Exhibit E

Planning Approval

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Exhibit E – Planning Approval

This Exhibit E includes the documents identified in Table 1 below.

Table 1. Planning Approval

Document	Date
Determination Report	6 May 2011

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Transport Construction Authority

NSW GOVERNMENT

AUBURN STABLING PROJECT

Determination Report

Date	6 May 2011
Status	Final
Author	Carolyn Riley
Document reference no.:	877412_3.DOC

Commercial in Confidence

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Attachments

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Introduction

Transport Construction Authority (TCA) is the proponent for the proposed Auburn Stabling Project (Proposed Activity).

A Review of Environmental Factors (REF) was prepared by GHD (November 2010) to assess the potential environmental impacts of the Proposed Activity. Since the display of the REF, a number of alterations have been made to the Proposed Activity, including refining the design (resulting in some design alterations) and a decision to deliver the Proposed Activity in a staged manner (TCA has been directed to deliver Stage One of the project).

The description of the Proposed Activity and the assessment of the potential environmental impacts have therefore been amended by the information included in the Preferred Activity Report (PAR) prepared by GHD (April 2011). The PAR also includes responses to issues raised in submissions resulting from display of the REF between 15 November and 13 December 2010 and an additional community information session held on 9 April 2011 to communicate proposed modifications to the project.

In order for the Proposed Activity to proceed, TCA must make a determination in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The objectives of this Determination Report are to:

- Assess the environmental impacts in respect of the Proposed Activity, which are detailed in the environmental impact assessment (REF and PAR);
- Determine the significance of those impacts; and
- Address the relevant matters under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in respect to the Proposed Activity.

This report has been prepared having regard to, among other things, the objective of TCA under the *Transport Administration Act 1988* to conduct its operations in compliance with the principles of ecologically sustainable development contained in Section 6(2) of the *Protection of the Environment Administration Act 1991.*

Description of Proposed Activity in REF

An overview of the Proposed Activity, which is the subject of the REF, is provided in the Executive Summary with full details set out in Section 6 of the REF (refer Attachment A). The Proposed Activity as described in the REF includes:

- stabling facility capable of holding up to 16 eight-car suburban train sets, in the following arrangement:
  - five terminating tracks along the western edge of the stabling yard, which would be accessed from the Auburn Junction
  - six through tracks that can be accessed from either the Auburn or Clyde Junctions
  - five terminating tracks along the eastern edge of the stabling yard, which would be accessed from the Clyde Junction
- walkways constructed between stabling tracks to provide access for personnel to the stabled trains
- one full-length elevated walkway may be required in the centre of the facility to provide door-level access to two stabled trains

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- connections from the existing network to the stabling facility in the vicinity of Auburn and Clyde stations, involving track work, overhead wiring and signalling
- primary administration, amenities and storage building, which would provide office space, storage facilities and staff amenities
- secondary amenities and storage building, which would provide unisex toilet, storage and first aid facilities
- potential new sectioning hut to assist with powering the stabling facility
- new staff car park adjacent to the primary administration, amenities and storage building, with provision for approximately 40 vehicles
- changed access to the MainTrain site, involving the construction of a new overbridge to provide pedestrian and vehicular access across the proposed ASP tracks
- road works associated with connecting the ASP into the existing street network on the Private Road and at Manchester Road at the location of the new MainTrain access
- drainage works across the site with a stormwater drainage system
- noise attenuation structures (e.g. noise mitigation barrier)
- two dry detention basins to supplement the site drainage and to mitigate against potential flooding
- remediation works on the site involving a 'cap and containment strategy'.

The need for the Proposed Activity is outlined in Section 5.1 of the REF.

Modification to Proposal in REF

Since the public display of the REF, several alterations have been made to the Proposed Activity as described in the REF, principally resulting from the following:

- Refinement of the design undertaken since public display of the REF.
- A decision to adopt a staged approach to construction of the Proposed Activity to meet funding availability and the forecast stabling demand in Sydney's inner-west and south-west (having regard to the delivery of a major stabling facility as part of the South West Rail Link (SWRL)). An initial stage (referred to as Stage One) is proposed to be delivered by TCA, with the remainder of the Proposed Activity to be delivered as required in line with future demand.

A description of the proposed alterations to the Proposed Activity and an assessment of the environmental impacts of these changes are provided in Section 4 of the PAR (Attachment B). The main design changes are as follows:

- Clyde Junction and access is to only consist of one track
- redesign of MainTrain gatehouse to ensure it complies with *Disability Discrimination Act 1992* (DDA) requirements
- repositioning of the noise mitigation barrier away from the track where it would follow the retaining wall and property boundary
- inclusion of a public address (PA) system on site

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- realignment of the 33kv and 11kv transmission lines through the MainTrain site as part of Stage Two of the ASP
- removal of the sectioning hut proposed in the REF
- relocation of the signalling hut, signalling room and compressor room to a single building (referred to as the combined signal equipment and compressor room) located on the eastern boundary of the existing AMC car park
- relocation of the cable route to an easement through the RailCorp owned land leased by Manildra
- removal of the elevated walkway between tracks eight and nine. Seven metre long cleaning access platforms are to be installed between every second set of tracks to provide access to carriages one, four, five and eight
- relocation of MainTrain training room to a new location due to potential flooding in the area shown in REF
- changes to property acquisition along the southern edge of the ASP to ensure a smoother (more gently curved) boundary line
- extension of the stabling space by four metres to allow for amalgamation and separation of train sets within the stabling area
- installation of additional overhead wiring for four-car suburban set length within the proposed MainTrain siding
- minor amendments to the Remediation Action Plan (RAP) addressing the remediation of the site
- confirmation of the use of the alternate horn testing location located on the Main Line between Lidcombe and Auburn stations (as described in Section 7.1.3 of the REF) by RailCorp
- confirmation of the testing of leading horns departing via Clyde Junction by RailCorp
- removal of enclosure structure described in Section 7.1.3 of the REF due to the confirmation of the alternate horn testing location.

The staged delivery approach proposes the following components of the Proposed Activity to be delivered as part of Stage One:

- construction and operation of stabling facility and track to stable 11 eight-car suburban train sets
- a short rail neck linking the facility to the Down Relief at the Clyde end of the facility (to be constructed as part of the Lidcombe to Granville Corridor Upgrade Program (LGCUP)
- staff facilities building and car park
- secondary amenities and storage building
- overhead wiring and signalling to support the Stage One tracks
- combined signal equipment and compressor room
- drainage works and the construction of two permanent detention basins
- remediation works

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- retaining structures
- noise mitigation barrier
- property acquisition
- lighting, electrical and relocation works
- PA system
- ancillary works required to support the Stage One stabling facility.

Stage Two would involve the construction of the remaining aspects of the Proposed Activity as described in Chapter 6 of the REF and any modifications described above which are to be constructed during Stage Two (as detailed in Section 4 of the PAR).

This Determination Report has been prepared for the consideration and determination of the Proposed Activity, comprising both Stage One and Stage Two works.

The majority of Stage One works to be delivered by TCA are proposed to commence in late 2011 and take approximately 24 months to complete. The finishing works, to integrate the stabling facility into the main network will be delivered on behalf of RailCorp at a later stage as part of the LGCUP works. Stage Two works would be delivered when required to meet future demand for stabling in Sydney's inner and south west.

Consideration of the environmental impacts

The REF and PAR (incorporating Submissions Report) have been examined and considered, as follows:

- *Environmental Planning and Assessment Act 1979*

  The REF addresses the requirements of Section 111 of the EP&A Act. In considering the Proposed Activity, all matters affecting or likely to affect the environment are addressed in the REF, the PAR and associated documentation.

  In accordance with the checklist of matters to be considered under clause 228 of the *Environmental Planning and Assessment Regulation 2000*, an assessment is provided at Appendix A of the REF. A revised Clause 228 assessment has been provided in Section 6 of the PAR to address the proposed alterations to the Proposed Activity.

  In respect of the Proposed Activity an assessment has been carried out on critical habitat and on threatened species, populations or ecological communities or their habitats, under Section 112 of the EP&A Act.

  It is noted that a population of the threatened Grey-headed Flying-fox is located adjacent to the Proposed Activity. Impacts on this population are considered unlikely during daylight hours when the population is present within the Duck River corridor. Impacts during the night (when the Proposed Activity is at its peak use) are considered to be minimal as the population would be away from the roost foraging. Some impacts during the early morning start up are expected when the bats are returning to the roost, however noise levels during this time are not likely to threaten the persistence of the flying-foxes from returning to the roost. A monitoring program would be undertaken upon start of Stage One and Stage Two operations to confirm and mitigate potential impacts (refer to Condition 48).

  The likely significance of the environmental impacts of the Proposed Activity has been assessed in accordance with the Department of Planning and Infrastructure's best practice guideline *'Is an EIS Required?'* and is not likely to significantly affect the

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environment (including critical habitat) or threatened species, populations or ecological communities, or their habitat. Accordingly, an Environmental Impact Statement is not required.

- *Environment Protection and Biodiversity Conservation Act 1999*

  As part of the consideration of the Proposed Activity, all matters of National Environmental Significance (NES) and any impacts on Commonwealth land for the purposes of the EPBC Act have been assessed. In relation to NES matters, this evaluation has been undertaken in accordance with Commonwealth Administrative Guidelines on determining whether an action has, will have, or is likely to have a significant impact. A summary of the evaluation in accordance with the Administrative Guidelines is provided at Appendix A of the REF. A revised assessment of EPBC Act matters has been provided in Section 6 of the PAR to address the proposed alterations to the Proposed Activity.

  The Grey-headed Flying Fox species is listed under the EPBC Act, with a colony of the species located adjacent to the Proposed Activity. An ecological assessment undertaken has determined that indirect impacts such as noise and lighting are unlikely to impact upon the colony. Mitigation measures requiring monitoring of the potential impacts on this colony upon commencement of Stage One and Stage Two operations have been recommended to confirm potential impacts (refer to Condition 48).

  It is considered that the Proposed Activity described in the REF, as modified and described in the PAR is not likely to have a significant impact on any Commonwealth land and is not likely to have a significant impact on any NES matters.

- *Submissions received in response to display of REF*

  The REF was publicly displayed from 15 November 2010 to 13 December 2010 in line with the requirements of the EP&A Act and Regulation - a description of the public display process implemented is provided within Section 2 of the PAR (refer Attachment B). Written submissions were accepted until 13 December 2010. Submissions received after the closing date were also considered. In total TCA received 24 submissions in response to its public display of the REF (comprising 18 community submissions, one from a community group and five from Government agencies). A summary of issues raised in submissions is provided within Section 3 of the PAR.

- *Submissions received in response to changes to Proposed Activity*

  During preparation of the PAR, TCA consulted with community members, government agencies and other stakeholders that made submissions in response to the REF. TCA also held a Community Information Session on Saturday 9 April 2011 to inform the community about changes to the project since display of the REF. Submissions were received as part of this consultation. A summary of issues raised in submissions received at the Community Information Session or during preparation of the PAR is provided within Section 5 of the PAR.

- *Key issues raised in submissions*

  The key issues raised in submissions received on the REF and in response to the changes proposed to the Proposed Activity (during preparation of the PAR) include noise and traffic. An overview of TCA's approach to assessing and responding to these key issues is provided as follows:

  Noise

  Wilkinson Murray was engaged to prepare noise and vibration assessments to support the environmental impact assessment of the Proposed Activity for both the REF and the PAR (refer Appendix B - *Addendum Noise and Vibration Assessment - Stage One*).

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Each noise and vibration assessment considered the potential impact of the Proposed Activity during both construction and operation, and included modelling relating to operational scenarios, with and without mitigation.

Without mitigation, the Proposed Activity included a significant number of receivers affected by exceedances of noise criteria and goals as a result of train arrival and brake exhaust, train departure and horn testing prior to departure.

In response, RailCorp advised they are currently reviewing operating procedures to minimise the impact of horn use at the proposed facility. Based on RailCorp's advice, the following mitigation options were modelled and considered in the REF for the Proposed Activity:

- constructing a three metre high noise barrier
- testing of only the town horns (eliminating country horns)
- testing only the leading (forward facing) horns
- testing town horns outside the stabling yard (i.e. in an 'enclosure' along the Auburn Neck or on the Main Line)

With these measures in place, the assessment concluded that noise levels and their impact on surrounding receivers is acceptable (refer Section 7.1 and Technical Paper 1 of REF).

Since display of the REF, RailCorp confirmed that the Auburn town horns would be sounded on the Main Line (as described in Figure 7.3 of the REF). Therefore, one of the design alterations involves the removal of the 'enclosure' along the Auburn Neck from the Proposed Activity (as it is no longer required).

The decision to deliver the project in stages has noise and vibration impacts. Stage One would have reduced noise impacts given that it does not involve construction and operation of the Auburn Neck and involves a reduced number of stabling facilities.

An *Addendum Noise and Vibration Assessment - Stage One* was undertaken to assess the noise and vibration impacts of constructing and operating Stage One of the Proposed Activity (refer Section 4.3.2 and Appendix B of PAR). The assessment of impacts incorporated the design alterations described in Section 4.1 of the PAR.

It was proposed to construct the noise barrier in stages to meet the noise mitigation requirements for each stage of the project. However as the full noise barrier is required for Stage Two, and as a result of feedback and submissions received from the community during the development of the PAR, both sections of the noise barrier will be constructed as part of Stage One works. The construction of the full noise wall during Stage One has noise mitigation benefits for both stages of the project.

A number of mitigation measures have also been recommended to manage/monitor potential impacts arising from construction and operational noise (refer Section 7.2 of the PAR). In addition, Conditions 21, 27 and 28 have been recommended to address noise impacts.

Traffic

A number of traffic related issues were raised by the community in response to display of the REF and attendance at the Community Information Session during preparation of the PAR. Issues included:

- construction related traffic;

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- additional operational traffic;
- proposed location of the overbridge (including safety related issues); and
- potential loss of parking.

The Traffic Impact Assessment undertaken as part of the REF (refer Section 7.3 and Technical Paper 3) concluded that whilst additional traffic movements would be generated during construction and operation, these movements would not have a significant impact on the road network.

Since completion of the REF, more detailed construction planning has occurred, which has resulted in the overall number of predicted truck movements being revised down from an estimated 22,400 to 11,270 heavy vehicle movements over the whole project (i.e. Stage One and Stage two), resulting from reduced quantities of fill to be imported and exported from the site. A large percentage of these movements would occur during Stage One given remediation works proposed. Stage One operational traffic would be reduced from that assessed in the REF, given only 11 of the 16 stabling tracks are to be provided.

The proposed overbridge to replace the existing level crossing access to the Maintrain Facility was of concern to a number of the adjacent residents. The overbridge is now proposed as part of Stage Two of the Proposed Activity. The traffic movements across the bridge would be limited to delivery and light vehicles, and are not considered to have a significant impact. Additional mitigation measures have been recommended requiring further investigation to be undertaken during Stage Two detailed design to ensure that community concerns raised regarding access, safety and parking impacts are addressed (refer Section 7.2.2 PAR).

Further assessment of these key issues, together with other issues raised in submissions is provided in the Preferred Activity Report (refer Sections 3, 4 and 5). Conditions 33, 34 and 36 have been imposed to address concerns raised in respect of traffic impacts.

- *Staging Timeframe*

The Stage One works are due to commence in late 2011 with the construction timeframe for the Stage Two works unconfirmed at this stage. Stage Two of the Proposed Activity is to be delivered as required, in line with future demand.

Due to the open ended timeframe of the Stage Two works, it is recommended that a "sunset clause" (refer to Condition 2) be included within the determination that commits the Proponent to reviewing the environmental impact assessment and approval framework should the Stage Two works occur beyond a five (5) year period from the date of determination of the ASP project.

This review will ensure that the approval framework as contained in this Determination Report remains relevant to the Stage Two works. The review would also allow the Proponent to include additional mitigation measures and conditions of approval should changes in the following occur:

- environmental and planning legislation;
- more detailed design; and
- the surrounding environment as a result of further development etc.

This approach would prevent the need for a re-assessment of the Stage Two works but still allow the Proponent to modify the approval framework should the need arise.

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Conditions of Approval (CoA)

The Determination is subject to compliance with the Conditions of Approval (CoA) included as Attachment C.

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Conclusion

Having regard to the assessments in the REF and the PAR, it is concluded that the Proposed Activity is not likely to significantly affect the environment (including critical habitat) or threatened species, populations or ecological communities, or their habitats. Consequently, an EIS is not required to be prepared under Part 5 of the EP&A Act.

It is also considered that the Proposed Activity does not trigger the approval regime under Part 3 of the EPBC Act.

The environmental impact assessment (REF and PAR) is recommended to be approved subject to the proposed mitigation and management measures included in Section 7.2 of the PAR and the Conditions of Approval contained in this Determination Report.

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ENVIRONMENTAL IMPACT ASSESSMENT

AUBURN STABLING PROJECT

REVIEW OF ENVIRONMENTAL FACTORS

& PREFERRED ACTIVITY REPORT

APPROVAL

I, CHRIS LOCK, Chief Executive of the Transport Construction Authority, state as follows:

1. I have examined and considered the Proposed Activity in the Review of Environmental Factors (GHD, November 2010) and Preferred Activity Report (GHD, April 2011) in accordance with s 111 of the *Environmental Planning and Assessment Act 1979*.
2. I determine on behalf of the Transport Construction Authority (the Proponent) that the Proposed Activity may be carried out in accordance with the Conditions of Approval in this Determination Report, consistent with the proposal described and mitigated in the Review of Environmental Factors (GHD, November 2010) and as amended by the mitigation and management measures included in the Preferred Activity Report (GHD, April 2011).

C Lock
Chris Lock
Chief Executive

Date: 6/5/11

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Attachment A

Review of Environmental Factors

(GHD, November 2010)

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Transport
Construction
Authority

Auburn Stabling Project

Review of Environmental Factors

Volume 1 - Main Report

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Glossary and abbreviations

AADT	Average annual daily traffic
AHIMS	Aboriginal Heritage Information Management System
AMC	Auburn Maintenance Centre – located within the Clyde Marshalling Yards to the north-east of the proposed ASP
ARI	Average recurrence interval (flood)
Arrival Track	Track upon which a train uses to enter at a facility (such as ASP, AMC and MainTrain)
ASP	Auburn Stabling Project
Auburn and Clyde Junctions	Points at which the ASP will connect into the LGCUP and the CityRail network at the Auburn and Clyde ends of the ASP respectively
Auburn and Clyde Necks	Approach tracks to the proposed stabling yard from the Auburn and Clyde ends of the ASP respectively
B-doubles	A truck with a double trailer
Bi-directional	Single track in which trains travel in both directions
Cap and contain	Remediation method where contaminants are left on site and covered with clean material or fill. Capping methods vary depending on the construction methods required on the land above the contaminated land.
CBD	Central Business District
CCTV	Closed Circuit Television
CEMP	Construction Environmental Management Plan
CityRail network	Passenger rail service covering suburban Sydney and extending to the Hunter, Central Coast, Blue Mountains, Southern Highlands and South Coast regions
Clyde Marshalling Yards	RailCorp owned land adjacent to the Main West Line comprising of facilities for the maintenance and construction of rolling stock
Crossover	Track component that allows the movement of a train between two parallel tracks
dBA	Decibels (A-weighted)
DECCW	NSW Department of Environment, Climate Change and Water
Departure Track	Track upon which a train uses to exit a facility (such as ASP, AMC and MainTrain)
'Down' direction/tracks	Railway lines for trains heading away from Central Station
Down Relief	Nearest operational track within the Main West Line corridor to the ASP
Down Suburban	Second nearest operational track within the Main West Line corridor to the ASP. This line is used for frequent stopping trains on the suburban network
DSEWPC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
ECRTN	*Environmental Criteria for Road Traffic Noise*

EMS	Environmental Management System
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	NSW Environmental Planning and Assessment Regulation 2000
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment protection licence
FM Act	NSW *Fisheries Management Act 1994*
Heritage Act	NSW *Heritage Act 1977*
IGANRIP	*Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects*
INP	*Industrial Noise Policy*
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
L_{Aeq}	The equivalent continuous sound level is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.
$L_{Aeq(15\ minutes)}$	The busiest 15 minute "Equivalent Continuous Noise Level" The L_{Aeq}(15min) represents the typical L_{Aeq} noise level from all the train noise events during the busiest 15 minute period of the assessment period.
$L_{Aeq(9hr)}$	Night-time "Equivalent Continuous Noise Level". The LA_{eq}(9hour) represents the cumulative effects of all the train noise events occurring in the night-time period from 10pm to 7am.
L_{Amax}	The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.
LEP	Local environmental plan
LGA	Local government area
LGCUP	Lidcombe to Granville Corridor Upgrade Program
Major Development SEPP	*State Environmental Planning Policy (Major Development) 2005*
NSW	New South Wales
MainTrain	Maintenance facility located within the Clyde Marshalling Yards to the east of the ASP stabling yard
Main West Line	The commuter railway lines extending from the Sydney CBD to Granville
NCA	Noise Catchment Area
NES matters	Matters of national environmental significance
OHW	Overhead wiring
Overbridge	A bridge that travels over the rail corridor
PoEO Act	NSW *Protection of the Environment Operations Act 1997*
RailCorp	Rail Corporation of New South Wales

RAP	Remediation Action Plan
RBL	The Rating Background Level for each period is the median value of the Assessment Background Level values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.
REF	Review of Environmental Factors
REP	Regional environmental plan
Rolling stock	Vehicles that are used on the rail network, these include powered (engines) and non-powered (carriages) vehicles
RTA	NSW Roads Traffic Authority
Sensitive receivers	Land uses and associated people that are sensitive to noise impacts, such as residential dwellings, schools and hospitals
Sensitive receptors	Land uses and associated people that are sensitive to air and visual impacts, such as residential dwellings, schools and hospitals
SEPP	State environmental planning policy
SEPP 55	*State Environmental Planning Policy No. 55 – Remediation of Land*
SREP	Sydney Regional Environmental Plan
Stabling yard or facility	Railway facility where trains not in service are stored, generally overnight, however, storage of trains during off peak times during the day does occur
SWRL	South West Rail Link
TCA	Transport Construction Authority (formerly Transport Infrastructure Development Corporation)
Terminating track	Track that ends at a point requiring a train to exit the track the same way that it came in
The proponent	Transport Construction Authority (TCA)
Through track	Track on which a train can continue in one direction and is not required to exit from the direction it has come from
TSC Act	NSW *Threatened Species Conservation Act 1995*
Two-way flows	Traffic counts accounting for traffic travelling on road regardless of direction
'Up' direction/tracks	Refers to railway lines allowing movements towards the Sydney CBD
Up Suburban	Third nearest operational track within the Main West Line corridor to the ASP. This line is used for frequent stopping trains on the suburban network

Executive summary

Introduction

The Auburn Stabling Project

Transport Construction Authority (TCA) proposes to construct a train stabling facility to the north-west of Auburn Station. The Auburn Stabling Project (ASP) forms part of the South West Rail Link (SWRL), which responds to issues of reliability and passenger growth in south-west Sydney.

The ASP would provide stabling for 16 eight-car suburban train sets, together with associated facilities such as offices, staff amenities, roads, walkways, fencing, lighting and others necessary for the operation of an effective stabling yard.

The stabling yard would enable trains to be stored in a suitable location to service the predicted growth in passenger demand in Sydney's west and south-west. Routine activities such as interior cleaning, minor exterior cleaning, train inspections and garbage removal would also be undertaken at the stabling yard.

The ASP would also include the remediation of existing contaminated land present on the site.

The ASP is proposed to be located on RailCorp-owned land known as the Clyde Marshalling Yards, within the Auburn local government area (LGA), approximately 20 kilometres west of the Sydney Central Business District (CBD). The site is located to the south-west of the Main West Line rail corridor between Auburn and Clyde stations.

Three rail facilities currently exist on the Clyde Marshalling Yards site; the MainTrain Facility, the Manildra facility and the recently constructed Auburn Maintenance Centre (AMC). These facilities are located to the east, south and north-east of the proposed ASP site respectively.

TCA is a statutory corporation and an operating entity within the NSW Government's transport department, Transport NSW. When completed, the ASP would be managed and operated by RailCorp as part of the CityRail network.

Why is the ASP needed?

The ASP is primarily needed to cater for an existing shortage of stabling facilities and to support the predicted demand for passenger services on the CityRail network from Sydney's west and south-west over the next 10 years. The ASP would provide stabling for some of the additional trains required to meet this predicted demand, as adequate stabling is currently not available on the network.

Furthermore, the current location of existing stabling facilities means that empty trains are required to travel longer distances on the CityRail network in order to reach their starting and finishing destination. The ASP would provide stabling in a position that would reduce the distance and time empty trains spend on the network, therefore reducing congestion on the CityRail network.

This facility would allow trains to quickly enter the network to service the morning and afternoon peak demand times in Sydney's west and south-west.

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1:10,000 (at A4)

0 50 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

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LEGEND

Ancillary infrastructure — Proposed track — Roads works

Detention basin — Existing track

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Auburn Stabling Project

Job Number	21-19479
Revision	A
Date	20 OCT 2010

Auburn Stabing Project

Figure ES.1

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Level 15, 133 lereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate Streetmap: Streetmap - Jan 2010. Created by: qjchung

Description of the ASP

The key features of the ASP include:

- stabling facility capable of holding up to 16 eight-car suburban train sets, in the following arrangement:
  - five terminating tracks along the western edge of the stabling yard, which would be accessed from the Auburn Junction
  - six through tracks that can be accessed from either the Auburn or Clyde Junctions
  - five terminating tracks along the eastern edge of the stabling yard, which would be accessed from the Clyde Junction
- walkways constructed between stabling tracks to provide access for personnel to the stabled trains
- one full-length elevated walkway may be required in the centre of the facility to provide door-level access to two stabled trains
- connections from the existing network to the stabling facility in the vicinity of Auburn and Clyde stations, involving track work, overhead wiring and signalling
- primary administration, amenities and storage building, which would provide office space, storage facilities and staff amenities
- secondary amenities and storage building, which would provide unisex toilet, storage and first aid facilities
- potential new sectioning hut to assist with powering the stabling facility
- new staff car park adjacent to the primary administration, amenities and storage building, with provision for approximately 40 vehicles
- changed access to the MainTrain site, involving the construction of a new overbridge to provide pedestrian and vehicular access across the proposed ASP tracks
- road works associated with connecting the ASP into the existing street network on the Private Road and at Manchester Road at the location of the new MainTrain access
- drainage works across the site with a stormwater drainage system
- noise attenuation structures (e.g. noise barrier)
- two dry detention basins to supplement the site drainage and to mitigate against potential flooding
- remediation works on the site involving a 'cap and containment strategy'.

If approved, construction of the ASP is programmed to start in late 2011 and, based on the current indicative construction scenario, is anticipated to take approximately 24 months and be completed by the end of 2013.

The approval pathway

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) applies to the ASP. ISEPP aims to facilitate the effective delivery of infrastructure across the State. Clause 79 of ISEPP permits development on any land for the purpose of a railway or rail infrastructure facilities to be carried out by or on behalf of a public authority without consent. As the ASP comprises a rail infrastructure facility and is to

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be carried out by a public authority, development consent from council is not required. The ASP is therefore subject to Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Review of Environmental Factors (REF) has been prepared by GHD Pty Ltd (GHD) on behalf of TCA to satisfy the environmental impact assessment requirements under Part 5 of the EP&A Act. For the purposes of these works, TCA is the proponent and a determining authority under Part 5 of the EP&A Act.

Summary of stakeholder and community consultation undertaken to date

During the preparation of this REF there has been communication and involvement with relevant state and local government stakeholders. Consultation with government stakeholders was undertaken via targeted meetings and correspondence.

Community consultation and provision of information to the local community has been delivered through a variety of means including via community newsletters, a community information session, letters to property owners, project website, door-knocking and direct phone calls.

The purpose of this consultation was to inform stakeholders and the community about the ASP and the environmental impact assessment process, and to identify environmental and community issues for consideration during the design of the ASP and the planning approval process.

Key environmental impacts of the ASP and management measures

Consideration of the potential impacts has been undertaken having regard to the factors provided in Clause 228 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) and the matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The ASP is expected to have both positive and negative environmental and social impacts, however these impacts are not considered to be significant.

Table ES-1 provides a summary of the key environmental and social issues identified for ASP: noise and vibration; soils and contamination; traffic and transport; hydrology, drainage and water quality; non-Indigenous heritage; biodiversity; visual; and socio-economic. It also identifies the key management commitments that would be implemented to minimise these impacts.

Table ES-1 Key issues and mitigation measures proposed

Key issues	Key mitigation measures
Noise and vibration	
• Using the worse-case construction scenario, construction noise would result in mild to moderate exceedances. • There would be noise exceedances for the operation of the stabling facility, including trains entering the stabling yard in the evening and at night and leaving in the morning.	• Standard mitigation measures would be implemented as outlined in the TCA *Construction Noise Strategy*. In the event noise levels exceed 20 dBA above the background noise levels, additional mitigation potentially would need to be investigated. • Noise barriers would be provided in strategic locations around the stabling yard.

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Key issues	Key mitigation measures
▸ There would be no noise exceedances for movements along the necks and for stabling overnight. ▸ Exceedances of noise criteria would predominantly occur at dwellings along Sheffield Street and Manchester Road. ▸ There would be exceedances of noise and sleep disturbance guideline levels related to train horn noise.	▸ Changes to the existing RailCorp procedures to minimise the use of horns within the stabling yard would be further investigated. This includes the potential for horn testing to occur outside the stabling yard, either within an 'enclosure' on the Auburn Neck or a suitable location on the Main West Line. ▸ An Operational Noise and Vibration Management Plan would be developed, and would include a post-operation monitoring program to demonstrate compliance with relevant noise goals.
Soils and contamination	
▸ The site is subject to contamination and remediation would be required as part of the ASP. ▸ Substantial earthworks during construction have the potential to result in erosion and sedimentation impacts, which have the potential to impact on water quality.	▸ All remediation work would be undertaken in line with the Remediation Action Plan (RAP) developed for the site. A 'cap and contain' method of remediation is proposed. ▸ The capping layer should be maintained in accordance with a long-term site Environmental Management Plan (EMP). ▸ Erosion and sedimentation from disturbed areas during construction would need to be controlled in accordance with *Managing Urban Stormwater Soils and Construction* (Landcom, 2004) and *Auburn City Council Development Plan 2000 - Guidelines for Erosion and Sediment Control* (2003) for each component of work such as the construction of the earthworks, culverts, roads and buildings. ▸ An Erosion and Sediment Control Plan would be prepared and incorporated into the Construction Environmental Management Plan (CEMP), and include a monitoring program to assess the water quality downstream of the development site before, during and after construction.
Traffic and transport	
▸ The construction period would result in additional traffic, in particular heavy vehicles, on the local road network. ▸ There would be changed access and temporary loss of some parking spaces from the MainTrain car park due to proposed overbridge being constructed. ▸ A minor increase in traffic in the local area is predicted as a result of operational movements.	▸ A Construction Traffic Management Plan would be prepared and identify options to minimise construction traffic impacts. ▸ The community would be kept informed of construction activities and provided with contact details to seek feedback on the ASP. ▸ Parking would be provided on the construction site for all vehicles and equipment where possible.

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Key issues	Key mitigation measures
▸ Long-term positive impacts would be associated with provision of stabling, which would enable additional trains to be added to the CityRail network. ▸ A reduction in the number of empty trains travelling on the CityRail network between the stabling facilities and their start and finish destinations.	
Hydrology, drainage and water quality	
▸ There may be erosion and sedimentation impacts on water quality during construction as a result of excavation works. ▸ There is potential for accidental spills during construction and operation impacting upon water quality of Duck River and other nearby watercourses. ▸ There is potential for flooding due to positioning of ASP within the existing overland flow paths.	▸ Surface water runoff would be captured and directed through appropriate detention and water quality controls to appropriate standards. ▸ The ASP incorporates drainage controls to connect with the existing trunk drainage system at the site and is designed to attenuate the 100 year average recurrence interval peak flows. ▸ Water quality controls have been designed into the ASP such as permanent detention basins and gross pollutant traps to manage water quality in the long-term.
Non-Indigenous heritage	
▸ The ASP site is listed as an archaeological item under the *Auburn Local Environmental Plan 2000* and RailCorp's Section 170 Register. However, the site is considered to have a low archaeological potential and therefore impacts to archaeological items are considered to be unlikely.	▸ If substantial intact subsurface elements are uncovered during the works, work would cease and an experienced industrial archaeological consultant would be engaged to assess the level of heritage significance of the remains. If the remains are determined to have heritage significance, approvals would be obtained under the relevant provisions of the *Heritage Act 1977.*
Biodiversity	
▸ Impacts to fauna may occur as a result of the clearing of habitat during construction. These impacts are considered to be relatively low due to the disturbed nature of the site. ▸ Noise levels during construction and operation may impact upon fauna utilising adjacent lands, including a population of the threatened Grey-headed Flying-fox. These impacts are considered to be not significant.	▸ In line with TCA's Biodiversity Offset Strategy, a target of 100 per cent offset vegetation would be set for the removal of trees as part of the ASP. ▸ Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist during the first year of operation of the Clyde Junction for evidence of negative impacts on the roost resulting from horn noise. In the event that the monitoring demonstrates an impact, mitigation measures would then be reviewed.

Key issues	Key mitigation measures
Visual	
• Temporary impacts to visual amenity would occur for surrounding residents and businesses, rail commuters and occupants of vehicles using nearby roads during construction. • Potential operational impacts are associated with the addition of rail infrastructure and associated facilities, including lighting and noise attenuation structures (e.g. noise barrier), which would result in long-term changes to the visual environment. • At some residences, an increased number of train movements would be visible.	• Lighting would be designed in accordance with Australian Standards and directed away from residences to minimise light spill. • Existing visual screening would be retained where possible. • Rehabilitation planting, landscaping and screening would be provided where possible. • The design would consider appropriate materials and colours for any noise barrier in order to blend in with the existing visual landscape. • Where appropriate consultation with the community would occur to minimise the visual impact of any structure.
Socio economic	
• Short-term impacts during construction of the ASP relate to noise, traffic and visual impacts. • The noise, traffic and visual issues also contribute to the long-term social impacts associated with the operation of the ASP. • The ASP would improve the CityRail network by providing stabling for additional trains and also providing space for future growth on the network. • Construction and operation of the ASP would generate jobs for the local economy. The local economy may also be supported by the introduction of workers during operation in the form of increased business, in particular within the Auburn Town Centre.	• The community would be kept informed of the ASP through regular updates and encouraged to provide feedback using the contact details provided. • Mitigation measures addressed in the noise, traffic and visual sections are relevant in relation to indirect impacts on surrounding land uses.

The following other environmental issues were also considered during the REF: Indigenous heritage; land use and property; air quality; hazards and risks; waste management; climate change; and cumulative impacts. Impacts associated with these issues are considered relatively minor and able to be managed through the implementation of the proposed mitigation measures.

A full discussion of the potential impacts and proposed mitigation measures for each of the environmental issues is provided in Chapters 7 and 8, respectively.

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Conclusions

The ASP is expected to have positive impacts on the operation of the CityRail network, assisting with meeting future needs for increased public transport capacity resulting from increasing population, particularly in Sydney's west and south-west.

The ASP would be expected to have some impacts during its construction and operation, as discussed in Table ES-1 and Chapter 7. However, these environmental impacts are generally localised in nature. With the adoption and implementation of the proposed mitigation measures and commitments specified in Section 8.2, the potential environmental impacts of the ASP can be adequately managed, and are not considered to be significant.

Display of the Review of Environmental Factors

This REF will be publicly displayed for approximately 30 days in late 2010. Written submissions will be invited from the community at this time (see details of how to make a submission below). Community consultation during the REF display period will include targeted consultation activities and community information sessions. More information on stakeholder and community consultation is provided in Chapter 4.

The REF can be viewed at:

- Transport Construction Authority Office at Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood
- Auburn Library at Civic Place, 1 Susan Street, Auburn
- Granville Branch Library, 1 Carlton Street, Granville
- Transport Construction Authority website – www.tca.nsw.gov.au.

The REF is also available on CD by request. Please phone 1800 684 490 or email mail@tca.nsw.gov.au.

Written submissions from the community on the REF should be sent to:

Reference: Auburn Stabling Project
Director, Planning and Assessments
Transport Construction Authority
Locked Bag 6501
St Leonards NSW 2065

At the close of the display period, TCA will consider the submissions received about the REF. A Submissions Report will be prepared to address and respond to any issues raised. The report, along with the REF and any other relevant information, will be used by TCA to carefully assess and determine the ASP.

Should the ASP be approved, TCA would make the REF, the Submissions Report and any conditions of approval publicly available.

The local community will be notified of the determination via newspaper advertisements and newsletters. Correspondence will also be sent to those who make a submission. This information will include contact details for further information and an indication of the anticipated timing of construction work.

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1. Introduction

This chapter provides an overview of the Auburn Stabling Project (ASP), including its location, its key features, and the need and benefits of the ASP. This chapter also outlines the purpose and structure of the REF.

1.1 The Auburn Stabling Project

Transport Construction Authority (TCA) proposes to construct a train stabling facility to the north-west of Auburn Station. The ASP forms part of the South West Rail Link (SWRL), which responds to issues of reliability and passenger growth in south-west Sydney.

The ASP is proposed to be located on RailCorp owned land known as the Clyde Marshalling Yards, within the Auburn local government area (LGA), approximately 20 kilometres west of the Sydney Central Business District (CBD). The site is located to the south-west of the Main West Line rail corridor between Auburn and Clyde stations.

The ASP would provide stabling for 16 eight-car suburban train sets, together with associated facilities such as offices, staff amenities, roads, walkways, fencing, lighting and others necessary for the operation of an effective stabling yard. Routine activities such as interior cleaning, minor exterior cleaning, train inspections and garbage removal would also undertaken at the stabling yard.

The ASP would also include the remediation of existing contaminated land present on the site.

The ASP is primarily needed to cater for an existing shortage of stabling facilities and to support the predicted demand for passenger services on the CityRail network from Sydney's west and south-west. The ASP would provide stabling for some of the additional trains required to meet this predicted demand. Chapter 5 includes further details on the need for stabling and details as to why Auburn is considered to be the most suitable location for a new stabling facility.

1.2 Key features of the ASP

Figure 1.1 provides an overview of the ASP and the works which would be undertaken as part of the ASP. A detailed description of the ASP is provided in Chapter 6.

The key features of the ASP include:

- stabling facility capable of holding up to 16 eight-car suburban train sets, in the following arrangement:
  - five terminating tracks along the western edge of the stabling yard which would be accessed from the Auburn Junction
  - six through tracks that can be accessed from either the Auburn or Clyde Junctions
  - five terminating tracks along the eastern edge of the stabling yard which would be accessed from the Clyde Junction
- walkways constructed between stabling tracks to provide access for personnel to the stabled trains
- one full-length elevated walkway may be required in the centre of the facility to provide door-level access to two stabled trains

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- connections from the existing network to the stabling facility in the vicinity of Auburn and Clyde stations, involving track work, overhead wiring and signalling
- primary administration, amenities and storage building which would provide office space, storage facilities and staff amenities
- secondary amenities and storage building which would provide unisex toilet, storage and first aid facilities
- potential new sectioning hut to assist with powering the stabling facility
- new staff car park adjacent to the primary administration, amenities and storage building, with provision for approximately 40 vehicles
- changed access to the MainTrain site, involving the construction of a new overbridge to provide pedestrian and vehicular access across the proposed ASP tracks
- road works associated with connecting the ASP into the existing street network on the Private Road and at Manchester Road at the location of the new MainTrain access
- drainage works across the site with a stormwater drainage system
- noise attenuation structures (e.g. noise barrier)
- two dry detention basins to supplement the site drainage and to mitigate against potential flooding
- remediation works on the site involving a cap and containment strategy.

1.3 The proponent

TCA, formerly Transport Infrastructure Development Corporation, is an operating entity within the NSW Government's transport agency, Transport NSW. The establishment of TCA is part of the NSW Government's commitment to streamline the delivery of transport initiatives across NSW. TCA has been commissioned to deliver the design and construction of the ASP.

On completion, the ASP would be managed and operated by RailCorp as part of the CityRail network.

1.4 Purpose and structure of the REF

1.4.1 Purpose of the REF

This Review of Environmental Factors (REF) has been prepared by GHD Pty Ltd (GHD) on behalf of TCA. For the purposes of the proposed works, TCA is the proponent and a determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the ASP, to document the likely impacts of the ASP on the environment, and to detail mitigation measures that would be implemented.

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

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LEGEND

Ancillary infrastructure	Proposed track
Roads works	
Detention basin	Existing track

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TCA
Auburn Stabling Project

Job Number	21-19479
Revision	A
Date	20 OCT 2010

Auburn Stabing Project

Figure 1.1

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Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate Streetmap: Streetmap - Jan 2010. Created by: qjchung

The description of the proposed works and associated environmental impacts have been undertaken in accordance with Clause 228 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation), the *Threatened Species Conservation Act 1995* (TSC Act), the *Fisheries Management Act 1994* (FM Act), and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so, the REF helps to fulfil the requirements of Section 111 of the EP&A Act, which requires TCA to examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

1.4.2 Structure and content of the REF

The structure and content of Volume 1 of the REF is summarised in Table 1.1.

Table 1.1 Structure and content of the REF

Chapter/Appendix	Description
Chapter 1 – Introduction	Outlines the key elements of and purpose for the ASP and provides an overview of the structure of the REF
Chapter 2 – Location and setting	Provides an overview of the regional setting of the ASP, including the site and the existing operations that are located in the vicinity of the ASP. A summary of the social and physical characteristics of the existing environment is also included
Chapter 3 – Statutory planning and approvals	Outlines the relevant legislation, environmental and planning instruments and policies, and provides an assessment of their relevance to the ASP
Chapter 4 – Community and stakeholder engagement	Outlines how the community and stakeholders have been and will continue to be involved in the ASP's development, assessment and construction phases
Chapter 5 – Option development and selection	Discusses the alternatives considered during the development of the ASP
Chapter 6 – Project description	Provides a detailed description of the ASP, including the design, construction and operation
Chapter 7 – Environmental impact assessment	Provides an assessment of the potential impacts of the ASP on noise and vibration, soils and landscape (including contamination), traffic and transport, hydrology, drainage and water quality, non-Indigenous heritage, biodiversity, visual and urban design, Indigenous heritage, socio-economic, land use and property, air quality, hazards and risks, waste management, climate change, demand on resources and cumulative impacts. Mitigation measures for each issue are also provided in this chapter
Chapter 8 – Environmental management and mitigation	Outlines the proposed environmental management systems to be implemented and provides a consolidated list of the management and mitigation measures to be implemented during the construction and operation phases of the ASP to manage the impacts identified in the REF
Chapter 9 – Justification and conclusion	Provides justification for the ASP and an outline of the key conclusions of the REF

Chapter/Appendix	Description
Chapter 10 – Certification	Provides the document signoff stating that the author of the REF has provided a true and fair review of the proposal and its impacts on the environment
Chapter 11 - References	Provides a list of references for the REF
Appendix A	Clause 228 factors and matters of national environmental significance checklists

Volume 1 is supported by five technical papers in Volume 2 (Technical Papers), providing detailed assessment on specific environmental issues associated with the ASP. The technical papers have been used to inform the REF.

Volume 2 of the REF comprises the following technical papers (with the author in brackets):

- Technical Paper 1 — Noise and Vibration Assessment (*Wilkinson Murray*)
- Technical Paper 2 — Remediation Action Plan (*Douglas Partners*)
- Technical Paper 3 — Traffic Impact Assessment (*GHD Pty Ltd*)
- Technical Paper 4 — Heritage Impact Assessment (*Casey & Lowe Pty Ltd*)
- Technical Paper 5 — Ecological Impact Assessment (*GHD Pty Ltd)*

2. Location and setting

This chapter provides an overview of the regional setting of the ASP, the site and the existing operations that are located in the vicinity of the ASP. A summary of the social and physical characteristics of the existing environment is also included in this chapter.

2.1 Regional setting

2.1.1 Key regional features

The ASP site is located approximately 20 kilometres from the Sydney CBD within the Auburn LGA. The Parramatta LGA is located approximately 500 metres to the west of the ASP site, on the western side of Duck River.

Duck River is located within the Sydney Harbour catchment and drains directly into the Parramatta River at Silverwater approximately three kilometres to the north-east.

The ASP site is located approximately 700 metres and one kilometre to the south of Parramatta Road and the M4 Motorway respectively (see Figure 2.1).

2.2 Description of the site

2.2.1 The ASP site

Figure 2.2 shows the location of the proposed ASP on railway land within the Clyde Marshalling Yards site, owned by RailCorp. The ASP is located in the north-western corner of the suburb of Auburn, with nearby suburbs including Granville, South Granville and Clyde. The area in the immediate vicinity of the ASP largely consists of industrial or railway uses. The exception to this is a commercial building that is located adjacent to the Manildra facility along the southern side of the Auburn Neck.

Land to the west of the proposed ASP is used for industrial and commercial purposes. These businesses are accessed via Manchester Road to the south of the site. Where Manchester Road turns in a northerly direction, it is parallel to the path of Duck River. At this point, Manchester Road becomes a private road owned by RailCorp (referred to as the Private Road).

On the western side of Duck River land use predominantly consists of low density residential dwellings, however a small number of industrial properties are also located along the western bank of Duck River. Land to the south and south-east of the ASP site consists of low density residential dwellings.

Approximately 350 metres to the south-east of the site, surrounding Auburn Station, is a commercial and business precinct. The Auburn town centre contains some multi-storey residential dwellings which are generally located above businesses located at street level. A number of community facilities are located in close proximity to the Auburn town centre. These include St John's Primary School, Trinity Catholic College and St Joseph's Public Hospital.

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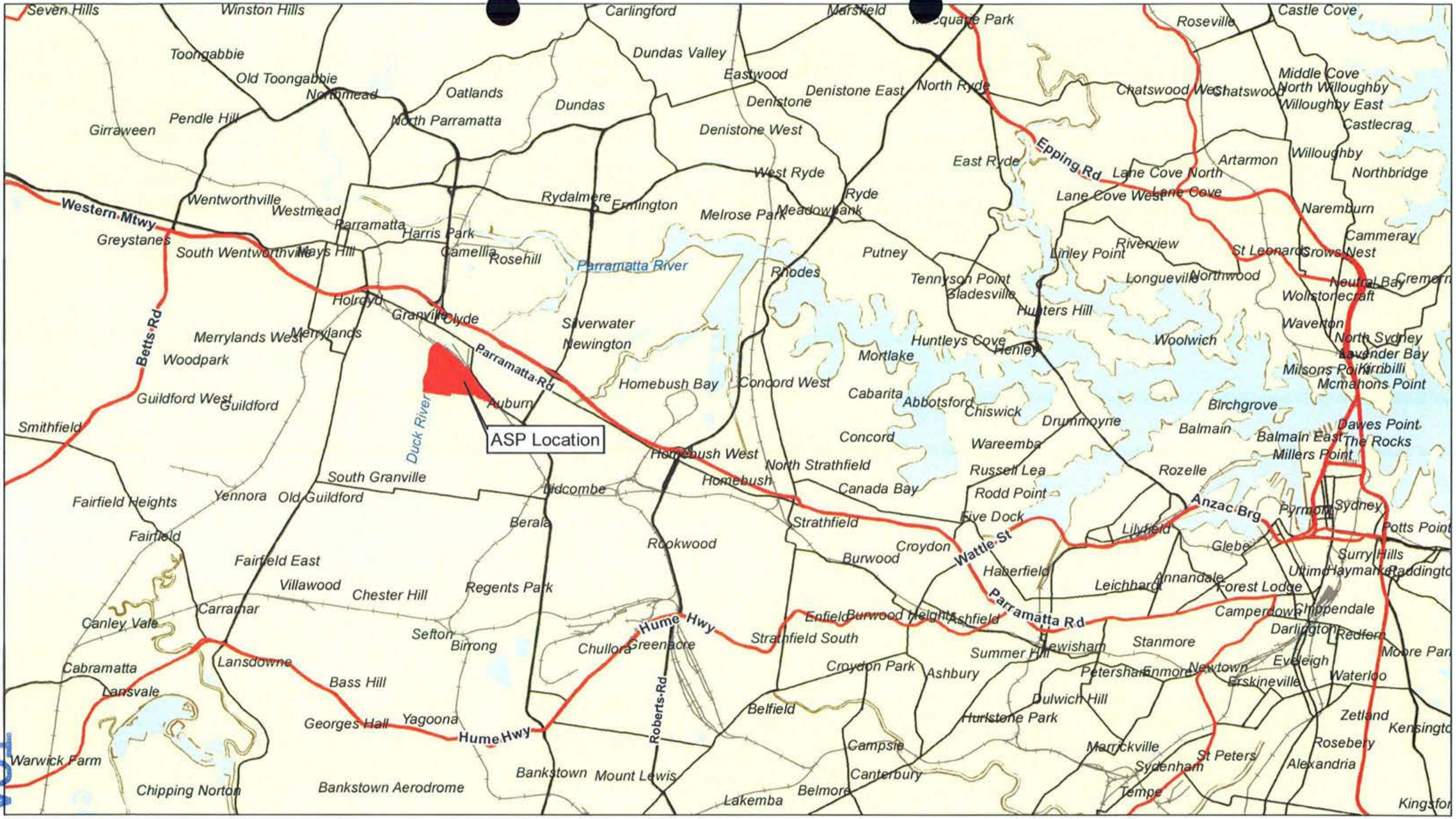

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Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

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Legend

Site location — Major Roads
Highways — Railways

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Auburn Stabling Project

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Revision | A
Date | 21 OCT 2010

Regional Context

Figure 2.1

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Data Source: Navigate StreetMap: StreetMap - Jan 2010; NSW Department of Lands: Cadastre - Jan 2010. Created by: qjchung

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

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LEGEND

- Clyde Marshalling Yards
- Ancillary infrastructure
- Detention basin
- Proposed track
- Existing track
- Roads works

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Auburn Stabling Project

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Revision A
Date 29 OCT 2010

Site Context

Figure 2.2

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Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - Jan 2010. Created by: gjchung

The landform in the vicinity of the site is generally flat with small undulations throughout the surrounding area. The site is primarily devoid of any significant vegetation, with much of the site covered with environmental weeds. There are however some planted native species located on site, in the vicinity of the existing MainTrain car park adjacent to the ASP Auburn Neck.

The main waterway in the surrounding area is Duck River, which runs in a northerly direction (towards the Parramatta River) approximately 250 metres to the west of the stabling yard. Duck River is located closer (approximately 30 metres) to the ASP in the vicinity of works within the Clyde Neck.

2.2.2 Clyde Marshalling Yards

The ASP is located on land which has historically been referred to as the Clyde Marshalling Yards.

The Clyde Marshalling Yards refers to land on which rail operations have been undertaken since 1892 (as shown in green on Figure 2.3). This land now includes both private land and also railway land owned by RailCorp. For the purposes of this REF, the Clyde Marshalling Yards site refers to land on which railway operations are currently undertaken (i.e. on RailCorp owned land, as shown in blue on Figure 2.3).

2.2.3 Land ownership

Figure 2.3 shows the cadastral layout of the ASP site and the surrounding property. The majority of the ASP site is owned by RailCorp. The only non-RailCorp land forming part of the ASP is the two land areas that form part of industrial lots with frontage to Manchester Road/Private Road, owned by Janyon Pty Ltd. These two pieces of land are shown on Figure 2.3 and would be acquired as part of the ASP (see Section 6.3 for details).

2.2.4 Existing rail operations

Currently there are three existing rail facilities operating within the Clyde Marshalling Yards to the south and south-west of the Main West Line. These facilities are:

- MainTrain Facility generally situated within the central portion of the site
- AMC to the north-west of the MainTrain Facility and north-east of the ASP
- Manildra to the south of the ASP Auburn Neck and to the south-east of the MainTrain Facility.

These facilities are shown on Figure 2.4 and described below.

MainTrain

The MainTrain Facility provides maintenance facilities for electric passenger trains and typically operates 6.30am to 12 midnight, seven days a week. However 24 hour operations are sometimes required. Existing movements are approximately four trains in and out per day. The MainTrain Facility is used to undertake major component overhauls.

The MainTrain Facility currently stores trains within existing sidings located in the area described as the Auburn Neck of the ASP, located to the south of the MainTrain Facility buildings.

The MainTrain Facility currently receives and dispatches old/reconditioned bogies (framework in which the wheels of a train are mounted) and wheels by semi trailer via the existing level crossing.

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Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

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LEGEND

Land Ownership

- Janyon Pty Ltd
- Rail Corp
- Clyde Marshalling Yards
- Property acquistion
- Lots
- Ancillary infrastructure
- Detention basin
- Proposed track
- Existing track
- Roads works

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Land Ownership

Figure 2.3

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Data Source: Navigate StreetMap: StreetMap - Jan 2010. Created by: qjchung

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Figure 2.4 Existing facilities within the Clyde Marshalling Yards

Auburn Maintenance Centre

The construction of the AMC has recently finished with the facility opened on 24 July 2010.

The AMC has approval to operate for up to 24 hours per day, seven days a week. The facility is to operate during these hours in order to meet the demands for reliability and availability of rolling stock.

The AMC provides for minor finishing works such as delivering and installing minor components (e.g. air conditioning and train radio components) and testing and commissioning of new rolling stock prior to entry into service. Finishing works (including testing and commissioning) for new rolling stock are currently anticipated to be undertaken during 2010–2014.

The centre primarily operates as a maintenance facility, ensuring that new and existing rolling stock is ready for operational use on a day-to-day basis. In addition, if required, the facility enables future upgrade works on existing rolling stock.

The AMC may also be accessed for train wash, wheel profiling, maintenance and upgrade works by other fleets.

Manildra

The Manildra sidings located on the southern side of the Auburn Neck are currently used by Manildra, primarily for the distribution of flour through the use of forklifts and trucks. The facility is operational 24 hours from 6pm Sunday through to 5pm Friday. Trains arrive on site during times in this period with up to three trains per week accessing the site.

2.3 Context with the CityRail Network

2.3.1 Overview

The ASP is located to the south-west of the Main West Line which generally runs in an east–west direction between the Sydney CBD and Granville. These running tracks form part of the CityRail network which is managed by RailCorp.

The CityRail network is the passenger network which operates services covering suburban Sydney, with extensions to the Hunter, Central Coast, Blue Mountains, Southern Highlands and South Coast regions. The network is made of approximately 1,600 kilometres of track with 307 stations located on the network. Figure 2.5 illustrates the stations and lines which form part of the CityRail network.

2.3.2 Sectors

The CityRail network is divided into three sectors which are largely based on the locations of maintenance depots. The three sectors are:

- Sector 1 – based around the Mortdale Maintenance Facility which services the Illawarra and Eastern Suburbs and South Coast CityRail lines.
- Sector 2 – based around the Flemington Maintenance Facility which services the Cumberland, Airport and East Hills, Olympic Park Sprint, Carlingford, South and Bankstown CityRail lines.
- Sector 3 – based around the Hornsby Maintenance Facility which services the North Shore, Northern, Western, Richmond, Newcastle, Blue Mountains and Central Coast CityRail lines.

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The ASP would form part of the Sector 2 operations. Currently stabling for Sector 2 services is located in the following locations (train sets are eight-car sets unless otherwise specified):

- Flemington – 21.5 train sets (including nine six-car sets and one four car set, which is represented as half (0.5) of an eight car set)
- Campbelltown – 19 train sets (including four six-car sets)
- Eveleigh – six train sets (including one six-car set)
- Macdonaldtown – six train sets
- Liverpool – four train sets
- Mortdale – three train sets
- Sydney Terminal – two train sets.

2.3.3 Lidcombe to Granville Corridor Upgrade Program

An important and related rail construction program in the vicinity of the ASP site is the Lidcombe to Granville Corridor Upgrade Program (LGCUP).

The LGCUP aims to optimise operation and train travel times between Lidcombe and Granville by minimising the use of components such as crossovers. The removal of such components would improve track speeds and minimise the time required for movements across tracks. Infrastructure performance enhancements include optimising turnout speeds, signalling overlaps and headways.

The Auburn Junction and Clyde Junction components of the LGCUP are located in the vicinity of the ASP. These works will be undertaken on behalf of RailCorp by the Novo Rail Alliance. Indicative timeframes indicate that the Auburn Junction works would be commissioned in 2014 and the Clyde Junction works in 2017. The works include the following:

- rationalisation and remodelling of the Auburn and Clyde Junctions, including associated signalling works
- construction of new crossovers and the decommissioning and removal of some of the diamond crossovers located on through tracks
- track reconstruction, including drainage works and upgrade of timber sleepers to concrete sleepers
- replacement of overhead wiring
- renewal of the corridors high and low voltage power supply networks.

The Auburn Junction works would provide the flexibility for 40 trains per day entering the MainTrain Facility and the AMC.

The LGCUP and ASP construction works would be integrated, with connections from the ASP into the Auburn and Clyde Junctions to be constructed as part of the LGCUP. This would avoid operational impacts to the MainTrain and Manildra facilities when the ASP is being constructed. The signalling for the ASP would also be integrated with the signalling for LGCUP and carried out by the Novo Rail Alliance on behalf of RailCorp.

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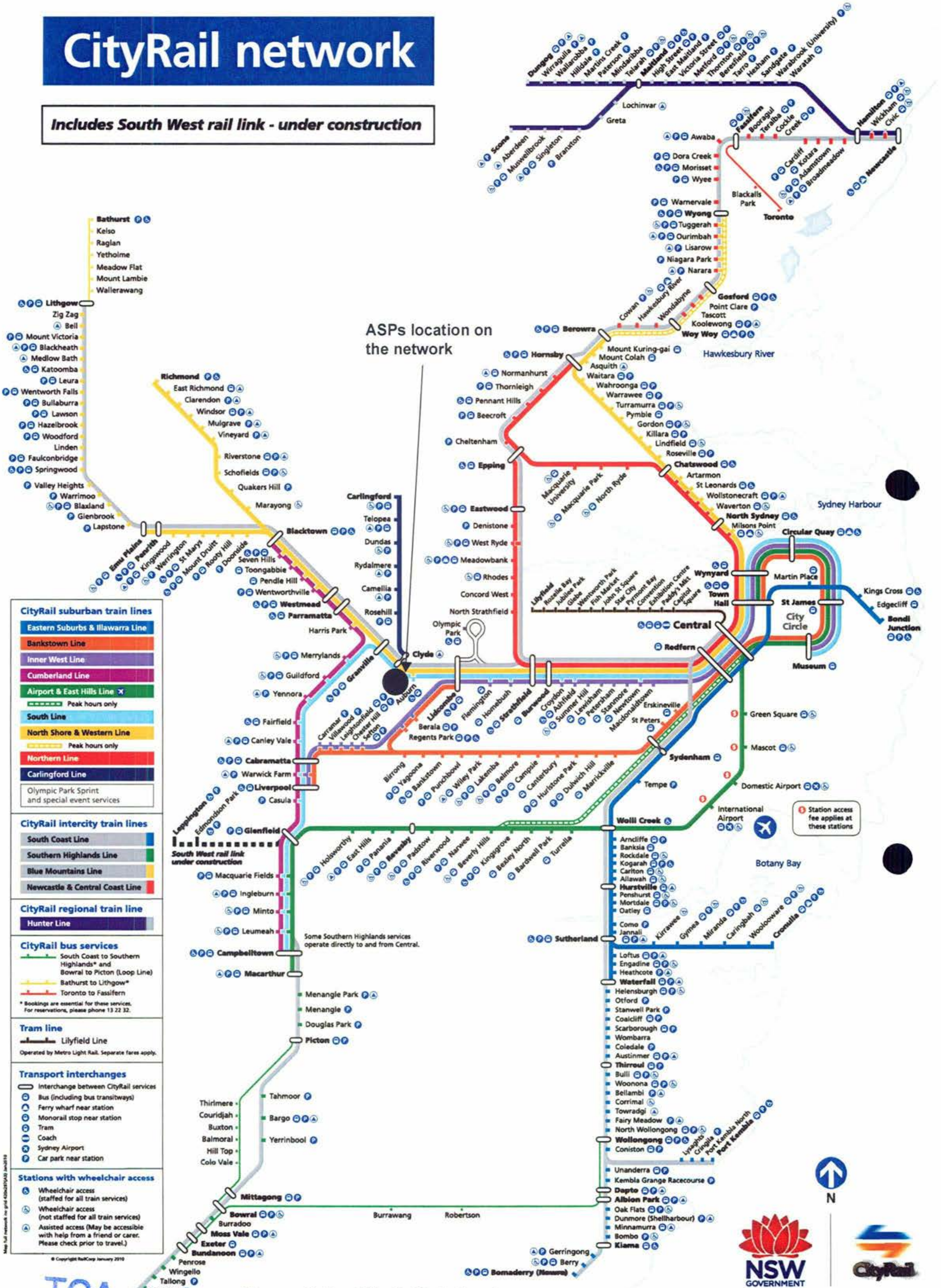

Figure 2.5 CityRail Network

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2.3.4 South West Rail Link

SWRL is a proposed rail line between Glenfield and Leppington and would form part of the Sector 2 network. This project responds to the issues of reliability and passenger growth on the metropolitan rail network and population growth in south-west Sydney. The SWRL involves two components: the Glenfield Interchange (Stage One); and the rail line between Glenfield and Leppington (Stage Two).

Funding for construction of Stage One of the SWRL was announced in June 2009. This announcement identified a new stabling facility at Auburn as part of the Stage One works. Funding for Stage Two of the SWRL was announced in February 2010 as part of the release of the *Metropolitan Transport Plan: Connecting the City of Cities* (NSW Government, 2010).

As part of Stage Two of SWRL, a new stabling facility is to be constructed at Leppington. The stabling facility at Leppington would provide stabling for 20 eight-car train sets. The stabling facility at Leppington would not provide the required stabling to support the future operations of Sector 2. As such, further stabling is required for Sector 2, which would be provided as part of the ASP.

The Leppington stabling facility is scheduled to be operational in 2017. The ASP would be operational in 2014 and as such would provide stabling prior to 2017 to support the interim demand for passenger services. However, the predicted demand cannot be fully met until the Leppington facility is operational.

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3. Statutory planning and approvals

This chapter outlines the decision making process for the ASP in terms of the NSW EP&A Act, the statutory approvals process and other statutory requirements. It also outlines the strategic planning context of the ASP.

3.1 Strategic planning context in NSW

3.1.1 NSW State Plan

The *NSW State Plan: Investing in a Better Future* (NSW Government 2010) includes priorities, targets and actions for transport within NSW. The 2010 plan includes new targets and actions that relate to improving the public transport system (including rail) and improving the reliability of the network. The ASP is not specifically identified as a key project within the NSW State Plan, however, the construction of the ASP would assist in meeting the targets and actions of the NSW State Plan.

3.1.2 Metropolitan Transport Plan

The *Metropolitan Transport Plan: Connecting the City of Cities* (NSW Government 2010) released in February 2010 is the NSW Government's strategy to link Sydney's land use planning (outlined in the Metropolitan Strategy) with its transport network.

The Metropolitan Transport Plan includes details of essential transport infrastructure and services which have a 10 year funding guarantee. The ASP is not identified as one of these essential projects by name, however, the Metropolitan Transport Plan does highlight that funding is to be made available for new stabling, rolling stock, engineering and capital works.

3.1.3 Sydney Metropolitan Strategy

The population of Sydney is expected to increase by 1.1 million people in the 25 years from 2006 to 2031. The *Metropolitan Strategy, City of Cities – A Plan for Sydney's Future* (the Metropolitan Strategy) (Department of Planning 2005) provides a framework to plan for and manage this growth. The main aims of the strategy are to:

- enhance liveability
- strengthen economic competitiveness
- ensure fairness
- protect the environment
- improve governance.

The Metropolitan Strategy provides strategies, objectives and actions for the Greater Sydney Metropolitan Region to meet these aims.

A formal review of the Metropolitan Strategy began in March 2010. The first step of the review process was the release of the *Metropolitan Strategy Review: Sydney Towards 2036 Discussion Paper* (Department of Planning, 2010). This discussion paper sets out the challenges facing Sydney for the next 25 years (up until 2036).

The discussion paper identifies that a major challenge for the Metropolitan Strategy Review is a projected increase in the population of Sydney (including the Central Coast) from 4.3 million in 2006 to 5.7 million by 2031 and 6 million by 2036.

The discussion paper proposes 10 directions for Sydney towards 2036. Of direct relevance to the ASP is the proposed direction to integrate land use with transport, to achieve best value from investment in transport infrastructure with integrated land use planning.

3.1.4 Draft West Central Subregional Strategy

To supplement the Metropolitan Strategy, a number of subregional strategies have been prepared. Some of these are currently in draft form. The subregional strategies translate the objectives of the Metropolitan Strategy to the local level.

The subregional strategies were prepared in consultation with local councils and address economy and employment; centres and corridors; housing; transport; environment, heritage and resources; parks, public places and culture; and implementation and governance. When finalised, the subregional strategies will guide land use planning in the subregions until 2031.

The *Draft West Central Subregional Strategy* (Department of Planning, 2007) does not have any specific actions that relate to the ASP. However, the ASP does assist in meeting some of the goals of the subregional strategy as outlined below in Section 3.1.5.

3.1.5 Discussion

The ASP would assist in meeting the aims and objectives of the above plans and strategies. It would result in improvements to the rail network, including an increase in stabling, that would allow for increased services required due to a growing population (particularly in Sydney's south-west) and therefore greater demand for trains. The location of stabling at Auburn would also improve the reliability of the network by reducing the distance and time empty trains spend on the network getting to their starting positions. These movements currently cause congestion on the network.

3.2 Environmental Planning and Assessment Act 1979

All development in NSW is assessed in accordance with the provisions of the EP&A Act and EP&A Regulation. The EP&A Act institutes a system for environmental planning and assessment, including approvals and environmental impact assessment for proposed developments. Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils.

The EP&A Act contains three assessment and approval pathways depending on the type and scale of the activity/development proposed. These are:

- Part 3A provides for control of 'major development or other projects' that require approval from the Minister for Planning
- Part 4 provides for control of 'local development' that requires development consent, usually from the local council
- Part 5 provides for control of 'activities' that do not require development consent or approval from the Minister for Planning.

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The need or otherwise for development consent is set out in environmental planning instruments – State environmental planning policies (SEPPs), regional environmental plans (REPs, now deemed to be SEPPs) or local environmental plans (LEPs).

The ASP is not a class of development identified in *State Environmental Planning Policy (Major Development) 2005* (see Section 3.3 for discussion) and the Minister for Planning has not declared the ASP to be a major project under Part 3A.

As outlined in Section 3.3, *State Environmental Planning Policy (Infrastructure) 2007* removes the need for development consent under Part 4 of the EP&A Act for the ASP.

As development consent is not required, the ASP requires assessment under Part 5 of the EP&A Act.

3.2.1 Part 5 assessment requirements

TCA is the proponent and a determining authority for the ASP under Part 5 of the EP&A Act.

Section 111 of the EP&A Act outlines the duty of determining authorities to consider the environmental impacts of an 'activity'. Under Section 110 of the EP&A Act an activity is defined as:

> *(a) the use of land, and*
>
> *(b) the subdivision of land, and*
>
> *(c) the erection of a building, and*
>
> *(d) the carrying out of a work, and*
>
> *(e) the demolition of a building or work, and*
>
> *(f) any other act, matter or thing referred to in section 26 that is prescribed by the regulations for the purposes of this definition,*

Under this definition the ASP is defined as an activity, as it involves the use of land, erection of a building and the carrying out of a work.

When considering an activity, the determining authority is required to 'examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment'.

Section 112 of the EP&A Act requires the determining authority to consider whether an activity is 'likely to significantly affect the environment' (including critical habitat) or threatened species, populations or ecological communities, or their habitats.

If a determining authority is of the opinion that an activity would be likely to significantly affect the environment, by virtue of a Ministerial order, the activity would then fall under Part 3A of the EP&A Act and require the approval of the Minister for Planning.

Factors that need to be taken into account when considering the likely impact of an activity on the environment are outlined in Clause 228 of the EP&A Regulation.

Chapter 7 of this REF assesses the likely effect of the ASP on the environment. As the level of impact likely to occur as a result of the ASP has been identified as not significant, the preparation of an REF is the appropriate environmental impact assessment mechanism to satisfy the requirements of Part 5 of the EP&A Act.

If an activity were to be carried out on land that is critical habitat, or if a determining authority decides the activity is likely to significantly affect a threatened species, population, an ecological community or its habitat, then it must obtain and consider a Species Impact Statement.

An ecological impact assessment (Technical Paper 5 in Volume 2) has been undertaken as part of this REF and the report concluded that the ASP would not be carried out on land that is critical habitat, and is not considered to significantly affect a threatened species, population, an ecological community or its habitat. As such, a Species Impact Statement is not required.

3.2.2 Assessment process under Part 5

The planning approvals process under Part 5 of the EP&A Act requires that TCA prepares an REF, which is to include appropriate mitigation measures to manage and minimise impacts on the environment.

A summary of the planning approval process for the ASP under Part 5 of the EP&A Act is illustrated in Figure 3.1.

AUBURN STABLING PROJECT

TCA determines approvals process by preliminary assessment of the significance of impact

Preliminary consultation with Government and community stakeholders

TCA prepares a REF to satisfy Part 5 of the EP&A Act and proposes mitigation measures

we are here

TCA displays the REF and invites submissions from the community. Further consultation is undertaken including community information sessions

TCA assesses and responds to submissions and prepares a report outlining any proposed changes to minimise environmental impacts

TCA determines the proposed project

If approved, post approval implementation and compliance.
The Submissions Report and Conditions of Approval would be made publicly available

Figure 3.1 Planning process flow chart

3.3 State environmental planning policies

3.3.1 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) includes specific planning provisions and development control for 25 types of infrastructure works or facilities.

Clause 79 of the ISEPP outlines what development is permissible without consent in relation to railways. Clause 79(1) of the ISEPP states that:

> *Development for the purpose of a railway or rail infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land. However, such development may be carried out without consent on land reserved under the National Parks and Wildlife Act 1974 only if the development:*
>
> > *(a) is authorised by or under that Act, or*
> >
> > *(b) is, or is the subject of, an existing interest within the meaning of section 39 of that Act, or*
> >
> > *(c) is on land to which that Act applies over which an easement has been granted and is not contrary to the terms or nature of the easement.*

Rail infrastructure facilities are defined in the ISEPP to include the following:

> *(a) railway tracks, associated track structures, cuttings, drainage systems, fences, tunnels, ventilation shafts, emergency accessways, bridges, embankments, level crossings and roads, pedestrian and cycleway facilities, and*
>
> *(b) signalling, train control, communication and security systems, and*
>
> *(c) power supply (including overhead power supply) systems, and*
>
> *(d) railway stations, station platforms and areas in a station complex that commuters use to get access to the platforms, and*
>
> *(e) public amenities for commuters, and*
>
> *(f) associated public transport facilities for railway stations, and*
>
> *(g) maintenance, repair and stabling facilities for rolling stock, and*
>
> *(h) refuelling depots, garages, maintenance facilities and storage facilities that are for the purposes of a railway, and*
>
> *(i) railway workers' facilities, and*
>
> *(j) rail freight terminals, sidings and freight intermodal facilities,*
>
> *but do not include buildings or works that are for residential, retail or business purposes and unrelated to railway purposes.*

The ASP is considered to meet the above definition.

In accordance with Clause 79, the ASP is permissible without consent as all of the components of the ASP can be defined as a rail infrastructure facility under the ISEPP, it is proposed to be carried out by a public authority and no land reserved under the *National Parks and Wildlife Act 1974* is affected.

Clause 79(2) of the ISEPP outlines other forms of development that are permissible without consent when in connection with a railway or rail infrastructure facilities. These include:

(a) construction works (whether or not in a heritage conservation area), including:

(i) temporary crushing plants or concrete batching plants, if they are used solely in connection with railway construction and in or adjacent to a rail corridor, and

(ii) track support earthworks, and

(iii) alteration, demolition or relocation of a local heritage item, and

(iv) alteration or relocation of a State heritage item, and

(v) temporary buildings, or facilities for the management of railway construction, that are in or adjacent to a rail corridor,

(b) emergency works, or routine maintenance works, carried out in the rail corridor of an existing railway or on land that is adjacent to such a corridor (including on land to which State Environmental Planning Policy No 14—Coastal Wetlands or State Environmental Planning Policy No 26—Littoral Rainforests applies but, if they are on such land, only if any adverse effect on the land is restricted to the minimum possible to allow the works to be carried out),

(c) maintenance or repair of an existing rail infrastructure facility,

(d) environmental management works.

This clause permits the construction compounds and earthworks associated with the ASP without consent and these are therefore also assessable under Part 5 of the EP&A Act.

3.3.2 State Environmental Planning Policy (Major Development) 2005

State Environmental Planning Policy (Major Development) 2005 (Major Development SEPP) identifies major developments to which Part 3A of the EP&A Act applies.

Clause 6(1) of the Major Development SEPP defines Part 3A projects as:

Development that, in the opinion of the Minister, is development of a kind:

(a) that is described in Schedule 1 or 2, or

(b) that is described in Schedule 3 as a project to which Part 3A of the Act applies, or

(c) to the extent that it is not otherwise described in Schedules 1–3, that is described in Schedule 5.

Clause 23 of Schedule 1 of the Major Development SEPP relates to rail and related transport facilities and states that the following development is subject to Part 3A:

(1) Development that has a capital investment value of more than $30 million for the purpose of:

(a) heavy railway lines associated with mining, extractive industries or other industry, or

(b) railway freight facilities or inter-modal terminals.

The ASP has a capital investment value of over $30 million, and is for the purpose of a heavy railway line. However, the ASP is not associated with any particular mine, extractive industry or other industry, and is not for the purpose of an inter-modal terminal.

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The ASP is therefore not considered to be a Part 3A project under the provisions of the Major Development SEPP.

3.3.3 State Environmental Planning Policy No. 55 – Remediation of Land

Under Clause 9 of *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55), Category 1 remediation work is defined as work that is:

(a) designated development, or

(b) carried out or to be carried out on land declared to be a critical habitat, or

(c) likely to have a significant effect on a critical habitat or a threatened species, population or ecological community, or

(d) development for which another State environmental planning policy or a regional environmental plan requires development consent, or

(e) carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:

(i) coastal protection,

(ii) conservation or heritage conservation,

(iii) habitat area, habitat protection area, habitat or wildlife corridor,

(iv) environment protection,

(v) escarpment, escarpment protection or escarpment preservation,

(vi) floodway,

(vii) littoral rainforest,

(viii) nature reserve,

(ix) scenic area or scenic protection,

(x) wetland, or

(f) carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated (or if the land is within the unincorporated area, the Western Lands Commissioner).

Under the above definition, the proposed remediation works could be considered Category 1 works under Clause 9(e)(ii) as the site is identified as an archaeological heritage item under the *Auburn Local Environmental Plan 2000* (Auburn LEP) and RailCorp's Section 170 Register, therefore requiring development consent.

The remediation works would be undertaken ancillary to the overall works that form part of the ASP, and therefore in accordance with the ISEPP the remediation works are to be assessed under Part 5 of the EP&A Act.

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3.4 Regional environmental plans

As of 1 July 2009, REPs are no longer part of the hierarchy of environmental planning instruments in NSW and all existing REPs are now deemed to be SEPPs. The Department of Planning is reviewing these REPs as part of the NSW planning system reforms.

3.4.1 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The ASP is located within the Sydney Harbour Catchment as identified in Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (the SREP). However, the ASP site is not located within the foreshores and waterways area, under the SREP. Therefore there are no specific provisions within the SREP relevant to the site.

The aims of the SREP are:

(a) to ensure that the catchment, foreshores, waterways and islands of Sydney Harbour are recognised, protected, enhanced and maintained:

(i) as an outstanding natural asset, and

(ii) as a public asset of national and heritage significance,

for existing and future generations,

(b) to ensure a healthy, sustainable environment on land and water,

(c) to achieve a high quality and ecologically sustainable urban environment,

(d) to ensure a prosperous working harbour and an effective transport corridor,

(e) to encourage a culturally rich and vibrant place for people,

(f) to ensure accessibility to and along Sydney Harbour and its foreshores,

(g) to ensure the protection, maintenance and rehabilitation of watercourses, wetlands, riparian lands, remnant vegetation and ecological connectivity,

(h) to provide a consolidated, simplified and updated legislative framework for future planning.

The ASP is considered to meet the aims of the SREP as outlined above. Mitigation measures would be implemented for the ASP to minimise the risk of indirect impacts upon Duck River, which drains to Parramatta River. This would reduce the risk of potential impact to the Sydney Harbour Catchment.

3.5 Local environmental plans

3.5.1 Auburn Local Environmental Plan 2000

The site is located within the Auburn LGA and falls under the provisions of the *Auburn Local Environmental Plan 2000* (LEP).

Figure 3.2 shows the zoning of land within the Clyde Marshalling Yards and surrounding areas.

The ASP is partially located on land zoned 5(a) Special uses (Railways). The objectives of this zone are:

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(a) to facilitate certain development on land which is or is proposed to be used by public authorities to provide services, utilities and public infrastructure that are compatible with the locality,

(b) to allow ancillary development which is incidental to the primary use specified on the map,

(c) to allow surplus public land to be used for purposes that are compatible with uses permitted in an adjoining zone.

The ASP is also partially located on land zoned 4(a) General Industrial. The objectives of this zone are:

(a) to provide sufficient land to be used primarily for a broad range of industrial uses,

(b) to permit a range of uses that are compatible with industrial areas,

(c) to encourage industrial uses that will contribute to economic and employment growth of the locality,

(d) to prohibit shops in this zone, but permit minor retail development only where it is providing for the daily convenience needs of the local workforce or is ancillary or incidental to the main purpose of development.

The ASP is considered to meet the above objectives as the land is to be used by a public authority for public infrastructure (railway facilities) and the ASP would be compatible with the surrounding industrial land uses including the surrounding railway uses (e.g. the adjacent MainTrain Facility and AMC). All works that form part of the ASP are considered ancillary to the use of the land for railway purposes. The remediation works that form part of the ASP are considered to be ancillary to the construction of the stabling yard as they would prepare the site for the construction of the stabling yard.

Under the LEP, the Clyde Marshalling Yards is identified as a heritage item, potentially having archaeological significance. This is addressed in Section 7.5.

The provisions of the ISEPP override any development consent requirements of the Auburn LEP for the ASP works (refer to Section 3.3).

3.6 Other licences and approvals

3.6.1 Protection of the Environment and Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (the PoEO Act) requires environment protection licences for specific activities relating to air, water and noise pollution, and waste management. The NSW Department of Environment, Climate Change and Water (DECCW) (and local government where relevant) administers the Act.

Development activities require an environment protection licence (EPL) under the PoEO Act if those activities meet any of the classifications outlined in Schedule 1 of the PoEO Act. The construction of the ASP may fall within the definition of subclause 1 of Section 33 'Railway system activities' of Schedule 1. Therefore consultation would be required with DECCW to confirm whether an EPL is required prior to commencement of construction.

During operation, the ASP would be covered by RailCorp's existing operational licence.

3.6.2 Heritage Act 1977

The NSW *Heritage Act 1977* (the Heritage Act) provides for conservation of environmental heritage in NSW. Environmental heritage is defined as items which are of state and local importance. Heritage items usually have historical, scientific, cultural, social, archaeological, architectural, natural or visual value to the State or local area.

Under Section 139 of the Heritage Act, approval from the NSW Heritage Council is required prior to the disturbance or excavation of land if a project will, or is likely to result in, a relic (defined as any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement and is of state or local significance) being discovered, exposed, moved, damaged or destroyed. The site has been listed on the Auburn LEP 2000 and on RailCorp's Section 170 Register as having potential for archaeological significance. If significant relics are present, an approval under Sections 139 and 140 of the Heritage Act or a section 139(4) Excavation Permit Exception Notification Approval would be required to manage the impact on these relics.

However, despite having been a major railways marshalling area, with engineering and carriage building facilities, the site has lost almost all its original elements and structures, leaving little physical evidence remaining. While the ASP would involve earthworks including remediation and excavation, no significant archaeological resource has been identified through site investigations as part of this REF.

Approval from the Heritage Council is therefore not expected to be required prior to ASP works occurring on site.

The ASP does not impact upon any heritage items listed on the State Heritage Register.

3.6.3 Roads Act 1993

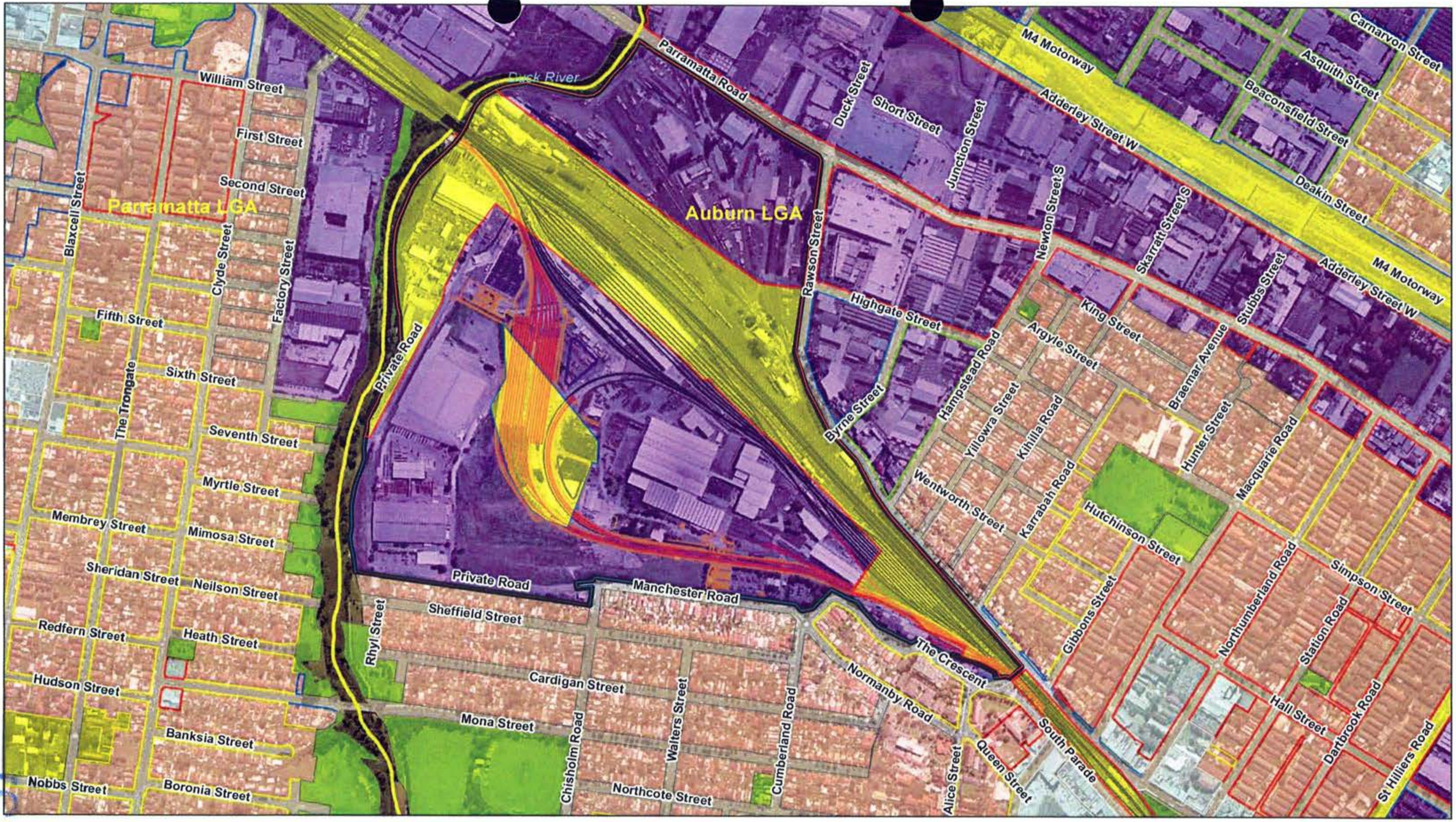
Section 138 of the NSW *Roads Act 1993* requires consent from the relevant roads authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a road. The ASP requires some work along Manchester Road to integrate the new access bridge to the MainTrain site into the surrounding network.

However, under Clause 5(1) in Schedule 2 of the Roads Act, public authorities do not require consent for works on unclassified roads. Therefore the proposed works do not require consent from the relevant roads authority under the Roads Act.

3.6.4 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) is administered by DECCW. The TSC Act aims to protect certain classes of threatened wildlife including endangered species, endangered populations, endangered ecological communities and vulnerable species.

Section 5A of the EP&A Act lists a number of factors to be taken into account in deciding whether there is likely to be a significant impact on threatened species, populations or ecological communities or their habitats. Should a threatened species or community be impacted, an Assessment of Significance must be completed to determine the significance of the impact. A Species Impact Statement is required if there is likely to be a significant impact on a threatened species, population or ecological community or its habitat.



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1:10,000 (at A4)

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

Ancillary infrastructure
Detention basin
Proposed Track
Existing Track
Roads works
LGA boundary
Clyde Marshalling Yards
2(a) Residential
2(b) Residential
2(c) Residential
2(e) Residential
3(a) Business
3(b) Business
4 Industrial
4(a) Industrial
4(b) Industrial
4(c) Industrial
5 Special Use
5(a) Special Use
5(c) Special Use
6(a) Recreation

GHD
CLIENTS | PEOPLE | PERFORMANCE

TCA
Auburn Stabling Project

Job Number | 21-19479
Revision | A
Date | 29 OCT 2010

Zoning Map

Figure 3.2

G:\21\19479\GIS\Maps\MXD\21_19479_Z013_LEP_map.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - Jan 2010. Created by: qjchung

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An ecological impact assessment has been undertaken for the ASP (see Section 7.7 and Technical Paper 5) and has concluded that no threatened species or communities are likely to be significantly affected.

3.7 Commonwealth legislation

3.7.1 Environment Protection and Biodiversity Conservation Act 1999

The primary objective of the EPBC Act is to 'provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance'.

Environmental approvals under the EPBC Act may be required for an 'action' that has, will have or is likely to have a significant impact on:

- matters of national environmental significance (known as 'NES matters')
- the environment on Commonwealth land (whether or not the action is occurring on Commonwealth land).

Approval for such an action may be required from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities.

An 'action' is considered to include a project, development, undertaking, activity or series of activities. NES matters include:

- World heritage areas
- National heritage places
- Ramsar wetlands of international importance
- nationally listed threatened species and ecological communities
- listed migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions.

Where the proponent considers that an action will have or is likely to have significant impacts on a NES matter or on Commonwealth land, a referral is made to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC). A proposal may also, but is not required to be referred to DSEWPC where an action will not have or is not likely to have a significant impact. If it is determined through the referral process by DSEWPC that a project is likely to have a significant impact on a NES matter, or on Commonwealth land, then the project is a controlled action and approval from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities would be required.

An EPBC Act protected matters search was undertaken on 8 October 2010, identifying several NES matters that may occur in, or may relate to, an area of approximately five kilometre radius around the site. Table 3.1 provides a summary of the results.

Table 3.1 EPBC Protected matters search results

NES matter	Results
World heritage areas	0*
National heritage places	1
Wetlands of international significance (Ramsar sites)	1
Commonwealth marine areas	None
Threatened ecological communities	3
Threatened species	22
Listed migratory species	30

Note: * Search undertaken on the 8 October 2010 did not identify any world heritage areas. However, the UNESCO website (UNESCO, 2010) identifies Old Government House and the Government Domain in Parramatta as a world heritage area under the list of Australian Convict Sites.

The ASP would not impact upon the identified World Heritage Area and National Heritage Place (Old Government House and the Government Domain in Parramatta) located approximately 4.5 kilometres from the site.

The ASP would also not impact upon the identified Ramsar Wetland (Towra Point Nature Reserve) identified. This wetland is located 22 kilometres from the site and is located within a different catchment to the ASP (which drains to the Parramatta River and Sydney Harbour Catchment). The wetland was identified by the search, as land within the five kilometre radius of the ASP site does drain to Botany Bay and therefore is within the catchment of the wetland.

An ecological impact assessment has indicated that the ASP is unlikely to significantly affect any threatened ecological communities, threatened species or habitat for migratory species that are EPBC listed (refer Section 7.7 and Technical Paper 5).

The ASP is not likely to significantly impact on any NES matter or Commonwealth land, therefore a referral to DSEWPC is not required.

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4. Community and stakeholder engagement

This chapter provides an overview of community consultation and stakeholder engagement processes that have been undertaken for the ASP and outlines the identified issues and how these have been addressed. It also provides details on future and ongoing community consultation for the ASP.

4.1 Community engagement overview

A range of engagement activities have been used to inform the community and stakeholders about the proposed ASP before and during the REF process. The objectives of the engagement activities were to:

- provide timely and up to date information about the ASP and the planning process to stakeholders and the community
- provide community members with the opportunity to express their views about the ASP
- identify issues and suggestions in preparation of the REF
- ensure that community and stakeholder input to the planning of the ASP is considered
- identify interested stakeholders and community members and appropriate methods of communication
- find a balance between economic, social and environmental needs, to ensure there is equity in the way that the ASP is delivered.

These engagement activities included:

- face to face meetings with residents
- establishment of community feedback mechanisms, such as the 1800 684 490 Project Infoline and the mail@tca.nsw.gov.au email address
- website updates providing information on the ASP and the REF process
- distribution of approximately 11,000 newsletters providing information on the ASP and REF process
- newspaper advertisements placed in local newspapers
- letters to residents and stakeholders
- a community information session.

4.2 Consultation during REF preparation

4.2.1 Community and stakeholders

Community and stakeholders were identified as individuals or groups who would be potentially impacted by the ASP. This included consideration of surrounding residents, individual members of the community, special interest groups and organisations, businesses, government agencies and other authorities.

A stakeholder database was developed based on identified stakeholders and community groups.

4.2.2 Engagement activities and tools

Table 4.1 lists the key engagement activities and tools, outlines the purpose of each tool and describes how each tool has been used to engage with the community and stakeholders.

Table 4.1 Key community and stakeholder engagement tools/activity

Tool	Purpose and activity to date
Contact mechanisms	A Project Infoline telephone number (1800 684 490) and email address (mail@tca.nsw.gov.au) was established at the commencement of the ASP to enable all stakeholders to provide feedback to the project team for consideration in the REF. A database was established to manage contacts and issue information received. Since inception, contact has been made with 5613 separate stakeholders and details of this communication have been recorded in the stakeholder database.
Community Newsletter #1	A community newsletter was distributed in April 2010 which outlined the ASP and its benefits, the REF process and progress to date. This newsletter was prepared by TCA and was distributed to nearby residents within approximately two kilometres of the site. Approximately 5,500 newsletters were distributed.
Direct contact via phone calls and door knocking	Residents who were identified as being directly or indirectly affected by the ASP were contacted by the TCA project team to make them aware of the ASP and how they could obtain more information and provide feedback.
Community Newsletter #2	A community newsletter was distributed in June 2010 which outlined the ASP, the REF process and details of the community information session to be held 1 July 2010. This newsletter was prepared by TCA and was distributed to nearby residents within approximately two kilometres of the site. Approximately 5,500 newsletters were distributed.
Newspaper advertisements	Newspaper advertisements to encourage attendance at the 1 July 2010 community information session were placed in the Wednesday 23 June editions of the *Review Pictorial* and *Parramatta Advertiser*.
Letters to adjacent property owners	Approximately 100 letters were sent to residents and businesses adjacent to the site in June 2010. Each letter outlined the ASP, the REF process and details of the community information session to be held on 1 July 2010.
Community information session	A community information session was held on 1 July 2010. The session provided an opportunity for the community to meet representatives from TCA and the project team to discuss any aspect of the ASP or to raise any concerns. Attendees were asked to complete a feedback form so that feedback could be included as part of the REF. There were six attendees and three feedback forms submitted.
Project website	Information about the ASP is available on the TCA website www.tca.nsw.gov.au The website provides detailed information about the ASP and the REF.

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4.2.3 Issues raised by the community

Table 4.2 summarises the issues raised by the community as part of the consultation to date.

Table 4.2 Summary of issues raised by the community

Issue	Details	Addressed in REF chapter
Property acquisition	Concern about demolition of any buildings or property acquisition for the ASP.	Section 6.3 identifies the property acquisition required for the ASP.
Scope and benefits of the ASP	Clarification on the purpose and scope of the ASP.	Chapter 5.1 identifies the need for stabling and Chapter 6 outlines the scope of the ASP.
Construction traffic	Concern regarding traffic volumes (in particular heavy vehicles) during construction, and resulting noise levels.	Sections 7.3.2 and 7.1.2 assess the construction traffic and noise impacts of the ASP.
Operational traffic	Concerns about the number of vehicles that would be using the relocated MainTrain entry.	Section 7.3.3 assesses the operational traffic impacts of the ASP.
Train noise during operation	Concern regarding train noise during operation.	Section 7.1.3 assesses the operational noise impacts of the ASP.
Pedestrian safety	Need for street lights on Manchester Road.	Lighting associated with the ASP is outlined in Section 6.2.13. All other lighting would be the responsibility of Auburn City Council.
Benefits of the ASP to CityRail network	Clarification on the benefits of the ASP to the CityRail network.	Section 5.1 identifies the need for stabling and Chapter 9 justifies and summarises the benefits of the ASP.
Suitability of Auburn as the preferred location	Querying whether the Auburn site is suitable for the proposed stabling yard.	Section 5.3 outlines the site selection considerations and identifies why Auburn is the preferred location for a new stabling facility.

4.2.4 Consultation with government agencies

During the REF process, meetings were held with the following agencies (date of meeting in brackets):

- Auburn City Council (17 June 2010)
- Department of Environment, Climate Change and Water (1 July 2010 and 8 October 2010).

Letters were sent to:

- Auburn City Council
- Parramatta City Council
- NSW Roads and Traffic Authority
- Transport NSW
- Department of Planning – Heritage Branch
- Department of Environment, Climate Change and Water.

A summary of the issues raised and where they have been addressed in the REF is provided in Table 4.3.

Table 4.3 Summary of issues raised by government agencies

Agency	Issue	Addressed in REF chapter
Auburn City Council	Planning approvals process for remediation works given the site is listed as having archaeological significance under the Auburn LEP.	Chapter 3
	Land acquisition	Section 6.3
	Traffic – construction traffic and that appropriate management measures are put in place to reduce the impacts of traffic	Section 7.3
DECCW	Need for an EPL under the PoEO Act	Section 3.6.1
NSW Roads and Traffic Authority	Confirmed no issues	

4.3 Consultation during display of the REF

The REF will be advertised and placed on public display for approximately 30 days.

During the display period, government agencies, interested groups and organisations, and the community will be invited to make written submissions in response to the REF (see details of how to make a submission below). Further community consultation would be undertaken during the display period to enable the community to comment and ask questions about details in the REF. Planned consultation activities associated with the REF display include:

- community information sessions at the following times and locations:
  - Saturday 27 November 2010, 10am to 12 noon at the corner of Manchester Road and Cumberland Road, Auburn
  - Saturday 11 December 2010, 10am to 1pm at the Auburn Central Markets
- community information displays at the following locations:
  - Auburn Library, Civic Place, 1 Susan Street, Auburn during the following times Monday to Thursday 9.30am to 8pm, Friday 9.30am to 6pm, Saturday 9.30am to 4pm, Sunday 1pm to 4pm

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  - Granville Branch Library, 8 Carlton Street, Granville during the following times Monday and Thursday 10am to 8pm, Tuesday, Wednesday and Friday 10am to 5.30pm, Saturday 9.30am to 12 noon
  - Transport Construction Authority, Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood during the following times Monday to Friday 8.30am to 5pm
- meetings with stakeholders (DECCW, RTA, Auburn City Council, councillors and the local MP)
- newspaper advertisements – public display notification
- community newsletter – public display notification
- media releases
- door knock at neighbouring properties
- letters with details of the REF display and community engagement activities to adjacent residents and businesses
- website information at www.tca.nsw.gov.au
- Project Infoline 1800 684 490.

Written submissions on the REF should be emailed to mail@tca.nsw.gov.au or sent to:

Reference: Auburn Stabling Project
Director, Planning and Assessments
Transport Construction Authority
Locked Bag 6501
St Leonards NSW 2065

Written submissions must be received by 5pm Monday 13 December 2010.

4.4 Submissions report

At the conclusion of the REF display, all submissions and other feedback received during the display period would be compiled, considered and evaluated. A Submissions Report would be prepared to summarise the review and evaluation of submissions, in which consideration would be given to:

- the REF
- all submissions and responses to the issues raised
- any new information concerning the ASP
- any design modifications to the ASP.

The report would also provide an updated list of mitigation and management measures to be implemented should the ASP proceed. TCA would then assess the Submissions Report, along with the REF and other relevant documentation, before making a determination on whether to proceed with the ASP.

4.5 Ongoing consultation

If the ASP is approved, consultation activities would continue in the lead up to and during construction. The consultation activities would ensure that:

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- the community and stakeholders have a high level of awareness of all processes and activities associated with the ASP
- accurate and accessible information is made available
- a timely response is given to issues and concerns raised by the community
- feedback from the community is encouraged
- opportunities for input into the ASP are used as appropriate.

The TCA information line and email address would continue to be available during the construction phase. Targeted consultation activities, such as letters, notifications, signage and verbal communications, would continue to occur. The TCA website would also include frequent updates on the progress of construction.

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5. Option development and selection

This chapter outlines the options considered for the ASP and provides discussion on the preferred option.

5.1 Need for stabling within Sector 2

Currently there is a shortage of stabling in Sector 2 to accommodate the introduction of 626 new Waratah carriages and to support the predicted future demand for passenger services. This means that additional stabling facilities must be constructed by at least 2013. The appropriate location of stabling reduces the need for excessive numbers of empty trains running from their stabling location to where they will start their service. Running empty trains on the rail network results in increased congestion, reduces reliability, and increases operating costs and interference with freight trains. This issue of empty running trains would be exacerbated in the future due to increased demand for trains within Sector 2 and the rest of the rail network, particularly due to population growth in Sydney's west and south-west.

Further to the above, there are currently operational constraints for Sector 2 trains exiting the Flemington Maintenance Centre to get to their start positions on Sector 2. This is due to the need to cross the path of the Western Line trains, which operate on Sector 3. In the future there is a desire by RailCorp to reduce this operational constraint and also redevelop Flemington as a Sector 3 stabling depot.

An operations analysis was undertaken in 2009 and identified that up to 86.5 train sets would be required to be stabled within Sector 2 in 2017/2020, at a network growth rate of 2.5 per cent. This increase in trains accounts for growth in demand within Sector 2. The ASP, in conjunction with the construction of the stabling facility at Leppington, would provide the necessary stabling capacity to meet the predicted fleet requirement of 2017/2020.

The construction of the Leppington stabling facility would provide stabling for SWRL and other Sector 2 services. However, this facility would not provide for the full increase in train sets required for Sector 2. Additional stabling within the Sector 2 services would be required regardless of Leppington, and as such, the ASP provides the required additional stabling to ensure future demand can be met.

5.2 'Do nothing' option

This option would involve not constructing a new stabling facility in Sector 2 that would complement the proposed new stabling facility to be built at Leppington as part of SWRL.

Without the construction of a second new stabling facility within Sector 2, the future demand for trains within Sector 2 cannot be met and therefore this option is not considered to be acceptable.

5.3 Site selection

A high level review of RailCorp's operations and stabling strategy for Sector 2 was undertaken in 2009. This review assessed the 'operational fit' of a proposed stabling yard at Auburn to meet the patronage growth within Sector 2.

The preference for the stabling in Sector 2 is centred around the starting and finishing of trains at Liverpool and therefore stabling should be as close to Liverpool as possible. Auburn has been identified

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as the closest available site to Liverpool to provide the required stabling. A stabling facility at Liverpool is not considered viable for the following reasons:

- RailCorp does not currently own the required land
- significant track work modifications would be required, severely disrupting existing services
- net benefits in terms of operation of a stabling facility at Liverpool are only marginally greater than those at Auburn.

The Auburn site is considered viable as it is on 'the right side of the line' to allow movements from the stabling yard to Liverpool without conflicting with Western Line services. The ASP would also be configured to allow for easy departures and arrivals at the Clyde end, facilitating the departure to Liverpool.

In summary, Auburn is considered the preferred site for the positioning of a new stabling facility for the following reasons:

- the location allows for services to quickly enter the network to service Sydney's west and south-west
- the Auburn site is the closest available site, within Sector 2, to Liverpool (and Sydney's south west) where the majority of trains would be required to start their journeys as a result of future demand
- the past and current use of the site and the surrounding land is for railway purposes
- the land is currently in the ownership of RailCorp
- the facility is located on the correct side of the corridor to avoid the need for trains to cross the path of Western Line trains operating on Sector 3.

5.4 Option development

Once the Auburn site was selected as the preferred location, the development of site constraints and opportunities assisted in determining what options were available for the arrangement of the ASP on the site. Options were assessed taking into consideration operations (service), engineering, constructability, maintenance and environmental requirements. Each option considered would provide a different level of service during operation. Site environmental constraints for the ASP are minimal largely due to the disturbed nature of the site and are relatively the same across all the options considered.

Option appraisal largely involved comparing different track arrangements within different site 'segments' (refer to Section 5.4.1). The results of the options assessment for each segment were compared against one another to determine which was considered the preferred option within each segment (refer to Section 5.4.2).

5.4.1 Segment options

The development of options for the ASP involved splitting the site into five segments. These segments are listed and the options within each segment briefly described below:

1. Auburn Junction – where the ASP would connect into the existing network at the eastern end of the ASP
2. Auburn Neck – the approach tracks to the stabling yard from the eastern end of the ASP
3. Stabling yard – area where trains would be stabled

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4. Clyde Neck – the approach tracks to the stabling yard from the western end of the ASP
5. Clyde Junction – where the ASP would connect into the existing network at the western end of the ASP.

Figure 5.1 shows what areas of the ASP each segment covers.

A range of options, based on the five segments, were developed, as shown in Table 5.1.

Table 5.1 Segment options

ASP segment		Segment options	Description
1	Auburn Junction	AJ1	A new crossover between two of the running tracks of the Main West Line rail corridor.
		AJ2	Two new Arrival and Departure Tracks on the alignment of the existing MainTrain Arrival and Departure Tracks. A new turnout on the AMC Departure Track and a 'diamond' crossing on the AMC Arrival Track and ASP Departure Track.
2	Auburn Neck	ST1	Two ASP Arrival and Departure Tracks connecting into the Auburn Junction tracks (existing Main Train Arrival and Departure Tracks). The two new tracks would then merge into a single bi-directional ASP track. A new electrified track would also be provided for MainTrain use between AMC and the MainTrain Presentation Shop adjacent to the existing MainTrain departures.
		ST2	Two ASP Arrival and Departure Tracks connecting into the Auburn Junction works. These tracks would be extended through this segment. Two new tracks would be constructed parallel to the ASP Arrival and Departure Tracks and would be used as MainTrain sidings.
3	Stabling yard	SY1	A total of 16 tracks for the stabling of 16 eight-car train sets.
4	Clyde Neck	CT1	Eleven tracks (six through and five terminating) would be merged into a single Arrival and Departure Track.
5	Clyde Junction	CJ1	Connecting the Clyde Neck to the Down Relief by a single turnout. The LGCUP project would provide the connections from the Down Relief to the Up and Down Suburban lines.

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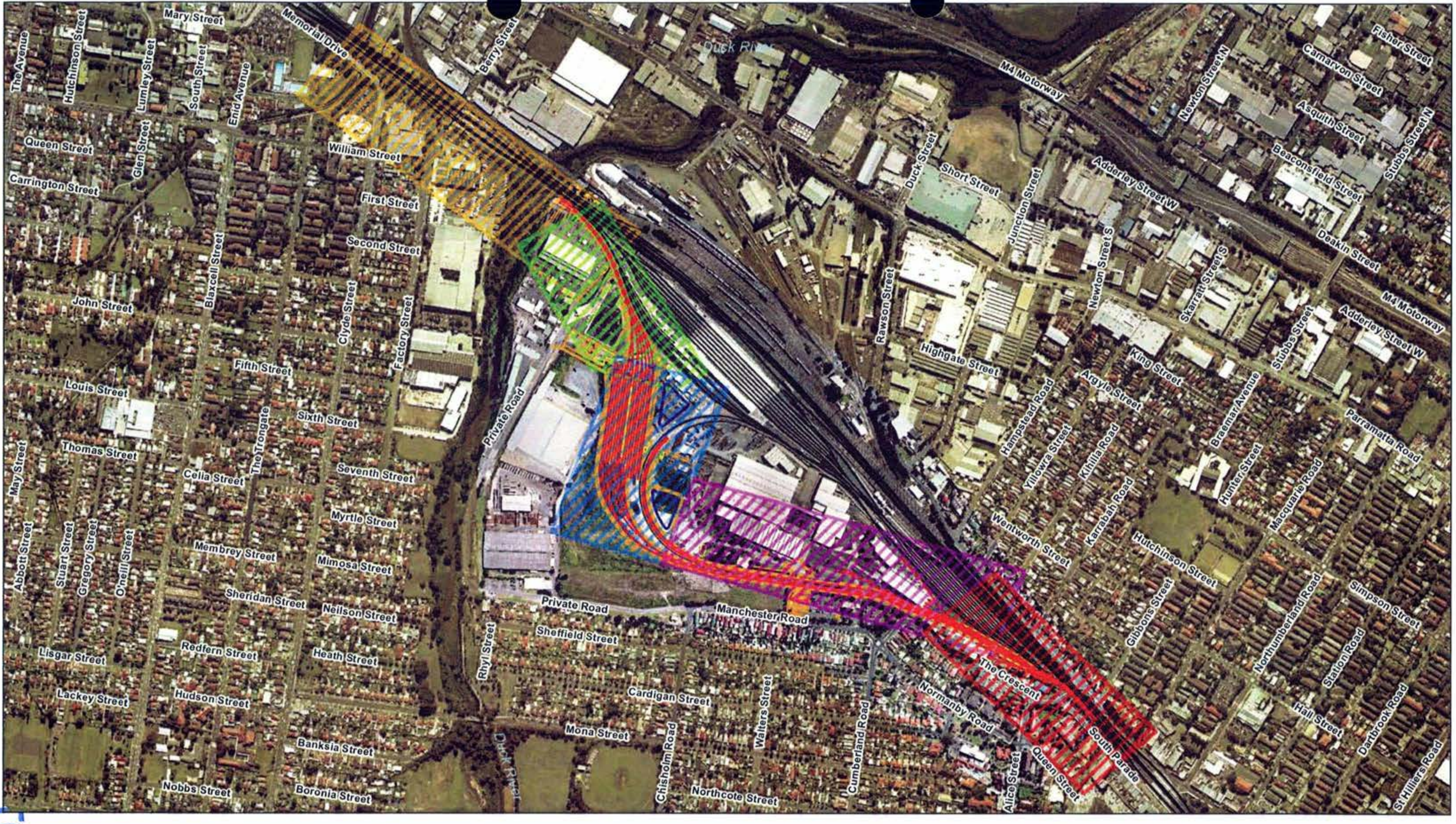

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Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

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LEGEND

- Auburn Junction
- Auburn Neck
- Stabling Yard
- Clyde Neck
- Clyde Junction
- Ancillary infrastructure
- Detention basin
- Proposed track
- Existing track
- Roads works

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Auburn Stabling Project

Job Number 21-19479
Revision A
Date 29 OCT 2010

Option development segments **Figure 5.1**

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Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - Jan 2010. Created by: gjchung

5.4.2 Segment option assessment and selection

All options were assessed for their engineering, operational, constructability and staging and maintenance impacts. Options within segments were then compared against each other to determine the preferred option.

Auburn Junction

Of the two options, AJ2 would have the greater operational constraints with respect to constructability and commissioning, largely due to its greater interaction with the existing MainTrain Facility and AMC facilities. However, constraints for space and operational impacts associated with main line signals exist for AJ1. From a maintenance and environmental planning perspective both options have similar impacts.

From an operational perspective, both options deliver similar flexibility and are both potentially constrained by the need to interface with the movements to and from the AMC. However, AJ2 offers greater flexibility to the movement both in and out of the stabling yard and AJ1 compromises main line running reliability.

Based on the operational benefits offered, AJ2 was considered to be the preferred option in the Auburn Junction segment.

Auburn Neck

Of the two options, ST2 would have the greater impact on the MainTrain Facility. However, from an operational perspective, ST2 provides greater flexibility in that the double track arrangement is able to provide separate Arrival and Departure Tracks from the stabling yard down through the neck. This offers a more effective signalling control of the interface between the Main Line signaller and the local ASP controller.

ST1 may result in some operational impacts when a departing train needs to await clearance. This may result in blocking access for trains heading toward Sydney. From a maintenance and environmental planning perspective both options have similar impacts.

Based on the operational benefits offered, ST2 was considered to be the preferred option in the Auburn Neck segment.

Stabling yard

The development of the stabling yard as a 16 track facility is the only option and is therefore is the preferred option.

Clyde Neck

Only one option was considered in the Clyde Neck segment and therefore this option is considered to be the preferred option for this segment.

Clyde Junction

Only one option was considered in the Clyde Junction segment and therefore this option is considered to be the preferred option for this segment.

5.4.3 Preferred option

The overall preferred ASP was developed by combining the preferred options from each segment.

The preferred overall option is the combination of the following segment options: AJ2 + ST2 + SY1 + CT1 + CJ1.

A detailed description of this combined option is provided in Section 6.2.2, with the remainder of Section 6.2 outlining the remaining works which form part of the ASP.

5.5 Option refinement

The design of the ASP would continue to be refined during the detailed design phase and would be guided by the key principles developed during the concept design and REF phase. The development of the detailed design would:

- be consistent with key design parameters as described in this REF and any subsequent TCA response to submissions
- address any unresolved issues associated with the development of the design proposed in this REF and any subsequent TCA response to submissions
- meet conditions of approval arising from the determination process under Part 5 of the EP&A Act
- incorporate community and government agency requirements by implementing a consultation plan to identify and resolve further concerns raised by the community and other stakeholders
- avoid identified environmentally sensitive areas and communities wherever possible
- further develop and refine mitigation measures to ensure measures discussed in Section 8.2 are adopted throughout design development to include construction and operational methodologies and conditions.

6. Project description

This chapter includes a description of the ASP and details how it would be constructed and operated as well as how sustainability has been addressed in the project development.

6.1 Existing site configuration and rail operations

6.1.1 Track configuration

Much of the ASP site is currently free of operational tracks. There are however existing dual tracks along the southern edge of the MainTrain site. These tracks connect into the existing CityRail network via the Down Relief and connect to the car turning loop, which provides access to the AMC tracks.

The primary access to the AMC and Manildra sites is provided off the Down Relief adjacent to the MainTrain access tracks. Two other access points from the Down Relief to the AMC site are provided; one at the Clyde end of the facility and the other between the two outer connections.

6.1.2 Existing rail movements

There are currently only limited rail movements on the ASP site, related to the existing tracks described above which are utilised to provide access for the MainTrain, Manildra and AMC operations.

6.1.3 Other movements on site

Vehicular

Vehicle movements are relatively low. Existing movements do however occur at the level crossing located to the south of the MainTrain site. This crossing provides vehicular access to the MainTrain site from Manchester Road.

Vehicular access to the AMC site is via Manchester Road and the Private Road. The level crossing at the Clyde end provides the vehicular connection between the Private Road and the AMC site. These movements would be occurring in the vicinity of the ASP site.

Pedestrian

Pedestrian movements around the ASP site are currently limited, and occur at three locations:

- from the car park, located off Manchester Road, to the MainTrain Facility – this access is located adjacent to the existing level crossing and is generally used by MainTrain workers
- from the AMC car park, located to the north of the ASP site, to the AMC – this access is via an existing pedestrian overbridge and is used by AMC workers
- from Clyde Station along the rail corridor to the AMC – this access is via an existing pedestrian pathway and provides access across Duck River.

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6.2 Physical description of the ASP

6.2.1 Overview of the ASP

The ASP would provide stabling for 16 eight-car suburban train sets, together with associated facilities such as offices, staff amenities, roads, walkways, fencing, lighting and others necessary for the operation of an effective stabling yard. The stabling yard would enable trains to be stored in a secure environment for routine activities such as interior cleaning, minor exterior cleaning, train inspections and garbage removal.

The ASP also includes the remediation of existing contaminated land present on site.

A detailed description of the design components associated with the ASP is provided in Sections 6.2.2 to 6.2.18. Figure 6.2, Figure 6.3 and Figure 6.4 show the works that form part of the ASP.

6.2.2 Track configuration and stabling yard

The ASP involves the construction of approximately 9.4 kilometres of new and reconditioned track, as illustrated in Figure 6.2, Figure 6.3 and Figure 6.4. The proposed track would be configured as follows:

- Dual tracks would be constructed to the south of the MainTrain Facility. These tracks would provide access to the stabling yard from the Auburn end of the facility (referred to as the Auburn Neck) and would connect into the Up and Down Suburban lines at the Auburn Junction (see Figure 6.2). This track would replace the existing common access tracks used by the MainTrain Facility and tracks which are currently used as sidings for the MainTrain Facility. These sidings would be relocated to adjacent to the car turning loop.
- A total of 16 tracks would be constructed within the stabling yard that forms part of the ASP, including a combination of terminating and through tracks (see Figure 6.3). The arrangement of these tracks within the stabling yard would be as follows:
  - five terminating tracks along the western edge of the stabling yard which would be accessed from the Auburn Junction
  - six through tracks that can be accessed from either the Auburn or Clyde Junctions
  - five through tracks along the eastern edge of the stabling yard which would be accessed from the Clyde Junction.
- Dual tracks would be constructed between the AMC arrival and departure tracks and the AMC car park located on the western side of Private Road. These tracks are referred to as the Clyde Neck. These works would also include the expansion of the existing AMC level crossing to accommodate the two new tracks to be constructed as part of the ASP (see Figure 6.4). These tracks would then merge into a single track which would connect into the existing network at Clyde Junction.
- Realignment of the track connections to Manildra and the MainTrain Facility to accommodate the Auburn Neck (see Figure 6.2).
- Realignment of the MainTrain car turning loop to accommodate the relocated MainTrain sidings (see Figure 6.3).

The current design of the stabling tracks provides flexibility for the potential for all 16 tracks to be accessed from both the Auburn and Clyde ends at some stage in the future. Should the provision of 16 through tracks be required in the future, this would be subject to separate planning approval.

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A series of at-grade walkways would be constructed throughout the stabling yard between the parallel tracks. The proposed walkways would provide cleaning personnel access to the stabled trains, with access available from both sides of each train. At the centre of the stabling yard (likely to be between tracks 8 and 9 which are both through tracks), an elevated walkway may be constructed to provide door level access to the trains stabled on these tracks (see Figure 6.1).

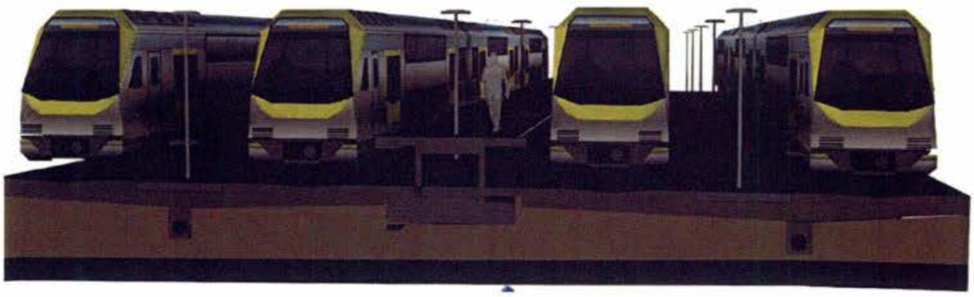

Figure 6.1 Indicative elevated walkway in the centre of the stabling yard

6.2.3 Amenities buildings

Primary administration, amenities and storage building

This building is proposed to be located to the north-west of the stabling yard, adjacent to the proposed car park (described below in Section 6.2.7). The following facilities are to be located within this building:

- meal room
- locker rooms toilets and showers
- training room
- crew sign on
- office space
- security control room
- operations control room
- store rooms.

The building would be a single storey structure with an approximate area of 550 square metres.

Secondary amenities and storage building

A secondary administration and staff amenities building would be located to the east of the stabling yard adjacent to the MainTrain car turning loop. This building would contain toilet facilities and a store room. The building would be a single storey structure with an approximate area of 50 square metres.

The existing MainTrain training room would require relocation and an existing shed would be demolished to accommodate the realignment of the MainTrain car turning loop. The training room would be relocated approximately 50 metres to the east.

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Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

- Ancillary infrastructure
- Detention basin
- Proposed Track
- Existing Track
- Roads works
- Stockpile (temporary)

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Auburn Stabling Project

Job Number	21-19479
Revision	A
Date	29 OCT 2010

Auburn Stabling Project (Auburn Junction) **Figure 6.2**

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Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - 2010; NSW Department of Lands: Cadastre - 2010. Created by: qjchung

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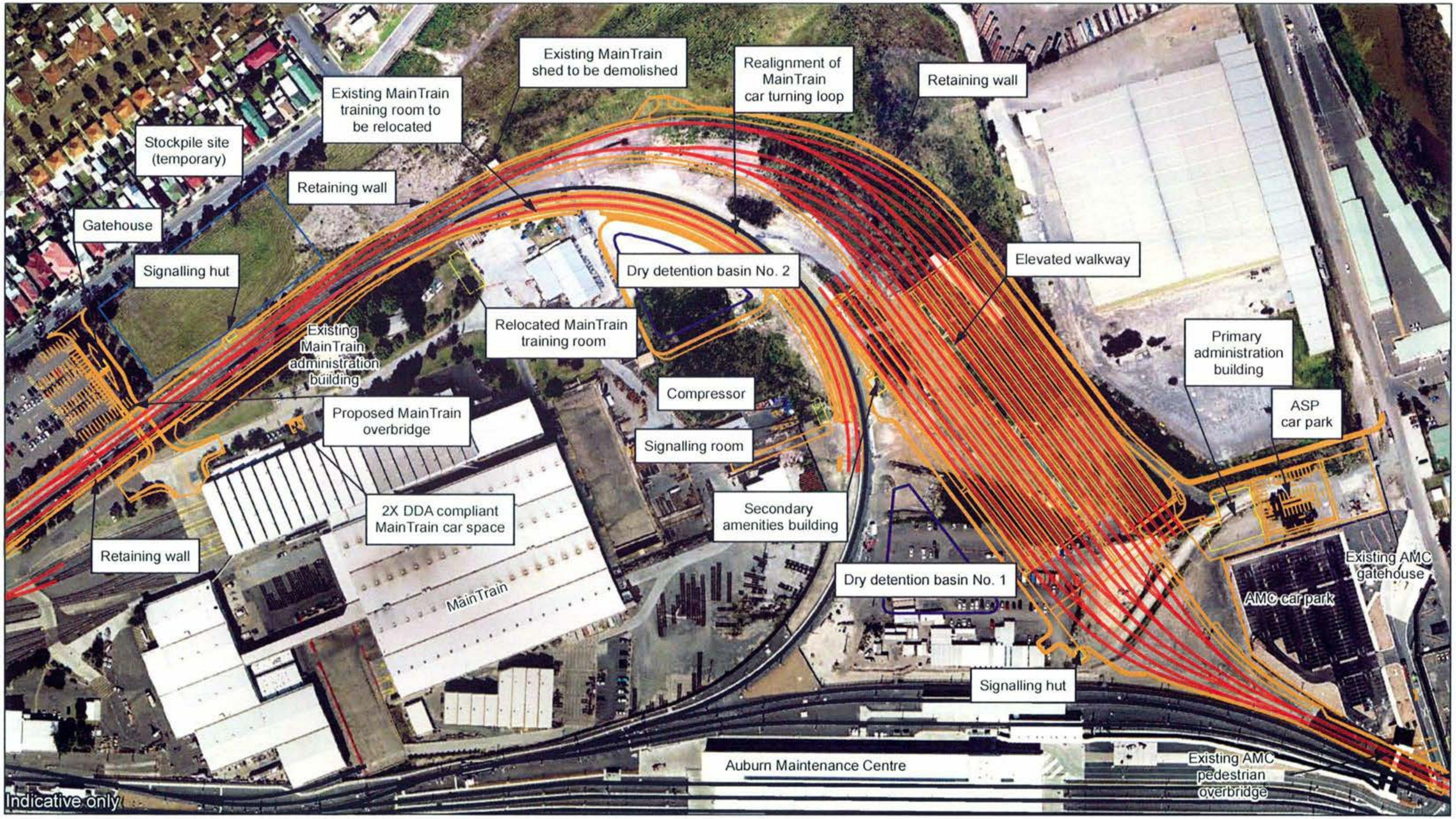

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Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

- Ancillary infrastructure
- Detention basin
- Proposed Track
- Existing Track
- Roads works
- Stockpile (temporary)

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Job Number 21-19479
Revision A
Date 29 OCT 2010

Auburn Stabling Project (Stabling Yard)

Figure 6.3

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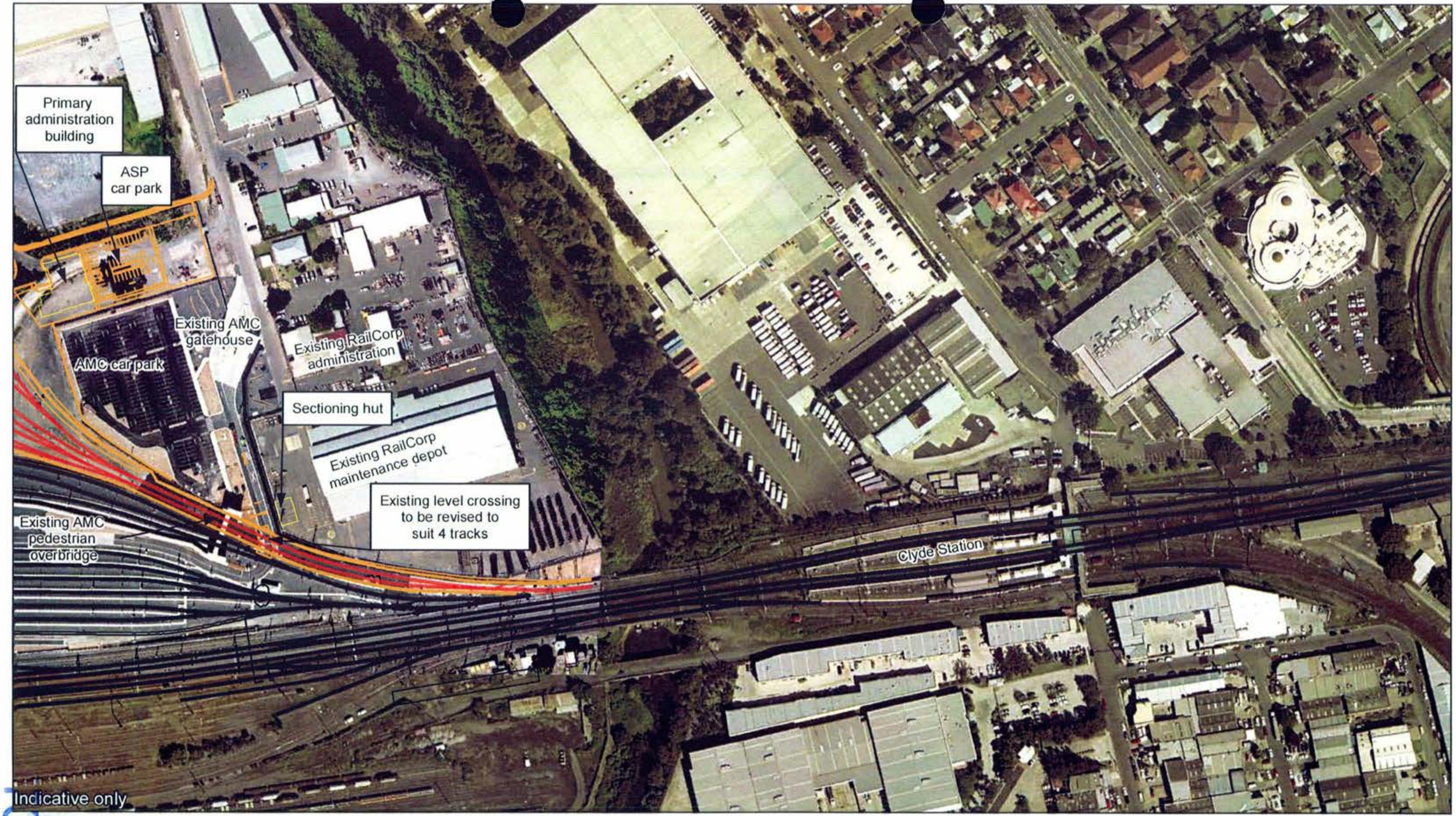
Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - 2010, NSW Department of Lands: Cadastre - 2010. Created by: qjchung



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

- Ancillary infrastructure
- Existing Track
- Detention basin
- Roads works
- Proposed Track
- Stockpile (temporary)

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Auburn Stabling Project

Job Number	21-19479
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Date	29 OCT 2010

Auburn Stabling Project (Clyde Junction)

Figure 6.4

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Data Source: Navigate StreetMap: StreetMap - 2010; NSW Department of Lands: Cadastre - 2010. Created by: qjchung

6.2.4 Overhead wiring and signalling

Overhead wiring (OHW) is to be installed on all new tracks and would be tied into existing OHW where required. OHW would be powered by connections from the AMC and existing rail network OHW systems, potentially via a sectioning hut. This signalling infrastructure includes a signalling room, a compressor room and two signalling huts. The signalling room and compressor room are to be located on the eastern side of the stabling yard to the east of the car turning loop. The two signalling huts are to be located at the following locations:

- to the north-east of the stabling area adjacent to AMC
- to the south of the Auburn Neck to the west of the proposed MainTrain overbridge.

The locations of these pieces of signalling infrastructure are shown on Figure 6.3 and Figure 6.4.

The ASP involves installation of new signalling infrastructure to suit the new track and connections to the existing track. The entrance/exits at the Auburn and Clyde ends of the ASP would be integrated into the existing signalling for the main lines.

6.2.5 Sectioning hut

In order to power the ASP, a new sectioning hut may be constructed on site and would be connected into the existing RailCorp supply from the Down Relief and the AMC. The hut would be located within the RailCorp Maintenance Depot land located to the south of Clyde Neck adjacent to the existing level crossing providing access to the AMC. This sectioning hut would have an approximate area of 50 square metres.

6.2.6 Electrical

Low voltage electricity supply for light and power for the amenities buildings within the stabling yard area, car park and the general site would be provided from two new 200kVA padmount distribution substations to be located on either side of the stabling yard. These substations would also supply power to the new signalling system in the stabling yard.

6.2.7 Staff car park

A new staff car park would be constructed adjacent to the primary administration, amenities and storage building. This car park would be located directly adjacent to the existing AMC car park and would have space for approximately 40 vehicles, with an additional two *Disability Discrimination Act* (DDA) compliant parking spaces located as close as possible to the primary administration building. A new driveway would be constructed off the Private Road with access to the site to be managed via a security gate. To provide flexibility and sharing of facilities in peak periods and in the event that the ASP car park is full, the AMC car park could be used. A secure pedestrian gate would connect to the AMC car park to the ASP site.

6.2.8 New access to MainTrain

Existing access to the MainTrain site by both vehicles and pedestrians is via a level crossing across the existing tracks. Due to the increase in frequency of trains using the tracks in this location as a result of the ASP, the continued operation of the level crossing is considered to be a safety hazard. For this reason, a new overbridge is proposed to allow vehicles and pedestrians to cross the proposed ASP tracks.

The proposed overbridge would be located at the western end of the existing MainTrain car park, approximately 200 metres east of Chisholm Road, and would include a new security check point in the centre of the new roadway. The existing security check point would be decommissioned and demolished. The new access would be connected into the road network along Manchester Road, as shown in Figure 6.3.

The overbridge is to be positioned where the existing tracks are located within a cutting, to minimise the extent of earthworks and substructure required. The bridge would have a span of approximately 20 metres, located approximately six metres above the tracks to provide the required clearance for the new OHW lines. The road approaches would consist of three metre high embankment structures; however the intersection of the new access with Manchester Road would be constructed at the current level.

The bridge would provide both vehicular and pedestrian access. The existing pedestrian footbridge would be demolished as part of the ASP. As pedestrian access across the proposed overbridge would not be DDA compliant, two DDA compliant parking spaces would be constructed at the southern entry of the MainTrain Facility (shown on Figure 6.3).

The construction of the overbridge would require the existing MainTrain car park to be modified, with the temporary loss of 32 car spaces during construction. Should replacement parking spaces be required to meet the parking demand at this site, an alternative location to offset the temporary loss of parking would be investigated prior to construction.

The existing level crossing would remain in use for service maintenance and emergency access only. Lockable gates would be installed at the level crossing to prevent everyday use of this crossing. The ASP would not alter the existing MainTrain car park access, with the existing access to continue to provide access to the car park.

Figure 6.5 shows the proposed overbridge.

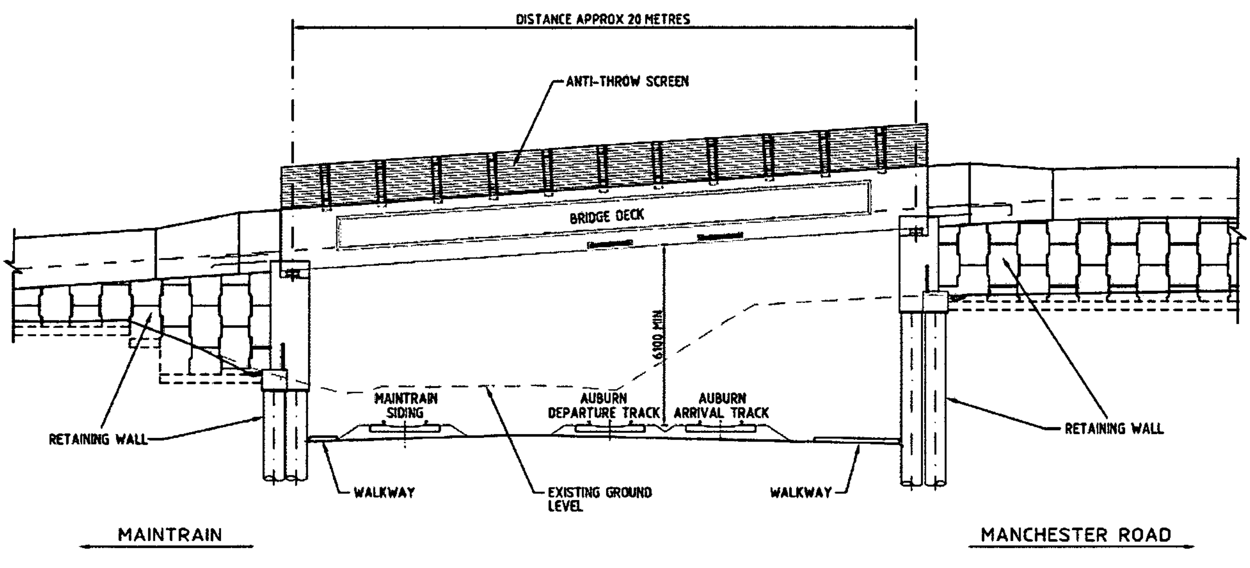

Figure 6.5 New MainTrain overbridge

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6.2.9 Stormwater drainage

Drainage works would occur across the site with the piped stormwater drainage system designed for the 1 in 100 year average recurrence interval (ARI) flood. The roads and car park area would be designed for the 1 in 20 year ARI flood. The drainage system proposed for the ASP would connect into the AMC trunk drainage and underground detention area near the north-eastern corner of the AMC car park.

Two dry detention basins would be constructed on site to supplement the drainage located within the stabling yard. These basins would help attenuate the flows discharging into the trunk drainage system during a 1 in 100 year ARI flood. The largest of these basins is to be located on the land situated between the stabling yard, the AMC and the MainTrain car turning loop. The second basin would be smaller and would be located inside the MainTrain car turning loop to the south-east of the stabling yard.

The stormwater drainage system could incorporate the following water sensitive design elements, which would improve the quality of run off from the site:

- permeable paving
- bio-filtration trenches
- filtration to inter-track storage cells
- bio-filtration to dry detention basins
- rainwater tanks
- rain gardens
- vegetated bio-swales
- pit basket screens
- spill control structures (as required).

Gross pollutant traps are already installed on site.

6.2.10 Noise attenuation

Noise attenuation structures are currently being considered as part of the ASP to minimise the potential noise impacts. This is further discussed in Section 7.1.3. The proposed three metre high noise barrier along the southern and western boundary of the ASP is indicative only, with the height, length and positioning of the barrier subject to further detailed design and consideration of alternative noise mitigation methods.

An 'enclosure' may also be constructed along the Auburn Neck, to the west of the proposed overbridge, to provide a suitable location within which trains departing towards Auburn can test their horns. This 'enclosure' would be partially open on one side and would aim to absorb and deflect train horn noise during testing of the train horns. The need for the 'enclosure' would be confirmed during the detailed design phase following further consideration of alternative noise mitigation measures (such as testing train horns on the Main Line).

6.2.11 Retaining walls

A number of retaining walls are likely to be required as part of the ASP, given the positioning of the tracks within the Auburn Neck in the vicinity of an existing cutting, which results in varying levels between the track and adjacent land.

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The detailed design of retaining structures would take into account construction area constraints, costs and safety during construction.

6.2.12 Control and communication systems and security

Control and communication systems

The control, information and communications technology services required for the ASP include telephones, intercoms, local area network/wide area network and precise clock. To facilitate these services, the following would be provided:

- equipment rooms
- main cable route - outdoors
- main cable route - indoors
- cable pits and pipes
- cable route connection from ASP communication equipment room(s) to existing RailCorp communications.

Security

The security services for the ASP would consist of access control system, intrusion detection system (including perimeter intrusion detection system), closed circuit television (CCTV) system, intercom, perimeter fence around the entire site (similar to that installed at the AMC, see Figure 6.6), physical measures (doors, glazing, gates and barriers) and supporting infrastructures (network and power supply). To facilitate these services, the following provisions are required in addition to those required for the control and communication systems discussed above:

- mounting space and structures (for cameras, intrusion detection sensors and intercoms)
- lighting poles/mounting structures.

The design of the security services would be in accordance with RailCorp Standards.

Access into the site would be via the primary access located off the Private Road and access would be controlled via a security gate.

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Figure 6.6 Existing security fencing at Auburn Maintenance Centre

6.2.13 Lighting

Lighting within the ASP would consist of the following:

- internal lighting of buildings
- lighting for the new MainTrain access including the overbridge, new access road, road connection to Manchester Road and associated security gate house and adjustments to road lighting within the MainTrain site and existing car park to account for road adjustments and reconfiguration of layout
- ASP car park lighting
- adjustment to the road lighting at the existing level crossing on the Clyde end to account for the new tracks
- security lighting within the stabling yard.

Car park and road lighting would satisfy Australian Standards, while lights within the stabling yard would be in accordance with RailCorp Standards. Due to the 24 hour operation of the ASP, lighting would be required to be on for all or most of the night and would be designed to minimise off site impacts to sensitive receivers.

6.2.14 Utility adjustments

The construction of the ASP would result in some impacts to existing service utilities, including the following:

- RailCorp overhead 33kV and 11kV transmission lines that run across the proposed stabling yard
- Jemena gas assets on Manchester Road at the location of the proposed overbridge

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- Sydney Water and Telstra assets on Manchester Road at the following locations:
  - proposed overbridge location
  - proposed access to ASP car park
- Sydney Water assets in the vicinity of new ASP tracks
- Auburn City Council trunk drainage to the east of the existing MainTrain level crossing
- Telstra assets within the MainTrain site in the vicinity of the permanent way of the tracks
- RailCorp assets including signalling and communications adjacent to the MainTrain Facility and the Auburn Neck
- AMC services including communications, power, fire services, sewer, signalling and water.

The location and extent of impact on these services would be confirmed during detailed design, and in consultation with the utility service provider or RailCorp. Adjustments would be made to these services as required.

6.2.15 Earthworks

The ASP involves bulk earthworks which are required to level the site. Earthworks are also required to widen the existing cutting within the Auburn Neck so as to provide the required space for the ASP Arrival and Departure Tracks and MainTrain storage tracks. The earthworks would be undertaken in conjunction with the remediation works described in Section 6.2.16.

Earthworks would also be required to construct the two detention basins to be located on site.

Approximately 17,000 cubic metres of fill material would be required to be exported from the site as it is not suitable as structural fill to be placed above the capping layer. Due to this, there is a shortfall in fill material and therefore approximately 17,800 cubic metres of material would be required to be imported (7,300 cubic metres for capping layer and 10,500 cubic metres for selected fill layer). The construction approach for the ASP has been developed to minimise the amount of imported fill required.

6.2.16 Remediation works

Due to past rail-related uses at the Clyde Marshalling Yards and the nature of surrounding land uses (i.e. industrial and commercial properties and other train maintenance facilities) there is contamination present on site, as detailed in Section 7.2.1. Investigations have concluded that contamination on site is not moving either off site or into groundwater and therefore a cap and contain remediation strategy is proposed for the site to limit the exposure of site users and/or off site receptors to contaminants. The cap and contain method involves leaving contaminants on site and covering them with clean material or fill. Capping methods vary depending on the location of the contamination and the construction methods required on the land above the contaminated land. Details can be found in the Remediation Action Plan (RAP) developed for the site (see Technical Paper 2 in Volume 2).

Various cap designs have been proposed depending on the location of the contamination. Details can be found in Technical Paper 2 in Volume 2.

The remediation works would involve the capping of the contaminated land with approximately 7,300 cubic metres of material to prevent the further movement of contaminated soil. Excess material from excavation on site and imported fill would then be placed on top of the capped contamination as part of the earthworks discussed in Section 6.2.15.

All remediation works would be undertaken in accordance with the RAP. A summary of the RAP is provided below, with further details located in Technical Paper 2 in Volume 2.

Remediation Action Plan

The RAP outlines the procedures for the remediation works and provides an appropriate scope for validation works to show that the site would be suitable for use as a stabling facility following remediation. The RAP has been prepared in accordance with the appropriate DECCW guidelines, specifically the EPA publication *Guidelines for Consultants Reporting on Contaminated Sites* (1997).

The RAP identifies the different remedial options available and identifies that a cap and contain design is considered to be most suitable for the site. The cap and contain method would involve the capping of the contaminated material using a range of methods depending on construction planned in any area (details of these methods are located in Technical Paper 2 in Volume 2). All caps would be underlain with a marker layer, which would be laid on the final contaminated surface. Due to the low leachability of the contaminants, the cap would not be required to be impermeable. The construction of the ASP would however result in a low permeability cap due to hardstand areas and the drainage system to be constructed as part of the ASP. The intention of this cap is to limit the exposure of site users and/or off-site receptors to contaminants.

The RAP outlines methods for the implementation of the RAP strategy, including:

- detail and bulk excavation protocols for the following works:
  - early works such as demolition, clearing and detailed excavations
  - bulk earthworks
  - dust and odour management and suppression
  - spoil management and waste classification, including protocols for spoil requiring off-site disposal (contaminated soils and filling), virgin excavated natural material requiring off-site disposal, spoil contingency plan, stockpiling of contaminated material, loading and transport of contaminated material, and disposal of material
- sedimentation and erosion controls
- unexpected finds protocols for:
  - underground storage tanks and other buried structures
  - volatile contaminants
  - asbestos
- excavations after the placement of the cap
- groundwater management.

The RAP also includes occupational, health and safety controls which are required for works on the ASP site in general and when working in the vicinity of particular areas.

Finally, the RAP outlines the validation strategy which would be followed in order to ensure that the site is safe for site users and off-site receptors once the remediation works are complete. As part of the

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validation process, a validation report would be prepared to confirm that the site has been remediated to a suitable standard for the proposed use as a train stabling facility.

6.2.17 Landscaping

Landscaping for the ASP would be minor in nature due to the intended use of the site. It is expected that some soft landscaping would be utilised at the site entrance and on exposed batters and around the vicinity of the buildings. Stripped topsoil would be reused and spread over batters, stockpile sites and access tracks throughout the site. Progressive landscaping of the stabling yard would help to minimise erosion and therefore reduce the requirement to implement additional environmental controls on exposed areas of land.

6.2.18 Relocation and removal of existing structures on site

The ASP would require the removal of an existing MainTrain shed located along the southern boundary of the site, which is located on land where the proposed tracks are to be constructed. This shed is no longer in use and is not considered to be of heritage significance.

The construction of the proposed tracks along the southern boundary would also require the removal of an existing MainTrain training room. This training room would be demolished and reconstructed approximately 50 metres to the west adjacent to an existing hardstand area located adjacent to the new MainTrain sidings.

6.3 Property acquisition

Two areas of acquisition have been identified for the ASP:

- approximately 300 square metres of Lot 1 DP 775808 an Industrial property owned by Janyon Pty Ltd and operated by Bluescope Steel
- approximately 4,140 square metres of Lot 2 DP 775808 which is vacant land owned Janyon Pty Ltd.

The location of these areas is shown on Figure 2.3.

Any acquisition required would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*, and associated subdivision/title amendments undertaken accordingly.

Land that is required for the ASP construction period (i.e. the stockpile site) would be leased from the owners (Janyon Pty Ltd) for the duration of the construction period. This land would then be returned to the owner after being rehabilitated to its original state or a state agreed upon through consultation with the landowner.

6.4 Construction of the ASP

6.4.1 Construction workforce and hours

Construction workforce

It is anticipated that approximately 95 staff would be required during construction of the ASP. The largest number of staff would be required during the main civil construction works.

Construction hours

Work would mainly be undertaken during the following construction hours:

- 7am to 6pm Monday to Friday
- 8am to 1pm Saturday.

There is potential for some out of hours construction (excluding any works undertaken during possession periods) in order to minimise the impacts on surrounding land uses. All works would be undertaken in line with the TCA *Construction Noise Strategy*.

Night works would be required to be undertaken during a number of possession periods to connect the overhead wiring for the ASP into the existing CityRail network. Track and signalling connections would be completed as part of the LGCUP. These works would potentially occur for 24 hours a day during the scheduled possession periods. These possession periods form part of the RailCorp possession regime and would occur regardless of the ASP.

6.4.2 Construction program

The construction program for the ASP is divided into four distinct phases of work as follows:

- Enabling works: involves the adjustment of any existing services within the ASP site that have the potential to affect the reliability of the main rail corridor.
- Main works: involves earthworks, construction of stabling facilities including the amenities building and overbridge, laying of track work and installation of signalling, power supply and other systems.
- Commissioning: involves the testing of all infrastructure and equipment prior to the ASP becoming operational for the stabling of trains.
- Demobilisation and rehabilitation of construction areas: involves the removal of all portable offices and amenities and removal of temporary service utility connections. Landscaping may also be undertaken as part of this final stage of the ASP.

Enabling works for the ASP would commence in mid 2011 with construction to start in late 2011. Based on the current indicative scenario, construction is anticipated to take approximately 24 months and be completed by the end of 2013.

The ASP would be integrated into the main network by 2014 for the Auburn Junction and by 2017 for the Clyde Junction. This work, involving track, signalling and overhead wiring connections, would be undertaken as part of the LGCUP.

Table 6.1 provides an indicative construction program for main elements for the ASP.

Table 6.1 Indicative construction program

Construction activities	Construction timeframes								
	End 2011	2012				2013			
Remediation and earthworks	■	■	■	■	■	■			
Drainage system	■	■	■						
Car park and road works	■	■	■	■		■			
Retaining walls		■	■						
Elevated walkway		■	■						
Staff amenities and buildings		■	■						
MainTrain overbridge			■	■					
Combined services route			■	■					
Power supply					■	■	■	■	
Walkways						■	■		
Track work						■	■	■	
Overhead wiring						■	■	■	■
Signalling						■	■	■	■
Communication systems						■	■	■	
Security (CCTV)								■	
Commissioning of ASP									■

6.4.3 Construction worksites and access points

Construction worksite

The site compound would be located within the proposed ASP car park. When works on the car park are being undertaken, a suitable alternative location would be provided within the ASP site. This location would be determined during detailed design.

A satellite site office for the construction of the new MainTrain overbridge could potentially be located within the proposed stockpile site located directly to the west of the proposed overbridge. The location of construction compounds would be confirmed during detailed design.

Access points

Access to the stabling yard during construction would be from the Private Road, in the vicinity of the proposed ASP car park. All deliveries and spoil removal would generally be via this entrance, although there is potential for some deliveries (i.e. imported fill material) to be delivered directly to the proposed stockpile site via an access to the west of the existing MainTrain car park.

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Access to the proposed overbridge works would be via the new construction access road for the southern bridge abutment and the existing access road (via existing level crossing) to access the northern bridge abutment and ramp works.

Stockpiling sites

Stockpiling would potentially be located within the vacant land (owned by Janyon Pty Ltd) located adjacent to the proposed overbridge (see Figure 6.3). This land would be leased during construction.

Stockpiling of excavated contaminated material would be provided on site to minimise the risk of cross contamination. Stockpiling of contaminated material would be carried out in accordance with the RAP.

Details of stockpiling sites would be confirmed during detailed design and construction planning.

Lay down areas

Lay down areas would be provided throughout the ASP site and would be positioned depending on availability of land during any particular stage of the ASP. Lay down areas would be used to store equipment and materials which have been delivered to the site prior to their use on site. There is potential for the stockpiling site to be used as a lay down area.

6.4.4 Construction traffic and routes

During the construction phase, approximately 22,400 truck movements are expected. Approximately 8,600 of these movements are associated with the importation and exportation of material for earthworks. These 8,600 movements for earthworks would occur over approximately a one year period with peak movements of approximately 30 movements per day, or three per hour. The remaining 13,800 truck movements would occur over the entire two year construction period with peak movements of approximately 24 truck movements per day, or three per hour.

It would be possible for these truck movements to occur simultaneously, which would result in approximately 54 movements per day, or six per hour. This figure is considered to be the maximum number of truck movements, providing a worst-case scenario. This number would potentially be reduced if track and ballast is delivered to the site by rail, therefore removing the need for trucks to deliver these materials. The use of trains for the delivery of track and ballast would be determined during detail design.

The majority of truck movements would occur during daylight construction hours. Some deliveries and removal of equipment (such as large cranes) at the site may require trucks to be used outside normal construction hours in accordance with RTA requirements.

The majority of truck movements would be via Manchester Road and the Private Road. To provide a worst-case assessment of the traffic impacts, it has been assumed that trucks would enter the site via the site access which is in the vicinity of the proposed ASP car park, although it is expected that some movements would also access the site off Manchester Road in the vicinity of the new proposed MainTrain overbridge and also via the existing MainTrain entrance (for works on the northern abutment).

Truck movements to the arterial road network would travel along Manchester Road, The Crescent and across the rail corridor, right into Rawson Street, and then left into St Hilliers Road, where both Parramatta Road and the M4 Motorway can be accessed to travel to either the east or west. Figure 6.7 shows the proposed heavy vehicle haulage routes.

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1:10,000 (at A4)

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

Heavy Vehicle Haulage Routes

CLIENTS | PEOPLE | PERFORMANCE

TCA
Auburn Stabling Project

Heavy vehicle
haulage routes

Job Number	21-19479
Revision	A
Date	20 OCT 2010

Figure 6.7

G:\21\19479\GIS\Maps\MXD\21_19479_Z010_Heavy_Vehicle_A4.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - Jan 2010. Created by: qjchung

It is estimated that a maximum of 95 construction personnel would be on site daily. Based on the assumption of a worse-case car driver rate of 100 per cent (i.e. each employee driving a car), construction of the ASP would yield a traffic generation in the order of 190 light vehicle movements per day. Construction parking is likely to be located adjacent to the proposed stockpiling site (within the vacant land owned by Janyon Pty Ltd), although this would be confirmed during detailed design.

6.4.5 Plant and equipment

Table 6.2 provides an indication of the construction plant and equipment that would be required during construction.

The construction scenarios outlined in Table 6.2 are as follows:

- A – Site setup and preliminary works
- B – Ground treatment
- C – Earthworks
- D – Overbridge
- E – Culverts and drainage
- F – Retaining walls
- G – High voltage supply
- H– Track and ballast
- I – Overhead wiring and signalling
- J – Landscaping
- K – Under boring/direction drilling

Table 6.2 Typical equipment

Construction equipment	Construction scenario										
	A	B	C	D	E	F	G	H	I	J	K
Semi-trailer	✓			✓	✓	✓			✓		
Generator	✓	✓	✓	✓	✓	✓	✓		✓		
Concrete saw				✓				✓	✓		
Concrete truck	✓			✓	✓	✓	✓		✓		
Concrete pump		✓		✓	✓	✓			✓		✓
Excavator	✓	✓	✓	✓	✓		✓	✓	✓		✓
Piling bore rig				✓		✓	✓		✓		
Franna crane				✓				✓	✓		
Mobile crane	✓	✓		✓	✓		✓				
Graders	✓	✓	✓								

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Construction equipment	Construction scenario										
	A	B	C	D	E	F	G	H	I	J	K
Dump trucks	✓	✓	✓	✓	✓		✓	✓		✓	
Hiab truck	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Front end loaders		✓	✓	✓	✓	✓		✓		✓	
Vibratory roller		✓	✓	✓	✓						
Compactor		✓	✓								
Bull dozer	✓	✓	✓								
Impact roller		✓									
Dewatering pump	✓	✓	✓	✓	✓	✓			✓		✓
Water carts	✓	✓	✓	✓	✓	✓					
Directional drill											✓
Elevated work platform				✓					✓		
Track laying machine								✓			
Tamper								✓			
Rail grinder								✓			
Drill rig		✓		✓						✓	

6.5 Operation of the ASP

6.5.1 Operational staging

At commissioning of the ASP at the end of 2013, only a total of 11 tracks would be operational, with these tracks to be all accessed via the Auburn Junction. Access from the Clyde Junction would be provided in 2017. This would increase the number of operational tracks to 16. Six tracks would be accessed via both the Auburn and Clyde junctions while the remaining tracks would only be accessible from one end of the ASP (five from the Auburn end and five from the Clyde end).

The ASP would be fully integrated with the main network by 2017. Integration of the ASP at the Auburn Junction would be completed by 2014 and integration at the Clyde Junction would be completed by 2017. The integration with the main network would be undertaken as part of the LGCUP.

6.5.2 Operational activities

The proposed stabling facility would operate 24 hours per day, 7 days a week. The activities carried out during the operation of the stabling facility would include:

- overnight and between-peak stabling of train sets
- internal train cleaning performed by train presentation staff (includes internal graffiti removal)

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- spot cleaning on train exteriors by train presentation staff (includes drivers' windscreens)
- shunting of train sets in preparation for departure or to accommodate arriving train sets
- train preparation performed by train crew
- division and amalgamation of trains by train crew
- minor rolling stock repairs performed by train technicians.

The movement of trains to and from the stabling facility would generally be during the evening, night and early morning. Trains would enter the facility between approximately 9pm to 12 midnight and would exit between approximately 3.30am and 6am. Limited train movements would occur outside these hours (up to four trains per hour) however the facility would be fully operational (i.e. cleaning and maintenance activities) during these hours.

Table 6.3 outlines the operational requirements which would be met during the morning and evening peaks.

Table 6.3 Operational train movements

Night	Arrive – evening peak (9pm to 12 midnight)		Depart – morning peak (3.30am to 6am)	
	From east	From west	To east	To west
Mon to Thurs	10	5	10	5
Fri night/Sat morning	10	5	4	2
Sat night/Sun morning	5	1	4	2
Sun night/Mon morning	5	1	10	5

Many of the trains departing to the east would use the Lidcombe Triangle Loop to support services along the Bankstown Line and to Liverpool.

6.5.3 Operational workforce

Table 6.4 outlines the indicative workforce required during the operation of the ASP. As shown in Table 6.4 the number of staff working at the facilities does not equal the maximum number of staff on site at any one time, due to shift work and differing working hours. The maximum number of staff that would be located on site at any one time would be 52 and is anticipated to occur between 9pm and 5.30am.

Table 6.4 Operational workforce

Position	Number of staff at facility	Maximum number at any one time	Timing of maximum
Train crew			
Drivers	35 - 40	16	3am to 5am 9pm to 12 midnight
Guards	25 - 30	16	3am to 5am 9pm to 12 midnight

Position	Number of staff at facility	Maximum number at any one time	Timing of maximum
Depot manager and personal assistant to the depot manager	2	2	Day shift
Operations standards managers	1	1	Day/night shift rotation
Administrative staff	1	1	Day shift
Presentation services			
Shift manager	1	1	Various
Supervisor	3	1	All year round
Cleaners	22	13	9pm to 5.30am (7 days)
Operations (yard control)			
Operations control	5	1	All year round
Security			
Guard	2	2	24 hour presence
Train technicians			
Technician	2	1	24 hour presence
Asset maintenance			
Maintenance staff	Roving crews would respond to service calls and the maintenance schedule.		

6.5.4 Maintenance of the site

Generally the proposed new tracks would have standard components, and normal inspection and maintenance methods would be adopted, in accordance with RailCorp standards. No unique or unusual OHW or signalling infrastructure is required.

Internal maintenance roads are located in the following locations:

- along the southern edge of the Auburn Neck between the new MainTrain overbridge access and the proposed ASP car park
- along the eastern edge of the car turning loop
- along the western side of the Clyde Neck north of the stabling yard.

The above maintenance roads connect into the internal road network provided within the stabling yard.

6.6 Sustainability in project development

The Preliminary Concept Design for ASP has been undertaken in accordance with TCA's *Sustainable Design Guidelines* which groups sustainability initiatives into six themes:

- energy
- materials and waste
- biodiversity and heritage
- water
- pollution control
- community benefit.

A selection of the sustainable design initiatives proposed in the Preliminary Concept Design include:

- buildings oriented to consider passive design principles within the constraints of the site
- building design incorporates climate responsive measures such as shade devices and natural ventilation
- car parking, roadways and pathways to contribute to stormwater drainage by use of permeable surfaces
- two detention basins have been incorporated into the design to mitigate flooding, and the design capacity allows for climate change
- landscaping design commitment to low water demand species

Additional sustainability initiatives to be further explored during future design stages include:

- optimising workspace lighting in the stabling yard
- further detailed analysis to explore the full range of low carbon and renewable energy technologies available on the market, their ease of integration into the ASP, their land use implications and visual integration, as well as capital costs, operational costs and energy generation rates
- update of the carbon footprint assessment as more detailed material mass/volume information becomes available and use of the outcomes of the assessment to inform material selection and specification in the design
- development of a materials procurement strategy
- assessment of indoor environmental quality of the primary administration, amenities and storage building in accordance with the building and construction industry Green Star - Office Design v3 and Green Star - Office As Built Technical Manuals
- development of Waste Management Plans for construction and operation, linked to procurement and materials strategy
- provision of cyclist facilities on site (i.e. bike racks, showers etc) to encourage staff to cycle to work
- further coordination of sustainability initiatives with regard to construction management strategies.

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7. Environmental impact assessment

This chapter outlines the impacts that would potentially result from the construction and operation of the ASP. A description of the existing environment for each issue is also included, along with the mitigation measures proposed to minimise impacts.

7.1 Noise and vibration

A Noise and Vibration Assessment has been undertaken for the ASP. A full version of the technical report is included in Technical Paper 1 in Volume 2 with a summary provided below.

7.1.1 Existing environment

Sensitive receivers

Identified sensitive residential receivers located in the vicinity of the ASP have been categorised into the following Noise Catchment Areas (NCA):

- Sheffield Street (NCA 1) – properties in Sheffield Street back onto the Private Road to the south of the site. These properties are approximately 250 metres from the stabling yard, and are generally single storey dwellings, with some two storey dwellings present.
- Manchester Road (NCA 2) – properties that front Manchester Road, approximately 250 metres from the stabling yard and 90 metres from the Auburn Neck and Auburn Junction. These properties are generally single storey dwellings, however some two storey dwellings are present.
- The Crescent (NCA 3) – properties that front The Crescent, located as close as 35 metres from the works within the Auburn Neck and Auburn Junction. These properties include some two storey residences. St Joseph's Public Hospital located one block away on Normanby Road, is also included.
- Properties to west of Duck River (NCA 4) – properties located on Seventh, Myrtle, Mimosa, Nielsen, Factory, First and Second streets. These properties are generally single storey dwellings, though most are shielded from the ASP site by existing industrial buildings to the west of the ASP site. Streets located further to the north are located further from the ASP and closer the Main West Line.
- Rawson Street (NCA 5) – properties fronting Rawson Street to the north of the Main West Line. These properties are generally single storey and located approximately 600 metres from the stabling yard and 100 metres from works within the Auburn Neck and Auburn Junction.

Figure 7.1 shows the extent of each of the above noise catchment areas and also the location of the monitoring locations discussed below.

Background noise

Long-term unattended noise measurements were undertaken between 1 July and 12 July 2010 at a total of four locations (deemed to be representative of the NCAs), in order to determine the existing noise environment for each of the NCAs (refer Figure 7.1). No suitable secure location for a logger was available along The Crescent (NCA 3) for unattended noise monitoring. However, attended survey noise monitoring was undertaken in NCA, with noise levels considered similar to those measured for Manchester Road (NCA 2). The results of background noise monitoring are provided in Table 7.1.

Table 7.1 Background noise levels

Location (NCA)	Daytime noise level (dBA)		Evening noise level (dBA)		Night-time noise level (dBA)	
	RBL[1]	Average (L_{Aeq})	RBL[1]	Average (L_{Aeq})	RBL[1]	Average (L_{Aeq})
1. Sheffield Street	37	52	37	46	35	45
2. Manchester Road	41	65	41	62	38	59
3. The Crescent	No logger deployed as no secure location available. RBL based on comparison to NCA 2 and considered to be 2dBA higher.					
4. West of Duck River	40	55	43	55	37	47
5. Rawson Street	53	69	50	67	46	65

Note:

1. The Rating Background Level for each period is the median value of the assessment background level values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

7.1.2 Construction impacts

Construction noise

Construction noise criteria and goals

The applicable construction noise goals (noise management levels) for the ASP are contained in DECCW's *Interim Construction Noise Guideline* (2009). During standard hours, a noise management level ($L_{Aeq\ (15minute)}$) of rating background level plus 10 dBA applies for residential receivers (i.e. noise management level = background noise level + 10 dBA).

This noise management level aims to represent the level above which there may be some community reaction to construction noise. Where the predicted levels exceed the noise management level, all feasible and reasonable work practices should be applied to minimise the potential noise impacts.

Where $L_{Aeq(15minute)}$ construction noise levels are predicted to exceed 75 dBA respite periods may be required, including restricting the hours that the very noisy activities can occur.

The specific construction noise criteria for the ASP are shown in Table 7.2.

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1:10,000 (at A4)

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

- Noise monitoring locations
- NCA 1
- NCA 2
- NCA 3
- NCA 4
- NCA 5
- Ancillary infrastructure
- Detention basin
- Proposed track
- Existing track
- Roads works

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TCA
Auburn Stabling Project

Job Number 21-19479
Revision A
Date 29 OCT 2010

Noise catchment areas and approximate monitoring locations

Figure 7.1

G:\21\19479\GIS\Maps\MXD\21_19479_Z019_Noise catchment areas.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - Jan 2010. Created by: qjchung

Table 7.2 Project specific construction noise criteria

Location (NCA)	L_{Aeq} construction noise criteria (dBA) Daytime (7am – 6pm)
1. Sheffield Street	47
2. Manchester Road	51
3. The Crescent	53
4. West of Duck River	50
5. Rawson Street	63

Predicted construction noise levels

Predicted noise levels from the main three construction stages, earthworks, trackworks and overbridge construction, are provided in Table 7.3.

Table 7.3 Predicted construction noise levels

NCA	Predicted $LA_{eq,15min}$ noise levels (dBA)								
	Earthworks			Trackworks					Bridge
	North	South	Stockpile	North	South	West	East-east	East-mid	
1. Sheffield Street	33 - 51	37 - 57	30-49	26 - 39	29 - 50	18 - 33	21 - 38	23 - 47	28 - 48
2. Manchester Road	25 - 50	29 - 58	31-67	18 - 43	22 - 50	15 - 33	25 - 60	27 - 59	33 - 59
3. The Crescent	24 - 41	29 - 43	25-45	17 - 34	22 - 36	18 - 30	28 - 70	27 - 49	29 - 50
4. West of Duck River	29 - 52	30 - 56	18-40	22 - 40	23 - 44	20 - 41	17 - 31	16 - 34	22 - 40
5. Rawson Street	31 - 45	36 - 38	36-39	24 - 38	29 - 31	23 - 31	29 - 50	34 - 43	39 - 45

Predicted noise levels in Table 7.3 indicate that some mild to moderate exceedances of criteria (Table 7.2) are expected at the nearest receivers. It should be noted that the noise levels identified in Table 7.3 represent the typical worse-case use of plant and thus noise levels would be expected to be lower than those presented for much of the construction period.

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Construction vibration

Construction vibration criteria

Vibration limits are typically established to meet two objectives:

- human comfort in buildings affected by the construction
- avoidance of damage to buildings affected by construction vibration.

When assessing human comfort, the DECCW's *Assessing Vibration: A Technical Guideline* provides acceptable values for continuous and impulsive vibration.

In regard to potential building damage, the German Standard DIN4150 suggests a limit of between 5-20 millimetres per second peak particle velocity, depending on the dominant frequency of vibration, within dwellings and buildings of similar construction. For the typical frequencies produced by construction activities this limit is usually around 10 millimetres per second. Without precise knowledge of the vibration frequency, which is both activity and site specific, conservative limits can also be applied.

Predicted construction vibration levels

At the typical distances to residential receivers, vibration levels are predicted to be substantially less than both structural damage and human comfort criteria given the likely duration of construction activities. It is possible that if some tamping of ballast is required approximately 35 metres from residences, this vibration may just be perceptible and duration is likely to be in the order of a few hours.

The nearest industrial buildings to any part of construction site are approximately 20 metres away. A review of vibration levels indicates that levels would be below the maximum commercial continuous vibration criteria at this location.

Accordingly, no adverse impact associated with vibration from construction is predicted at either nearby industrial or residential receivers.

Construction traffic noise

Traffic noise criteria

Applicable noise criteria for proposals which have the potential to increase traffic on roads are presented in the DECCW's *Environmental Criteria for Road Traffic Noise* (ECRTN).

For noise assessment, Manchester Road can be considered as a collector road east of Chisholm Street and a local road west of Chisholm Street. Sheffield Street and the Private roads can be considered as local roads. The applicable noise criteria are:

- for land use developments with the potential to create additional traffic on collector roads:
  - $L_{Aeq,1hour}$ 60 dBA during daytime (7am – 10pm)
  - $L_{Aeq,1hour}$ 55 dBA during night time (10pm – 7am).
- for land use developments with the potential to create additional traffic on local roads:
  - $L_{Aeq,1hour}$ 55 dBA during daytime (7am – 10pm)
  - $L_{Aeq,1hour}$ 50 dBA during night time (10pm – 7am).

Existing traffic noise levels at the residences on Manchester Road exceed the base criteria of 60 dBA and 55 dBA during most hours. There is no opportunity to provide noise mitigation at the roadside to reduce noise levels hence a criterion of +2 dBA applies.

For the rear of residences on Sheffield Street, existing levels at most hours of the day or night time are below the base criteria of 55 dBA and 50 dBA, with the exception of the morning peak hours.

Where these criteria are already exceeded by existing traffic noise levels, the ECRTN recommends in all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA.

Predicted construction traffic noise impacts

It is expected that 95 light vehicle movements would be required each morning and evening. To provide a worst case assessment, it has been assumed that 95 light vehicle movements would occur in the hour prior to 7am and in the hour after 5pm. An average of 54 heavy vehicle movements would be required each day during the first year of construction. To provide a worst case assessment, it has been assumed that some grouping of heavy vehicle movements may occur and as such up to 10 heavy vehicle movements would occur in an hour.

Manchester Road residences

The arrival of 95 light vehicles in the hour between 6am and 7am would result in an increase in existing noise levels of less than 1 d BA. This complies with the ECRTN allowance criterion and marginal impact would be expected.

Up to 10 heavy vehicles per hour during the daytime would result in a less than 1 dBA increase from existing levels of typically between 64-66 dBA to 65-66.5 dBA. This complies with the ECRTN allowance criterion and marginal impact would be expected during the busier construction phases.

Sheffield Street residences (backing onto the Private Road)

The arrival of 95 light vehicles in the hour between 6am and 7am would result in a 2 dBA increase in existing noise levels from 56.5 dBA to 58.5 dBA. This complies with the 2 dBA allowance criteria in the ECRTN, although marginal impact is expected during the busier construction phases in this hour.

Up to 10 heavy vehicles in an hour during the day would result in up to a 2 dBA increase from typically between 55-57 dBA to 57-58.5 dBA. This meets the 2 dBA allowance criteria in the ECRTN, although marginal impact is expected during the busier earthworks phase.

7.1.3 Operational impacts

Operational noise

Operational noise criteria and goals

Rail noise is normally assessed using the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP) (DECC/DOP 2007). This document mainly relates to either new rail lines or redevelopment of existing rail lines and some other ancillary rail activities where noise is likely to be generated. Specifically, the document does not apply to 'projects involving maintenance facilities for rolling stock' which it stipulates should be assessed in accordance with the *NSW Industrial Noise Policy* (INP) (EPA 2000).

Whilst the ASP is not a maintenance facility, the types of activities occurring within the facility including trains in a stationary position 'on air' with systems running and cleaning/maintenance and preparation activities occurring would be more closely related to the type of noise generated for a maintenance facility than that from rail movements along a rail line.

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Considering the information provided above, the stabling yard would be assessed according to the INP. However, for the tracks within the Clyde and Auburn Necks and the Clyde and Auburn Junctions, since the only activity occurring along these zones are rail movements typical of rail noise generation on any existing or new line, it is considered appropriate to assess the noise from these areas in accordance with the IGANRIP requirements.

In addition to assessment against INP and IGANRIP, assessment against DECCW guideline for sleep disturbance has also been undertaken to determine the impact of short-term high noise level events such as train horns.

Figure 7.2 shows the areas of the ASP and the criteria which apply for rail noise generated within these zones.

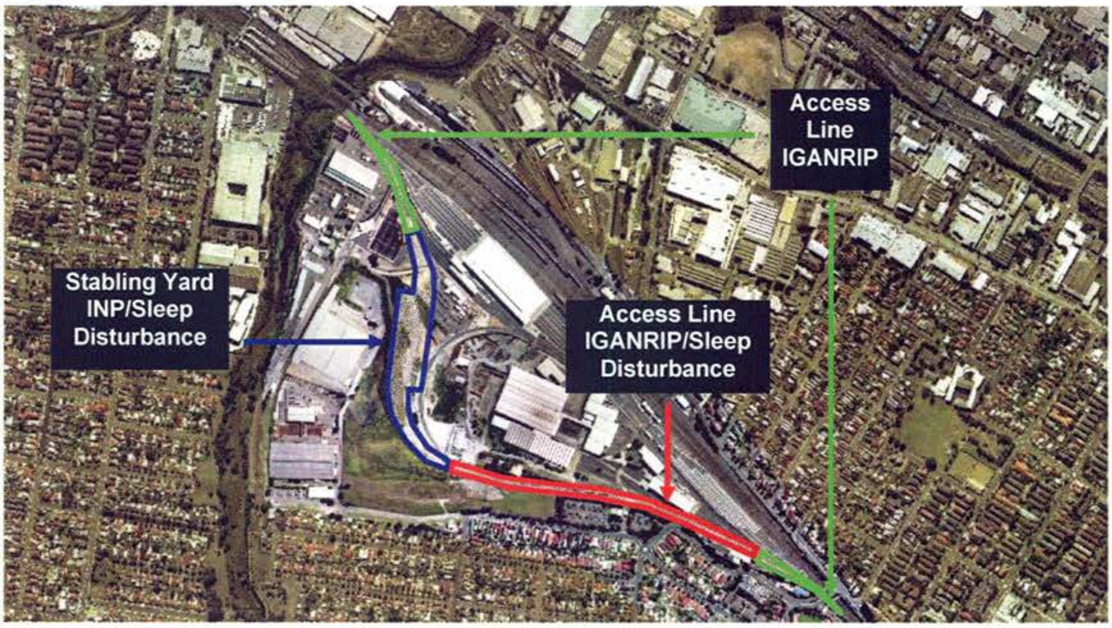

Figure 7.2 Applicable noise assessment guidelines

Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP)

Table 7.4 outlines the noise criteria under IGANRIP.

Table 7.4 Airborne rail traffic noise trigger levels for residential land uses

Type of development	Day (7am – 10pm)	Night (10pm – 7am)	Comment
New rail line development	Development increases existing rail noise levels and resulting rail noise levels exceed:		These numbers represent external levels of noise that trigger the need for an assessment of the potential noise impacts
	60 $L_{Aeq(15hr)}$	55 $L_{Aeq(9hr)}$	
	80 L_{Amax}	80 L_{Amax}	

Type of development	Day (7am – 10pm)	Night (10pm – 7am)	Comment
Redevelopment of existing rail line	Development increases existing rail noise levels and resulting rail noise levels exceed:		
	65 $L_{Aeq(15hr)}$	60 $L_{Aeq(9hr)}$	
	85 L_{Amax}	85 L_{Amax}	

Source: Extract of Table 1 of the DECCW's IGANRIP

As three of the five NCAs experience rail noise levels that are sufficiently low that the development would be classified as a 'new rail line development', the night time 'new rail line development' criteria has been adopted for all NCAs (i.e. 55 $L_{Aeq(9hr)}$ and 80 L_{Amax}).

Industrial Noise Policy (INP)

The INP is designed to assess noise using the following two approaches:

- intrusive noise impacts in the short-term for residences
- amenity for particular land uses such as residences.

The INP intrusive goal is set 5 dBA above the RBL for each time period (daytime, evening or night time).

The potentially most affected residential areas would all be classified as suburban by the INP. Accordingly the acceptable amenity levels ($L_{Aeq,period}$) which apply over the whole day, evening or night period are as follows:

- daytime (7am to 6pm) 55 dBA
- evening (6pm to 10pm) 45 dBA
- night time (10pm to 7am) 40 dBA.

Where the existing industrial noise is more than 2 dBA above the acceptable levels, and the existing industrial noise is unlikely to decrease in the future, the amenity criterion is set at 10 dBA below the existing levels.

Similarly in high traffic noise areas, where traffic noise is unlikely to decrease in the future, the amenity criterion is set at 10 dBA below the existing traffic noise levels.

The amenity criteria for ASP, with the inclusion of adjustments for high traffic noise, are shown in Table 7.5.

Table 7.5 Amenity criteria allowing for high traffic noise $L_{Aeq,period}$

Location (NCA)	Time period - all levels dBA		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night time (10pm – 7am)
1. Sheffield Street	55	45	40
2. Manchester Road	55	52	49
3. The Crescent	57	54	51

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Location (NCA)	Time period - all levels dBA		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night time (10pm – 7am)
4. West of Duck River	55	45	40
5. Rawson Street	59	57	55

In order to simplify the dual INP intrusive and amenity approach, an intrusive criterion can be adopted at all receivers which would ensure the amenity criterion (including high traffic areas) would be met based on typical operations.

To the west of Duck River (NCA 4), the higher background noise levels in the evening are considered 'real' and have been adopted, however since this period is not as sensitive as the night time period, this does not alter the consideration of overall noise impacts. Table 7.6 identifies site specific noise criteria for the ASP.

Table 7.6 Site specific residential noise criteria $L_{Aeq,15min}$

Location (NCA)	Time period - all levels dBA		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night time (10pm – 7am)
1. Sheffield Street	42	42	40
2. Manchester Road	46	46(1)	43(1)
3. The Crescent	48	48(1)	45(1)
4. West of Duck River	45	48(3)	42(2)
5. Rawson Street	58(1)	55(1)	51(1)

Notes:

1. Achieving the intrusive levels over a busy 15 minutes is estimated to achieve the high traffic amenity criterion over the relevant day, evening or night period.
2. Achieving these levels over a busy 15 minutes is estimated to achieve 40 dBA over a 9 hour night period.
3. Achieving these levels over a busy 15 minutes is estimated to achieve 45 dBA over a 4 hour evening period

There are no other noise sensitive receivers sufficiently close to the ASP, such that achieving the criteria at the residences identified would not automatically result in achieving criteria at those receivers.

Sleep disturbance

Short-term high noise level events such as train horns have the potential to cause sleep disturbance if they emerge significantly above the background level. Neither IGANRIP nor the INP specifically address sleep disturbance from these types of noise level events.

The DECCW recommends in their *Noise Guide to Local Government* (NGLG) that the $L_{A1,1min}$ noise level should not exceed the background L_{A90} level by more than 15 dBA, which should be used as a screening

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test. In addition, the *Environmental Criteria for Road Traffic Noise* (ECRTN) includes the following statements based on transportation type noise for internal noise levels:

'Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions'

'One or two events per night, with maximum internal noise levels of 65-70 dBA, are not likely to affect health and well being significantly.'

A summary of the recommended night time noise criteria for ASP is shown in Table 7.7.

Table 7.7 Summary of recommended night time noise criteria L_{Amax}

Location (NCA)	Approach	Goal (dBA)
1. Sheffield Street	NGLG – RBL + 15dB	50
2. Manchester Road	ECRTN 50-55dBA Internal + 10dB[1]	60-65
3. The Crescent	ECRTN 50-55dBA Internal + 10dB[1]	60-65
4. West of Duck River	NGLG – RBL + 15dB	52
5. Rawson Street	ECRTN 50-55dBA Internal + 10dB[1]	60-65

Notes:

1 10dBA has been allowed for the attenuation of sound from outside to inside. This is an industry accepted adjustment.

Predicted operational noise levels – without mitigation

Operational noise from the ASP is likely to be generated by train movements (arrivals and departures to/from the stabling yard), the release of brakes once trains are stabled in the yard and the sounding of the train horns. Other insignificant noise would also be generated by the cleaning and minor maintenance processes.

Train horns are a necessary safety device; alerting pedestrians, road traffic users, other trains and also maintenance personnel of the train's imminent movement. Commuter trains used on the CityRail network have two types of horns at each end of the train – town horns and country horns. The town horns are quieter and are used in densely populated residential areas to lessen the nuisance impacts of horn noise. Country horns are louder than town horns, as the higher train speeds outside metropolitan areas requires audibility at greater distances to still give sufficient warning of the approaching train.

Under current RailCorp operating procedures for stabling yards the following is required:

- Prior to departure, the town and country horns at both ends of the train are tested to ensure this safety system is functioning properly and available if required.
- The leading (forward-facing) town horn is sounded to signal imminent movement upon departure or in response to a hand signal from a rail worker.

In order to establish a base case for the consideration of the noise mitigation options (if required), the impacts of the ASP under current RailCorp operating procedures and without noise mitigation were assessed.

Based on the proposed stabling operations, three operational scenarios have been used for the purpose of the noise assessment. These are described below:

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- **Evening/night time arrival scenario (9pm to 12 midnight)** – During this late evening period it is likely a number of trains would arrive at the facility, go through their shut down procedure and be left in stabling mode during the night time period.
- **Night time stabling (1am to 3am)** – This scenario represents the typical operation during the middle of the night when all trains are stabled and some trains are being cleaned. This scenario would also be typical of the daytime period between the morning and afternoon peak hours when background noise levels would be significantly higher.
- **Early morning train preparation and departure (4am to 5am)** – This scenario represents the busiest time within the stabling facility as trains are being prepared for departure and start to depart the facility. This scenario includes horn testing and the sounding of horns to signal imminent movement in the stabling yard.

Evening and night time arrival

Table 7.8 and Table 7.9 outline the predicted $L_{Aeq,15min}$ and L_{Amax} evening and night time arrival noise levels for each of the NCAs.

Table 7.8 Evening/night time arrival $L_{Aeq,15min}$ results summary

NCA	$L_{Aeq,15min}$ criteria[1] (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)	Number of receivers exceeding criteria	No. of receivers in NCA
1. Sheffield Street	40	22 - 41	1	68
2. Manchester Road	43	19 - 40	0	127
3. The Crescent	45	8 - 30	0	37
4. West of Duck River	42	12 - 35	0	201
5. Rawson Street	51	24 - 33	0	31

Notes:

1 Criteria derived from INP.

Table 7.9 Evening/night time brake exhaustion L_{Amax} results summary

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)	Number of receivers exceeding goal	No. of receivers in NCA
1. Sheffield Street	50	32 - 54	4 (All comply with ECRTN)	68
2. Manchester Road	60	32 - 53	0	127
3. The Crescent	60	23 - 44	0	37
4. West of Duck River	52	24 - 52	0	201
5. Rawson Street	60	36 - 46	0	31

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As shown in Table 7.8, the $L_{Aeq,15min}$ noise level from this scenario is predicted to comply with criteria at all receivers except one receiver within NCA 1, where an exceedance of 1 dB is expected.

Table 7.9 shows that four receivers in NCA 1 are predicted to receive noise levels exceeding the NGLG sleep disturbance screening goal by up to 4 dB as a result of train brake exhaustion upon arrival to the stabling yard. However, the ECRTN goal of 60 dBA is achieved at all receivers.

Night time stabling

Table 7.10 outlines the predicted $L_{Aeq,15min}$ night time stabling noise levels for each of the NCAs. It is noted that this modelled scenario does not include assessment against the sleep disturbance goals as all trains are stabled and no short-term high level noise events, such as train horns, would occur.

Table 7.10 Night time stabling $L_{Aeq,15min}$ results summary

NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)	Number of receivers exceeding criteria	No. of receivers in NCA
1. Sheffield Street	40	16 – 38	0	68
2. Manchester Road	43	17 – 38	0	127
3. The Crescent	45	8 – 30	0	37
4. West of Duck River	42	11 – 35	0	201
5. Rawson Street	50	24 – 33	0	31

Table 7.10 shows that all receivers are predicted to comply with the relevant $L_{Aeq,15min}$ criteria.

Early morning train preparation and departure

Table 7.11 outlines the predicted $L_{Aeq,15min}$ early morning train preparation and departure noise levels for each of the NCAs. In order to demonstrate the contribution of horn testing to overall noise levels, the $L_{Aeq,15min}$ noise levels have been modelled with and without horns. Table 7.12 and Table 7.13 outline the predicted L_{Amax} noise levels resulting from horn testing at the Auburn and Clyde ends of the stabling yard, respectively.

Table 7.11 Early morning preparation and departure $L_{Aeq,15min}$ results summary

NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)		Number of receivers exceeding criteria		No. of receivers in NCA
		Without horns	With horns	Without horns	With horns	
1. Sheffield Street	40	22 - 41	31 - 56	1	60	68
2. Manchester Road	43	18 - 40	28 - 52	0	65	127
3. The Crescent	45	8 - 29	16 - 40	0	0	37

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NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)		Number of receivers exceeding criteria		No. of receivers in NCA
		Without horns	With horns	Without horns	With horns	
4. West of Duck River	42	11 - 35	20 - 48	0	12	201
5. Rawson Street	50	24 - 32	32 - 40	0	0	31

Table 7.12 Early morning preparation and departure L_{Amax} results summary – horn at Auburn end

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)		Number of receivers exceeding goal		No. of receivers in NCA
		Town horn	Country horn	Town horn	Country horn	
1. Sheffield Street	50	43 - 72	49 - 78	63	67	68
2. Manchester Road	60	44 - 69	50 - 75	56	105	127
3. The Crescent	60	29 - 55	35 - 61	0	1	37
4. West of Duck River	52	28 - 62	34 - 68	70	86	201
5. Rawson Street	60	41 - 48	47 - 54	0	0	31

Table 7.13 Early morning preparation and departure L_{Amax} results summary – horn at Clyde end

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)		Number of receivers exceeding goal		No. of receivers in NCA
		Town horn	Country horn	Town horn	Country horn	
1. Sheffield Street	50	34 - 56	40 - 62	25	58	68
2. Manchester Road	60	27 - 52	33 - 58	0	0	127
3. The Crescent	60	25 - 47	31 - 53	0	0	37
4. West of Duck River	52	31 - 56	37 - 62	11	65	201
5. Rawson Street	60	34 - 56	40 - 62	0	1	31

$L_{Aeq,15min}$ levels produced by the horn preparation are predicted to exceed criteria at receivers in NCA 1, 2 and 4 (see Table 7.11). In the absence of these horn events only one receiver is predicted to exceed $L_{Aeq,15min}$ criteria, and the magnitude of this exceedance is limited to 1 dB.

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Table 7.12 and Table 7.13 show that many of the identified receivers are predicted to receive L_{Amax} noise levels well in excess of sleep disturbance screening criteria. The greatest noise levels are predicted to occur in NCAs 1, 2 and 4. Noise contours for this scenario indicate that exceedances would also be expected some distance outside the study area (refer to Appendix C of Technical Paper 1).

Rail noise on Auburn and Clyde Necks

Table 7.14 and Table 7.15 outline the predicted noise levels for train movements along the Auburn and Clyde Necks for each of the NCAs.

Table 7.14 Night time IGANRIP $L_{Aeq,9hr}$ results summary

NCA	$L_{Aeq,9hr}$ trigger levels (dBA)	Predicted $L_{Aeq,9hr}$ range (dBA)	Number of receivers exceeding trigger levels	No. of receivers in NCA
1. Sheffield Street	55	12 - 33	0	68
2. Manchester Road		17 - 37	0	127
3. The Crescent		27 - 42	0	37
4. West of Duck River		9 - 28	0	201
5. Rawson Street		24 - 39	0	31

The $L_{Aeq,9hr}$ noise levels are well below the relevant IGANRIP trigger levels. This is to be expected for such a small number of events, relative to a busy main line, occurring at low speeds and with considerable setback to receivers.

Table 7.15 Evening/night time arrival L_{Amax} results summary

NCA	L_{Amax} trigger levels (dBA)	Predicted L_{Amax} range (dBA)	Number of receivers exceeding trigger levels	No. of receivers in NCA
1. Sheffield Street	80	42 - 58	0	68
2. Manchester Road		49 - 63	0	127
3. The Crescent		55 - 68	0	37
4. West of Duck River		40 - 55	0	201
5. Rawson Street		51 - 65	0	31

L_{Amax} noise levels from train passbys are predicted to be well within IGANRIP trigger levels.

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Operational noise – with mitigation

Exceedances of noise criteria and goals have been identified during the following operational scenarios and therefore noise mitigation has been considered to minimise these impacts:

- train arrival and brake exhaust
- train departure
- horn testing prior to departure

In response to the predicted noise levels at the ASP, and noise issues arising with other projects, RailCorp has advised that they are currently reviewing the operating procedures to identify measures by which the impact of train horn noise can be minimised, while also ensuring that future trains operate in a safe manner. At this stage, RailCorp has identified the following means of minimising the impact of horn use at the ASP:

- use of a broadband yard horn to warn of impending train movement within the stabling yard
- eliminating the need to sound country horns
- testing the town horn outside the stabling yard, such as on the Main West Line or along the Auburn Neck, to minimise the potential for sleep disturbance impacts on sensitive receivers.

RailCorp proposes to implement these operational changes subject to the required assessment of safety and operational aspects and obtaining all necessary approvals. Assuming these changes are acceptable, RailCorp envisage that these approvals would be resolved ahead of project completion of the ASP.

The following mitigation options have been considered and the results of modelling can be found in the sections below:

- constructing a three metre high noise barrier
- testing of only the town horns
- testing only the leading (forward-facing) horns
- testing town horns outside the stabling yard (i.e. in an 'enclosure' along the Auburn Neck or on the Main Line).

Constructing a noise barrier

Without mitigation, brake exhaustion is predicted to produce L_{Amax} noise levels exceeding sleep disturbance screening criteria by up to 4 dBA at four receivers in Sheffield Street. This exceedance is not considered to be significant and not likely to require mitigation. However, due to the requirement of a barrier for horn noise (see below), noise impacts as a result of brake exhaustion have been modelled with the inclusion of an indicative three metre high noise barrier along the western and southern boundary of the stabling yard.

Table 7.16 outlines the predicted noise levels resulting from brake exhaustion during arrival and stabling with the installation of a three metre noise barrier.

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Table 7.16 Evening/night time brake exhaustion L_{Amax} predicted results summary with a three metre barrier

NCA	L_{Amax} Goal (dBA)	Predicted L_{Amax} range (dBA)	Number of receivers exceeding goal	No. of receivers in NCA
1. Sheffield Street	50	32 - 50	0	68
2. Manchester Road	60	30 - 51	0	127
3. The Crescent	60	23 - 43	0	37
4. West of Duck River	52	24 - 51	0	201
5. Rawson Street	60	36 - 46	0	31

With the inclusion of the three metre barrier, the L_{Amax} noise levels for evening and night time brake exhaustion are predicted to comply at all receivers.

Table 7.11, Table 7.12 and Table 7.13 indicate that without mitigation, early morning train preparation and departure would result in a number of exceedances of $L_{Aeq,15min}$ and L_{Amax} criteria.

Table 7.17 and Table 7.18 present a summary of the results with a three metre barrier and can be used as the basis for assessing further mitigation options.

Table 7.17 Early morning preparation and departure $L_{Aeq,15min}$ predicted results summary – testing town and country horns within ASP with modelled barrier

NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)	Number of receivers exceeding criteria	No. of receivers in NCA
1. Sheffield Street	40	30 - 51	56	68
2. Manchester Road	43	28 - 49	62	127
3. The Crescent	45	16 - 40	0	37
4. West of Duck River	42	20 - 42	0	201
5. Rawson Street	50	31 - 40	0	31

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Table 7.18 Early morning preparation and departure L_{Amax} predicted results summary – testing town and country horns within ASP with modelled barrier

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)		Number of receivers exceeding goal		No. of receivers in NCA
		Clyde end	Auburn end	Clyde end	Auburn end	
1. Sheffield Street	50	40 - 58	49 - 74	52	67	68
2. Manchester Road	60	33 - 58	50 - 71	0	104	127
3. The Crescent	60	31 - 53	35 - 61	0	1	37
4. West of Duck River	52	37 - 62	34 - 64	65	84	201
5. Rawson Street	60	40 - 62	47 - 54	1	0	31

The results show that significant exceedances of both L_{Aeq} and L_{Amax} criteria are predicted even including a noise barrier. Therefore, consideration of additional mitigation is necessary.

Modelling showed little benefit (1-2 dBA) in raising the barrier from three metres to six metres. This is not considered a reasonable solution and would also have increased visual implications. As such, additional mitigation options were considered, including testing only the leading (forward-facing) town horn and conducting horn testing outside of the stabling yard.

Testing only town horns

Country horns are responsible for the greatest noise emissions. Testing only town horns in the ASP would present a significant reduction in noise emissions.

Table 7.19 and Table 7.20 present the predicted worst case noise levels from testing the town horn only, with a three metre noise barrier.

Table 7.19 Early morning preparation and departure $L_{Aeq,15min}$ predicted results summary – testing town horns within ASP with modelled barrier

NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)	Number of receivers exceeding criteria	No. of receivers in NCA
1. Sheffield Street	40	26 - 47	33	68
2. Manchester Road	43	24 - 44	2	127
3. The Crescent	45	12 - 35	0	37

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NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)	Number of receivers exceeding criteria	No. of receivers in NCA
4. West of Duck River	42	16 - 38	0	201
5. Rawson Street	50	28 - 36	0	31

Table 7.20 Early morning preparation and departure L_{Amax} predicted results summary – testing town horns within ASP with modelled barrier

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)		Number of receivers exceeding goal		No. of receivers in NCA
		Town horn Clyde end	Town horn Auburn end	Town horn Clyde end	Town horn Auburn end	
1. Sheffield Street	50	34 - 52	43 - 68	21	62	68
2. Manchester Road	60	27 - 52	44 - 65	0	55	127
3. The Crescent	60	25 - 47	29 - 55	0	0	37
4. West of Duck River	52	31 - 56	28 - 58	11	48	201
5. Rawson Street	60	34 - 56	41 - 48	0	0	31

The results show significant reductions as compared with testing country horns (see Table 7.18). All but 33 of the receivers in Sheffield Street and two receivers in Manchester Road are predicted to comply with L_{Aeq} criteria and the degree of exceedance reduces from 11 dB to 7 dB.

L_{Amax} noise levels are still predicted to significantly exceed sleep disturbance screening goals, though the number and magnitude of predicted exceedances is reduced.

The residual greatest noise impacts are predicted to result from testing the town horn at the southern end of the facility (where trains depart towards Auburn).

Testing only leading horns

Testing trailing (rear-facing) horns has a significant impact on receiver noise levels. By removing the need to test this horn, the worst-case $L_{Aeq,15min}$ would reduce by 1-2 dB at most receivers. L_{Amax} noise levels would not change but the number of occurrences would reduce.

Implementing alternative methods for signalling imminent movement

To minimise the impacts of sounding the town horn to signal imminent movement, two alternative methods have been identified:

- Older trains, which activate the horn via a manual valve, could be operated such that only a "toot" is produced. RailCorp has stated that such a "toot" has been measured to produce a L_{Amax} sound power level of 110 dBA. The duration of this event would be sufficiently short that L_{Aeq} emissions in comparison to auxiliary systems are negligible.
- The new A Sets (i.e. Waratah trains) could be fitted with a broadband yard horn (commonly referred to as a "quacker"). The procedure using this alarm involves sounding the alarm, which has a maximum sound power level of 110 dBA for 30 seconds. Considering this source averaged over a 15 minute period the L_{Aeq} is below the cumulative auxiliary systems noise, which has been demonstrated to comply without the 3 metre noise barrier.

The L_{Amax} noise levels from either the "toot" or broadband yard horn would comply with the sleep disturbance goals at all receivers with the inclusion of the 3 metre noise barrier.

Testing town horns in an "enclosure" along the Auburn Neck

To minimise the impacts of testing the town horn of trains departing towards Auburn, a scenario where the horn testing was carried out along the Auburn Neck within a 30 metre 'enclosure' with absorptive lining was modelled.

The modelled scenario requires testing of only the leading (forward-facing) horn and includes the provision of the three metre noise barrier discussed previously.

Table 7.21 and Table 7.22 outline the predicted noise levels for the testing of town horns within the "enclosure" for each of the NCAs.

Table 7.21 Early morning preparation and departure $L_{Aeq,15min}$ predicted results summary – testing town horns within Auburn Neck 'enclosure' and low noise signal for movement in the yard

NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)	Number of receivers exceeding criteria	No. of receivers in NCA
1. Sheffield Street	40	21 - 36	0	68
2. Manchester Road	43	20 - 37	0	127
3. The Crescent	45	20 - 46	1	37
4. West of Duck River	42	13 - 34	0	201
5. Rawson Street	50	29 - 38	0	31

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Table 7.22 Early morning preparation and departure L_{Amax} predicted results summary – testing town horns within Auburn Neck 'enclosure'

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)	Number of receivers exceeding goal	No. of receivers in NCA
1. Sheffield Street	50	30 - 52	8 (All comply with ECRTN)	68
2. Manchester Road	60	41 - 59	0	127
3. The Crescent	60	44 - 71	3	37
4. West of Duck River	52	20 - 47	0	201
5. Rawson Street	60	47 - 62	4	31

The predicted $L_{Aeq,15min}$ noise levels comply with criteria at all identified receivers except for a 1 dB exceedance at a single receiver in The Crescent. This exceedance is considered negligible as it is unlikely to be perceptible. Detailed design of the enclosure is expected to eliminate this exceedance.

The L_{Amax} noise levels are predicted to exceed sleep disturbance goals at 8, 3 and 4 receivers in Sheffield Street, The Crescent and Rawson Street respectively.

The three receivers predicted to exceed ECRTN goals in The Crescent are predicted to experience noise levels between 66 and 71 dBA. These receivers are isolated, with surrounding receivers experiencing greater shielding from buildings and the horn enclosure itself. Noise levels of this magnitude might require further investigation to determine the likelihood of awakening reactions. It is anticipated that some local treatments of these receivers may be necessary to reach acceptable internal noise levels.

Further examination of the noise levels shows L_{Amax} up to 52 dBA and 62 dBA in Sheffield Street and Rawson Street respectively. This is a minor 2 dB exceedance of the goals.

Noise levels predicted to be produced by town horns within the enclosure are considered acceptable.

Testing of the town horn on the Main Line

Testing the town horn on the Main West Line would provide an alternative to horn testing within the ASP.

Train horns at the northern (Clyde) end of the ASP are currently directed towards commercial and industrial areas. A review of alternative horn testing locations on the Main West Line for trains departing towards Clyde concluded that residences are generally in closer proximity and/or with less shielding than at the ASP and as such a suitable location on the Main West Line could not be found. Therefore, this assessment considers only horns testing on trains departing towards Auburn, to replace horn testing at the southern end of the ASP where significant impacts have been identified.

The alternate location on the Main West Line identified for testing horns of trains departing towards Auburn is approximately 1.2 kilometres from the ASP, between Auburn and Lidcombe stations (refer Figure 7.3). The buildings adjoining the railway are commercial or industrial and provide significant shielding to the residential receivers on the south-western side of the track. An oval and parks provide a large setback distance to receivers in the easterly direction.

Background noise monitoring was undertaken at two locations in the vicinity of the proposed testing location (refer to Technical Paper 1 in Volume 2 for further details). The results of this monitoring are located in Table 7.23 and indicate that the area is subject to high levels of existing road and rail noise, with L_{Amax} noise levels reaching 84 dBA.

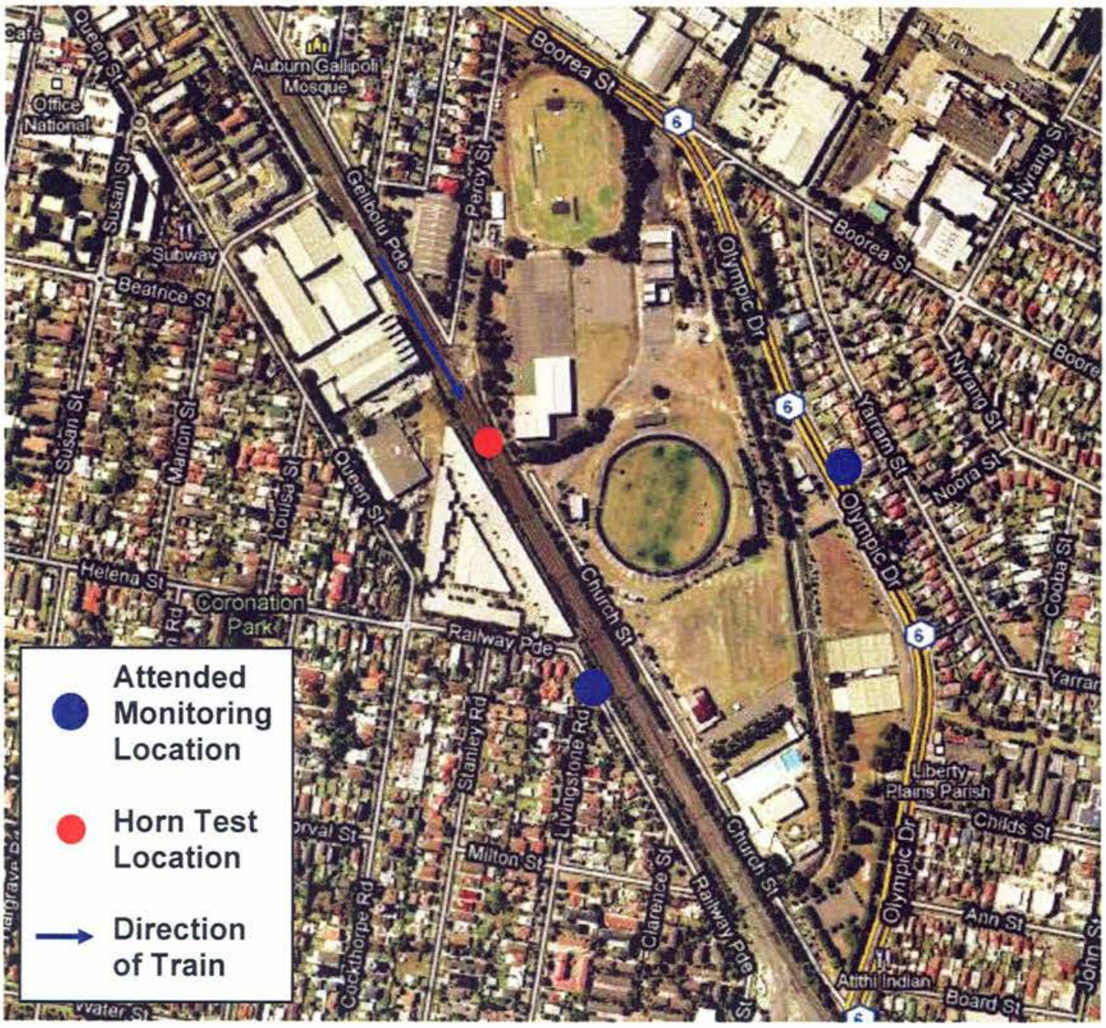

Figure 7.3 Main line horn testing location

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Table 7.23 Summary of attended monitoring at receivers adjacent to the Main Line horn testing location

Location	Time	Measured noise level (dBA)			Comments
		L_{A90} Range	Range of rail L_{Amax}	Range of traffic L_{Amax}	
17 Olympic Drive	3.30-4.30am	46-48	55-60 (passenger)	59-77 (cars) 68-85 (trucks and motorbikes)	Road traffic dominated the noise environment. Trains were audible during lulls in road traffic.
	4.30-5.30am	51-59			
	5.30-7.00am	58-65			
1 Livingstone Road	4.30-5.30am	39-45	60-78 (passenger)	56-75 (cars) 66-83 (trucks and motorbikes)	Road traffic dominated the noise environment. Trains were clearly audible. Two freight trains were observed.
	5.30-7.00am	45-49	71-74 (freight)		

Table 7.24 presents a summary of predicted receiver noise levels from town horn testing at the alternative location. To provide a best and worst case scenario, Table 7.24 provides the predicted noise levels for horns sounded in two positions, 50 metres apart. These positions are representative of the varying positions in which drivers are likely to test the horn whilst travelling.

Table 7.24 Summary of predicted L_{Amax} noise levels – dBA

Testing location	Criteria (dBA)[1]	Range	Number of receivers exceeding criteria	Number of identified receivers
Best	60-65	39-63	0-20	339
Worst		39-66	1-62	

Note:

1 Derived from ECRTN criteria. The minimum goal level of 60 dBA coincides with the RBL + 15 dBA screening goal.

Noise modelling confirmed the viability of this location. For the best case scenario, up to 20 receivers were predicted to exceed the ECRTN sleep disturbance lower goal of 60 dBA (derived from 50 dBA internally), with no exceedances of the upper goal of 65 dBA predicted. The number of receivers exceeding the ECRTN sleep disturbance lower goal of 60 dBA increases to 62 under the worst case scenario. Of these only 3 receivers were predicted to exceed the ECRTN sleep disturbance upper goal of 65 dBA, although exceedances are not by more than 1 dB.

Noise levels of this magnitude are considered generally acceptable, especially in the context of the existing noise environment which comprises a major suburban railway and also traffic noise for receivers

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to the east. The impact of the predicted noise levels from horn testing at this location would be low considering the relatively high background noise levels, whereby existing L_{Amax} noise levels are regularly in excess of 70 dBA and even 80 dBA.

Operational vibration

Operational vibration criteria

Operational vibration can be generated through the wheel rail interface and then transmitted through the ground to nearby sensitive receivers. Vibration is normally considered in relation to the risk to structural or architectural damage to buildings and also human comfort within buildings. The human comfort limits are the most stringent, in the sense that where compliance with these limits is achieved, compliance with the other objectives would also be achieved.

Prevention of building damage

For the likely frequency content associated with trains, a limit of approximately 10 millimetres per second peak particle vibration velocity can be conservatively applied, based on either German Standard DIN 4150 or British Standard BS 7385: Part 2 – 1993.

For commercial receivers in modern reinforced concrete framed structures, higher limits of 25 millimetres per second would apply in accordance with the British Standard. For vibration-sensitive heritage buildings, a vibration limit of 3 millimetres per second is suggested by DIN 4150. However, there are no such buildings close to the proposed track.

Prevention of disturbance of human comfort

Criteria derived from British Standard BS 6472:1992, expressed in terms of the vibration dose value (in units of metres per second$^{1.75}$), include:

- residential buildings, daytime (7am-10pm): 0.2 to 0.4
- residential buildings, night time (10pm-7am): 0.13.

These criteria define conditions that the Standard describes as giving "low probability of adverse comment", and do not necessarily imply that vibration would not be detectable.

Predicted operational vibration levels

From an operational perspective, trains would be moving at relatively low speed (less than 25 kilometres per hour) along the Auburn and Clyde Necks and into the stabling facility. For residences in Manchester Road and Sheffield Street, the stabling yard is approximately 250 metres away and the Auburn Neck is 90 metres away. Similarly, close to the eastern end of the Auburn Neck, residences in The Crescent are approximately 35 metres away. At these distances, with slow train speeds and relatively low number of movements, it is expected that vibration would not be perceptible and would be below both structural damage and human comfort limits.

Confirmation is required as to whether any sensitive equipment is located in the Manildra Facility, which is set back approximately 20 metres from the track towards the Auburn end of the proposed stabling operations. There are existing tracks in this location, which are used intermittently, and there are no known issues relating to vibration from these tracks.

Should sensitive equipment be housed in the Manildra facility and any increase in the number or type of train movements is determined to result in unacceptable increases in vibration, then the section of track

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in the vicinity of the building could be treated with some form of mitigation (i.e. ballast mat or under sleeper pads). On this basis, no residual vibration impacts are considered likely.

Operational traffic noise

Operational traffic noise is also assessed against DECCW's ECRTN criteria (refer Section 7.1.2).

The operational traffic noise assessment has been undertaken on the assumption that up to 20 light vehicle movements would occur per hour during the night time period. This has been based on the expected arrival and departure times for the operational workforce, as identified in Table 6.4.

Manchester Road

For Manchester Road the additional movements would not increase existing levels by more than 2 dBA. Negligible impact is therefore expected.

As part of the ASP, there is also a requirement to provide a grade separated heavy vehicle access into the MainTrain Facility, and the 'delivery' entrance from Manchester Road moves approximately 150 metres to the west, adjoining the existing car park. Given that the number of daily deliveries is relatively small, and limited to daytime periods only, this change is considered negligible.

Sheffield Street

At the rear of residences along Sheffield Street, up to 15 additional movements during the quietest hours of the night (where there are only five existing movements) would not increase noise levels above the base criterion of 50 dBA. For up to 20 additional movements (total of 25), the level would increase from 44 dBA to 51 dBA. During the busier hours (over 30 existing movements) an additional 20 movements would not increase existing noise levels by more than 2 dBA. At single storey residences, where some shielding exists, the criteria are met. Marginal impact is therefore expected at the upper floor of two storey residences.

7.1.4 Management and mitigation measures

Construction

- Where practicable, any mitigation measures provided to control operational noise impacts shall be implemented as early as practicable to also provide a benefit during some of the construction phase.
- A Construction Noise and Vibration Management Plan would be prepared prior to the construction of the ASP. The Plan would be developed in accordance with TCA's *Construction Noise Strategy (Rail Projects)* and DECCW guidelines. The Plan would:
  - Detail the construction activities to be carried out, along with an indicative schedule for construction works.
  - Identify the reasonable and feasible mitigation measures to be implemented to minimise noise impacts.
  - Describe how the effectiveness of the proposed measures would be monitored during the works, including frequency and location of monitoring and recording and reporting of results.
  - Identify how non-compliance with noise goals would be rectified.
  - Identify procedures for notifying sensitive receivers and responding to noise complaints.

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- The Construction Noise and Vibration Management Plan would include a consultation program to keep the potentially affected receivers informed regarding the progress of the works, and to forewarn (through measures such as letterbox drops and meetings with surrounding tenants) of any anticipated changes in noise and vibration emissions prior to critical stages of the works.
- A range of possible approaches for minimising the impact of construction noise would be considered during the detailed design phase and could include:
  - Stockpile shielding: Localised shielding could be implemented for contained work areas such as the stockpile area. This could be achieved through purpose built temporary barriers or by managing the stockpile such that a mound is maintained on the Manchester Road boundary.
  - Minimise tamping at night: Where feasible minimise tamping during night time periods. This activity has been determined to be the loudest noise source and incurs a 5 dB penalty.
  - Localised barrier: The installation of temporary, localised plywood barriers could be considered around the location of noisy works. These could be located to provide shielding of up to 10dBA.
  - Plant noise audit: Noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. To this end, testing should be established with the contractor.
  - Operator instruction: Operators should be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission.
  - Equipment selection: All fixed plant at the work sites should be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures in order to ensure that the total noise emission from each work site complies with DECCW guidelines.
  - Site noise planning: Where practical, the layout and positioning of noise-producing plant and activities on each work site should be optimised to minimise noise emission levels.
- The standard mitigation measures outlined in Section 4 of TCA's *Construction Noise Strategy (Rail Projects)* would be implemented and additional mitigation measures outlined in Section 6 of the strategy would be implemented when relevant noise goals are exceeded.
- Construction work would be restricted to the hours of 7am to 6pm (Monday to Friday), 8am to 1pm (Saturday) and at no time on Sundays and public holidays, except as being permitted in accordance with TCA's *Construction Noise Strategy (Rail Projects)*.
- The contractor should encourage car pooling or a mini bus to local stations in an attempt to limit private vehicle trips to the site.
- Providing direct access to the proposed stockpile site would minimise the number of heavy vehicle movements along the western section of Manchester Road at the rear of Sheffield Street during the construction phase.

Operation

Based on the assessment of the potential operational noise mitigation options, the following mitigation measures are recommended to minimise the operational noise impacts associated with the ASP:

- A yard horn or a short toot of the town horn would be used to warn of impending train movement within the stabling yard.

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- Approximately 3 metre high noise barriers would be provided in strategic locations around the stabling yard. The exact location and length of the noise barrier would be determined during detailed design. To achieve maximum noise attenuation benefit, the noise barrier would be constructed as close to the noise source as possible.
- Train horn testing would only be undertaken on the leading (forward facing) town horn of the train prior to departure:
  - Testing of the town horn at the Clyde end would be undertaken within the stabling yard.
  - Testing of the town horn at the Auburn end would be undertaken outside the stabling yard, either on the main line or along the Auburn neck. Should horn testing be carried out along the Auburn neck a purpose built 'enclosure' within which to test the train horns would be provided. Acoustic treatment of individual buildings at the affected residences along The Crescent may be required.

The implementation of the above measures is subject to the required assessment of safety and operational aspects and obtaining all necessary approvals.

- An Operational Noise and Vibration Management Plan would be prepared during the detailed design phase of the project. The Plan would:
  - Identify the specific mitigation measures for controlling operational noise from the ASP, including the location, type and timing for the erection of permanent noise barriers and/or other noise mitigation measures. This would also include confirmation, following an operational review by RailCorp, as to whether testing of the train horn at the Auburn end would occur within the 'enclosure' along the Auburn neck or on the main line.
  - Include a consultation strategy to seek feedback from affected property owners on the specific mitigation measures.
  - Predict the operational noise impacts at sensitive receivers based on the final design of the ASP.
  - Identify a program for post-operation noise monitoring at representative locations to confirm the predicted noise source levels and to demonstrate compliance. If it is identified during the post-operation noise monitoring that the relevant noise criteria are exceeded, further noise modelling would be undertaken to investigate the potential for any further management measures.
- The detailed design phase of the ASP would continue to consider and identify ways to minimise potential noise impacts.
- Should a wheel squeal impact be identified during the post operational noise monitoring, friction modifiers or other suitable source mitigation measures would be employed.
- Noise monitoring would be undertaken to confirm the traffic noise contribution at residential receivers once the ASP is operational. Subject to this review the need to provide further mitigation can be considered.

7.2 Soils and landscape

7.2.1 Existing environment

Topography

The site generally falls towards the north-west with heights being approximately RL 20 metres in the south-east in the vicinity of the Manildra facility to approximately RL 8 metres near Duck River in the vicinity of the Clyde Junction.

Topography within the stabling yard of the ASP is generally flat with localised variations of about two to three metres exist across the site, particularly within the vacant land.

Land in the vicinity of the Auburn Neck contains variations in topography. The existing tracks to the south of the MainTrain site are located within a cutting (approximately three metres deep) with the MainTrain car park elevated above this cutting to the south.

Soils

The subsurface profile across the site is typically comprised of uncontrolled fill to depths between 0.4 metres below ground to 4.5 metres below ground. This fill is then underlain by natural silty/shaly clays and shale/laminate/sandstone bedrock.

Filling was typically uncontrolled, generally poorly to moderately compacted, with various proportions of clay, silty, sand and gravel filling with some railing ballast, basalt gravel (road base), ash, cinder, metal, slag, ceramic, glass, crushed sandstone and building rumble.

Salinity

Reference to the Western Sydney Salinity Soils Map indicates soils at the site have moderate salinity hazard potential.

Acid sulphate soils

Acid sulphate soil investigations undertaken by Douglas Partners found that the soil profile on the site is not acid sulphate soils nor potential acid sulphate soils.

Geology

Sydney 1:100,000 Geological Series Sheet indicates that the site is located across the boundary between Quaternary alluvial and estuarine sediments (stabling yard, Clyde Neck and Clyde Junction) and Ashfield Shale of Triassic Age (Auburn Neck and Auburn Junction). The Quaternary sediments are mapped as silty to peaty quartz sand, silt and clay, whereas Ashfield shale typically comprises black to dark grey shale and fine grained sandstone-siltstone laminite, which generally weathers to form clays of high plasticity.

Geotechnical investigations on site encountered silty clay, underlying the fill, confirming the presence of alluvial deposits and dark grey shale confirming the presence of Ashfield Shale.

Contamination

A contamination assessment undertaken for the ASP site by Douglas Partners identified that as a result of past uses on the site, some contaminated soils are present. The following is a summary of the contaminants identified, generally associated with the fill material present:

- heavy metals (lead and copper)
- total petroleum hydrocarbons (TPH): attributable to sporadic pockets of ash, charcoal and cinder found in the fill located on site
- polycyclic aromatic hydrocarbons (PAH): attributable to the trace ash or bitumen inclusions in the fill. Leachability testing indicates that PAH is not leachable and therefore migration of the contaminated PAH soil is low
- asbestos: due to the random presence of asbestos within the fill.

Some exceedances in the site acceptance criteria (as identified in DECCW's *Guidelines for NSW Site Auditor Scheme* for heavy metal and PAH contamination and *Guidelines for Assessing Service Station Sites* for TPH contamination) were found to be present for a range of pollutants.

Two soil samples showed elevated lead and copper readings. The lead reading only exceeds the site acceptance criteria slightly and the copper results were only found to be in one sample and therefore copper contaminants are not considered widespread across the site.

Contaminants on site do not appear to have adversely impacted upon groundwater on the site. Five groundwater samples indicated exceedances in the criteria for zinc, however, this occurrence is not considered to constitute unacceptable impact, but rather is a reflection of the background quality of local groundwater which is witnessed across Sydney.

7.2.2 Construction impacts

Topography

During construction, the ASP site would be levelled to enable its use as a stabling facility. The site is to be levelled so that the formation is between RL 9.5 metres and 10.1 metres AHD. This formation includes the capping layer required as part of the remediation works (details of this capping layer are located in Technical Paper 2). In order to obtain the required formation levels, cut and filling would occur across the site, with 0.5 metres of controlled fill to be placed over the entire ASP. Overall, the topography across the entire site would not be altered to any great extent and therefore the regional topography would not be impacted.

The existing cutting in which the Auburn Neck is located would be widened to provide the required space for the new ASP Arrival and Departure Tracks. The widening of this cutting would not significantly alter the topography of the site from regional perspective.

Soils

The land surface would be disturbed during construction activities which would expose soil to the effects of erosion and sedimentation, which may in turn impact on water quality. The impacts as a result of erosion and sedimentation are considered to be manageable through the implementation of mitigation measures.

Contamination

Construction works for the ASP are considered unlikely to impact upon contaminated land as the contaminated soils are to be contained and located beneath clean fill to be imported on to the site as part of the site preparation works. Any works required to be undertaken for the ASP that may affect the

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contaminated soils would be undertaken using methods outlined in the Remediation Action Plan (RAP) (refer to Technical Paper 2).

During the remediation works there is potential for contamination impacts on workers and the surrounding area as a result of exposure of contaminated soils and dust particles. All remediation works would be undertaken in accordance with the RAP which outlines the work methods to be followed in order to minimise the impacts of contaminated material.

There is potential for chemical and fuel spills during construction, which may result in localised contamination of soils. The impact of chemical and fuel spills has been identified as a hazard and risk and has been addressed in Section 7.12.1. These impacts would be minimised through the implementation of mitigation measures (refer Section 7.12.3).

7.2.3 Operational impacts

During operation of the ASP, there is the potential for contamination risks to future users of the site, site workers and the environment through potential release of contaminants resulting from current and/or historical site practices. This could be in the form of potential spillages/leakages of contaminants (such as oils and other fluids on from trains and substances required for cleaning of trains such as detergents) used on the site and surrounds into subsurface soil layers. Mitigation measures, including an incident emergency spill plan outlined in Section 7.12.3 would be implemented to minimise the impacts of potential spills and leaks.

Any future works involving excavating on site would be required to take into account the presence of capped contaminated soils located beneath a marking layer (piece of plastic or similar) identifying the top of the capping layer. There is potential for the capped contamination to be released in the event that this layer is breached. Mitigation measures in Section 7.2.4 would be implemented to minimise the impacts of breaching the capping layer.

7.2.4 Management and mitigation measures

Construction

- An Erosion and Sediment Control Plan would be prepared. The plan is to include a monitoring program to assess the water quality downstream of the ASP site both during and after construction, until exposed soils are stabilised and deemed to be suitably stable for sedimentation controls to be removed.
- Erosion and sedimentation from disturbed areas and stockpiles during construction would be controlled in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Auburn City Council Development Control Plan 2000 - Guidelines for Erosion and Sediment Control* (2003).
- Stockpiling of contaminated material would be undertaken in line with the measures outlined in the RAP.
- All roads used for site access and work sites would be maintained free of dust, waste materials and mud as far as reasonably practicable. This would aid in preserving the normal characteristics and setting of the surrounding environment.

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- In the event that indications of additional contamination are encountered (i.e. odorous or visually contaminated materials) or the capping/marking layer is disturbed as a result of excavation during construction, work in the area would cease until an environmental consultant can advise on appropriate action.
- All workers would attend a site induction outlining the location, nature, type and concentration of contaminants present on site. This induction would include an outline of the risks of contaminants, methods of identification for contaminants, monitoring to be undertaken and health and safety controls (e.g. PPE requirements as identified in the RAP) to mitigate against the risks.
- Prior to earthworks commencing all visible asbestos-based fragments would be removed by an appropriately licensed contractor as required by the *Working with Asbestos: Guide* (WorkCover NSW, 2008).
- Inspections of excavated and filled surfaces would be made during construction to determine the presence of visible asbestos.
- All contamination hotspots would be clearly marked in the field.
- Contaminated soils would not be stockpiled on the structural fill layer or formation layers to avoid cross contamination.
- In the event that excavated spoil which fails to meet landfill criteria is encountered, the spoil contingency plan outlined in the RAP would be implemented.
- The unexpected finds protocols developed and included in the RAP, would be implemented in the event the following is found:
  - buried structures such as underground storage tanks and the associated pipe work
  - volatile contaminants
  - asbestos
- In the event the cap is required to be excavated post placement due to construction, the contingency protocols outlined in the RAP would be followed.
- Asbestos monitoring would be carried out on site and in the surrounding areas. This would include monitoring in the cabins of selected plant, on the perimeter of the site, change room and if required the decontamination unit.
- Final cleanup after the works are complete would include removal of any erosion control devices and rehabilitation works of disturbed areas.

Operation

- A long-term site Environmental Management Plan (EMP) would be prepared to detail the ongoing management requirements for the long-term maintenance of the capping structures. This plan would include provision of regular inspection and maintenance as necessary.
- All employees (particularly those undertaking excavation works) would be made aware of the location of the capping layer and of the marking layer, to minimise exposing the contaminated land. In the event the cap is breached, contingency plans outlined in the RAP would be implemented.

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7.3 Traffic and transport

A Traffic Impact Assessment has been undertaken for the ASP. A full version of the technical report is included in Technical Paper 3 with a summary provided below.

7.3.1 Existing environment

Existing traffic generation

The existing vehicle traffic generation of the south-western section of the Clyde Marshalling Yards accessing via the Private Road was recorded to be 1,074 vehicles per day. Approximately 9.2 percent of the daily vehicle movements (99 vehicles per hour) occur during the morning peak period and 8.5 percent (91 vehicles per hour) in the evening peak period.

Existing road network

In accordance with the Roads and Traffic Authority (RTA) road hierarchy classifications (refer Table 2 of Technical Paper 3), the streets surrounding the ASP site have been classified as either an arterial, sub-arterial, collector or local road based on their daily and peak hour traffic volumes:

- Manchester Road is a collector road. This road has two wide travel lanes, one in each direction, and sufficient width to accommodate kerbside parking lanes. This is a council maintained road.
- Chisholm Road, also a council maintained road, functions as a collector road. This road has two wide travel lanes, one in each direction, and sufficient width to accommodate kerbside parking lanes.
- The Private Road, owned by RailCorp, functions as an industrial access road with connection to Manchester Road and Chisholm Road at its eastern end and Clyde Marshalling Yards at its northern end. This road has a sealed carriageway comprising two wide travel lanes, one in each direction.
- The Crescent is a council maintained road. It functions as a collector road and has two travel lanes, one in each direction, and sufficient width to accommodate kerbside parking lanes.
- Rawson Street is a classified regional road. It functions as a sub-arterial road and has a two lane two way divided carriageway. The westbound carriageway narrow to one lane between Northumberland Road and Macquarie Road, but is two lanes for the rest of its length.
- Cumberland Road is a council maintained road. It functions as a truck collector road with connection to Manchester Road at its northern end and St Johns Road at its southern end. It has two wide travel lanes one in each direction and sufficient width to accommodate kerbside parking lanes.

Existing traffic volumes

The average daily traffic flows for a number of streets in the area surrounding the ASP are provided in Table 7.25.

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Table 7.25 Average daily flows

Location	Weekday			
	Direction one (vpd)	% HV	Direction two (vpd)	% HV
Chisholm Road (south of Manchester Road)	2,650 NB	6.3	1,600 SB	8.7
Manchester Road (east of Chisholm Road)	2,614 EB	10.2	1,382 WB	12.4
Private Road (west of Chisholm Road)	540 EB	15.8	534 WB	16.2
The Crescent	7,716 NB	8.0	7,671 SB	9.1
Cumberland Road (south of Manchester Road)	2,721 NB	6.2	3,442 SB	4.1
Rawson Street	9,333 NB	10.9	7,721 SB	15.2

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound, HV = heavy vehicles, vpd = vehicles per day

The existing morning and afternoon peak flows for the surrounding streets are provided in Table 7.26.

Table 7.26 AM and PM peak flows

Location	AM				PM			
	Direction one	% HV	Direction two	% HV	Direction one	% HV	Direction two	% HV
Chisholm Road (south of Manchester Road)	209 NB	9.1	67 SB	19.4	137 NB	8.7	122 SB	10.6
Manchester Road (east of Chisholm Road)	274 EB	6.2	91 WB	20.8	186 EB	11.8	123 WB	8.1
Private Road (west of Chisholm Road)	41 EB	17.1	74 WB	8.1	68 EB	11.7	44 WB	18.1
The Crescent	812 NB	7.1	775 SB	7.6	549 NB	6.9	618 SB	6.8
Cumberland Road (south of Manchester Road)	266 NB	9.0	285 SB	5.2	278 NB	5.3	354 SB	5.4
Rawson Street	693 NB	11.7	446 SB	18.3	663 NB	6.3	613 SB	8.5

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound, HV = heavy vehicles.

The traffic volumes identified in Table 7.25 and Table 7.26 for Chisholm Road, Manchester Road, Cumberland Road and The Crescent are within the acceptable traffic volumes for collector roads and are operating below their design capacity (i.e. lane capacity or traffic throughput (vehicles per hour) which is influenced by lane width, roadside friction, gradient and other such factors).

The traffic volumes along Rawson Street are within the acceptable traffic volumes for a sub-arterial road and result in the road operating below its design capacity. The traffic volumes on the Private Road (west of Manchester Road) are below the design capacity.

Technical Paper 3 outlines the compliance of the traffic volumes on Chisholm, Manchester and Private roads against the RTA guidelines that determine whether these streets are meeting their environmental capacity (i.e. the capacity of roads which have direct access to residential, shopping centres and educational establishments and takes into account pedestrians and safety). The peak hour flows along Chisholm Road and Manchester Road are below the maximum environmental goal. The peak hour flows along the Private Road are below the maximum environmental goal for a local residential street. The results of environmental capacity performance indicate traffic demands on the road network in the vicinity of the ASP site during the morning and afternoon peak periods are within the environmental capacity two-way flow range.

Existing intersection performance

The SIDRA Intersection Analysis model has been used to assess the existing peak hour operating performance of the following intersections:

- Chisholm Road/Manchester Road/the Private Road
- Manchester Road/The Crescent/Normanby Road/Cumberland Road.

A summary of the existing performance of the subject intersections during the morning and evening peak periods resulting from the SIDRA analysis is presented in Table 7.27. These intersections were selected as they form part of the main routes which would be utilised for access to the ASP.

Level of service of an intersection is determined by the performance criteria outlined in Table 7.27.

Table 7.27 Performance criteria at intersections

Level of service	Average delay per vehicle (AVD) (secs/vehicle)		Traffic signals, roundabout	Give-way and stop signs
	RTA Guide	SIDRA boundary values		
A	Less than 14	less than or equal to 14.5	Good operation	Good operation
B	15 to 28	Greater than 14. and less than or equal to 28.5	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Greater than 28.5 and less than or equal to 42.5	Satisfactory	Satisfactory but accident study required
D	43 to 56	Greater than 42.5 and less than or equal to 56.5	Operating near capacity	Near capacity and other accident study required

Level of service	Average delay per vehicle (AVD) (secs/vehicle)		Traffic signals, roundabout	Give-way and stop signs
	RTA Guide	SIDRA boundary values		
E	57 to 70	Greater than 56.5 and less than or equal to 70	At capacity; at signals incidents would cause excessive delays	At capacity and requires other control mode
F	Greater than 70	Greater than 70	Roundabouts require other control mode	

Table 7.28 Existing intersection performance

Intersection	Peak period	Average delay (secs) (a)	Level of service (b)	Degree of saturation (c)	Comments
Chisholm Road/ Manchester Road/ Private Road	AM	19.3	B	0.126	Worst movement – Through from Manchester Road approach All movements satisfactory
	PM	16.2	B	0.071	
Crescent/ Manchester, Cumberland/ Normanby (roundabout)	AM	14.4	A	0.375	Worst movement – Right turn from Manchester Road approach All movements satisfactory
	PM	16.6	B	0.143	Worst movement – Right turn from Normandy Road approach All movements satisfactory

Notes:

(a) The average delay for sign controlled intersections is selected from the movement with the highest average delay. The average delay for roundabouts is selected from the movement on the approach with the highest average delay.

(b) The level of service for sign controlled intersections is based on the highest average delay per vehicle for the most critical movement during peak conditions. The level of service for roundabouts is based on the highest average delay per vehicle for the most critical movement.

(c) The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.

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The results show that both intersections currently operate at an acceptable level of service during morning and afternoon peak periods.

Local transport and other transport issues

Pedestrian and cyclists

Fairly low pedestrian activity was observed on the road network surrounding the ASP site. A footpath exists along the southern side of Manchester Road, between Cumberland Road and Chisholm Road, which facilitates movement for pedestrians. There is also a pedestrian footpath from Clyde Station to the AMC (and ASP site). There are no cyclist facilities provided in the vicinity of the Clyde Marshalling Yards.

The main desire line for pedestrian movement in the vicinity of the site is eastbound and westbound along Manchester Road, between the residential suburbs and the train station and town centre.

Existing pedestrian footpaths provide adequate linkages to the surrounding area and town centre.

Figure 6 in Technical Paper 3 shows the existing pedestrian desire lines.

Bus services

One bus service operates in the vicinity of the ASP. This service runs along Chisholm Road and Mona Street. The frequency of this bus varies between every 30 minutes during peak periods and every hour outside the peak.

Rail services

The Main West Line is located to the north of the ASP site. Auburn Station is located approximately 1.5 kilometres from the ASP site, along South Parade. Clyde Station is located 500 metres from the ASP site to the north-west, with a pedestrian footpath providing access from Clyde Station to the AMC.

The operation of the Main West Line is outlined in Table 7.29.

Table 7.29 Rail services along rail corridor

Route description	Station stops	Weekday peak frequency	Weekday off-peak frequency	Weekend frequency
Western Line	Clyde and Auburn	15 mins	30 mins	30 mins
Carlingford Line	Clyde	30 mins	60 mins	60 mins
South Line	Auburn	10 mins	15 mins	30 mins

7.3.2 Construction impacts

Heavy vehicle generation

The total number of truck movements is estimated to be approximately 22,400 over the duration of the construction phase, based on single body truck movements. These movements include 8,600 truck movements associated with the importation of material for earthworks. These 8,600 movements for earthworks would occur over approximately a one year period (260 regular working days plus 50 Saturdays) with peak movements of approximately 30 truck movements per day, or 3 per hour. The other truck movements (13,800) are associated with the deliveries of construction components and materials expected to occur over the two-year duration of the construction. These movements translate to approximately 24 truck movements (during the peak construction period) per day or approximately 3 truck movements per hour during the peak hour. Hence, it has been assumed that there would be a maximum of 54 truck movements per day or 6 truck movements per hour.

The majority of truck movements would occur during daylight construction hours. Some deliveries and removal of equipment (such as large cranes) at the site may require trucks to be used outside normal construction hours in accordance with RTA requirements.

Light vehicle traffic generation

It is estimated that approximately 95 construction personnel would be on site daily. Based on the assumption of a typical car driver rate of 100 per cent (i.e. each employee driving a car), a worst-case construction scenario would translate to 190 light vehicle trips per day, with 95 vehicle trips inbound during the morning peak hour and 95 vehicle trips outbound during the evening peak hour. It is likely the majority of the workforce would arrive between 6.30am and 7am, outside the existing road network morning peak hour.

A summary of traffic movements during the construction period is shown in Table 7.30.

Table 7.30 Construction period traffic movements

Activity	Daily traffic movements (vtpd)	AM and PM peak construction traffic movements (vtph)
Light vehicles	190	95
Heavy vehicles	54	6
Total	**244**	**101**

Traffic assignment during construction

The existing directional traffic flows along the local road network surrounding the ASP site forms the basis for the assumptions on the likely traffic movements during construction. The future assignment of traffic generated by the ASP has been predicted on the basis of the current directional split of traffic at the intersection of Manchester Road and Chisholm Road. The flows were observed as follows:

- Morning peak
  - 51 per cent or 48 light vehicles and 2 heavy vehicles approach the ASP site via Manchester Road (east of Chisholm Road)
  - 49 per cent or 47 light vehicles and 1 heavy vehicle approach the ASP site via Chisholm Road (south of Manchester Road)
  - 100 per cent of vehicles approach/ depart the ASP site via the Private Road (west of Manchester Road)
  - 67 per cent or 2 heavy vehicles depart the Private Road via Manchester Road (east of Chisholm Road)
  - 33 per cent or 1 heavy vehicle departs the Private Road via Chisholm Road (south of Manchester Road).
- Evening peak

- 67 per cent or 2 heavy vehicles approach the ASP site via Manchester Road (east of Chisholm Road)
- 33 per cent or 1 heavy vehicle approaches the ASP site via Chisholm Road (south of Manchester Road)
- 100 per cent of vehicles approach/ depart the ASP site via the Private Road (west of Manchester Road)
- 44 per cent or 41 light vehicles and 2 heavy vehicles depart the Private Road via Manchester Road (east of Chisholm Road)
- 56 per cent or 54 light vehicles and 1 heavy vehicle depart the Private Road via Chisholm Road (south of Manchester Road).

The likely haulage routes are shown in Figure 6.7 and discussed in Section 6.4.4.

Construction period road network and intersection performance

Environmental capacity performance standards

The environmental capacity performance of the road network in the vicinity of the ASP site under construction period conditions is detailed in Technical Paper 3.

The results of the environmental capacity performance show that construction period traffic demands on the road network in the vicinity of the ASP site during the peak hours is within an acceptable range in terms of environmental capacity.

Intersection performance

The main traffic impact relates to the effect of the additional vehicles on the operational performance of key intersections. The SIDRA model has been used to assess the performance of two intersections in the vicinity of the ASP during the construction period as shown in Table 7.31.

Table 7.31 Construction period intersection performances

Intersection	Peak period	Average delay (secs)	Level of service	Comments
Chisholm Road/Manchester Road/the Private Road	AM	18.3	B	Worst movements – Through from Manchester Road Approach
	PM	17.2	B	All movements satisfactory
The Crescent /Manchester Road, Cumberland Road/Normanby Road (roundabout)	AM	14.7	B	Worst movements – Right turn from Manchester Road Approach All movements satisfactory
	PM	16.7	B	Worst movements – Right turn from Normandy Road Approach All movements satisfactory

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The average delay per vehicle for the worst movement has decreased when compared to the existing situation, mainly due to the increase in traffic volume (more vehicles sharing the delay time, hence the lower average).

The results of the SIDRA analysis indicate that the subject intersections would operate satisfactorily under the projected construction traffic demand, with a minor increase in delay during the morning and evening peak periods compared to the existing situation. The results revealed that both intersections would operate at level of service B for the morning and evening peak periods.

Local transport and other transport issues

Pedestrian and cyclist impacts

The pedestrian access to Clyde Station would be retained and would not be impacted by the construction of the ASP. There are no designated cycle paths in the vicinity of the ASP site but cyclists could potentially use the existing footpath along Manchester Road. The additional number of vehicles to be generated by the construction of the ASP is not likely to impact on cyclists.

The construction of the proposed overbridge would not adversely impact the users of the existing pedestrian footbridge from the MainTrain car park to the MainTrain Facility. The pedestrian footbridge would be retained during construction of the proposed overbridge and its demolition would not occur until pedestrian access across the proposed overbridge is available.

Public transport

Bus services in the vicinity of the site would not be adversely affected by the construction of the ASP. The ASP would retain satisfactory access to Manchester Road and Chisholm Road which link the site to the bus and rail services.

Train services on the Main West Line can be used by workers to travel to and from the ASP site. The rail service would not be impacted by the construction of the ASP. Part of the works would be undertaken during possession periods during which the Main West Line is shutdown. This shutdown is scheduled and would occur regardless of the ASP.

Construction parking

A temporary parking area would be designated on the ASP site to accommodate construction staff parking and heavy vehicle parking. The location of the temporary parking area is likely to be within the stockpiling area to the west of the proposed overbridge, although this would be confirmed at the detailed design stage.

The construction of the new MainTrain overbridge would involve the temporary removal of 32 parking spaces within the existing MainTrain car park. The need to offset the loss of parking, and an alternative location, would be investigated prior to construction and included in a traffic management plan developed for the ASP.

The construction of the overbridge would not impact upon the existing access to the MainTrain car park.

7.3.3 Operational impacts

Traffic generation as a result of the ASP

The projected traffic generation during operation of the ASP would be determined by:

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- the number of employees
- the associated car usage rate
- the number of heavy vehicles likely to access the ASP site.

Based on the information provided in Section 6.5.3, it has been assumed that there would be at most 52 personnel on site at one time and they would arrive and depart at different times during a typical weekday. However, to provide a worst-case scenario, the future peak hour employee traffic generation during the weekday peak period is assumed to be a maximum of 52 light vehicle movements inbound and 52 light vehicle movements outbound.

Expected truck movements during operations would be minimal. At most, it would be two trucks per day.

The daily peak hour traffic generation of the ASP site is set out in Table 7.32

Table 7.32 Total future traffic generation during AMC operation

Component	Morning peak (vtph)	Evening peak (vtph)
Employee traffic	104	104
Heavy vehicle traffic	2	2
Total	**106**	**106**

Traffic generation attributed to the AMC

As the AMC has been recently commissioned, the traffic generated by the operation of this site was not incorporated into the existing traffic volumes presented in Section 7.3.1. To ensure the operational traffic impact assessment of the ASP considers the traffic associated with the AMC, the traffic generation attributed to the AMC has been provided separately. The daily peak hour traffic generation of the AMC is set out in Table 7.33.

Table 7.33 Traffic generation attributed to the AMC

Component	Morning peak (vtph)	Evening peak (vtph)
Employee traffic	218	218
Heavy vehicle traffic	6	6
Total	**224**	**224**

Total future traffic generation

The maximum traffic generation due to the future operations of the ASP site and the AMC would be:

- 330 vehicle trips per hour during the morning peak period, comprising 322 employee trips (180 in/142 out) and 8 heavy vehicle movements (4 in/4 out)
- 330 vehicle trips per hour during the evening peak period, comprising 322 employee trips (142 in/180 out) and 8 heavy vehicle movements (4 in/4 out).

Table 7.34 shows the total vehicle trips to and from the site during the morning and afternoon peaks.

Table 7.34 Total future traffic generation

Component	Morning peak (vtph)	Evening peak (vtph)
Employee traffic	322	322
Heavy vehicle traffic	8	8
Total	**330**	**330**

Future traffic assignment during operational phase

The existing directional traffic flows along the local traffic network surrounding the site forms the basis for the assumptions on the likely traffic movements during operation. For the purpose of this assessment, the future assignment of traffic generated by the ASP during the operational phase has been predicted on the basis of the current directional split of traffic at the intersection of Manchester Road and Chisholm Road. The flows were observed as follows:

- Morning peak
  - 51 per cent or 92 light vehicles and 2 heavy vehicles approach the ASP site via Manchester Road (east of Chisholm Road)
  - 49 per cent or 88 light vehicles and 2 heavy vehicle approach the ASP site via Chisholm Road (south of Manchester Road)
  - 100 per cent of vehicles approach/ depart the ASP site via the Private Road (west of Manchester Road)
  - 55 per cent or 78 light vehicles and 2 heavy vehicles depart the Private Road via Manchester Road (east of Chisholm Road)
  - 45 per cent or 64 light vehicles and 2 heavy vehicles depart the Private Road via Chisholm Road (south of Manchester Road).
- Evening peak
  - 55 per cent or 78 light vehicles and 2 heavy vehicles approach the ASP site via Manchester Road (east of Chisholm Road)
  - 45 per cent or 64 light vehicles and 2 heavy vehicles approach the ASP site via Chisholm Road (south of Manchester Road)
  - 100 per cent of vehicles approach/ depart the ASP site via the Private Road (west of Manchester Road)
  - 44 per cent or 79 light vehicles and 2 heavy vehicles depart the Private Road via Manchester Road (east of Chisholm Road)
  - 56 per cent or 101 light vehicles and 2 heavy vehicles depart the Private Road via Chisholm Road (south of Manchester Road).

Future road network and intersection performance

Environmental capacity performance standards

The results of the environmental capacity performance indicate that the operational traffic demands on both Manchester Road and Chisholm Road in the vicinity of the site during the peak periods are within an acceptable range with regard to environmental capacity, except for the Manchester Road morning peak where the average peak hour two-way flow exceeds the environmental capacity.

The Private Road exceeds the environmental capacity in the morning and evening peak periods. This road is a private road that was built for the purpose of accessing the Clyde Marshalling Yards site and has limited access points. Therefore any potential impacts would be isolated to the Private Road and are not likely to significantly impact on the surrounding road network.

Intersection performance

The SIDRA model has been used to assess the operational performance of the following intersections based on the maximum total traffic generation from both AMC and ASP:

- Chisholm Road/Manchester Road/the Private Road
- Manchester Road/The Crescent South/Cumberland Road.

The results of the analysis are contained in Table 7.35.

Table 7.35 Operational intersection performances

Intersection	Peak period	Average delay (secs)	Level of service	Comments
Chisholm Road/Manchester Road/Private Road	AM	18.7	B	Worst movement – Left turn from Manchester Road approach All movements satisfactory
	PM	15.8	B	
The Crescent/Manchester Road, Cumberland Road/Normanby Road (roundabout)	AM	14.5	A	Worst movement – Right turn from Cumberland Road approach All movements satisfactory
	PM	17.1	B	Worst movement – Right turn from Normandy Road approach All movements satisfactory

The average delay per vehicle for the worst movement has decreased compared to the existing, mainly due to the increase in traffic volume (more vehicles sharing the delay time, hence the lower average).

The results of the SIDRA analysis indicate that the two intersections modelled would both operate at a good level of service under the projected operational traffic demand.

Local transport and other transport issues

Staff parking

The new staff car park would have space for approximately 40 vehicles. It has been assumed that the maximum number of staff that could be on site at one time would be 52 staff. To cater to a potential shortfall in the number of car parking spaces within the ASP parking area, there is an arrangement with the adjacent AMC car park to allow for additional parking spaces to be utilised by ASP staff where necessary.

Pedestrian and cyclists

The increase in truck movements generated by the operation of the ASP is not likely to impact on pedestrians and cyclists in the vicinity of the ASP as the low number of additional vehicles generated are not likely to conflict with the pedestrian desire line along Manchester Road.

To encourage staff to cycle to work, one of the sustainability initiatives identified for further consideration during the detailed design is to provide bicycle lockers and/or racks near the entrance to the site for at least 5 per cent of the permanent staff.

Public transport

The ASP is located in close proximity to public transport with Clyde and Auburn stations in the vicinity of the ASP. Given the operation hours and shift start and finish times it is considered public transport is unlikely to be used. The operation of the ASP would not adversely impact upon the operation of any public transport networks.

7.3.4 Management and mitigation measures

Construction

- A Traffic Management Plan would be prepared and implemented that seeks to:
  - minimise the level of disturbance created as a result of construction related vehicle movements (particularly in residential streets and outside of daytime working hours) to the road, pedestrian and cycle network within, and influenced by, the ASP
  - minimise the impacts of construction related parking, including minimising the number of vehicles parking on surrounding streets by providing parking within construction site compounds
  - minimise material delivery during school start and finish times
  - determine the need to offset the loss of parking within the existing MainTrain car park during the construction period
  - minimise impacts to the movement of vehicles to, from and around the MainTrain site
  - minimise disturbances to the effective operation and reliability of existing transport services such as passenger and freight rail as well as bus routes
  - advise drivers on protocol for access to site, covering loads, assessing soil tracking etc
  - provide adequate signage to inform motorists and pedestrians of the presence of a worksite ahead to minimise the risk of road accidents.
- Where work would be undertaken adjacent to the existing road network, the speed limit would be reduced to 40 kilometres per hour in accordance with the requirement of the RTA's *Traffic Control at Work Sites Manual 2003.*

- Nominated heavy vehicle access routes would be identified in the Traffic Management Plan, and vehicle operators are to be made familiar with this plan as part of the induction process.

Operation

- Parking within the MainTrain car park would be reinstated to ensure that there is no net loss in parking at the MainTrain Facility.

7.4 Hydrology, drainage and water quality

7.4.1 Existing environment

Flooding

Duck River is located approximately 250 metres to the west of the ASP stabling yard. Duck River is located within the Sydney Harbour catchment and drains directly into Parramatta River at Silverwater approximately three kilometres to the north-east.

Two distinct areas within the site have been identified as being potential flood areas, located in the vicinity of the two relief culverts constructed on the car turning loop as part of the AMC construction work, around the location of the two proposed detention basins shown on Figure 6.3.

Loop Culvert 1 is located midway around the car turning loop to the north-east of the proposed staff amenities and storage building on the eastern side of the stabling yard. This culvert only begins to operate when surface flows reach RL 9.10 metres AHD, when most of the ASP site and some of the car turning loop becomes inundated. Water then drains from the site on the southern side at two locations near Manchester Road.

Loop Culvert 2 is located at the southern end of the car turning loop in a depression with no apparent outlet to Duck River or to council drainage. Local flooding and ponding of water has been observed in this area. Loop Culvert 2 becomes inundated to an approximate level of RL 8.10 metre AHD before surface flows can drain from the site at the southern end.

Flood modelling undertaken for the site indicates that the current overland flow path traverses private land to the south of the ASP site, which is not considered to meet council requirements and policy.

Some local nuisance surcharge flooding may occur near the existing level crossing access to the MainTrain site during high intensity storm events.

Existing drainage infrastructure

The ASP site does contain some existing drainage infrastructure, as follows:

- Auburn Junction – An existing pit and underground inter-track drainage is located in the vicinity of Auburn Junction.
- MainTrain site - Track drainage consists of an existing pit and underground pipe network which connects to the Auburn City Council trunk drainage and traverses across the MainTrain site.
- Auburn Neck - Existing drainage consists of cess drains, pits and an underground pipe network grading towards the ASP interface. Drainage for the existing MainTrain car park is evident along the western edge of the track across from the MainTrain site.

- Stabling yard - It is assumed that this part of the ASP site contains no existing piped drainage. Old survey drawings indicate two pipe crossings heading into Duck River. These pipes may be buried from previous activities on site or have been abandoned. The age of these pipes is unknown and would be required to be determined during detailed survey.
- Clyde Neck - Existing drainage infrastructure has been constructed during the AMC construction works. Detention storage has been installed under the AMC car park and a future trunk connection pipe has been provided for the ASP. The AMC and associated car park drainage flows into the detention system and is then piped to Duck River.
- Clyde Junction - Infrastructure has been constructed as part of the AMC and includes underground storage cells, piped drainage and surface pits. This network connects into a trunk drainage pipe which discharges into Duck River.

Further surveys of infrastructure would be undertaken during detailed design.

7.4.2 Construction impacts

During construction, potential impacts are likely to be focused on erosion and sedimentation as a result of land disturbance, which, if uncontrolled, could potentially have the following effects:

- fluctuations in the stream flow characteristics
- increased sediment load and organic matter as a result of construction site runoff, resulting in adverse impacts to benthic fauna (species that live on the bottom of water bodies)
- reduction in photosynthetic productivity of water bodies from increasing turbidity
- reduction in channel habitat from sediment deposition
- scour of stream banks due to high discharge velocities and increased flows
- gross pollutants entering receiving creeks
- declining water quality from the influx of man-made substances
- contamination of surface water due to contaminated soils entering the surrounding drainage network.

The ASP would reduce the permeability of the site due to the compaction of soil as a result of earthworks and remediation works on site; however the site would remain permeable. This would result in a minor increase in overland flows. This increase is not considered to substantially impact upon the drainage of the site because drainage works would be undertaken early in the ASP meaning that overland flows would begin to be collected by the system during the construction activities proposed after earthworks are complete. Impacts of overland flows would also be minimised as diversion drains would be put in place to direct any upstream runoff around the site, this water would be collected and treated prior to discharge.

Impacts could also potentially occur during construction as a result of fuel or chemical spills (see Section 7.12 for discussion on such impacts).

The above impacts would be minimised through the implementation of mitigation measures outlined in Section 7.4.4.

7.4.3 Operational impacts

During operation, the ASP would be located within existing overland flow paths, effectively cutting the flow paths off (and therefore reducing the flooding impacts of adjacent properties to the south which currently are on the overland flow path). The positioning of the ASP would also impact upon the storage capacity of the two existing culverts on the car turning loop. Due to the loss of overland flows, there is an increased potential for flooding in the vicinity of these culverts.

The drainage system for the ASP has been designed in accordance with Auburn City Council's detention, drainage and flooding requirements and the requirements recommended by the RAP. The treatment level of stormwater discharged from the site to Duck River would be in accordance with the targets identified in Landcom's *Water Sensitive Urban Design Strategy* (2009).

In order to minimise the impacts of flooding on the ASP site, neighbouring sites and on the Duck River, detention basins have been proposed as part of the ASP, designed to attenuate the 100 year ARI flows prior to connecting into the trunk drainage systems (both basins would have extra capacity above the 100 year ARI flows). The provision of these basins would assist in reducing the hydraulic impacts to downstream trunk drainage and the Duck River.

An on site drainage system is to be constructed which connects into the existing trunk drainage system (built as part of the AMC) located in the vicinity of the AMC car park. This system would include water treatment facilities to minimise the impacts on water quality as a result of runoff from the ASP site. The proposed piped stormwater drainage system would be designed for the 50 year ARI flows for all infrastructure except for trunk drainage which would be designed for the 100 year ARI flow. All roads and car park areas would be designed for the 20 year ARI flow. In order to manage the cumulative impacts of both the ASP and AMC on the trunk drainage network the ASP stormwater management plan would be developed to work in conjunction with the AMC stormwater management plan.

Overall, the ASP would benefit the hydrology and water quality of the site as the proposed drainage system and associated water treatment (see Section 6.2.9) would improve the flow of the water across and off the site and also the quality of the discharges.

7.4.4 Management and mitigation measures

Construction

- The Erosion and Sediment Control Plan would address waste water discharge from surface washing, washing vehicles and plant, and washing out concrete mixers and concrete trucks.
- Final cleanup after the works are complete would include removal of any sediment in drainage lines that has been trapped by erosion control devices.
- Surface water management systems adopted on site would ensure the ASP does not adversely affect water quantity or quality in downstream watercourses.
- Any water collected from the site is to be tested and discharged in accordance with current guidelines and the RAP for the site in order to avoid any potential contamination or impacts on waters or local stormwater systems. The need for treatment of water requiring disposal is to be further investigated prior to construction, and implemented if required (treatment could be required to meet DECCW licence requirements for stormwater discharge or Sydney Water requirements for sewer discharge).

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- To reduce the impact of flooding, weather forecasts are to be regularly monitored and, as needed, works ceased and equipment removed from flow paths before the rainfall event.
- Control of the movement of water onto, through, and off the site, such as diversion drains to direct upstream runoff around the site and collection and treatment of runoff prior to discharge from the site, would be investigated.
- If dewatering is required on site, then water requiring off-site discharge would be disposed of in accordance with relevant guidelines, approvals and licences.

Operation

- A Stormwater Management Plan would be developed for the ASP. This plan would be consistent with the Stormwater Management Plan for the AMC, any council requirements and any requirements outlined in the RAP. The stormwater management plan would include protocols for the maintenance of water quality structures.
- Stormwater management within the site would include treatment of stormwater runoff prior to discharge from the site by providing water quality treatment measures in accordance with the principles of Water Sensitive Urban Design (WSUD). The stormwater discharged from the site to Duck River would be treated prior to discharge in accordance with the targets identified in Landcom's *Water Sensitive Urban Design Strategy* (2009). The exact location and sizing of water quality treatment structures would be finalised during the detailed design. Design shall be in accordance with *Australian Runoff Quality* (IEAust, 2006). Discharge of this runoff would be undertaken in a controlled manner to prevent erosion at the discharge point to Duck River.
- Drainage systems (including dry detention basins) would be maintained in line with RailCorp's existing maintenance procedures to ensure they are operating at full capacity at all times.

7.5 Non-Indigenous heritage

A Heritage Impact Assessment (Non-Indigenous Archaeology) has been undertaken by Casey & Lowe Pty Ltd. A full version of the report is included in Technical Paper 4 with a summary provided below.

7.5.1 Existing environment

Heritage listings

A search of the State Heritage Inventory (managed by Department of Planning Heritage Branch) and the Australian Heritage Database (managed by the DSEWPC) identified two heritage listings relating to land on which the ASP is proposed:

- Clyde Marshalling Yards – archaeological item under the Auburn LEP
- Clyde Railway Yards – archaeological item under RailCorp's Section 170 Register.

Table 7.36 outlines other listed heritage items located in the vicinity of the ASP. None of these items are located directly adjacent to the ASP. The Auburn Signal Box would however be in the vicinity of works forming part of the ASP and the heavy vehicles would travel past St Joseph's Hospital.

Archaeological potential

Archaeological potential is defined as a site's potential to contain archaeological relics which fall under the provisions of the *Heritage Act 1977*. This potential is identified through historical research and by judging whether building or other activities have removed all evidence of known previous land use.

Investigation into past land uses indicates that much of the ASP site was unoccupied, cleared land prior to it being resumed for railway usage from 1874. Little appears to have been built before the latter part of the century and the opening of the yards in 1891/1892. After 1891/1892, the ASP site was occupied by numerous tracks, sidings, railway workshops and built infrastructure.

There is no evidence that the study area would retain features associated with any pre-railway use of the land. The majority of the railway-period infrastructure that made up the Clyde Marshalling Yards has been removed or demolished, although there is a small amount of in situ rail track located on site. Railway track cannot be considered to be a rare or significant resource. The railway plans indicate that other features such as building footings or traverser pits may be present but they are likely to have been disturbed or be of limited value in adding to knowledge of the place. There is an extant railway shed on the western boundary which is considered to have no heritage significance.

Table 7.36 Adjacent heritage items

Name	Address	Listing
Electricity Substation No. 167	93 Parramatta Road, Auburn	State Heritage Register #1790 EnergyAustralia S170 register
Auburn Railway Station	South Parade, Auburn	Auburn LEP
Auburn Signal Box	Rawson Street (opposite Karrabah Road), Auburn	State Heritage Register #1023 RailCorp S170 register
Dwelling	3 Kihilla Street, Auburn	Auburn LEP
Electricity Substation No. 257	Park Road and Queen Road, Auburn	EnergyAustralia S170 register
Inter war dwelling	21 Yillowra Street, Auburn	Auburn LEP
St. Joseph's Hospital	Corner Alice Street and Normanby Road, Auburn	Auburn LEP

7.5.2 Construction impacts

Despite having been a major railways marshalling area, with engineering and carriage building facilities, the ASP site has lost almost all its original elements and structures, leaving little physical evidence remaining. While the proposed ASP works would involve earthworks including excavation, the historical research did not identify a significant archaeological resource and therefore impacts during construction are considered to be minimal.

The ASP is located in the vicinity of the Auburn Signal Box which is a State Heritage Item. Vibration impacts on this item are considered unlikely as the item would be over 35 metres away from the proposed works. As discussed in Section 7.1.2, the predicted vibration source levels associated with the construction plant are not expected to exceed the criteria at distances greater than 20 metres away from

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the proposed works and tamping of ballast would not affect structures greater than 35 metres from the works.

The proposed haulage routes for the ASP are located adjacent to St Joseph's Hospital which is a heritage item and construction of the ASP may potentially result in some vibration impacts. These impacts are considered to be minimal as the number of heavy vehicles travelling in the vicinity of the proposal is considered minimal when compared to existing traffic along this road.

7.5.3 Operational impacts

The operation of the ASP would not result in any non-Indigenous heritage impacts.

7.5.4 Management and mitigation measures

Construction

- If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of heritage significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are determined to have heritage significance, approval under sections 139 and 140 of the *NSW Heritage Act 1977* would be obtained to allow their recording prior to removal.
- A heritage interpretation plan would be developed and implemented including the provision of interpretive signage that provides information on the heritage significance of the site.
- Any significant findings would be documented and then reported to RailCorp so that the Section 170 listing for the site can be updated.
- A 5-metre curtilage would be maintained around the Auburn Signal Box.

Operation

No operational mitigation measures were identified relating to non-Indigenous heritage as impacts are not expected.

7.6 Indigenous heritage

7.6.1 Existing environment

History

The Auburn area was used as a meeting place between Aboriginal groups. This was largely due to it being located between the Darug inland group and the Eora/Dharawal coastal group. The most commonly recognised subclans located within the Auburn area are the Wangal and Wategoro clans who are considered to be the original inhabitants of the region. The Wategoro is considered the Duck River clan which would have most likely lived on the land surrounding the ASP site.

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Listed items

A search of DECCW's Aboriginal Heritage Information Management System (AHIMS) was undertaken on 1 June 2010. This search indicated that no Indigenous heritage items have been recorded within the footprint of the ASP or within a two kilometre radius of the site.

Due to the highly modified environment in the vicinity of the ASP site, it is considered unlikely that any unidentified Indigenous heritage items are located on or in the vicinity of the ASP.

7.6.2 Construction impacts

As no known Indigenous heritage items are located in the vicinity of the ASP and the potential for unknown items is low, the ASP is unlikely to affect Indigenous heritage during construction.

However, there is the potential to encounter unknown Indigenous heritage items during earthworks associated with the ASP. Mitigation measures outlined in Section 7.6.4 would be implemented in the unlikely event that any items are encountered during construction.

7.6.3 Operational impacts

No operational impacts on Indigenous heritage are expected.

7.6.4 Management and mitigation measures

Construction

- If previously unidentified Indigenous heritage items are uncovered during the work, all work in the vicinity of the find must cease and appropriate advice would be sought from DECCW and/or heritage consultants. Work in the vicinity of the find would not re-start until clearance has been received.

Operation

No operational mitigation measures were identified relating to Indigenous heritage as impacts are not expected.

7.7 Biodiversity

An Ecological Impact Assessment has been undertaken for the ASP. A full version of the report is included in Technical Paper 5 with a summary provided below.

7.7.1 Methodology

Desktop assessment

A desktop assessment was undertaken to identify flora and fauna species, populations and threatened ecological communities listed under the NSW TSC Act and FM Act and the Commonwealth EPBC Act (threatened biota) that have previously been recorded or could be expected to occur within the study area. The following databases and documentation were reviewed prior to field investigations:

- NSW National Parks and Wildlife Service Wildlife Atlas database (searched March 2010 for records for threatened species within a 10 kilometre radius of the ASP site)

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- EPBC Online Protected Matters Search Tool (searched March 2010 for NES matters recorded or predicted to occur within a 10 kilometre radius of the ASP site)
- *Review of Environmental Factors for the Proposed Maintenance Facility at Auburn* (GHD 2006) for previous species lists from the study area.

Site survey

An ecological survey of the ASP site was undertaken on 1 April 2010. A supplementary survey of an adjoining area of native vegetation was undertaken on 12 May 2010. All species observed were recorded on field sheets.

7.7.2 Existing environment

Flora

A total of 78 flora species were identified during the 2010 site surveys (refer Appendix A of Technical Paper 5 for full list). However, accounting for seasonal variation in plant growth the total number of flora species present at the ASP site is likely to be higher. Of the species identified, 53 (approximately 67 per cent) were introduced species.

The majority of the ASP site is disturbed, cleared, hardstand areas or exposed fill with little vegetation cover. Vegetation within the footprint for the ASP is fragmented and is dominated by environmental weeds. There are the occasional planted native tree and shrub and opportunistic native herbs and grasses. Vegetation at the ASP site is shown on Figure 7.4.

There are no intact native vegetation communities on the ASP site. The distribution of plant species and vegetation structural forms at the ASP site suggest a history of disturbance rather than any natural ecological processes. Disturbance has resulted in forming dense clumps of environmental weeds.

There are occasional isolated planted native trees spread throughout the ASP site, supported by some native understorey species. These native species do not represent a specific remnant vegetation community.

There is an area of planted and regenerating native vegetation located near the footprint of the proposed overbridge to the MainTrain Facility, which contains planted native garden beds with a canopy of sub-mature species and occasional shrubs.

Duck River, which is located adjacent to the ASP site, is noted as an important wildlife corridor in the area. It has been extensively altered due to the prior removal of vegetation for residential and industrial land uses. Parts of the river are currently being rehabilitated by bush regeneration groups, and in places it does contain elements of vegetation communities that would qualify as endangered ecological communities (EECs). The portion of the corridor immediately adjacent to the ASP site is dominated by exotic trees, shrubs and scramblers with very few native elements remaining.

A management plan has been developed for the restoration and rehabilitation of Duck River (PB, 2010) in the vicinity of the RailCorp land within the Clyde Marshalling Yards. The objectives of the plan include the revegetation of the riparian zone and the long-term eradication and suppression of the most detrimental weed species.

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Fauna

Fauna recorded in the study area comprised of three frogs, 14 birds, one mammal and three reptile species. Most species observed were generalist, adaptable species which are commonly encountered throughout the Sydney Basin. Five exotic bird species and evidence of the introduced predator Red Fox (*Vulpes vulpes*) were also recorded on site. The list of recorded fauna species is provided in Appendix A of Technical Paper 5.

The Grey-headed Flying Fox (*Pteropus poliocephalus*), which is listed as vulnerable under both the TSC and EPBC Acts, was recorded during the site visit. This species is known to congregate at a roost camp in the Duck River corridor (GHD 2006), and approximately 600–800 individuals were observed roosting within 200 metres of where the rail line crosses Duck River during the 2010 site visit. The roost camp and fauna habitat resources are shown on Figure 7.4. No other threatened fauna species listed under the TSC, FM or EPBC Acts were recorded during the field surveys.

The fauna diversity of the ASP site is likely to be greater than the species recorded in this single survey but would probably only consist of opportunistic fauna typical of urban environments. The ASP site would be very unlikely to support any native terrestrial mammals and would support relatively few native birds in addition to those common, opportunistic species observed during the 2010 surveys.

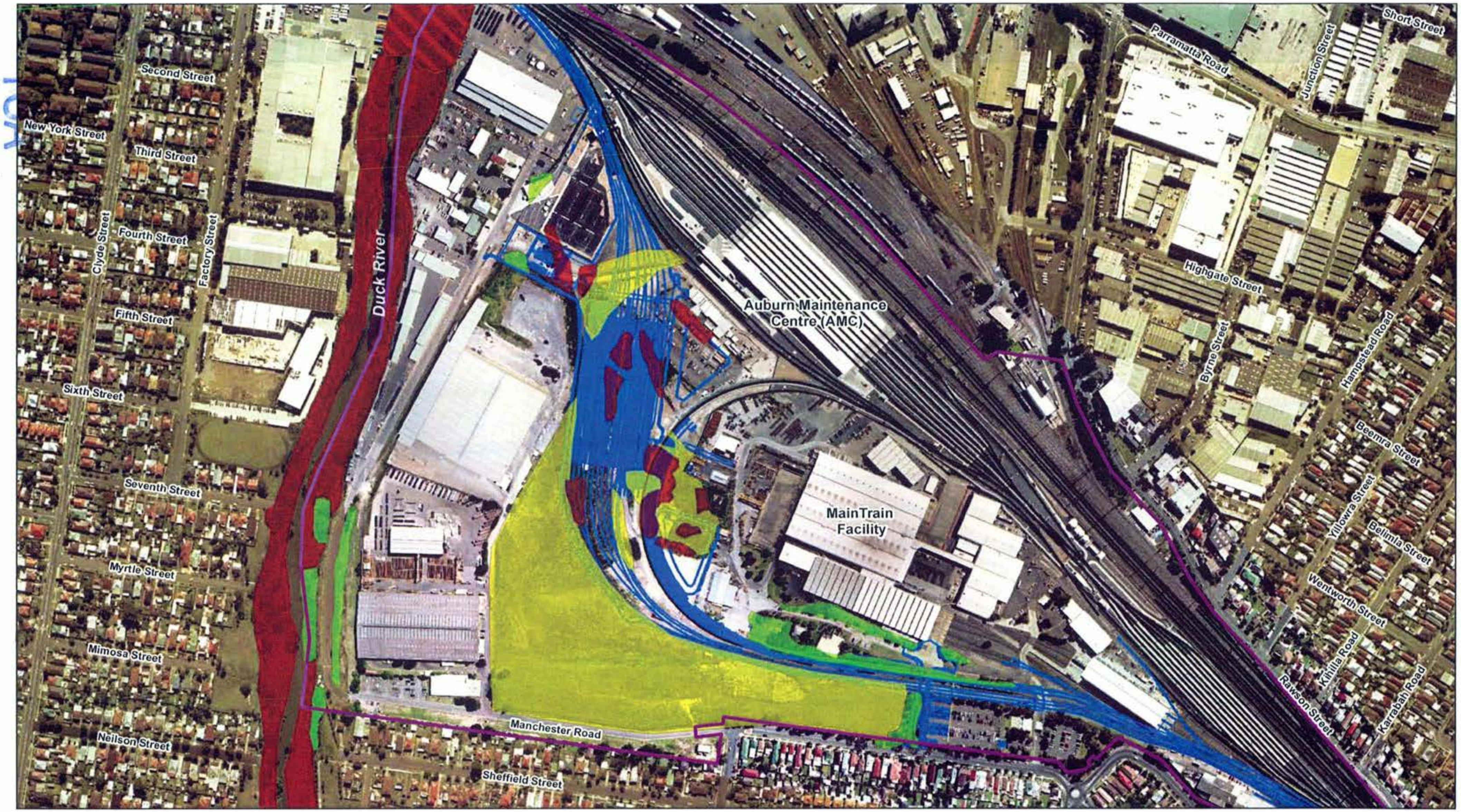
Fauna habitat

The ASP site is highly disturbed, and contains limited habitat resources. Small patches of lantana and exotic rushland/scrub provide some understorey shelter habitat for small birds. Substantial amounts of refuse (e.g. sheet metal, plastic, railway sleepers, metal drums) occur throughout the main stabling yard footprint. This refuse provides potential shelter for reptiles, amphibians and small mammals.

The ASP site includes areas of aquatic habitat, including man-made drains and small depressions, a number of which were flooded due to the rain preceding the site survey. These small, ephemeral aquatic habitats may be used by a number of amphibian species on an opportunistic basis but are unlikely to support permanent, long-term populations at the ASP site.

A limited number of mature Eucalyptus and Casuarina trees that would provide foraging and shelter resources for native fauna were recorded on site. These trees are present in landscaped areas and are generally isolated from other habitat resources.

The ASP site does not contain any intact native vegetation patches, hollow-bearing trees, rock outcrops, natural wetlands, extensive areas of understorey vegetation or any other important habitat resources for native fauna.



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0 25 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 56

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LEGEND

- Study area
- Exotic Scrub and Rushland
- Exotic Tussock Grassland
- Planted and regenerating native vegetation
- Disturbed cleared land
- Grey- Headed Flying-Fox Roost Camp
- Auburn Stabling Project
- Existing track

CLIENTS | PEOPLE | PERFORMANCE

TCA
Auburn Stabling Project

Job Number	21-19479
Revision	B
Date	29 OCT 2010

Vegetation and habitat resources **Figure 7.4**

G:\21\19479\GIS\Maps\MXD\21_19479_Z005_Vegeation_and_habitatResA4_Corp.mxd

Data Source: StreetMap Navigate: StreetMap - Jan 2010. Created by: qjchung

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Conservation significance

No threatened flora species were recorded during the field surveys.

No EECs were recorded in the field surveys or have been mapped in the broader study area. The ASP site does not support any remnant native vegetation communities.

Planted vegetation at the ASP site includes some species representative of EECs however the vegetation is not sufficiently developed to comprise a native community. Therefore it is unlikely that any EECs could regenerate at the ASP site in the future.

The development footprint contains no suitable roosting habitat for the threatened Grey-headed Flying-fox and only a few large Eucalypts exist on the site that could be used as foraging habitat for this species. No other threatened fauna species were identified during the site surveys.

The aquatic habitats identified on site may provide marginal foraging and breeding habitat for the endangered Green and Golden Bell Frog. Despite the presence of potentially suitable habitat at the ASP site, the Green and Golden Bell Frog is unlikely to occur on the ASP site given the surrounding matrix of industrial estates, roads and rail infrastructure and the lack of connectivity to other suitable aquatic habitats.

Native trees at the ASP site and in the broader study area would provide only very marginal habitat for migratory or nomadic threatened fauna species which may potentially occur in the locality on occasion, including but not limited to the Swift Parrot and Regent Honeyeater. The ASP site would not permanently support any individuals nor provide any important resources for these species.

7.7.3 Construction impacts

Direct impacts

The development would require the clearing of habitat, including some mature native trees, dense patches of environmental weeds and artificial wetlands, for the common native fauna which occur on the ASP site. The proposed clearing of this habitat is likely to result in the displacement or mortality of individuals within disturbance footprints. The magnitude of these likely impacts is assessed below.

Construction of the ASP would disturb approximately 10 hectares of exotic tussock grassland and environmental weeds. These contain limited potential foraging habitat for native birds, reptiles and amphibians, some shrubby areas which may provide sheltering habitat for native birds, and abundant discarded refuse which provides potential shelter for native reptiles and amphibians. A limited amount of ephemeral aquatic habitat would be removed within the construction footprint, removing potential foraging and breeding habitat for native frogs.

There is some scope for native fauna to evade injury and/or seek alternative habitat in an area of similarly modified exotic grassland to the south of the ASP site, or in habitat along the Duck River corridor to the east.

A number of native bird species occupy the ASP site and would be affected by the removal of potential foraging and sheltering habitat resources. The majority of these species are mobile, widespread, common and tolerant of highly disturbed areas. Given the marginal nature of habitat on site and the proximity of alternative habitat (Duck River corridor) and resources in the locality, it is likely that the impact on local populations of native birds would be minor.

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It is likely that native frogs and reptiles would be adversely affected during clearing, particularly species sheltering under refuse or amongst vegetation surrounding aquatic habitats. Mitigation measures outlined in Section 7.7.5 would partially ameliorate these impacts.

Indirect impacts

The ASP has the potential to produce contaminated surface water through runoff from areas stripped of vegetation and soil stockpiles and leakage of hydrocarbon products from vehicles. Duck River contains aquatic habitats which comprise sensitive receptors for these potential impacts (albeit already extensively degraded).

There are likely to be moderate, temporary impacts associated with noise and other disturbances on fauna utilising adjacent areas of habitat during construction. Resident fauna are likely to be adapted to these disturbances given the current industrial and rail activities at the ASP site.

The ASP is not located on the Duck River however the works at the ASP would be required to be constructed and operated in accordance with the management strategies outlined in the Duck River management plan. The ASP would not have any impact on the implementation of this management plan.

These impacts would be minimised and managed through the implementation of the mitigation measures outlined in Section 7.7.5.

7.7.4 Operational impacts

During the operational phase of the ASP, the busiest periods for the stabling facility would be during the night (from 9pm to 12 midnight and then from 3.30am to 6am). Current RailCorp operating procedure requires trains to test their horns prior to departure from the stabling yard and sound their horns to signal imminent movement. This horn noise at the Clyde end of the stabling yard would potentially affect the Grey-headed Flying-fox and may result in the species vacating their existing habitat.

Between 9pm and 12 midnight, Flying-foxes are likely to be foraging away from the roost camp and be largely unaffected by noise. Trains testing their horns during the morning departure period would have a greater potential for impact as this is the period when Flying-foxes are returning to roost and may be vulnerable to disturbance. Roosting individuals observed during 2010 surveys showed no discernible response to the high speed passage of trains within 50 metres of the camp.

The Royal Botanic Gardens Melbourne Grey-headed Flying-fox relocation program highlighted pre-dawn noise disturbance as a highly effective component of the relocation strategy (ARCUE 2009). However the relocation program used much higher intensity noises (~140 dB), and also highlighted the importance of varying the directionality and type of noise disturbance to avoid habituation (ARCUE 2009). Most other relocation operations, such as those at the Sydney Royal Botanic Gardens, have been largely unsuccessful in causing populations of Grey-headed Flying-foxes to abandon roost camps (Hall 2002, ARCUE 2009). This relocation operation used noise intensities of 76 dB, which is higher than the expected noise levels resulting from the ASP site. Given the relatively low noise levels, consistency of the proposed disturbance in terms of direction and noise type, and the adoption of a monitoring program, it is unlikely that the increased noise would threaten the persistence of the Grey-headed Flying-fox camp site at Duck River. Any potential impacts resulting from horn noise in this location would not occur until the Clyde Junction is integrated with the Main Line in 2017.

The operation of the ASP would require increased lighting, including at the existing level crossing over the rail tracks at the Clyde end, the ASP car park and security lighting in the stabling yard itself. These

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areas are at their closest over 100 metres from the Flying-fox camp. The maintained average illuminance in these areas would be 50- 85 Lux in car parks, aisles and roadways and 160 Lux in circulation areas. These levels would drop to below 0.016 or 0.0085 Lux at a distance of over 100 metres, which is approximately equivalent to a normal night with a quarter moon. Taking into account buildings and vegetation barriers between these areas and the Flying-fox camp, it is highly unlikely that the roost camp would be significantly affected by these lighting levels. Grey-headed Flying-foxes live and forage in urban areas with much higher illumination levels (for example around the Sydney CBD) and navigation to and from the roost camp is therefore unlikely to be affected.

The ASP would not represent a substantial increase in the risk of vehicle collisions with fauna given the lack of habitat in the local area, and the presence of existing local residential and industrial traffic and the Main West Line.

Provided the environmental management measures are implemented and maintained the ASP is unlikely to result in any significant ecological impacts during operation.

7.7.5 Management and mitigation measures

Construction

- Mature trees and other native vegetation to be retained would be clearly delineated, with all construction activities excluded from these areas, in accordance with TCA procedure.
- Construction impacts would be restricted to the immediate surface disturbance area and previously degraded land through stockpiling of soils away from native vegetation areas to be retained.
- Soil management systems would be implemented to ensure that topsoils are maintained in a form that would maintain their viability for use in landscaped portions of the final site layout and minimise the risks of erosion, sedimentation or the spread of environmental weeds, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).
- A weed management plan would be developed for the ASP.
- In line with TCA's *Biodiversity Offset Strategy*, a target of 100 per cent offset vegetation would be set for the removal of trees as part of the ASP.
- All vegetation planted on site would generally consist of local native species.
- Should any trimming, cutting, pruning or removal of trees or vegetation beyond that assessed as part of this REF be required, approval from TCA would be required.
- Preclearance surveys for resident fauna would be undertaken and any fauna sheltering within the construction footprint would be relocated to the nearest area of 'safe' habitat.

Operation

- Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist. Monitoring would be undertaken fortnightly during the first three months of operation of the Clyde Junction in 2017 and then monthly for the next nine months. In the event that the monitoring demonstrates an impact, further investigation to identify the cause would be undertaken. A management plan would then be developed to address the impact. Where major impacts to the roost are identified, operations (or the identified source of the impact) would be halted until a time in which the impacts are reduced through appropriate mitigation.

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- A weed management plan would be developed to manage the issue of weeds during operation.

7.8 Visual and urban design

7.8.1 Methodology

Landscape impact

Landscape impacts refer to the relative capacity of the landscape to accommodate changes to the physical landscape of the type and scale proposed that would occur as a direct result of the ASP. Impacts have been assessed from identified viewing locations and consideration of the scale of change including:

- the extent to which the change of features alters the existing landscape character
- the extent of area from which the effect is evident
- the duration of the effect (short, medium, long-term, or permanent)
- the physical state (or condition) of the landscape and its intactness from a visual, functional, and ecological perspective. This includes consideration of the condition of landscape elements such as roadside planting or landscaping or features such as a distinctive building, or important mature trees, and their contribution to landscape character
- the effectiveness of any proposed mitigation.

Definitions used to describe this assessment are detailed in Table 7.37.

Table 7.37 Assessment of landscape impact

Landscape impact	Definition
Large	A substantial / obvious change to the landscape due to total loss of, or change to, elements, features or characteristics of the landscape. Would cause a landscape to be permanently changed and its quality diminished. Change is likely to cause a direct adverse permanent or long-term (more than 10 years) impact on the value of the receptor.
Moderate	Discernible changes in the landscape due to partial loss of, or change to the elements, features or characteristics of the landscape. May be partly mitigated. The change would be out of scale with the landscape, and at odds with the local pattern and landform and would leave an adverse impact on the landscape. Change is likely to impact adversely the integrity/value of the receptor but recovery is predicted in the medium term (5–10 years).
Small	Minor loss or alteration to one or more key landscape elements, features, or characteristics, or the introduction of elements that may be visible but may not be uncharacteristic within the existing landscape. Change is likely to adversely impact the integrity/value of the receptor but recovery is expected in the short-term (0–4 years).
Negligible	Almost imperceptible or no change in the view as there is little or no loss of / or change to the elements, features or characteristics of the landscape.

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Landscape impact	Definition
	The existing landscape quality is maintained but may be slightly at odds to the scale, landform and pattern of the landscape.

Source: Landscape Institute and Institute for Environmental Management and Assessment, 2002

Visual sensitivity

Visual impacts arise from changes in available views of the landscape that occur as a result of the ASP. Visual impact is determined through the subjective assessment of sensitivity of the visual receptors and the magnitude (scale) of the change in view. Sensitivity is dependent upon receptors' location, the importance of their view, their activity, expectations, available view, and the extent of screening of this view.

Factors that have been considered in assessing the response to changes in the visual amenity include:

- interest in the visual environment and distance/angle of view to the source of the impact from the visual receptor
- the extent of screening/filtering of the view
- magnitude of change in the view (i.e. loss/addition of features that change the view's composition)
- integration of changes within the existing view (form, mass, height, colour and texture)
- duration of the effect (temporary/permanent, intermittent/continuous)
- effectiveness of the proposed mitigation.

Visual sensitivity definitions used to describe this assessment have been outlined in Table 7.38.

Table 7.38 Assessment of visual sensitivity

Sensitivity	Definition
High	◗ Occupiers of residential properties with long viewing periods, within close proximity to the ASP ◗ Communities that place value upon the landscape and enjoyment of views of their landscape setting
Medium	◗ Outdoor workers who have a key focus on their work who may also have intermittent views of the ASP site ◗ Viewers at schools, or similar, when outdoor play and recreation areas are located within close proximity but viewing periods are limited ◗ Occupiers of residential properties with long viewing periods, at a distance from or screened from the ASP site
Low	◗ Road users in motor vehicles, trains or on transport routes that are passing through or adjacent to the study area and therefore have short-term views ◗ Viewers indoor at their place of work, schools or similar
Negligible	◗ Viewers from locations where there is screening by vegetation or structures where only occasional screened views are available and

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	viewing times are short • Road users in motor vehicles, trains or on transport routes that are passing through/adjacent to the study area and have partially screened views and short viewing times

Source: Landscape Institute and Institute for Environmental Management and Assessment 2002

Significance of impact

For the purposes of this assessment, predicted impacts as a direct result of the ASP have been described according to their significance, which is a function of the magnitude of the impact and the sensitivity of the receptor as detailed in Table 7.39.

Table 7.39 Significance of impact

		Landscape impact			
		Large	**Moderate**	**Small**	**Negligible**
Visual sensitivity	**High**	Major significance	High significance	Moderate significance	Minor significance
	Medium	High significance	Moderate significance	Minor significance	Not significant
	Low	Moderate significance	Minor significance	Not significant	Not significant
	Negligible	Minor significance	Not significant	Not significant	Not significant

Source: Landscape Institute and Institute for Environmental Management and Assessment 2002

7.8.2 Existing environment

Views of the ASP site are available from various locations around the ASP site. Many of these viewpoints have extended viewing periods or directly overlook the ASP site. It is recognised that views would be available from locations such as the surrounding road network however these locations also have residences or other premises that have been addressed and therefore associated impacts and mitigation measures would also apply to road users.

The viewing locations that have been identified and assessed are:

- Manchester Road and Private Road
- The Crescent
- Rawson Street
- rail passengers
- properties west of Duck River.

The existing visual context at these locations is described below.

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Manchester Road and Private Road

The residential properties on Manchester Road are directly adjacent to the southern boundary of the ASP site in the vicinity of the proposed overbridge. Properties fronting Manchester Road have some direct views overlooking the ASP site. Properties along the Private Road that have frontage to Sheffield Street generally have fencing that provides a visual barrier to the views towards the ASP site. Some properties contain two storey dwellings and therefore views are available over the rear fences from the second storey. Some properties also contain vegetation along their rear fences to assist in creating a visual barrier.

Views from Private Road are limited due largely to existing industrial buildings located to the west of the ASP site and existing mounding (approximately three metres high) located on land to the south of the ASP site, which would provide a visual screen. Figure 7.5 and Figure 7.6 contain views of the ASP site from Manchester Road and Private Road respectively. In the event that the mounding on the adjacent land is removed due to the site being developed, any new development that that is constructed on the adjacent site would potentially provide screening of the ASP site from Manchester Road and Private Road. Overall the views of the site from Private Road and Manchester Road consist of railway facilities.

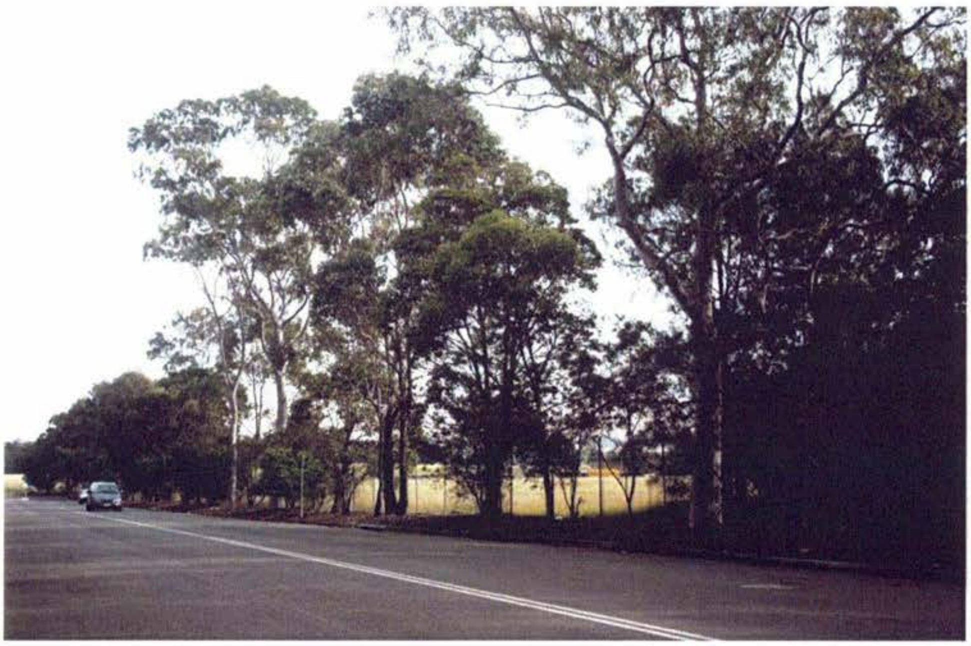

Figure 7.5 View north-east along Manchester Road towards the ASP site

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Figure 7.6 View north from Private Road towards the ASP site

The Crescent

While the single storey detached houses on The Crescent are at a similar elevation to the ASP site, mature trees located within the road reserve and within the ASP site provide a good visual screen of views into the ASP site (Figure 7.7). The presence of the MainTrain Facility, the Manildra facility and a commercial building located adjacent to the Manildra facility also act as a visual buffer providing screening of the views of the ASP site and adjacent railway infrastructure.

Views into the ASP site for residents of the multi storey residential development are screened by existing buildings and vegetation (Figure 7.7 and Figure 7.8).

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Figure 7.7 View west from The Crescent toward the ASP site

Rawson Street

The single storey residences on Rawson Street, to the north-east of the ASP site, have direct viewing of the existing railway infrastructure (within the Main West Line corridor) across Rawson Street. There is some screening of these views however much of this view point contains no screening and therefore the outlook is dominated by the road and rail land uses (Figure 7.9).

Larger multi storey residential developments located on Rawson Street to the north-east of the Auburn end of the ASP site, with units facing to the south, have views across the Main West Line corridor to the ASP site. These views are dominated by railway infrastructure in particular the MainTrain and AMC facilities.

Residential houses and businesses located in the northern section of Rawson Street are offered substantially more screening through mature trees and a landscaped mound. While this screening does not completely remove viewing opportunities, the extent of overlooking is greatly reduced.

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Figure 7.8 Screened views into the ASP site from multi storey dwellings on The Crescent

Figure 7.9 View south-west from Rawson Street towards the ASP site

Rail passengers

Rail passengers currently travel adjacent to the ASP site along a number of tracks on the Main West Line that are largely parallel to the northern site boundary. Passengers can access the train service at Clyde Station to the north-west.

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The views available from this location are largely of mature vegetation, and existing rail infrastructure including the passenger rail network and the AMC (see Figure 7.10 and Figure 7.11).

Properties west of Duck River

A number of properties are located on the western side of Duck River and potentially have views across to the ASP site. Views for residential properties between Seventh and Nielson Streets are very limited due to vegetation along the Duck River corridor and also some industrial properties located directly adjacent to the ASP site.

Some industrial properties are located along the Duck River to the south of the Main West Line. These properties comprise of large warehouses. Views from these industrial properties of the ASP site would be limited due to vegetation along the Duck River and some RailCorp properties located on the eastern bank of the Duck River.

Figure 7.10 Rail passengers viewing location from Clyde Station

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Figure 7.11 Rail passengers viewing location from passing train across AMC tracks to ASP site

7.8.3 Construction impacts

Manchester Road and Private Road

Construction works in the vicinity of Manchester Road would be focused on the development of a new access road and pedestrian overbridge for MainTrain staff. The construction compound for these works and the stockpiling site is likely to be situated within the land located to the south of the ASP (Janyon Pty Ltd owned land). A section of the existing vegetation on the ASP site's boundary would be cleared for access reducing available screening.

While the additions of the access road and overbridge would be permanent fixtures the majority of impacts on the visual landscape would be temporary resulting from the removal of vegetation along Manchester Road and on the ASP site in the vicinity of the existing car park.

The retention of other screening vegetation on the ASP site's boundary, where possible, to Manchester Road and retention of the existing mound on the property to the south of the ASP site (if possible) would continue to provide a partial visual buffer to other on site activities during construction. The proposal to carry out construction works within standard working hours would assist in minimising visual impacts on surrounding properties, as construction lighting would not be required. Night time works would only be required during possession periods. Lighting impacts from these works would not impact upon Manchester Road, as works during possession periods would only be required at the Auburn and Clyde Junctions where the ASP is integrated with the existing network, approximately 300 metres and 800 metres from Manchester Road/Private Road respectively.

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It is assessed that the ASP would have a moderate adverse landscape impact and medium visual sensitivity, therefore resulting in a moderate impact (in accordance with Table 7.38) on views from residences along Manchester Road during construction.

The Crescent

Works within the vicinity of The Crescent involve the establishment of new tracks leading into the existing MainTrain Facility and ASP stabling yard. While earthworks and construction processes are undertaken plant and machinery would be operating in the area increasing the activity visible from this viewing location.

The MainTrain Facility, Manildra and an adjacent commercial building would provide screening to a large proportion of the receptors located in The Crescent minimising their visual exposure to the construction works. In addition, construction works would be undertaken within standard working hours and therefore would assist in minimising visual impacts on surrounding properties as construction lighting would not be required. Some works in the vicinity of The Crescent would be undertaken during possession periods and therefore potential lighting impacts are expected. These impacts would be minimal due to the short timeframes they would be required and would largely be screened by existing vegetation and buildings.

The change in view during construction would be experienced by occupants of the residential units (located at the corner of The Crescent and Alice Street) with windows or balconies orientated towards the ASP site. However due to the limited extent of works proposed in this section of the ASP site, the landscape and visual impact is not considered to be significant.

St John's Primary School is located to the south-east of The Crescent and, due to its position and site landform, views from this receptor are limited.

It is assessed that the ASP would have a small adverse landscape impact and medium visual sensitivity, therefore, resulting in a minor impact on views from The Crescent during construction.

Rawson Street

Works required as part of the ASP would be visible from sections of Rawson Street, however these works are separated from the viewing location by the existing rail lines.

Units oriented to the south and west located within the multi-storey residential development located on the corner of Macquarie Road and Rawson Street would have views over the ASP site and of the construction works. The separation distance to this development, the composition of the existing view and the orientation of the building all minimise the visual sensitivity of the residents of this development.

The proposed works should not result in the removal of any existing screening vegetation on Rawson Street.

Night works to be undertaken during possession periods would require lighting that would be visible from Rawson Street from across the existing rail corridor. These impacts would be minimal due to the short timeframe of the night time works. These night works occasionally occur within the existing corridor during possession periods.

It is assessed that the ASP would have a small adverse landscape impact and low visual sensitivity, therefore, resulting impacts on views from Rawson Street are not considered to be significant during construction.

Rail passengers

The required construction works would result in a number of changes to the environment in which rail passengers currently transect when moving between Auburn and Clyde stations. The activities involved in construction of the ASP all have potential to be visible to rail passengers.

The visual landscape of the ASP site as experienced by patrons of passenger trains is comprised of short-term views of rail infrastructure, adjacent development and advertising along the rail line.

Construction works would be visible to patrons on passenger trains within this viewing location but the works would not be uncharacteristic to the existing visual landscape.

It is assessed that the ASP would have a negligible adverse landscape impact and negligible visual sensitivity, therefore, resulting impacts on rail passenger views are not considered to be significant during construction.

Properties west of Duck River

Construction of the ASP is considered unlikely to impact on the views from properties to the west of Duck River due to vegetation along the river corridor and also existing buildings located to the west of the ASP site. Views of the site from the industrial properties are considered more likely however, given these sites are classified as industrial properties, they are not considered to be sensitive receptors and therefore impacts are not expected.

7.8.4 Operational impacts

Manchester Road and Private Road

The proposed access road and pedestrian overbridge would require the clearing of vegetation along the southern boundary of the ASP site and the alterations to the MainTrain Facility site entrance would result in changes to traffic movement patterns in Manchester Road.

The construction of the new MainTrain access would result in the introduction of new structures such as the overbridge and security checkpoint. The introduction of these structures would have some minor impact on the views from Manchester Road residences. Impacts are considered minor due to the existing views from this location being of the existing MainTrain car park and the MainTrain Facility.

The ASP may include the installation of noise attenuation structures, although their exact location and length would be determined during detailed design. These structures may be visible from the existing receptors along Manchester Road and Private Road, although the potential 'enclosure' structure on the Auburn Neck has been designed within an existing cutting and therefore would not be highly visible from residences on Manchester Road and Private Road. A noise barrier along the southern boundary of the site would screen views of the ASP from Manchester Road. Given the distance of any noise attenuation structures from residences, it is unlikely to be a major feature of the landscape. The Urban Design and Landscape Plan would consider ways to minimise the impact of any noise attenuation structures.

Increased security lighting associated with the new MainTrain vehicle entrance and car parking may result in some increased illumination in the immediate vicinity, however management of the lighting would minimise any additional visual impact. Light spill from other sections of the stabling yard is expected to be minimal due to the distance to the residential dwellings to the south of Manchester Road and the Private Road. These impacts would also be minimised through the implementation of mitigation measures relating to the type and positioning of lighting.

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Lighting from trains moving around and stabled within the ASP site is not considered to generate significant light spill impacts on neighbouring properties, largely due to screening to be provided (e.g. vegetation and a noise barrier), the distance from the receptors, and the limited opportunities for internal train lights to be directed at neighbouring properties.

While some of the new rail infrastructure would be visible from Manchester Road, Private Road and some residential properties in this viewing location, the proposed uses are considered to be consistent with the existing character of the area. The existing landscaping and mounding would also continue to offer partial screening of on site activities during the operation of the ASP. Where possible, the proposed landscaping would provide some visual screening.

An artist impression of the ASP, providing an elevated view from the south-east of the site, is provided in Figure 7.12.

It is assessed that the ASP would have a small adverse landscape impact and medium visual sensitivity, therefore, resulting in a minor impact on views from Manchester Road and Private Road during operation.

The Crescent

The provision of additional tracks in the vicinity of The Crescent would result in increased train movements during operation. Additional lighting provided in this section of the ASP site may result in some increased illumination in the immediate vicinity of the tracks.

The new tracks are consistent with the current activities on site and are not anticipated to result in any long-term changes to the ASP site's landscape character or the amenity of surrounding residents.

Existing buildings and street vegetation would not be affected as a result of ongoing operation.

It is assessed that the ASP would have a small adverse landscape impact and medium visual sensitivity, therefore, resulting in a minor impact on views from The Crescent during operation.

Rawson Street

A number of on site facilities are likely to be visible from some properties on Rawson Street, particularly multi storey residential developments. However the separation distance to the ASP and the presence of existing rail infrastructure located between the visual receptors and the ASP reduces the sensitivity of the changes to the visual outlook.

Additional lighting provided in this section of the ASP site may result in some increased illumination in the immediate vicinity of the new facilities.

The changes to the ASP site post construction including lighting and the presence of new infrastructure are all considered to be consistent with the existing character of the landscape.

It is assessed that the ASP would have a negligible adverse landscape impact and low visual sensitivity, therefore, resulting impacts on views from Rawson Street are not considered to be significant during operation.

Rail passengers

Due to the location of the ASP, the location of existing rail infrastructure associated with the AMC, and the separation distance to the passenger rail lines, there would be limited viewing opportunities for train passengers.

The existing nature of this rail landscape, and the short-term nature of the views, reduces the visual impact and sensitivity of this viewing location.

It is assessed that the ASP would have a negligible adverse landscape impact and negligible visual sensitivity, therefore, resulting impacts on rail passenger views are not considered to be significant during operation.

Properties west of Duck River

Operation of the ASP is considered unlikely to impact upon the views of properties to the west of Duck River due to vegetation along the river corridor and also existing buildings located to the west of the ASP site. Views of the site from the industrial properties are considered more likely however, given these sites are classified as industrial properties they are not considered to be sensitive receptors and therefore impacts are not expected.

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Figure 7.12 **Artist impression of the ASP**

7.8.5 Management and mitigation measures

Construction

- An Urban Design and Landscape Plan would be prepared for the ASP during the detailed design stage. This plan would aim to:
  - minimise the visual impact of any noise attenuation structures
  - minimise the visual impact of new driveway entrances (e.g. MainTrain and ASP)
  - address the requirements for landscaping on site
  - minimise the impacts of lighting from the site, particularly in relation to the new MainTrain overbridge.

  The plan would detail how consultation regarding visual and urban design issues would be undertaken with stakeholders.
- Loss or damage to vegetation would be avoided where practicable, particularly vegetation located on the ASP site's boundaries that provide a screening function. Alternatives to clearing such as trimming are to be considered to avoid the total removal of vegetation.
- Use of lighting during night-time works would take into consideration the light spill impacts on surrounding residential dwellings. All lighting for the ASP would be designed and installed in accordance with the requirements of AS 1158 *Road Lighting* and AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible. Only those work areas being used would be lit at any time.
- All temporary hoarding, barriers, traffic management and signage would be removed as soon as it is not expressly required for construction activities.
- All construction materials and vehicles would be stored in an organised and tidy manner when work is not being undertaken on site. This would confine any associated adverse impacts to a distinct area.

Operation

- All lighting for the ASP would be operated in accordance with the requirements of AS 1158 *Road Lighting*, AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* and RailCorp's operational requirements to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible.
- Landscaping on site would be maintained during operation to ensure that the visual environment is maintained. Where vegetation would be required to be replaced (due to damage or for health reasons), replacement vegetation is to be planted as soon as possible and be of a similar type and size to ensure screening is provided.
- Design would consider appropriate materials and colours for any noise barrier in order to blend in with the existing visual landscape.

7.9 Socio-economic

7.9.1 Existing environment

Social environment

As at the 2006 census, 1,091 residents occupied the area immediately adjacent to the ASP site (defined by the Main West Line to the north and north-east; Duck River to the west; Sheffield Street, Chisholm Road, Cardigan Street and Normandy Road to the south; and Park Road to the south-east). This area experienced substantial population growth of nearly 25 per cent between 2001 and 2006 (ABS 2007). This rate of growth was higher than that of the Auburn LGA (16.4 per cent increase) which, according to Auburn City Council, underwent the highest percentage growth rate of any council in western Sydney during the same time period (Auburn City Council 2008). The average age of the population within the immediate area (29 years) and Auburn LGA (31 years) is much younger than the NSW average (37 years) (ABS 2007).

Auburn LGA has the largest overseas born population of any LGA in NSW with 64.3 per cent of residents in the immediate area being born in over 100 different countries (ABS 2007).

Consistent with the high proportion of overseas born residents is the very high percentage of people for whom English is not the main language spoken at home. The top five languages spoken by residents in the immediate area are English (16.2 per cent), Arabic (13.3 per cent), Cantonese (13.2 per cent), Turkish (9.8 per cent) and Mandarin (6.4 per cent).

Within the immediate area, the total number of families increased by 33 per cent between 2001 and 2006. The overall increase in the number of families, coupled with a decrease in families without children and lower median age suggest that young couples are migrating to the area and causing the demographic mix to be altered.

Economic environment

Approximately 91 per cent of residents within the Auburn LGA are employed, with 67 per cent involved in full time work. These employment rates are marginally lower for those living in the immediate area around the ASP.

The largest sources of employment within the Auburn LGA are the manufacturing (13.8 per cent), retail (10.9 per cent), and healthcare and social assistance sectors (9.1 per cent). A similar percentage of the population are employed in abovementioned sectors for the immediate area, however, 9.1 per cent of the population in the immediate area are employed in the accommodation and food service sector.

7.9.2 Construction impacts

Noise and vibration, traffic, and visual impacts are addressed as part of the socio-economic assessment as they are considered to be issues with the greatest potential to impact on the amenity of the surrounding area.

Noise and Vibration

Noise and vibration generated from the construction of the ASP would affect nearby residents, varying with distance from the ASP site. Outside of standard hours, construction work is expected to be minimal, limited to a number of possessions periods required for the ASP. Mitigation measures would be

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implemented to minimise or manage any adverse impacts. For more detailed findings, refer to Section 7.1.

Traffic

During construction of the ASP there is expected to be an increase in the number of vehicles using local roads in the immediate area. A traffic impact assessment of the area concluded that the impact of additional vehicles in the area would be minimal as the roads would continue to operate at an acceptable capacity level. The traffic impact assessment also indicates that the ASP would allow satisfactory access to Manchester Road and Chisholm Road which link the ASP site to both bus and rail services and access to Clyde Station would be maintained. For more detailed findings, refer to Section 7.3.

Visual amenity

The visual amenity of local residents in the vicinity of the construction area may be affected during construction of the ASP. Light emitted from the construction site at night time during a limited number of possession periods may spill over into nearby residences, potentially affecting the amenity. Mitigation measures have been proposed to minimise adverse visual impacts resulting from construction. For more detailed findings, refer to Section 7.8.

Community relations

Measures to inform the community and provide them with opportunities to ask questions or raise issues about the ASP have been outlined in Chapter 4. Communication methods have been used to ensure that project information has been accessible to non-English speaking residents.

Safety

The perceived and actual level of safety enjoyed by local residents, cyclists and pedestrians within the immediate area may be affected during construction. During consultation with local residents, the issue of safety along Manchester Road due to construction vehicles and additional traffic was raised. The traffic impact assessment concluded that the construction vehicles were unlikely to conflict with pedestrian and cyclist use along Manchester Road. Safety measures would be put in place to limit actual impacts to the community, while consultation with community members, particularly cyclists and pedestrians using the area, would focus on informing and educating people to ensure safety on the roads surrounding the ASP.

Impacts on safety resulting from the construction work area associated with the ASP would be minimised through the provision of fencing to prevent members of the public from accessing the worksite.

Local economy

The nearby Auburn town centre is anticipated to receive minor economic benefits during construction due to increased patronage at food outlets by the construction workforce.

The ASP would provide approximately 95 jobs during the construction period which is considered to be a benefit to the local and regional economy. The above number of jobs created is only limited to the workforce directly employed to construct the ASP and does not include jobs created through the supply of materials and delivery of materials (e.g. truck drivers). The industries which support the construction of the ASP would also see economical benefits, through providing their services and personnel (e.g. trucks or materials) to assist in the construction of the ASP. These benefits would likely be for businesses in the local area, however the benefits maybe felt further away depending on the service provided and the

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availability of services in the local area (either due to high demand locally or expertise in a particular field only being located outside the local area).

7.9.3 Operational impacts

Noise and vibration

The operation of the ASP would result in an increase in train noise in the evening and early morning, as trains move into and out of the facility. Impacts of noise from train horns would vary depending on the time of day and proximity of sensitive receivers to the facility, with greater impacts in the early morning, when the horn testing would be undertaken.

Measures to offset or minimise any adverse noise or vibration impacts have been proposed. Noise attenuation structures are being considered to minimise noise impacts. For more detailed findings, refer to Section 7.1.

Traffic

A minor increase in vehicle traffic resulting from employees and deliveries to the ASP could contribute to congestion of local roads. However investigations have shown that the impact to the local road network during operation of the ASP would be minimal (see Section 7.3).

Visual amenity

The visual amenity of residents and businesses within the immediate area is unlikely to be significantly affected during operation of the ASP. Impacts would be associated with the introduction of new infrastructure into the visual catchment and also the additional trains which would be travelling part the sensitive receptors. Views of the ASP site would be limited from sensitive receptors due to existing screening and existing mounding located on adjacent properties. Impacts on visual amenity are further reduced as the ASP would be visually consistent with the existing structures such as the AMC and other industrial sites and businesses, thus not altering the existing landscape substantially (see Section 7.8). While the ASP would result in increased train movements, this increase is not considered to significantly impact upon views from sensitive receivers as a result of existing and proposed screening.

The staff facilities and amenities building and any noise attenuation structures that may be incorporated into the design of the ASP have the potential to generate some visual impacts on the existing visual catchment. However, due to the distance of these structures to sensitive receivers (150 metres) and their position behind mounding on the site located to the south, these structures are considered unlikely to be a dominant feature of the environment. The structures are however considered to provide some beneficial effects as they would provide screening between the sensitive receivers and the new railway infrastructure to be introduced into the visual catchment of the sensitive receivers.

The new MainTrain access would change the visual landscape, however, this impact is not considered to be substantial as outlined in Section 7.8. There is potential for light spill impacts from the ASP on surrounding residential dwellings, particularly those in the vicinity of the new MainTrain access. These impacts would be minimised through the implementation of mitigation measures outlined in Section 7.8.5.

Improved rail facilities

The operation of the ASP would result in a number of benefits for train users within the immediate and surrounding areas as well as the broader community. The benefits of the ASP include:

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- allowing for an increased number of trains to service Sydney's west and south-west, thereby benefitting rail patrons
- reducing the number of empty trains on the metropolitan network, which in turn reduces congestion and improves reliability on the CityRail network
- assisting train services to run on time by allowing trains to start from the stabling facility
- improving travel conditions by providing passengers with clean well maintained trains.

Property

Minimal property acquisitions of neighbouring industrial land would take place to accommodate the ASP. Properties located within the immediate area have similar existing facilities in their vicinity.

Employment

During operation, the ASP would generate approximately 110 jobs which would be a benefit for the local and regional economy. Economic benefits would not be limited to the generation of jobs as the increase in workers in the area has the potential to generate business for local businesses.

7.9.4 Management and mitigation measures

Construction

- A Community Involvement Plan would be developed and implemented to engage with government agencies, relevant councils, landowners, community members and other stakeholders, as relevant, as part of ongoing design development and construction. This plan would identify all potential stakeholders and the best practice methods for consultation with these groups. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the ASP where possible.
- Contact details for a 24-hour Construction Response Line, Project Infoline and email address would be provided for ongoing stakeholder contact during the construction phase.
- The community to be notified of any changes to access to local roads as a result of the ASP.
- Fencing and signage would be erected around the construction area to ensure safety.
- Access to neighbouring properties would be maintained at all times. In the event that property access is required to be removed, consultation with council, relevant stakeholders, owners and tenants would be undertaken to discuss alternate access arrangements including temporary relocation of property access.

Operation

- A RailCorp infoline would be available for ongoing stakeholder contact following commissioning.

7.10 Land use and property

7.10.1 Existing environment

ASP site

The ASP is located on land within the Clyde Marshalling Yards which is currently disused.

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Figure 3.2 shows the land use zoning of the ASP site.

Surrounding land uses

Surroundings land uses are dominated by other railway facilities which are located on the Clyde Marshalling Yard. These facilities are:

- MainTrain Facility, located to the east of the stabling yard and also to the north of the Auburn Neck. The MainTrain car park is located on the southern side of the Auburn Neck
- AMC, located to the north-east of the stabling yard
- Manildra, located on the southern side of the Auburn Neck.

A RailCorp Maintenance Depot and Administration Building are located to the north-west of the site on the western side of Private Road.

Land to the west of the ASP is predominately used for industrial purposes with two private companies operating out of warehouses accessed off Manchester Road. Beyond these industrial land uses and Duck River is further industrial development and residential development.

Land to the south of the ASP predominantly consists of residential development. Directly south of Auburn Junction is a commercial building containing a printing support business and a computer support business. Some commercial development associated with the Auburn Town Centre is located to the south-east of the junction. Other notable uses within the town centre include St John's Primary School, Trinity Catholic College and St Joseph's Public Hospital.

To the north-west of the ASP, MainTrain Facility and AMC is the Main West Line rail corridor. Further to the north and north-west of this operational line is a mixture of industrial and residential development.

Figure 3.2 shows the land use zoning of the area surrounding the ASP. Figure 2.3 outlines the cadastral layout of the land surrounding the ASP site.

7.10.2 Construction impacts

Direct impacts

Due to much of the ASP being located on vacant land, the direct land use impacts are considered minimal. The majority of the construction works required for the ASP would be located within the ASP site and therefore impacts are considered minimal.

During construction, some temporary land acquisition/leasing would be required to provide adequate space for stockpiling of imported fill. This would be located adjacent to the proposed overbridge on vacant land located on Manchester Road. There would be no impacts on the use of this land as it is currently vacant.

Some impacts are expected at the interface of the ASP and the MainTrain access points located in the Auburn Neck due to the installation of new track. These impacts can also be expected in the vicinity of the Manildra sidings. Impacts to these neighbouring land uses are associated with the loss of rail access to the respective sites. These impacts are considered minimal as works in these areas would be undertaken during possession periods when train movements are restricted due to the operational lines being shutdown temporarily.

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The ASP would result in existing MainTrain sidings being lost and therefore potentially affecting the operation of the MainTrain Facility. These impacts are considered minimal as the ASP includes the provision of new sidings to be used by the MainTrain Facility in the vicinity of the car turning loop.

Indirect impacts

Construction of the ASP would result in indirect impacts to surrounding land uses particularly residential dwellings that are located in close proximity to the ASP site. Such impacts include noise, visual, traffic and transport and air quality; assessment of these impacts is discussed in Sections 7.1, 7.3, 7.8 and 7.11.

7.10.3 Operational impacts

Direct impacts

The operation of the ASP would not generate any direct impacts to land use and the operation of the neighbouring facilities as it would be integrated with these facilities through the works that form part of the LGCUP (see Section 2.3.3)

Two small pieces of privately owned industrial land would be acquired (see Section 6.3 for details) for the ASP. The land use impacts resulting from this acquisition are considered minimal as these pieces of land are small in size and located on parts of the adjacent properties which are currently vacant.

Indirect impacts

During the operation of the ASP, indirect impacts to surrounding land uses are expected. These impacts would include noise, visual and air quality impacts; assessment of these impacts is located in Sections 7.1, 7.8 and 7.11.

7.10.4 Management and mitigation measures

Construction

No specific mitigation measures are proposed for land use during operation.

Operation

- Any acquisition would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.

7.11 Air quality

7.11.1 Existing environment

Sensitive receptors

Potentially affected sensitive receptors within the vicinity of the ASP include residential properties and schools. Those people who are considered to be particularly sensitive are the young and elderly. The nearest potentially affected receptors include the following:

- residential properties located:

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- along Manchester Road (including properties along Sheffield Street which back onto Manchester Road) to the south of the ASP site (approximately 300 metres from the stabling facility and approximately 90 metres from the required track work)
- along The Crescent to the south of the ASP site, with the nearest dwelling located approximately 35 metres from track work
- to the west of Duck River on Seventh, Myrtle, Mimosa, Nielsen and Factory Streets
- to the east of the existing tracks along Rawson Street
- other local streets which could potentially be used by construction traffic

- St John's Primary School (located 100 metres to the south of the southern extent of the works)
- St Joseph's Public Hospital (located 250 metres to the south of the southern extent of the works)
- workers in surrounding rail facilities and also any other businesses located in the vicinity of the ASP site.

Existing air quality

Based on a review of existing land uses in the vicinity of the ASP, the existing air quality is considered characteristic of an urban environment.

A number of industrial and non-industrial sources within the area surrounding the ASP have the potential to influence the local area to varying degrees. These include:

- vehicle exhaust from the surrounding environment
- freight and passenger train exhaust along the existing tracks
- light industry
- general residential sources.

These activities are likely to create emissions of visible particles, oxides of nitrogen, sulphur dioxide, carbon monoxide, volatile organic compounds and heavy metals.

7.11.2 Construction impacts

During construction, the main potential impacts would be associated with the generation of dust and emissions from the movement of on site machinery and associated vehicular traffic.

Anticipated sources of dust and dust-generating activities from the ASP are as follows:

- operation of earthmoving equipment
- dust loading from aggregate material on trucks and excavators
- emissions of dust from the movement of vehicles on unsealed roads
- wind erosion from exposed surfaces at disturbed areas
- emissions of dust from stockpiles on site.

Dust generation during remediation works has the potential to result in the dispersion of contaminated dust particles and potentially asbestos fibres. In order to minimise the dispersal of contaminated particles, measures outlined in Section 7.2.4 and the RAP developed for the ASP site would be implemented.

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The anticipated levels of particulate matter would not be excessive, with impacts expected to decrease substantially as distances from the source increase. Negligible dust impacts from the construction works would be anticipated beyond 200 metres from the work areas given the implementation of a range of mitigation measures. During unfavourable meteorological conditions, such as dry and windy conditions, dust emissions could be higher.

The impact of emissions associated with the combustion of diesel fuel and petrol would depend on the number and power output of the combustion engines, the quality of the fuel and the condition of the combustion engines. The ASP would result in a relatively small increase in vehicles and construction plant in the surrounding area; however this increase is unlikely to result in any significant impacts on air quality.

The construction contractors and site managers would be required to ensure that all equipment is checked and does not release smoke in contravention of the *Clean Air Act 1970, Protection of the Environment Operations Act 1997* and/or the *Clean Air (Plant and Equipment) Regulation 1997.* Good site practices would ensure emissions of combustion gases are minimised and would not have any impact on the nearest sensitive receptors.

7.11.3 Operational impacts

An increase in train movements on the ASP site is expected. However, as these trains are electrified trains, the air quality impacts are considered minimal. In the event diesel trains are required to enter the ASP site, the air quality impacts are considered negligible due to their infrequency and the small number of diesel vehicles which would enter.

The movement of trains over ballast has the potential to generate dust. This generation of dust is considered to be minimal and unlikely to significantly affect air quality.

The ASP would result in increased vehicular traffic in the local area however this increase is unlikely to result in any significant air quality impacts.

7.11.4 Management and mitigation measures

Construction

- An Air Quality Management Plan would be prepared for the construction phase of the ASP. This plan would include the following measures:
  - water would be applied as appropriate to stockpiles, internal unsealed access roadways and work areas. Application rates would be determined based on wind conditions, the intensity of construction operations and potential risks of contamination such as asbestos. To reduce potable water consumption, recycled water would be used for dust suppression where practicable
  - site rehabilitation would be undertaken as soon as practicable
  - disturbed areas would be stabilised as soon as practicable to prevent or minimise wind-blown dust
  - on site speed limits would be enforced for all construction vehicles at the ASP site
  - vehicle and machinery movements during construction would be restricted to designated areas
  - rumble grids and/or wheel wash facilities would be provided at the ASP site exit onto sealed roads to remove mud and dust from vehicles

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- sediment on roads that is likely to generate dust or wash into the local drainage system would be swept to remove dirt and mud
- options for coating the exposed surface with a soil bonding substance to be explored if standard controls are ineffective
- vehicles transporting material to and from the ASP site would be covered after loading to prevent wind blown dust emissions and spillages. Tailgates of road transport trucks would be securely fixed prior to loading and after unloading
- construction plant and equipment would be well maintained and regularly serviced so that vehicular emissions remain within relevant air quality guidelines and standards
- all site vehicles and machinery would be switched off or throttled down to a minimum when not in use
- monitoring of dust would be undertaken daily. Where visible levels of dust are high, on site activities are to be reviewed, with additional control measures and/or varied site operations to be implemented as soon as practicable

- In the event odours associated with contaminated soils are encountered, the protocols outlined in the RAP would be implemented.

Operation

No operational mitigation measures were identified for air quality as impacts are minimal.

7.12 Hazards and risks

7.12.1 Construction hazard and risk impacts

The main hazards that would be associated with the construction of the ASP include:

- handling of contaminated material particularly during remediation works
- transportation, use and storage of hazardous materials to and on site
- impacts to soils and water quality as a result of spills
- working in the vicinity of an operating corridor (including Auburn Neck and access to MainTrain) and therefore of risk of being hit by a train
- working in the vicinity of live overhead wires and subsurface utilities.

The above risks would be managed through the mitigation measures described in Section 7.12.3 which would be incorporated into the Construction Environmental Management Plan (CEMP).

7.12.2 Operational hazard and risk impacts

The main hazards associated with the operation of the ASP include:

- natural events (including flood)
- impacts of climate change
- external events (events occurring at adjacent facilities which generate hazards and risks for the ASP during operation)
- utility failure (power or communication failure)

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- train accident (including derailment, collision or impact)
- stabling and associated buildings or train fire
- storage of hazardous materials
- potential spills from trains and other equipment (oil etc) and materials used for train cleaning.

Operational hazards and risks would be managed through the implementation of RailCorp's standard measures relating to hazard and risk.

7.12.3 Management and mitigation measures

Construction

- Construction works would be undertaken in accordance with the RAP.
- Any storage of hazardous materials, and refuelling/maintenance of construction plant and equipment, would be undertaken in clearly marked designated areas that are designed to contain spills and leaks with appropriate bunding.
- Machinery would be checked daily to ensure there is no leaking oil, fuel or other liquids.
- An Occupational Health and Safety Plan would be developed to manage construction safety hazards for the ASP.
- Contingency plans would be developed to deal with any spills which might occur during construction. This would include the following:
  - All hazardous materials spills and leaks would be reported immediately to site managers and TCA. Actions would be immediately taken to remedy spills and leaks.
  - Chemical spill kits would be readily available and accessible to construction workers. Kits would be kept at site compounds and on specific construction vehicles. Environmental control maps and/or site maps would illustrate the location of the spill kits.
- All earthworks and other works below ground would be undertaken in consultation with the relevant utility providers to minimise the risk of accidents involving subsurface utilities.

Operation

- An incident emergency spill plan would be developed. The plan would include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways. An emergency spill kit would be kept on site at all times.
- All staff would be made aware of incident emergency procedures and the location of emergency spill kits.
- The ASP would be designed to achieve RailCorp's operational safety, signalling and operating procedures. Operational hazards would be managed through RailCorp's standard procedures for hazard and risk that are currently in place across the entire rail network.

7.13 Waste management

7.13.1 Policy setting

Waste management would be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act 2001.*

The objectives of this Act are:

- to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development
- to ensure that resource management options are considered against a hierarchy of the following order:
  - avoidance of unnecessary resource consumption
  - resource recovery (including reuse, reprocessing, recycling and energy recovery)
  - disposal
- to provide for the continual reduction in waste generation
- to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste
- to ensure that industry shares with the community the responsibility for reducing and dealing with waste
- to ensure the efficient funding of waste and resource management planning, programs and service delivery
- to achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis
- to assist in the achievement of the objectives of the *Protection of the Environment Operations Act 1997.*

7.13.2 Potential waste streams

The ASP would generate the following waste during construction:

- spoil that is not suitable as structural fill
- asbestos
- vegetation
- asphalt and concrete
- existing track and other railway related waste located on site (including railway carriages located on site and existing shed located on the western boundary)
- other materials (fencing, off cuts of metal or other materials)
- paper waste from administrative activities
- general waste from construction site office.

During operation the following wastes would be generated:

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- rubbish removed from the trains
- general waste from the staff and amenity buildings.

A number of sustainability initiatives that would minimise wastes generated as part of the ASP have been identified (see Section 6.6). Some of these initiatives include:

- use of pre-fabricated elements where possible to minimise the need for further fabrication on site
- consideration of standard sizes for building materials where practicable to minimise waste
- consideration of future disassembly and re-use of buildings
- implementation of reuse-recycling training and infrastructure on site to facilitate waste separation during construction
- agreement to construction reuse/recycling targets and monitoring of waste generated to determine where improvements can be made
- use of waste separated bins for collecting train rubbish
- reuse of ASP site spoil where practicable.

7.13.3 Management and mitigation measures

Construction

- A Waste Management Plan (WMP) would be prepared which would:
  - identify all potential waste streams associated with the works
  - identify the need to avoid the unnecessary use of resources
  - identify opportunities to minimise the use of resources, and to reuse, recover and recycle materials
  - outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities
  - disposal would be undertaken in accordance with the PoEO Act.
- Removal of wastes from the site would only be undertaken by a licensed contractor as required by the PoEO Act and with appropriate approvals obtained from the NSW DECCW, if required.
- All material to be recovered off-site would be appropriately classified in accordance with the *Resource Recovery Exemptions* (DECCW).
- All material that requires off-site disposal would be appropriately tested and classified against the *Waste Classification Guidelines* (DECC, 2008).
- Water captured in construction sediment basins would be reused for dust suppression, watering of landscaped areas and any other suitable construction activity, if it meets the relevant water quality guidelines.
- Recyclable wastes would be separated and transported to a suitable recycler.
- Construction waste material would not be left on site once the works have been completed.
- Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.

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- Where possible native vegetation which is required to be cleared for construction would be converted to mulch and stockpiled for use during landscape planting works.

Operation

- Existing environmental practices would be implemented, which would include procedures for the management of on site waste including waste from stabled train sets.

7.14 Climate change and sustainability

7.14.1 Climate change

Current reports indicate that climate change is likely to result in more frequent and more intense storms as well as sea level rises. Sea levels have been increasing at a rate of approximately 1.8 millimetres per year and are expected to accelerate further. Increasing storm surges due to low pressure systems and wind generated waves are likely to become more frequent.

Changes in flood behaviour due to climate change have the potential to increase the risk of flooding from backwater effects and increased storm intensity and duration times.

Studies undertaken by the CSIRO in conjunction with the Bureau of Meteorology in 2007 investigated past and likely future changes to climate in NSW. The outcomes estimate that extreme rainfall (defined as a 1 in 40 year 1 day total rainfall event) would be likely to increase by up to 12 per cent for the Sydney metropolitan catchments by 2030.

Increases in the intensity of flood-producing rainfall events are likely to change flood behaviour, but catchment conditions at the time of each rainfall event (soil moisture conditions and levels in major water storages) will affect the degree of the change (Department of Environment, Climate Change and Water 2010).

Higher rainfalls are likely to accelerate all forms of soil erosion across the region. Some redistribution of run-off across the seasons is likely, with increases in summer and autumn and decreases in winter and spring.

The *Floodplain Risk Management Guideline – Practical Consideration of Climate Change* (Department of Environment and Climate Change 2007) recommends a sensitivity analysis for increases in rainfall of between 10 per cent and 30 per cent. However, given the research undertaken by CSIRO/Bureau of Meteorology, it is considered that a rainfall increase of 10 per cent is appropriate for an assessment of rainfall due to climate change for the proposed development catchment.

The ASP drainage modelling considered the 1 in 100 year ARI peak event. The general track drainage has been designed for the 1 in 50 year peak event and car park/road drainage for the 1 in 20 year peak event.

Climate change has been allowed for in the design of the ASP through ensuring that the ASP drainage system accounts for increased intensity of rainfall events that are predicted to result from climate change. The design has considered the *Floodplain Risk Management Guideline – Practical Considerations of Climate Change*.

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7.14.2 Energy consumption and greenhouse gas emissions

TCA is responsible for design and construction of the ASP and has the opportunity to influence the carbon footprint of the ASP by:

- reducing carbon during construction by requiring construction contractors to adopt resource efficient construction techniques
- reducing carbon during materials manufacture by requiring low embodied energy in construction materials
- reducing carbon during operation by energy efficient design
- reducing carbon during operation by increasing patronage through improvements to rail services.

Through incorporation of sustainability in design and construction, this ultimately encourages sustainability in operation, maintenance and use of the facilities associated with the ASP.

A preliminary carbon footprint assessment has been undertaken for the construction of the ASP, which uses the following categories for the reporting of greenhouse gas emissions from sources owned or controlled by an organisation (as required by the *National Greenhouse and Energy Reporting Act 2007*):

- Scope 1 – direct greenhouse gas emissions that occur on the construction site or are under the direct and immediate control of the project
- Scope 2 – indirect greenhouse gas emissions associated with the production of electricity, steam or heat
- Scope 3 – all other upstream and downstream greenhouse gas emissions, which occur indirectly as a consequence of the project, often out of the direct control of the project/proponent.

The Scope 1, Scope 2 and Scope 3 emissions considered in this assessment are presented in Table 7.40.

Table 7.40 Greenhouse gas emissions categories

Emissions	Definition	Likely sources – construction
Scope 1	Direct emission generated within the project boundaries	Fuel combustion in construction plant and equipment Emissions associated with vegetation clearance
Scope 2	Use of steam, heat or power within project boundaries where emissions are generated offsite	Electricity use in construction site office

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Emissions	Definition	Likely sources – construction
Scope 3	Downstream emissions from the supply chain Upstream emissions from use of products	Embodied energy in construction materials Transport of materials to and from construction site Emission from landfill associated with waste generated during construction and demolition Emissions associated with the extraction, production, transmission and distribution of the fuel and electricity used on site

Scope 1, Scope 2 and Scope 3 emissions for the construction phase of the ASP are presented in Table 7.41.

Table 7.41 Summary of construction GHG emissions

Scope	Source	GHG emissions (tCO2e-)	Percentage (%)
Scope 2	Electricity use on site	73	0.23
Scope 3	Embodied energy construction materials	4296	13.34
	Waste	27,405	85.07
	Transport to and from site	408	1.27
	Upstream fuel and electricity supply	31	0.10
Total		32,213	100

It is anticipated that these calculations would change as more detailed data becomes available. The current assessment does not include Scope 1 fuel exhaust emissions for the construction plant and on-site equipment and Scope 3 upstream fuel extraction emissions as an indirect result of the use of such equipment. In addition the summary indicates towards an under-estimation of materials emissions and potentially transport emissions due to data gaps; as well a probable over-estimation of emissions from spoil, with an aim for maximum reuse instead of disposal.

The relative attribution of emissions to the different scopes and emission sources is expected to change during future design phases. In addition, this preliminary assessment would be used as a tool to identify innovative measures to be incorporated in the detailed design to reduce the carbon footprint of the construction of the ASP.

TCA is committed to implementing the following sustainability initiatives to assist with reducing the energy consumption and greenhouse gas generation of the ASP:

- incorporation of energy efficient lighting technologies
- maximising natural light and solar penetration

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- effective insulation of indoor areas
- selection and design of heating, ventilation and air conditions systems with prioritisation of energy efficiency
- maximising reuse of ASP site spoil where practicable.

Additional sustainability initiatives, such as the integration of photovoltaic panels in the building roof and facade, would be subject to further consideration during the detailed design phase.

7.14.3 Sustainability

Using TCA's Sustainable Design Guidelines, an assessment of the sustainability initiatives that were considered applicable to the ASP was undertaken. A summary of sustainable design initiatives proposed is provided in Section 6.6. Sustainability initiatives would be further investigated in the detailed design phase.

7.15 Demand on resources

The ASP would not increase the demand on any resources that are, or are likely to become, in short supply. Materials that are likely to be required for the ASP include:

- fill
- pipes
- building materials
- asphalt
- concrete
- electricity
- steel
- ballast
- sleepers
- overhead wire structures
- water

Several sustainability initiatives which would minimise the demand on resources for the ASP have been adopted for the ASP, or are being considered further as part of the design process. A summary of the initiatives is provided in Section 6.6.

Such initiatives include:

- consideration of recycled building material content where practicable
- designing buildings and structures to minimise ongoing maintenance requirements
- reuse of materials where practicable
- implementation of a sustainable procurement strategy for the construction and operation phases
- investigation water harvesting opportunities on site
- building design to maximise natural lighting and ventilation and minimise energy requirements.

Further initiatives would be developed through future design phases.

7.16 Cumulative impacts

The consequences that may arise from the effects of incremental development are usually described as 'cumulative environmental impacts'. In accordance with Clause 228(2) of the EP&A Regulation 2000, any

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cumulative environmental effects of the proposed development with other existing and likely future activities must be taken into account in assessing the potential environmental impacts of the proposed development.

Cumulative impacts have the potential to arise from:

- the interaction of individual construction impacts for a proposed development
- the additive effects of the proposed development with other external projects.

The ASP can have both positive and negative cumulative impacts

7.16.1 Potential developments

In order to ascertain the likelihood of any future developments occurring in the vicinity of the ASP, searches of the New South Wales Government Department of Planning, Auburn City Council and Parramatta City Council websites were undertaken to determine if any applications are currently under consideration or have recently been approved.

Searches of the two council websites did not provide any indication of any major developments that would be located in the vicinity of the ASP.

The search of the Department of Planning's 'Major Projects Register' (in May 2010) indicated there are currently no potential major projects located in close proximity to the ASP.

7.16.2 Construction-specific cumulative effects

Cumulative effects arising from construction phase activities relate to noise and vibration, traffic and access, dust, visual amenity and air quality impacts.

Indirect impacts could also arise during the construction phase of the ASP. To avoid the associated changes to traffic flow caused by construction vehicles and construction sites located next to major transportation routes, drivers may choose to travel through adjacent networks rather than along the section of road or highway. This could result in other indirect impacts on the environment and communities in these networks, namely air quality and noise and vibration impacts. The movement of vehicles through the adjacent road network would be avoided where possible and construction traffic would be managed by the Construction Traffic Management Plan and the identification of haulage routes.

7.16.3 Operation-specific cumulative effects

During operation, cumulative impacts would include the introduction of additional trains into an environment where a large number trains are already operating.

The operation of the ASP, AMC and MainTrain facilities simultaneously would result in a cumulative increase in noise, visual and traffic impacts. These impacts have been addressed in Sections 7.1, 7.8 and 7.3 respectively.

The construction of the ASP, coupled with the construction of the SWRL, would result in increased stabling capacity within Sector 2 of the CityRail network. This would benefit the areas serviced by Sector 2, particularly Sydney's west and south-west, as this would provide the stabling required to meet the future demand for services in these areas.

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8. Environmental management and mitigation

This chapter outlines the environmental management principles which would be implemented to minimise the potential impacts of the ASP. It also provides a summary of the mitigation measures that would be incorporated into the Environmental Management Plans for the ASP.

8.1 Overview of environmental management system

The construction of the ASP would be undertaken in accordance with TCA's Management System, which would include elements of an Environmental Management System (EMS) (ISO 14001 accredited), and the construction contractor's EMS. The management system would provide the framework for implementing the environmental management measures documented in this REF, and any conditions of other approvals, licences or permits.

8.1.1 Construction environmental management plan

A CEMP would be prepared for the construction phase of the ASP to manage potential environmental impacts. The CEMP would document mechanisms for demonstrating compliance with the commitments made in this REF, the Submissions Report (to be prepared), and other relevant statutory approvals, and would address, as a minimum, the following elements:

- traffic and transport management
- noise and vibration management
- air quality management (including dust suppression)
- landscape and rehabilitation (plan for worksites)
- community and stakeholder communication
- non-Indigenous and Indigenous heritage management
- water and soil management
- contaminated land
- flora and fauna management
- weed management
- waste (including spoil) management
- sustainability.

The CEMP would be prepared prior to the commencement of construction.

8.1.2 Operational environmental management

For the operational phase, environmental issues and impacts would be managed under RailCorp's existing EMS and through the mitigation measures identified in Section 8.2.2.

8.2 Management and mitigation measures

8.2.1 Construction

Management and mitigation measures to be implemented during construction are detailed in Table 8.1.

Table 8.1 Construction mitigation measures

ID Number	Measure
General	
A.1	A Construction Environmental Management Plan (CEMP) would be prepared prior to the commencement of construction. This plan would incorporate the mitigation measures outlined below.
A.2	Consultation with Auburn Council would be undertaken under the requirements of ISEPP. This consultation would be in relation to council infrastructure services, local heritage items and works on flood liable land.
Noise and vibration	
B.1	Where practicable, any mitigation measures provided to control operational noise impacts shall be implemented as early as practicable to also provide a benefit during some of the construction phase.
B.2	A Construction Noise and Vibration Management Plan would be prepared prior to the construction of the ASP. The Plan would be developed in accordance with TCA's *Construction Noise Strategy (Rail Projects)* and DECCW guidelines. The Plan would: • Detail the construction activities to be carried out, along with an indicative schedule for construction works. • Identify the reasonable and feasible mitigation measures to be implemented to minimise noise impacts. • Describe how the effectiveness of the proposed measures would be monitored during the works, including frequency and location of monitoring and recording and reporting of results. • Identify how non-compliance with noise goals would be rectified. • Identify procedures for notifying sensitive receivers and responding to noise complaints.
B.3	The Construction Noise and Vibration Management Plan would include a consultation program to keep the potentially affected receivers informed regarding the progress of the works, and to forewarn (through measures such as letterbox drops and meetings with surrounding tenants) of any anticipated changes in noise and vibration emissions prior to critical stages of the works.
B.4	A range of possible approaches for minimising the impact of construction noise would be considered during the detailed design phase and could include: • Stockpile shielding – Localised shielding could be implemented for contained work areas such as the stockpile area. This could be achieved through purpose built temporary barriers or by managing the stockpile such that a mound is maintained on the Manchester Road boundary. • Minimise tamping at night – Where feasible minimise tamping during night time

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ID Number	Measure
	periods. This activity has been determined to be the loudest noise source and incurs a 5 dB penalty. ▸ Localised barrier - The installation of temporary, localised plywood barriers could be considered around the location of noisy works. These could be located to provide shielding of up to 10dBA. ▸ Plant noise audit – Noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. To this end, testing should be established with the contractor. ▸ Operator instruction – Operators should be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission. ▸ Equipment selection - All fixed plant at the work sites should be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures in order to ensure that the total noise emission from each work site complies with DECCW guidelines. ▸ Site noise planning - Where practical, the layout and positioning of noise-producing plant and activities on each work site should be optimised to minimise noise emission levels.
B.5	The standard mitigation measures outlined in Section 4 of TCA's *Construction Noise Strategy (Rail Projects)* would be implemented and additional mitigation measures outlined in Section 6 of the strategy would be implemented when relevant noise goals are exceeded.
B.6	Construction work would be restricted to the hours of 7am to 6pm (Monday to Friday), 8am to 1pm (Saturday) and at no time on Sundays and public holidays, except as being permitted in accordance with TCA's *Construction Noise Strategy (Rail Projects).*
B.7	Additional mitigation measures outlined in Section 6 of TCA's *Construction Noise Strategy (Rail projects)* would be implemented when relevant noise goals are exceeded.
B.8	The contractor should encourage car pooling or a mini bus to local stations in an attempt to limit private vehicle trips to the site.
B.9	Providing direct access to the proposed stockpile site would minimise the number of heavy vehicle movements along the western section of Manchester Road at the rear of Sheffield Street during the construction phase.
Soils and landscape	
C.1	An Erosion and Sediment Control Plan would be prepared. The plan is to include a monitoring program to assess the water quality downstream of the ASP site both during and after construction, until exposed soils are stabilised and deemed to be suitably stable for sedimentation controls to be removed.
C.2	Erosion and sedimentation from disturbed areas and stockpiles during construction would be controlled in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Auburn City Council Development Control Plan 2000 - Guidelines for Erosion and Sediment Control* (2003).

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ID Number	Measure
C.3	Stockpiling of contaminated material would be undertaken in line with the measures outlined in the RAP.
C.4	All roads used for site access and work sites would be maintained free of dust, waste materials and mud as far as reasonably practicable. This would aid in preserving the normal characteristics and setting of the surrounding environment.
C.5	In the event that indications of additional contamination are encountered (i.e. odorous or visually contaminated materials) or the capping/marking layer is disturbed as a result of excavation during construction, work in the area would cease until an environmental consultant can advise on appropriate action.
C.6	All workers would attend a site induction outlining the location, nature, type and concentration of contaminants present on site. This induction would include an outline of the risks of contaminants, methods of identification for contaminants, monitoring to be undertaken and health and safety controls (e.g. PPE requirements as identified in the RAP) to mitigate against the risks.
C.7	Prior to earthworks commencing all visible asbestos-based fragments would be removed by an appropriately licensed contractor as required by the *Working with Asbestos: Guide* (WorkCover NSW, 2008).
C.8	Inspections of excavated and filled surfaces would be made during construction to determine the presence of visible asbestos.
C.9	All contamination hotspots would be clearly marked in the field.
C.10	Contaminated soils would not be stockpiled on the structural fill layer or formation layers to avoid cross contamination.
C.11	In the event that excavated spoil which fails to meet landfill criteria is encountered, the spoil contingency plan outlined in the RAP would be implemented.
C.12	The unexpected finds protocols developed and included in the RAP, would be implemented in the event the following is found: • buried structures such as underground storage tanks and the associated pipe work • volatile contaminants • asbestos.
C.13	In the event the cap is required to be excavated post placement due to construction, the contingency protocols outlined in the RAP would be followed.
C.14	Asbestos monitoring would be carried out on site and in the surrounding areas. This would include monitoring in the cabins of selected plant, on the perimeter of the site, change room and if required the decontamination unit.
C.15	Final cleanup after the works are complete would include removal of any erosion control devices and rehabilitation works of disturbed areas.

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ID Number	Measure
Traffic and Transport	
D.1	A Traffic Management Plan would be prepared and implemented that seeks to: • minimise the level of disturbance created as a result of construction related vehicle movements (particularly in residential streets and outside of daytime working hours) to the road, pedestrian and cycle network within, and influenced by, the ASP • minimise the impacts of construction related parking, including minimising the number of vehicles parking on surrounding streets by providing parking within construction site compounds • minimise material delivery during school start and finish times • determine the need to offset the loss of parking within the existing MainTrain car park during the construction period • minimise impacts to the movement of vehicles to, from and around the MainTrain site • minimise disturbances to the effective operation and reliability of existing transport services such as passenger and freight rail as well as bus routes • advise drivers on protocol for access to site, covering loads, assessing soil tracking etc • provide adequate signage to inform motorists and pedestrians of the presence of a worksite ahead to minimise the risk of road accidents.
D.2	Where work would be undertaken adjacent to the existing road network, the speed limit would be reduced to 40 kilometres per hour in accordance with the requirement of the RTA's *Traffic Control at Work Sites Manual 2003*.
D.3	Nominated heavy vehicle access routes would be identified in the Traffic Management Plan, and vehicle operators are to be made familiar with this plan as part of the induction process.
Hydrology, drainage and water quality	
E.1	The Erosion and Sediment Control Plan would address waste water discharge from surface washing, washing vehicles and plant, and washing out concrete mixers and concrete trucks.
E.2	Final cleanup after the works are complete would include removal of any sediment in drainage lines that has been trapped by erosion control devices.
E.3	Surface water management systems adopted on site would ensure the ASP does not adversely affect water quantity or quality in downstream watercourses.
E.4	Any water collected from the site is to be tested and discharged in accordance with current guidelines and the RAP for the site in order to avoid any potential contamination or impacts on waters or local stormwater systems. The need for treatment of water requiring disposal is to be further investigated prior to construction, and implemented if required (treatment could be required to meet DECCW licence requirements for stormwater discharge or Sydney Water requirements for sewer discharge).
E.5	To reduce the impact of flooding, weather forecasts are to be regularly monitored and, as needed, works ceased and equipment removed from flow paths before the rainfall event.

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ID Number	Measure
E.6	Control of the movement of water onto, through, and off the site, such as diversion drains to direct upstream runoff around the site and collection and treatment of runoff prior to discharge from the site, would be investigated.
E.7	If dewatering is required on site, then water requiring off-site discharge would be disposed of in accordance with relevant guidelines, approvals and licences.
Non-Indigenous heritage	
F.1	If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of heritage significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are determined to have heritage significance, approval under sections 139 and 140 of the *NSW Heritage Act 1977* would be obtained to allow their recording prior to removal.
F.2	A heritage interpretation plan would be developed and implemented including the provision of interpretive signage that provides information on the heritage significance of the site.
F.3	Any significant findings would be documented and then reported to RailCorp so that the Section 170 listing for the site can be updated.
F.4	A five-metre curtilage would be maintained around the Auburn Signal Box.
Indigenous heritage	
G.1	If previously unidentified Indigenous heritage items are uncovered during the work, all work in the vicinity of the find must cease and appropriate advice would be sought from DECCW and/or heritage consultants. Work in the vicinity of the find would not re-start until clearance has been received.
Biodiversity	
H.1	Mature trees and other native vegetation to be retained would be clearly delineated, with all construction activities excluded from these areas, in accordance with TCA procedures.
H.2	Construction impacts would be restricted to the immediate surface disturbance area and previously degraded land through stockpiling of soils away from native vegetation areas to be retained.
H.3	Soil management systems would be implemented to ensure that topsoils are maintained in a form that would maintain their viability for use in landscaped portions of the final site layout and minimise the risks of erosion, sedimentation or the spread of environmental weeds, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).
H.4	A weed management plan would be developed for the ASP.
H.5	In line with TCA's *Biodiversity Offset Strategy*, a target of 100 per cent offset vegetation would be set for the removal of trees as part of the ASP.
H.6	All vegetation planted on site would generally consist of local native species.

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ID Number	Measure
H.7	Should any trimming, cutting, pruning or removal of trees or vegetation beyond that assessed as part of this REF be required, approval from TCA would be required to be obtained.
H.8	Preclearance surveys for resident fauna would be undertaken and any fauna sheltering within the construction footprint would be relocated to the nearest area of 'safe' habitat.
Visual and urban design	
I.1	An Urban Design and Landscape Plan would be prepared for the ASP during the detailed design stage. This plan would aim to: ▸ minimise the visual impact of any noise barrier and 'enclosure' ▸ minimise the visual impact of new driveway entrances (e.g. MainTrain and ASP) ▸ address the requirements for landscaping on site ▸ minimise the impacts of lighting from the site, particularly in relation to the new MainTrain overbridge. The plan would detail how consultation regarding visual and urban design issues would be undertaken with stakeholders.
I.2	Loss or damage to vegetation would be avoided where practicable, particularly vegetation located on the ASP site's boundaries that provide a screening function. Alternatives to clearing such as trimming are to be considered to avoid the total removal of vegetation.
I.3	Use of lighting during night-time works would take into consideration the light spill impacts on surrounding residential dwellings. All lighting for the ASP would be designed and installed in accordance with the requirements of AS 1158 *Road Lighting* and AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible. Only those work areas being used would be lit at any time.
I.4	All temporary hoarding, barriers, traffic management and signage would be removed as soon as it is not expressly required for construction activities.
I.5	All construction materials and vehicles would be stored in an organised and tidy manner when work is not being undertaken on site. This would confine any associated adverse impacts to a distinct area.
Socio economic	
J.1	A Community Involvement Plan would be developed and implemented to engage with government agencies, relevant councils, landowners, community members and other stakeholders, as relevant, as part of ongoing design development and construction. This plan would identify all potential stakeholders and the best practice methods for consultation with these groups. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the ASP where possible.
J.2	Contact details for a 24-hour Construction Response Line, Project Infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase.

ID Number	Measure
J.3	The community to be notified of any changes to access to local roads as a result of the ASP.
J.4	Fencing and signage would be erected around the construction area to ensure safety.
J.5	Access to neighbouring properties would be maintained at all times. In the event that property access is required to be removed, consultation with council, relevant stakeholders, owners and tenants would be undertaken to discuss alternate access arrangements including temporary relocation of property access.
Land use and property	
	No specific mitigation measures are proposed for land use during operation.
Air quality	
K.1	An Air Quality Management Plan would be prepared for the construction phase of the ASP. This plan would include the following measures: ▸ water would be applied as appropriate to stock piles, internal unsealed access roadways and work areas. Application rates would be determined based on wind conditions, the intensity of construction operations and potential risks of contamination such as asbestos. To reduce potable water consumption, recycled water would be used for dust suppression where practicable. ▸ site rehabilitation would be undertaken as soon as practicable ▸ disturbed areas would be stabilised as soon as practicable to prevent or minimise wind-blown dust ▸ on site speed limits would be enforced for all construction vehicles at the ASP site ▸ vehicle and machinery movements during construction would be restricted to designated areas ▸ rumble grids and/or wheel wash facilities would be provided at the ASP site exit onto sealed roads to remove mud and dust from vehicles ▸ sediment on roads that is likely to generate dust or wash into the local drainage system would be swept to remove dirt and mud ▸ options for coating the exposed surface with a soil bonding substance to be explored if standard controls are ineffective ▸ vehicles transporting material to and from the ASP site would be covered after loading to prevent wind blown dust emissions and spillages. Tailgates of road transport trucks would be securely fixed prior to loading and after unloading ▸ construction plant and equipment would be well maintained and regularly serviced so that vehicular emissions remain within relevant air quality guidelines and standards ▸ all site vehicles and machinery would be switched off or throttled down to a minimum when not in use ▸ monitoring of dust would be undertaken daily. Where visible levels of dust are high, on site activities are to be reviewed, with additional control measures and/or varied site operations to be implemented as soon as practicable.

ID Number	Measure
K.2	In the event odours associated with contaminated soils are encountered, the protocols outlined in the RAP would be implemented
Hazards and risks	
L.1	Construction works would be undertaken in accordance with the RAP.
L.2	Any storage of hazardous materials, and refuelling/maintenance of construction plant and equipment, would be undertaken in clearly marked designated areas that are designed to contain spills and leaks with appropriate bunding.
L.3	Machinery would be checked daily to ensure there is no leaking oil, fuel or other liquids.
L.4	An Occupational Health and Safety Plan would be developed to manage construction safety hazards for the ASP.
L.5	Contingency plans would be developed to deal with any spills which might occur during construction. This would include the following: ▸ All hazardous materials spills and leaks would be reported immediately to site managers and TCA. Actions would be immediately taken to remedy spills and leaks. ▸ Chemical spill kits would be readily available and accessible to construction workers. Kits would be kept at site compounds and on specific construction vehicles. Environmental control maps and/or site maps would illustrate the location of the spill kits.
L.6	All earthworks and other works below ground would be undertaken in consultation with the relevant utility providers to minimise the risk of accidents involving subsurface utilities.
Waste management	
M.1	A Waste Management Plan (WMP) would be prepared which would: ▸ identify all potential waste streams associated with the works ▸ identify the need to avoid the unnecessary use of resources ▸ identify opportunities to minimise the use of resources, and to reuse, recover and recycle materials ▸ outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities ▸ disposal would be undertaken in accordance with the PoEO Act.
M.2	Removal of wastes from the site would only be undertaken by a licensed contractor as required by the PoEO Act and with appropriate approvals obtained from the NSW DECCW, if required.
M.3	All material to be recovered off-site would be appropriately classified in accordance with the *Resource Recovery Exemptions* (DECCW).
M.4	All material that requires off-site disposal would be appropriately tested and classified against the *Waste Classification Guidelines* (DECC, 2008).

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ID Number	Measure
M.5	Water captured in construction sediment basins would be reused for dust suppression, watering of landscaped areas and any other suitable construction activity, if it meets the relevant water quality guidelines.
M.6	Recyclable wastes would be separated and transported to a suitable recycler.
M.7	Construction waste material would not be left on site once the works have been completed.
M.8	Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.
M.9	Where possible native vegetation which is required to be cleared for construction would be converted to mulch and stockpiled for use during landscape planting works.
Sustainability	
N.1	Sustainability initiatives would be further investigated in the detailed design phase, and would consider waste management, material selection and alignment of sustainability initiatives with construction management strategies.

8.2.2 Operation

Management and mitigation measures to be implemented during operation are located in Table 8.2.

Table 8.2 Operation mitigation measures

ID Number	Measure
Noise and vibration	
O.1	A yard horn or a short toot of the town horn would be used to warn of impending train movement within the stabling yard.
O.2	Approximately 3 metre high noise barriers would be provided in strategic locations around the stabling yard. The exact location and length of the noise barrier would be determined during detailed design. To achieve maximum noise attenuation benefit, the noise barrier would be constructed as close to the noise source as possible.
O.3	Train horn testing would only be undertaken on the leading (forward facing) town horn of the train prior to departure: • Testing of the town horn at the Clyde end would be undertaken within the stabling yard. • Testing of the town horn at the Auburn end would be undertaken outside the stabling yard, either on the main line or along the Auburn neck. Should horn testing be carried out along the Auburn neck a purpose built 'enclosure' within which to test the train horns would be provided. Acoustic treatment of individual buildings at the affected residences along The Crescent may be required.

The implementation of the above measures is subject to the required assessment of safety and operational aspects and obtaining all necessary approvals.

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ID Number	Measure
O.5	An Operational Noise and Vibration Management Plan would be prepared during the detailed design phase of the project. The Plan would: • Identify the specific mitigation measures for controlling operational noise from the ASP, including the location, type and timing for the erection of permanent noise barriers and/or other noise mitigation measures. This would also include confirmation, following an operational review by RailCorp, as to whether testing of the train horn at the Auburn end would occur within the 'enclosure' along the Auburn neck or on the main line. • Include a consultation strategy to seek feedback from affected property owners on the specific mitigation measures. • Predict the operational noise impacts at sensitive receivers based on the final design of the ASP. • Identify a program for post-operation noise monitoring at representative locations to confirm the predicted noise source levels and to demonstrate compliance. If it is identified during the post-operation noise monitoring that the relevant noise criteria are exceeded, further noise modelling would be undertaken to investigate the potential for any further management measures.
O.6	The detailed design phase of the ASP would continue to consider and identify ways to minimise potential noise impacts.
O.7	Should a wheel squeal impact be identified during the post operational noise monitoring, friction modifiers or other suitable source mitigation measures would be employed.
O.8	Noise monitoring would be undertaken to confirm the traffic noise contribution at residential receivers once the ASP is operational. Subject to this review the need to provide further mitigation can be considered.
Soils and landscape	
P.1	A long-term site Environmental Management Plan (EMP) would be prepared to detail the ongoing management requirements for the long-term maintenance of the capping structures. This plan would include provision of regular inspection and maintenance as necessary.
P.2	All employees (particularly those undertaking excavation works) would be made aware of the location of the capping layer and of the marking layer, to minimise exposing the contaminated land. In the event the cap is breached, contingency plans outlined in the RAP would be implemented.
Traffic and transport	
Q.1	Parking within the MainTrain car park would be reinstated to ensure that there is no net loss in parking at the MainTrain Facility.
Hydrology, drainage and water quality	
R.1	A Stormwater Management Plan would be developed for the ASP. This plan would be consistent with the Stormwater Management Plan for the AMC, any council requirements and any requirements outlined in the RAP. The stormwater management plan would include protocols for the maintenance of water quality structures.

ID Number	Measure
R.2	Stormwater management within the site would include treatment of stormwater runoff prior to discharge from the site by providing water quality treatment measures in accordance with the principles of Water Sensitive Urban Design (WSUD). The stormwater discharged from the site to Duck River would be treated prior to discharge in accordance with the targets identified in Landcom's *Water Sensitive Urban Design Strategy* (2009). The exact location and sizing of water quality treatment structures would be finalised during the detailed design. Design shall be in accordance with *Australian Runoff Quality* (IEAust, 2006). Discharge of this runoff would be undertaken in a controlled manner to prevent erosion at the discharge point to Duck River.
R.3	Drainage systems (including dry detention basins) would be maintained in line with RailCorp's existing maintenance procedures to ensure they are operating at full capacity at all times.
Non-Indigenous heritage	
	No operational mitigation measures were identified relating to non-Indigenous heritage as impacts are not expected.
Indigenous heritage	
	No operational mitigation measures were identified relating to Indigenous heritage as impacts are not expected.
Biodiversity	
S.1	Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist. Monitoring would be undertaken fortnightly during the first three months of operation of the Clyde Junction in 2017 and then monthly for the next nine months. In the event that the monitoring demonstrates an impact, further investigation to identify the cause would be undertaken. A management plan would then be developed to address the impact. Where major impacts to the roost are identified, operations (or the identified source of the impact) would be halted until a time in which the impacts are reduced through appropriate mitigation.
S.2	A weed management plan would be developed to manage the issue of weeds during operation.
Visual	
T.1	All lighting for the ASP would be operated in accordance with the requirements of AS 1158 *Road Lighting*, AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* and RailCorps operational requirements to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible.
T.2	Landscaping on site would be maintained during operation to ensure that the visual environment is maintained. Where vegetation would be required to be replaced (due to damage or for health reasons), replacement vegetation is to be planted as soon as possible and be of a similar type and size to ensure screening is provided.
T.3	Design would consider appropriate materials and colours for any noise barrier in order to blend in with the existing visual landscape.

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ID Number	Measure
Socio-economic	
U.1	A RailCorp infoline would be available for ongoing stakeholder contact following commissioning.
Land use and property	
V.1	Any acquisition would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.
Air quality	
	No operational mitigation measures were identified for air quality as impacts are nil or minimal.
Hazards and risks	
W.1	An incident emergency spill plan would be developed. The plan would include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways. An emergency spill kit would be kept on site at all times.
W.2	All staff would be made aware of incident emergency procedures and the location of emergency spill kits.
W.3	The ASP would be designed to achieve RailCorp's operational safety, signalling and operating procedures. Operational hazards would be managed through RailCorp's standard procedures for hazard and risk that are currently in place across the entire rail network.
Waste management	
X.1	Existing environmental practices would be implemented, which would include procedures for the management of on site waste including waste from stabled train sets.
Sustainability	
	Sustainability initiatives would be further investigated in the detailed design phase, and would consider operational waste management strategies and landscaping design.

8.3 Summary of licences and approvals required

The ASP would potentially require the following licences and/or approvals from relevant statutory agencies as outlined in Table 8.3.

Table 8.3 Summary of licensing and approval required

Requirement	Timing
The proponent and determining authority for the ASP is TCA. ISEPP provides that the works are subject to assessment under Part 5 of the EP&A Act and development consent from council is not required (see Section 3.3.1).	TCA would need to determine the ASP prior to any work on site commencing.

Requirement	Timing
An excavation permit under Section 139 and 140 of the *Heritage Act 1977* may be required during excavation if a heritage item or relic is found.	This would be required during excavation if a heritage item or relic is found, prior to undertaking any further excavation works in that area.
The ASP is a scheduled activity under the *Protection of the Environment Operations Act 1997*. An Environment Protection Licence (EPL) may be required under Section 48 of this Act to authorise the carrying out of scheduled development work.	TCA will continue discussions with DECCW to determine if an EPL is required.
Consultation requirements and notification under Clause 13, 14 and 15 of ISEPP.	Prior to any development or activity that may impact on council-related infrastructure or services; a local heritage item where the impact is not minor or inconsequential; or flood liable land.

9. Justification and conclusion

This chapter provides the justification for the ASP and include a conclusion summarising the benefits and the adverse impacts of the ASP.

9.1 Justification for the ASP

With the population of Sydney expected to increase by 1.1 million people in the 25 years from 2006 to 2031, particularly in Sydney's west and south-west, the demand for services on the CityRail network is also forecast to increase. In order to meet this demand, additional stabling facilities are required to accommodate the increase in the number of train sets required on the CityRail network. The ASP would assist by enabling an additional 16 eight-car train sets to be stabled on the network.

Overall the ASP provides a wide range of operational benefits for the CityRail network, by increasing both the capacity and reliability of the existing network. As addressed in this REF, the ASP would potentially result in some adverse impacts. These potential adverse impacts are considered justified due to the operational benefits of the ASP, which not only benefit the local area but the entire CityRail network. These adverse impacts can also be managed and mitigated to an acceptable level.

9.2 Sustainable development considerations

TCA is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of ecologically sustainable development (ESD). Sustainability in design has been discussed in Section 6.6 and demonstrated throughout Chapter 7.

These initiatives and principles would be incorporated into TCA's management systems for the ASP. Table 9.1 summarises how the four principles of ESD have been addressed through the ASP design and assessment processes.

Table 9.1 Adherence with principles of ESD

Principle	Adherence
The precautionary principle	Detailed assessment of options for the ASP was carried out, as described in Chapter 5. On and off-site mitigation and management measures have been incorporated into the ASP. This is considered to represent a precautionary approach to the management of these impacts. Mitigation measures have also been proposed to minimise other potential impacts of the ASP and environmental management plans would be implemented as a precautionary measure.
Intergenerational equity	The ASP is expected to contribute towards regional strategic benefits for future generations by providing stabling on the CityRail network. This would allow for an increase in the number of trains to service Sydney's west and south-west, catering for the forecast increase in passenger demand. An assessment of the potential socio-economic impacts of the ASP was also undertaken, as described in Section 7.9.

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Principle	Adherence
Conservation of biological diversity and ecological integrity	Potential impacts on species and vegetation communities of local, regional, national and State and national significance were assessed as described in Section 7.7. Impacts on biological diversity and ecological integrity would be minor as development would be focused in the already disturbed rail corridor and industrial zone. Mitigation measures are, however, still proposed to minimise flora and fauna impacts in the vicinity of the ASP, with the aim to conserve biological diversity and ecological integrity in the area.
Improved valuation, pricing and incentive mechanisms	The REF has examined the environmental consequences of the ASP and identified mitigation measures for potential adverse impacts. Requirements imposed in terms of implementation of these mitigation measures would result in an economic cost. The implementation of mitigation measures would increase both the capital and operating costs of the ASP. This signifies that environmental resources have been given appropriate valuation.

9.3 Significance of the environmental impacts

Consideration of the potential impacts has been undertaken against the factors provided in Clause 228 of the EP&A Regulation and the matters of national environmental significance identified in the EPBC Act (see Appendix A). Whilst a number of potentially neutral and negative impacts may result from the ASP, these impacts are not considered to have a significant impact on the environment or the community with the implementation of mitigation measures recommended in Section 8.2.

9.4 Conclusion

The ASP is expected to have positive impacts on the operation of the CityRail network by assisting with meeting future service requirements resulting from Sydney's increasing population, particularly in Sydney's west and south-west.

The potential key beneficial impacts of the ASP include:

- an increase in stabling provided on the CityRail network in order to meet future demand
- a reduction in the need to run empty trains to their starting destination during off peak times, which reduces congestion on the network
- allowing trains to quickly enter the network from the stabling facility which would assist in ensuring train services run on time
- remediation works forming part of the ASP would assist in the management of existing contaminated land on site
- creation of jobs during both construction and operation
- minor economic benefits for businesses within the Auburn town centre due to increased business from construction and operational workers.

The potential key adverse construction impacts of the ASP comprise:

- *Construction traffic impacts* – There would be an increase in traffic on roads during the construction phase. These impacts are considered manageable due to the relatively small number of vehicles per day expected over the construction stage of the ASP (approximately two years) and the implementation of mitigation measures outlined in Section 7.3.4.
- *Vegetation clearance on site* – There would be some vegetation clearance required as part of the ASP. The majority of clearance would be of environmental weeds however some regenerating native vegetation would be removed. Removal of native species would be minimised where possible, however offset planting would occur.
- *Amenity impacts from construction including noise and vibration, air quality and visual impacts* – Construction of the ASP would impact the surrounding local community particularly in relation to noise impacts. There would also be construction impacts on air quality generally associated with dust generation and visual amenity impacts on surrounding sensitive visual receptors (e.g. residential dwellings) due to the presence of construction worksites.

The potential key adverse operational impacts of the ASP are:

- *Noise impacts* – During operation, noise impacts would be related to the movement of trains to and from the stabling yard as well as impacts resulting from the trains stabled in the stabling yard. The key operational noise impact is related to the sounding of train horns within the stabling yard. Noise attenuation structures would be included as part of the ASP.
- *Visual impacts* – During operation the ASP would be viewed from a number of sensitive locations. Impacts would be associated with the introduction of new railway infrastructure on the ASP site (including OHW, tracks and other structures within the ASP site), the proposed overbridge proving access to the MainTrain Facility and also the potential for light spill from the stabling yard which operates throughout the night.
- *Traffic impacts* – During operation the ASP would result in a minor increase in traffic on the existing road network. The ASP also includes the repositioning of the MainTrain access, though the impacts of the new access are considered minimal.

It is considered that the adverse environmental impacts are generally localised in nature. With the adoption and implementation of the mitigation measures and commitments specified in Section 8.2, the potential environmental impacts of the ASP can be adequately mitigated and managed, and are not considered to be significant.

10. Certification

This Review of Environmental Factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Katrina Smallwood

Senior Environmental Scientist

Date: 5 November 2010

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Appendix A

Environmental checklists

Clause 228 factors checklist

Matters of national environmental significance checklist

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Clause 228 – Environmental Planning and Assessment Regulation 2000 considerations

Compliance with Clause 228(2) of the EP&A Regulation 2000

Clause 228(2) factors	Overall impact
(a) Any environmental impact on a community?	
Comments:	
Some adverse effects on the local community are anticipated during construction of the ASP, particularly in relation to noise, air quality, traffic and transport and visual impacts.	Short-term negative
During operation, impacts of the ASP include noise, traffic (due to staff vehicles accessing the site) and visual impacts associated with the increase in rail infrastructure and potential light spill. Long-term positive impacts include the opportunity to increase trains on the rail network catering for future increased passenger demand.	Long-term negative and positive
Mitigation measures outlined in Section 8.2 would be implemented to manage and minimise any adverse impacts.	
(b) Any transformation of a locality?	
Comments:	
Overall the locality is not being transformed as a result of the ASP as the site has historically been used for railway purposes.	Neutral
During construction the ASP is not considered to involve a transformation of the locality due to the historical use of the site and the surrounding area for railway and industrial uses. Construction works have also been present in the locality due to the construction of the AMC over the past few years.	
(c) Any environmental impact on the ecosystem of the locality?	
Comments:	
The impacts on biodiversity and ecosystems on or adjacent to the ASP site are considered to be relatively minor due the highly disturbed nature of the site, and its separation from the adjacent Duck River corridor by the Private Road. A population of the threatened Grey-headed Flying-fox is located adjacent to the ASP, impacts on this population are considered unlikely during daylight hours (when the population is present within the Duck River corridor).	Minor negative
(d) Any reduction of the aesthetics, recreational, scientific or other environmental quality or value of a locality?	
Comments:	
The ASP would result in visual impacts during both construction and operation. A general reduction in aesthetics would be associated with construction activities being undertaken at the site. During operation visual impacts are considered minimal as the ASP is to be in character with the surrounding land uses. Some visual impacts are considered likely due to light spill however these impacts would be minimised through the implementation of mitigation measures.	Short-term negative Long-term minor negative

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Clause 228(2) factors	Overall impact
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present generations?	
Comments:	
The site is listed under the Auburn LEP and on the RailCorp Section 170 Register. It has been determined that the likelihood of finding significant archaeological items is low. No known Indigenous heritage items have been identified. Unidentified heritage items (both non-Indigenous and Indigenous) would be protected should they be uncovered during construction, until the required approvals are obtained for them to be removed.	Neutral
(f) Any impact on habitat of any protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?	
Comments:	
The ASP is considered unlikely to require the clearance of any vegetation that is considered to be potential habitat for any protected fauna.	Neutral
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	
Comments:	
The ASP is considered unlikely to endanger any threatened species due to the minimal vegetation to be removed. Vegetation to be removed is considered to be in a highly degraded state and is unlikely to be habitat for any endangered species. Operation of the ASP could potentially impact upon a threatened Grey-headed Flying-fox colony located adjacent to the site. Mitigation measures outlined in Section 7.8.5 would be implemented to minimise impacts on this colony.	Short-term negative Long-term neutral
(h) Any long-term effects on the environment?	
Comments:	
Some long-term negative impacts such as the impact of noise (as described in Section 7.1) and visual impact (as described in Section 7.8) are expected with the operation of the ASP. Mitigation measures would be implemented to manage long-term effects to an acceptable level.	Negative
(i) Any degradation of the quality of the environment?	
Comments:	
The ASP includes the remediation of the ASP site as it is currently contaminated due to past uses. The ASP is therefore considered to improve the quality of the environment as the contaminants on site are to be removed from the ASP site or capped to prevent further movement around the ASP site and off site.	Positive

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Clause 228(2) factors	Overall impact
(j) Any risk to the safety of the environment?	
Comments:	
Construction safety hazards would be managed by an Occupational Health and Safety Plan. Management measures have been proposed to minimise contaminated/hazardous materials issues. The ASP has been designed to minimise safety risks for the movement of trains with the stabling yard.	Positive
(k) Any reduction in the range of beneficial uses of the environment?	
Comments:	
The ASP would not result in a reduction in the range of beneficial uses of the environment as the ASP site would be located on disused land.	Neutral
(l) Any pollution of the environment?	
Comments:	
There is potential for some short-term air, soil and water pollution during construction of the ASP. However this would be managed through the proposed mitigation measures (refer Section 7.11.4, 7.2.4 and 7.4.4). Exceedences in noise levels during construction and operation would potentially impact receivers in surrounding areas, however, mitigation measures have been proposed to manage these impacts to an acceptable level. Water pollution would be managed through the implementation of mitigation measures outlined in Section 7.4.4.	Short-term negative Long-term negative
(m) Any environmental problems associated with the disposal of waste?	
Comments:	
All waste would be managed and disposed of in accordance with the DECCW *Waste Classification Guidelines* (April 2008). Mitigation measures would be implemented to ensure waste is reduced, recycled or reused where applicable.	Neutral
(n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply?	
Comments:	
There would be no increase in demand on resources that are likely to become in short supply.	Neutral
(o) Any cumulative environmental effect with other existing or likely future activities?	
Comments:	
Cumulative effects of the ASP are described in Section 7.16. Where feasible, environmental management measures would be coordinated to reduce cumulative construction impacts. Mitigation measures would be implemented to manage impacts (refer Section 8.2).	Short-term negative Long-term neutral

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Matters of national environmental significance considerations

Compliance with Commonwealth EPBC Act requirements

EPBC Act Factors	Impact
Any environmental impact on World Heritage property?	
There are no World Heritage properties in the vicinity of the ASP site. The nearest site is located 4.5 kilometres away in Parramatta.	Nil
Any environmental impact on National Heritage places?	
There are no National Heritage Places in the vicinity of the ASP site. Nearest site is located 4.5 kilometres away.	Nil
Any environmental impact on wetlands of international importance?	
The ASP is located over 22 kilometres north-west of Towra Point Nature Reserve which is the nearest wetland in international importance. The ASP would not impact on this wetland of international importance as it is located within a different catchment to this wetland. This wetland has been identified, as land within the 5 kilometre radius of the site is located within the same catchment as the wetland.	Nil
Any environmental impact on Commonwealth listed threatened species or ecological communities?	
The ASP would not see the removal of any Commonwealth listed threatened species or ecological communities. The Grey-headed Flying Fox (*Pteropus poliocephalus*) is listed under the EPBC Act, with a colony of the species located directly adjacent to the ASP. No direct impacts are expected, however indirect impacts such as lighting and noise impacts potentially can impact on the colony. An ecology assessment has been undertaken and determined that noise and lighting impacts are considered unlikely to impact upon the colony.	Nil
Any environmental impact on Commonwealth listed migratory species?	
Although 30 migratory species are likely to occur within a 5 kilometres radius of the ASP, the ASP would not impact on these species due to the minor nature of the works.	Nil
Does any part of the proposal involve nuclear action?	
The ASP does not involve a nuclear action.	Nil
Any environmental impact on a Commonwealth Marine area?	
No Commonwealth Marine Areas are located within 5 kilometres of the proposed site.	Nil
Any impact on Commonwealth Land?	
The ASP would not impact on any Commonwealth Land.	Nil

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		Name	Signature	Name	Signature	Date
0	K Smallwood B James	M Roser	MRoser	M Roser	MRoser	05.11.10

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Attachment B

Preferred Activity Report

(GHD, April 2011)

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Auburn Stabling Project

Preferred Activity Report

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Appendices

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Glossary and abbreviations

AMC	Auburn Maintenance Centre – located within the Clyde Marshalling Yards to the north-east of the proposed ASP
ASP	Auburn Stabling Project
Auburn and Clyde Junctions	Points at which the ASP will connect into the CityRail network and the LGCUP at the Auburn and Clyde ends of the ASP respectively
Auburn and Clyde Necks	Approach tracks to the proposed stabling yard from the Auburn and Clyde ends of the ASP respectively
Cap and contain	Remediation method where contaminants are left on site and covered with clean material or fill. Capping methods vary depending on the construction methods required on the land above the contaminated land.
CCTV	Closed Circuit Television
CEMP	Construction Environmental Management Plan
CityRail network	Passenger rail service covering suburban Sydney and extending to the Hunter, Central Coast, Blue Mountains, Southern Highlands and South Coast regions
Clyde Marshalling Yards	RailCorp owned land adjacent to the Main West Line comprising of facilities for the maintenance and construction of rolling stock
Crossover	Track component that allows the movement of a train between two parallel tracks
dBA	Decibels (A-weighted)
DECCW	NSW Department of Environment, Climate Change and Water (now the Office of Environment and Heritage)
EMS	Environmental Management System
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	NSW Environmental Planning and Assessment Regulation 2000
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment protection licence
IGANRIP	*Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects*
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*

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L_{Aeq}	The equivalent continuous sound level is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.
$L_{Aeq(15\ minutes)}$	The busiest 15 minute "Equivalent Continuous Noise Level" The L_{Aeq}(15min) represents the typical L_{Aeq} noise level from all the train noise events during the busiest 15 minute period of the assessment period.
$L_{Aeq(9hr)}$	Night-time "Equivalent Continuous Noise Level". The LA_{eq}(9hour) represents the cumulative effects of all the train noise events occurring in the night-time period from 10pm to 7am.
L_{Amax}	The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.
LEP	Local environmental plan
LGA	Local government area
LGCUP	Lidcombe to Granville Corridor Upgrade Program
NSW	New South Wales
MainTrain	Maintenance facility located within the Clyde Marshalling Yards to the east of the ASP stabling yard
Main West Line	The commuter railway lines extending from the Sydney CBD to Granville
NCA	Noise Catchment Area
Overbridge	A bridge that travels over the rail corridor
PAR	Preferred Activity Report
PoEO Act	NSW *Protection of the Environment Operations Act 1997*
RailCorp	Rail Corporation of New South Wales
RAP	Remediation Action Plan
REF	Review of Environmental Factors
RTA	NSW Roads Traffic Authority
Sensitive receivers	Land uses and associated people that are sensitive to noise impacts, such as residential dwellings, schools and hospitals
Stabling yard or facility	Railway facility where trains not in service are stored, generally overnight, however, storage of trains during off peak times during the day does occur
SWRL	South West Rail Link
TCA	Transport Construction Authority (formerly Transport Infrastructure Development Corporation)

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Terminating track	Track that ends at a point requiring a train to exit the track the same way that it came in
Through track	Track on which a train can continue in one direction and is not required to exit from the direction it has come from

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1. Introduction

1.1 Background

The Auburn Stabling Project (ASP) forms part of the South West Rail Link (SWRL), which responds to issues of reliability and passenger growth on the Sydney metropolitan rail network and population growth in south-west Sydney.

The ASP comprises construction and operation of a train stabling facility north-west of Auburn Station to enable trains to be stored in a suitable location to service the predicted growth in passenger demand in Sydney's south-west. A detailed overview of the ASP is located in Section 1.3.

A Review of Environmental Factors (REF) was prepared for the ASP by GHD on behalf of Transport Construction Authority (TCA) to satisfy the environmental impact assessment requirements under Part 5 of *the Environmental Planning and Assessment Act 1979* (EP&A Act). The REF was on public display between 15 November 2010 and 13 December 2010. Formal submissions were invited from anyone with an interest in the ASP, including government stakeholders and members of the community (refer to Chapter 2). These submissions have been considered and addressed in this Preferred Activity Report (PAR).

If approved the ASP would be delivered in two stages. The majority of Stage One would be delivered by TCA, with the remainder of the works delivered as described in Section 1.1.2.

1.1.1 Alterations to the ASP since the display of the REF

Since the display of the REF, a number of alterations have been made to the design of the ASP. These alterations are an outcome of refining the design and a decision to deliver the ASP in a staged manner. An overview of the alterations is provided in Section 4.1.

A key alteration is that construction would be staged, involving an initial stage (referred to as Stage One and outlined in Section 4.1.2) and Stage Two (the remaining aspects of the ASP as described in Chapter 6 of the REF and any modifications outlined in Section 4.1). A staged approach to construction of the ASP has been developed to meet funding availability and the forecast demand in Sydney's inner-west and south-west.

As a major stabling facility forms part of the South West Rail Link (SWRL), it was determined that a facility capable of housing 11 eight-car trains at Auburn would be sufficient to meet current predicted short to medium term demand on the network. The expansion of the ASP by five stabling tracks (to provide a total of 16 tracks) would occur as required during Stage Two in line with future demand.

1.1.2 Relationship with the Lidcombe to Granville Corridor Upgrade Program

As noted in Section 2.3.3 of the REF, the Lidcombe to Granville Corridor Upgrade Program (LGCUP) is an important and related rail construction program occurring in the vicinity of the ASP site. The aim of the LGCUP is to optimise operation and train travel times between Lidcombe and Granville by minimising the use of components such as crossovers. The removal of these components would improve track speeds and result in reduced travel times for the movement across tracks.

The construction of the LGCUP is important for the integration of the ASP into the rail network with the Auburn and Clyde Junctions to be constructed as part of the LGCUP works by the Novo Rail Alliance on behalf of RailCorp. The following components of Stage One of the ASP would be constructed as part of the LGCUP:

- installation of the single track and supporting civil works to connect to the ASP from the approximate location of the existing Auburn Maintenance Centre (AMC) fence at the pedestrian bridge to the Down Relief
- turnout and plain line track until the turnout connection on to the Down Relief
- expansion of the Manchester Road level crossing
- utility relocations, drainage works, power supply and overhead wiring.

Upon completion of the LGCUP works, including required signalling, Stage One of the ASP would become fully operational and integrated into the main network.

1.1.3 Community consultation

Consultation with the community during the REF display period and development of the PAR has been undertaken as described in Chapter 2. Some modifications to the ASP have been made in response to submissions received by the community. Responses to all submissions received on the REF are addressed in Chapter 3.

Since the public display of the REF in November and December 2010, a number of design changes have occurred to the ASP. In light of these changes a number of additional consultation activities were undertaken, including a community information session to provide information to the community and seek further submissions (details in Section 2.3.1). The submissions received during this information session have been considered and addressed in Chapter 5.

1.2 Purpose and structure of this report

This PAR documents and considers the submissions received on the ASP REF (Chapter 3), as well as additional submissions received during preparation of the PAR (Chapter 5), and outlines TCA's response to these submissions together with changes in scope and impacts as a result of the staged delivery of the ASP. The PAR also provides the following:

- an overview of the ASP (refer Section 1.3)
- an overview of key information on the ASP as outlined in the REF (refer Section 1.4)
- details of the consultation activities undertaken prior to and during display of the REF and during preparation of the PAR (refer Chapter 2)
- an overview of alterations made since the display of the REF, including staging, and impacts of these alterations (refer Chapter 4)
- a revised set of mitigation measures which reflect the key issues raised in the public submissions and as a result of alterations to the ASP (refer Chapter 7).

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1.3 Overview of the Auburn Stabling Project

The ASP would provide stabling for 16 eight-car suburban train sets, together with associated facilities such as offices, staff amenities, roads, walkways, fencing, lighting and others necessary for the operation of an effective stabling yard. Routine activities such as interior cleaning, minor exterior cleaning, train inspections and garbage removal would also be undertaken at the stabling yard.

The ASP is proposed to be delivered in stages. Stage One of the ASP would include the construction and operation of 11 of the 16 stabling tracks, while Stage Two involves the delivery of the remainder of the ASP as described in the REF (and modifications as detailed in this PAR). Staging is discussed further in Section 4.1.2.

The ASP would also include the remediation of existing contaminated land present on the site.

The ASP is proposed to be located on RailCorp owned land known as the Clyde Marshalling Yards, within the Auburn local government area, approximately 20 kilometres west of the Sydney Central Business District (CBD). The site is located to the south-west of the Main West Line rail corridor between Auburn and Clyde stations.

If approved, construction of the majority of Stage One of the ASP is programmed to start in late 2011 and, based on the current indicative construction scenario, is anticipated to take approximately 24 months and be completed by the end of 2013. Works to integrate the Stage One stabling facility with the main line would be constructed as part of the LGCUP works. Stage Two would be constructed when additional stabling facilities are required.

1.4 Review of Environmental Factors

The following sections present a summary of the REF that was prepared for the ASP.

1.4.1 Need for the ASP

The ASP is needed to address the existing shortage of stabling facilities and support the predicted demand for passenger services on the CityRail network from Sydney's inner-west and south-west over the next 10 years. The ASP would provide stabling for some of the additional trains required to meet this predicted demand, as adequate stabling is currently not available on the network.

Furthermore, the current location of existing stabling facilities means that empty trains are required to travel long distances on the CityRail network in order to reach their starting and finishing destination. The ASP would provide stabling in a location that would reduce the distance and time empty trains spend on the network, therefore reducing congestion on the CityRail network.

This facility would allow trains to quickly enter the network to service the morning and afternoon peak demand times in Sydney's inner-west and south-west.

1.4.2 Key features of the ASP as defined in the REF

The key features of the ASP assessed in the REF include:

- stabling facility capable of holding up to 16 eight-car suburban train sets, in the following arrangement:

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- five terminating tracks along the western edge of the stabling yard, which would be accessed from the Auburn Junction
- six through tracks that can be accessed from either the Auburn or Clyde Junctions
- five terminating tracks along the eastern edge of the stabling yard, which would be accessed from the Clyde Junction

- walkways constructed between stabling tracks to provide access for personnel to the stabled trains
- one full-length elevated walkway may be required in the centre of the facility to provide door-level access to two stabled trains
- connections from the existing network to the stabling facility in the vicinity of Auburn and Clyde stations, involving track work, overhead wiring and signalling
- primary administration, amenities and storage building, which would provide office space, storage facilities and staff amenities
- secondary amenities and storage building, which would provide unisex toilet, storage and first aid facilities
- potential new sectioning hut to assist with powering the stabling facility
- new staff car park adjacent to the primary administration, amenities and storage building, with provision for approximately 40 vehicles
- changed access to the MainTrain site, involving the construction of a new overbridge to provide pedestrian and vehicular access across the proposed ASP tracks
- road works associated with connecting the ASP into the existing street network on the Private Road and at Manchester Road at the location of the new MainTrain access
- drainage works across the site with a stormwater drainage system
- noise attenuation structures (e.g. noise mitigation barrier)
- two dry detention basins to supplement the site drainage and to mitigate against potential flooding
- remediation works on the site involving a 'cap and containment strategy'.

Figure 1.1 shows the key features of the ASP as described in the REF.

Refer to Section 1.5 for an overview of the modifications to the ASP that have occurred since the display of the REF.

1.4.3 Overview of the likely impacts and benefits of the ASP

Table 1.1 provides a summary of the key environmental and social issues identified for the ASP. These issues are:

- noise and vibration
- soils and contamination
- traffic and transport
- hydrology, drainage and water quality

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- non-Indigenous heritage
- biodiversity
- visual
- socio-economic.

Table 1.1 also identifies the key management commitments that would be implemented to minimise the above impacts.

The following other environmental issues were also considered as part of the REF:

- Indigenous heritage
- land use and property
- air quality
- hazards and risks
- waste management
- climate change
- cumulative impacts.

Impacts associated with these issues are considered to be relatively minor and able to be managed through the implementation of the proposed mitigation measures.

1:10,000 (at A4)

0 50 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

Ancillary infrastructure — Proposed Track — Roads works

Detention basin — Existing Track

GHD

CLIENTS | PEOPLE | PERFORMANCE

TCA
Auburn Stabling Project

Job Number 21-19479
Revision A
Date 20 OCT 2010

Auburn Stabing Project as in REF   Figure 1.1

G:\21\19479\GIS\Maps\MXD\21_19479_Z003_LocationMap_areial_A4.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate Streetmap: Streetmap - Jan 2010. Created by: qjchung

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Table 1.1 Key issues and mitigation measures proposed in REF

Key issues	Key mitigation measures
Noise and vibration	
• Using the worse-case construction scenario, construction noise would result in mild to moderate exceedances. • There would be noise exceedances for the operation of the stabling facility, including trains entering the stabling yard in the evening and at night and leaving in the morning. • There would be no noise exceedances for movements along the necks and for stabling overnight. • Exceedances of noise criteria would predominantly occur at dwellings along Sheffield Street and Manchester Road. • There would be exceedances of noise and sleep disturbance guideline levels related to train horn noise.	• Standard mitigation measures would be implemented as outlined in the TCA *Construction Noise Strategy*. In the event construction noise levels exceed 20 dBA above the background noise levels, additional mitigation potentially would need to be investigated. • Noise mitigation barrier would be provided in strategic locations around the stabling yard as required. • Changes to the existing RailCorp procedures to minimise the use of horns within the stabling yard would be further investigated. This includes the potential for horn testing to occur outside the stabling yard, either within an 'enclosure' on the Auburn Neck or a suitable location on the Main West Line. • An Operational Noise and Vibration Management Plan would be developed, and would include a post-operation monitoring program to demonstrate compliance with relevant noise goals.

Key issues	Key mitigation measures
Soils and contamination	
◗ The site is subject to contamination and remediation would be required as part of the ASP. ◗ Substantial earthworks during construction have the potential to result in erosion and sedimentation impacts, which have the potential to impact on water quality.	◗ All remediation work would be undertaken in line with the Remediation Action Plan (RAP) developed for the site. A 'cap and contain' method of remediation is proposed. ◗ The capping layer should be maintained in accordance with a long-term site Environmental Management Plan (EMP). ◗ Erosion and sedimentation from disturbed areas during construction would need to be controlled in accordance with *Managing Urban Stormwater Soils and Construction* (Landcom, 2004) and *Auburn Council Development Control Plan 2000 - Guidelines for Erosion and Sediment Control* (2003) for each component of work such as the construction of the earthworks, culverts, roads and buildings. ◗ An Erosion and Sediment Control Plan would be prepared and incorporated into the Construction Environmental Management Plan (CEMP), and include a monitoring program to assess the water quality downstream of the development site before, during and after construction.
Traffic and transport	
◗ The construction period would result in additional traffic, in particular heavy vehicles, on the local road network. ◗ There would be changed access and temporary loss of some parking spaces from the MainTrain car park due to proposed overbridge being constructed. ◗ A minor increase in traffic in the local area is predicted as a result of operational movements.	◗ A Construction Traffic Management Plan would be prepared and would identify options to minimise construction traffic impacts. ◗ The community would be kept informed of construction activities and provided with contact details to provide feedback on the ASP. ◗ Parking would be provided on the construction site for all vehicles and equipment where possible.

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Key issues	Key mitigation measures
▸ Long-term positive impacts would be associated with provision of stabling, which would enable additional trains to be added to the CityRail network. ▸ There would be a reduction in the number of empty trains travelling on the CityRail network between the stabling facilities and their start and finish destinations.	
Hydrology, drainage and water quality	
▸ There may be erosion and sedimentation impacts on water quality during construction as a result of excavation works. ▸ There is potential for accidental spills during construction and operation impacting upon water quality of Duck River and other nearby watercourses. ▸ There is potential for flooding due to positioning of ASP within the existing overland flow paths.	▸ Surface water runoff would be captured and directed through appropriate detention and water quality controls to appropriate standards. ▸ The ASP incorporates drainage controls to connect with the existing trunk drainage system at the site and is designed to attenuate the 100 year average recurrence interval peak flows. ▸ Water quality controls have been designed into the ASP such as permanent detention basins and gross pollutant traps to manage water quality in the long-term.
Non-Indigenous heritage	
▸ The ASP site is listed as an archaeological item under the *Auburn Local Environmental Plan 2000* and RailCorp's Section 170 Register. However, the site is considered to have a low archaeological potential and therefore impacts to archaeological items are considered to be unlikely.	▸ If substantial intact subsurface elements are uncovered during the works, work would cease and an experienced industrial archaeological consultant would be engaged to assess the level of heritage significance of the remains. If the remains are determined to have heritage significance, approvals would be obtained under the relevant provisions of the NSW *Heritage Act 1977*.

Key issues	Key mitigation measures
Biodiversity	
• Impacts to fauna may occur as a result of the clearing of habitat during construction. These impacts are considered to be relatively low due to the disturbed nature of the site. • Noise levels during construction and operation may impact upon fauna utilising adjacent lands, including a population of the threatened Grey-headed Flying-fox. These impacts are considered to be not significant.	• In line with TCA's Biodiversity Offset Strategy, a target of 100 per cent offset vegetation would be set for the removal of trees as part of the ASP. • Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist during the first year of operation of the Clyde Junction for evidence of negative impacts on the roost resulting from horn noise. In the event that the monitoring demonstrates an impact, mitigation measures would then be reviewed.
Visual	
• Temporary impacts to visual amenity would occur for surrounding residents and businesses, rail commuters and occupants of vehicles using nearby roads during construction. • Potential operational impacts are associated with the addition of rail infrastructure and associated facilities, including lighting and a noise attenuation structure (e.g. noise mitigation barrier), which would result in long-term changes to the visual environment. • At some residences, an increased number of train movements would be visible.	• Lighting would be designed in accordance with Australian Standards and directed away from residences to minimise light spill. • Existing visual screening would be retained where possible. • Rehabilitation planting, landscaping and screening would be provided where possible. • The design would consider appropriate materials and colours for any noise mitigation barrier in order to blend in with the existing visual landscape. • Where appropriate consultation with the community would occur to minimise the visual impact of any structure.

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Key issues	Key mitigation measures
Socio economic	
• Short-term impacts during construction of the ASP relate to noise, traffic and visual impacts. • The noise, traffic and visual issues also contribute to the long-term social impacts associated with the operation of the ASP. • The ASP would improve the CityRail network by providing stabling for additional trains and also providing space for future growth on the network. • Construction and operation of the ASP would generate jobs for the local economy. The local economy may also be supported by the introduction of workers during operation in the form of increased business, in particular within the Auburn town centre.	• The community would be kept informed of the ASP through regular updates and encouraged to provide feedback using the contact details provided. • Mitigation measures addressed in the noise, traffic and visual sections are relevant in relation to indirect impacts on surrounding land uses.

1.4.4 Conclusions of the Review of Environmental Factors

The REF concluded that the ASP is expected to have positive impacts on the operation of the CityRail network. It would assist to meet future service requirements resulting from Sydney's increasing population, particularly in Sydney's inner-west and south-west.

The potential key beneficial impacts of the ASP include:

- an increase in stabling provided on the CityRail network to meet future demand
- a reduction in the need to run empty trains to their starting destination during off peak times, which reduces congestion on the network
- allowing trains to quickly enter the network from the stabling facility which would assist in ensuring train services run on time
- management of existing contaminated land on site as a result of remediation works forming part of the ASP
- creation of jobs during both construction and operation
- minor economic benefits for businesses within the Auburn town centre due to increased business from construction and operational workers.

The main adverse construction impacts of the ASP comprise:

- *Construction traffic impacts* – There would be an increase in traffic on roads during the construction phase. These impacts are considered manageable due to the relatively small number of vehicles per day expected over the construction stage (approximately two years) and the implementation of mitigation measures.
- *Vegetation clearance on site* – There would be some vegetation clearance required. The majority of clearance would be environmental weeds however some regenerating native vegetation would be removed. Removal of native species would be minimised where possible, and offset planting would occur.
- *Amenity impacts from construction including noise and vibration, air quality and visual impacts* – Construction would impact the local community particularly in relation to noise impacts. There would also be impacts on air quality generally associated with dust generation and visual amenity impacts on surrounding sensitive visual receptors (e.g. residential dwellings) due to the presence of construction worksites.

The main potential adverse operational impacts of the ASP are:

- *Noise impacts* – During operation, noise impacts would be related to the movement of trains to and from the stabling yard as well as impacts resulting from the trains stabled in the stabling yard. The key operational noise impact is related to the sounding of train horns within the stabling yard. Noise attenuation structures would be included as part of the ASP.
- *Visual impacts* – During operation, the ASP would be viewed from a number of locations. Impacts would be associated with the introduction of new railway infrastructure on the ASP site (including overhead wiring, tracks and other structures), the proposed overbridge providing access to the MainTrain Facility and also the potential for light spill from the stabling yard as it operates throughout the night.

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- *Traffic impacts* – During operation the ASP would result in a minor increase in traffic on the existing road network. The ASP also includes the repositioning of the MainTrain access, though the impacts of the new access are considered minimal.

The REF concluded that the adverse environmental impacts are generally localised in nature. With the adoption and implementation of the mitigation measures and commitments specified in the REF, the potential environmental impacts of the ASP would be adequately mitigated and managed, and are not considered to be significant.

1.5 Overview of project modifications

Refinement of the ASP since the REF was completed has resulted in a number of changes to the design. Details of these design changes are provided in Section 4.1. The main design changes are as follows:

- Clyde Junction and access is to only consist of one track
- redesign of MainTrain gatehouse to ensure it complies with *Disability Discrimination Act 1992* (DDA) requirements, including provision of a ramp, potential provision of DDA compliant car spaces and general enlargement of the gatehouse. Security cameras around the perimeter of the guard house have also been include in the design
- repositioning of the noise mitigation barrier away from the track where it would follow the retaining wall and property boundary
- inclusion of a public address (PA) system on site
- realignment of the 33kv and 11kv transmission lines through the MainTrain site as part of Stage Two of the ASP
- removal of the sectioning hut proposed in the REF
- relocation of the signalling hut, signalling room and compressor room to a single building (referred to as the combined signal equipment and compressor room) located on the eastern boundary of the existing AMC car park
- relocation of the cable route to an easement through the RailCorp owned land leased by Manildra
- removal of the elevated walkway between tracks eight and nine. Seven metre long cleaning access platforms are to be installed between every second set of tracks to provide access to carriages one, four, five and eight
- relocation of MainTrain training room to a new location due to potential flooding in the area shown in REF (to be confirmed during detailed design). The size of this room is also likely to be increased (to be confirmed during detailed design)
- changes to property acquisition along the southern edge of the ASP to ensure a smoother or more gently curved boundary line (in consultation with the landowner)
- extension of the stabling space by four metres to allow for amalgamation and separation of train sets within the stabling area
- installation of additional overhead wiring for four-car suburban set length within the proposed MainTrain siding

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- minor amendments to the RAP addressing the remediation of the site
- confirmation of the use of the alternate horn testing location located on the Main Line between Lidcombe and Auburn stations (as described in Section 7.1.3 of the REF and shown in Figure 7.3 in the REF) by RailCorp
- confirmation of the testing of leading horns departing via Clyde Junction by RailCorp
- removal of enclosure structure described in Section 7.1.3 of the REF due to the confirmation of the alternate horn testing location.

In addition to the above, a staged delivery of the ASP is now proposed. Stage One includes:

- construction and operation of stabling facility and track to stable 11 eight-car suburban train sets
- a short rail neck linking the facility to the Down Relief at the Clyde end of the facility (to be constructed as part of the LGCUP)
- staff facilities building and car park
- secondary amenities and storage building
- overhead wiring and signalling to support the Stage One tracks
- combined signal equipment and compressor room
- drainage works and the construction of two permanent detention basins
- remediation works
- retaining structures
- noise mitigation barrier
- property acquisition
- lighting, electrical and relocation works
- PA system
- ancillary works required to support the Stage One stabling facility.

Further details of the works forming part of Stage One are provided in Section 4.1.2. Stage Two would involve the construction of the remaining aspects of the ASP as described in Chapter 6 of the REF and any modifications described above which are to be constructed during Stage Two. Section 4.1.2 outlines the works to be undertaken during Stage Two.

The staging of the proposal has also resulted in some changes to the approach to construction of Stage One of the ASP. These include:

- Change in location of the construction compound and stockpiling area from the neighbouring Janyon land to within the boundaries of the Stage One works. Details of this location would be confirmed during construction planning and incorporated in the CEMP.
- Change in access to the ASP site, with vehicles to access the site via Private Road. Access points located along Manchester Road would not be utilised for the construction of Stage One works.

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- Majority of remediation works to be undertaken during Stage One. Details of the remediation works to be undertaken during Stage One are outlined in Section 4.1.2.
- Change in composition of heavy vehicles between the two stages. The estimated numbers of heavy vehicle movements have also been reduced as outlined in Section 4.3.4.
- Change in construction timeframes for the ASP. Construction timeframes for the entire ASP would be longer than the expected two years because of the staged delivery.

1.6 Submissions received

During the REF display period TCA received a total of 24 submissions. Eighteen of these came from the community, one from a community group and five from Government departments, agencies and other stakeholders. Issues raised included:

- noise
- traffic and transport
- hydrology, drainage and water quality
- visual and urban design
- socio-economic
- land use and property
- air quality.

Further details of the submissions received during display of the REF and TCA's responses are provided in Chapter 3.

An additional 10 submissions were received from community members during the preparation of the PAR as a result of consultation which included a community information session held on 9 April 2011. Issues raised in these submissions included:

- noise and vibration
- traffic and transport
- information request.

Further details of the submissions received during display of the REF and TCA's responses are provided in Chapter 5.

1.7 Statutory compliance

Chapter 3 of the REF outlined the statutory planning and approvals process for the ASP.

As discussed in Section 3.3.1 of the REF, in accordance with *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP), development consent from council under the relevant local environmental plan (LEP) is not required and the proposal is to be assessed under Part 5 of the EP&A Act.

Due to the changes in the ASP since finalisation of the REF, the Clause 228 matters for consideration under the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and the matters for consideration under the provisions of the *Environment Protection*

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and Biodiversity Conservation Act 1999 (EPBC Act) have also been revised (see Sections 6.1.1 and 6.1.2 respectively). The design changes would not affect Commonwealth land, nor would they have an impact on matters of national environmental significance under the EPBC Act. Furthermore, the modifications are unlikely to 'significantly affect the environment' within the meaning of Section 112(1) of the NSW EP&A Act and therefore, an Environmental Assessment under Part 3A is not required.

1.7.1 Auburn LEP 2010

While the REF was being finalised, the *Auburn Local Environmental Plan 2000* was repealed and replaced with the *Auburn Local Environmental Plan 2010* (Auburn LEP 2010*)*. This LEP was prepared in accordance with the *Standard Instrument (Local Environmental Plans) Order 2006.*

The Auburn LEP 2010 came into force on 29 October 2010 and now controls land use on the ASP site. The relevant provisions of the Auburn LEP 2010 are outlined below.

Under the Auburn LEP 2010, the ASP is located on two land use zones, IN1 – General Industrial and SP2 – Infrastructure (Railway).

The majority of the site is located within the IN1 – General Industrial zone. The objectives of this zone are:

- *To provide a wide range of industrial and warehouse land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of industry on other land uses.*
- *To encourage economic growth of the locality.*
- *To minimise adverse effects on the natural environment.*

Works at the Clyde and Auburn Junctions are located on land that is zoned SP2 – Infrastructure (Railways). The objectives of this zone are:

- *To provide for infrastructure and related uses.*
- *To prevent development that is not compatible with or that may detract from the provision of infrastructure.*

The ASP is considered to meet the above objectives as the land is to be used by a public authority for public infrastructure (railway facilities). The ASP would be compatible with the surrounding industrial land uses, including the surrounding railway uses (e.g. the adjacent MainTrain Facility, AMC and Manildra). All works that form part of the ASP are considered ancillary to the use of the land for railway purposes. The remediation works that form part of the ASP are considered to be ancillary to the construction of the stabling yard as they would prepare the site for the construction of the stabling yard.

Under the Auburn LEP 2010, the Clyde Marshalling Yards is still identified as a heritage item with potential archaeological significance. Details of the listing applying to the site are provided in Section 7.5 of the REF. The gazettal of the Auburn LEP 2010 does not result in any changes to the heritage provisions.

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2. Consultation

2.1 Pre REF display consultation

This section describes consultation activities undertaken during preparation of the REF.

2.1.1 Community and stakeholders

Community and stakeholders were identified as individuals or groups who would be potentially impacted by the ASP. This included consideration of surrounding residents, individual members of the community, special interest groups and organisations, businesses, government agencies and other authorities.

A stakeholder database was developed based on identified stakeholders and community groups.

2.1.2 Engagement activities and tools

Table 2.1 lists the key engagement activities and tools, outlines the purpose of each tool and describes how each tool has been used to engage with the community and stakeholders.

Table 2.1 Key community and stakeholder engagement tools/activity

Tool	Purpose and activity to date
Contact mechanisms	A project infoline telephone number (1800 684 490) and email address (mail@tca.nsw.gov.au) was established at the commencement of the ASP to enable all stakeholders to provide feedback to the project team for consideration in the REF. A database was established to manage contacts and issue information received. Since inception, contact has been made with 5613 separate stakeholders and details of this communication have been recorded in the stakeholder database.
Community newsletter #1	A community newsletter was distributed in April 2010 which outlined the ASP and its benefits, the REF process and progress to date. This newsletter was prepared by TCA and was distributed to nearby residents within approximately two kilometres of the site. Approximately 5,500 newsletters were distributed.
Direct contact via phone calls and door knocking	Residents who were identified as being directly or indirectly affected by the ASP were contacted by the TCA project team to make them aware of the ASP and how they could obtain more information and provide feedback. Approximately 90 residents adjacent to the site were door knocked on 12 May 2010.
Community newsletter #2	A community newsletter was distributed in June 2010 which outlined the ASP, the REF process and details of the community information session to be held 1 July 2010. This newsletter was prepared by TCA and was distributed to nearby residents within approximately two kilometres of the site. Approximately 5,500 newsletters were distributed.

Tool	Purpose and activity to date
Newspaper advertisements	Newspaper advertisements to encourage attendance at the 1 July 2010 community information session were placed in the Wednesday 23 June editions of the *Review Pictorial* and *Parramatta Advertiser.*
Letters to adjacent property owners	Approximately 100 letters were sent to residents and businesses adjacent to the site in June 2010. Each letter outlined the ASP, the REF process and details of the community information session to be held on 1 July 2010.
Community information session	A community information session was held on 1 July 2010. The session provided an opportunity for the community to meet representatives from TCA and the project team to discuss any aspect of the ASP or to raise any concerns. Attendees were asked to complete a feedback form so that feedback could be included as part of the REF. There were six attendees and three feedback forms submitted.
Project website	Information about the ASP was made available on the TCA website www.tca.nsw.gov.au. The website provided details about the ASP and the REF.
Translation services	Translation services were included in eight languages other than English on the community newsletter #1 and #2.

2.1.3 Issues raised by the community

Table 2.2 summarises the issues raised by the community as part of the consultation undertaken prior to the REF display.

Table 2.2 Summary of issues raised by the community

Issue	Details	Where addressed in REF
Property acquisition	Concern about demolition of any buildings or property acquisition for the ASP	Section 6.3 identifies the property acquisition required for the ASP
Scope and benefits of the ASP	Clarification on the purpose and scope of the ASP	Section 5.1 identifies the need for stabling and Chapter 6 outlines the scope of the ASP
Construction traffic	Concern regarding traffic volumes (in particular heavy vehicles) during construction, and resulting noise levels	Sections 7.3.2 and 7.1.2 assess the construction traffic and noise impacts of the ASP
Operational traffic	Concerns about the number of vehicles that would be using the relocated MainTrain entry	Section 7.3.3 assesses the operational traffic impacts of the ASP

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Transport Construction Authority

Issue	Details	Where addressed in REF
Train noise during operation	Concern regarding train noise during operation	Section 7.1.3 assesses the operational noise impacts of the ASP
Pedestrian safety	Need for street lights on Manchester Road	Lighting associated with the ASP is outlined in Section 6.2.13. All other lighting would be the responsibility of Auburn City Council
Benefits of the ASP to CityRail network	Clarification on the benefits of the ASP to the CityRail network	Section 5.1 identifies the need for stabling and Chapter 9 justifies and summarises the benefits of the ASP
Suitability of Auburn as the preferred location	Querying whether the Auburn site is suitable for the proposed stabling yard	Section 5.3 outlines the site selection considerations and identifies why Auburn is the preferred location for a new stabling facility

2.1.4 Consultation with government agencies

During the preparation of the REF, meetings were held with the following agencies (date of meeting in brackets):

- Auburn City Council (17 June 2010)
- Department of Environment, Climate Change and Water (now Office of Environment and Heritage) (1 July 2010 and 8 October 2010).

Letters offering a briefing and providing a general overview of the ASP were sent to:

- Auburn City Council
- Department of Environment, Climate Change and Water (DECCW) (now Office of Environment and Heritage)
- Department of Planning – Heritage Branch (now Office of Environment and Heritage)
- NSW Roads and Traffic Authority
- Parramatta City Council
- Transport NSW (now Department of Transport).

A summary of the issues raised by government agencies as part of the consultation undertaken prior to REF display is provided in Table 2.3.

Table 2.3 Summary of issues raised by government agencies

Agency	Issue
Auburn City Council	Planning approvals process for remediation works given the site is listed as having archaeological significance under the Auburn LEP
	Land acquisition
	Traffic – construction traffic and that appropriate management measures are put in place to reduce the impacts of traffic
DECCW (now Office of Environment and Heritage)	Need for an Environment Protection Licence under the *Protection of the Environment Operations Act 1997* (POEO Act)
NSW Roads and Traffic Authority	Confirmed no issues

2.2 Consultation during public display of the Review of Environmental Factors

The REF was placed on public display between 15 November 2010 and 13 December 2010.

During the display period, government agencies, interested groups and organisations, and the community were invited to make written submissions in response to the REF. Further community consultation was undertaken during the display period to enable the community to comment and ask questions about details in the REF. The consultation and engagement activities undertaken in the lead up to and during the display period are outlined in Sections 2.2.1.

Table 2.4 lists the key engagement activities and tools, outlines the purpose of each tool and describes how each tool has been used to engage with the community and stakeholders.

Table 2.4 Key community and stakeholder engagement tools and activities preceding display of REF

Tool	Purpose and activity to date
Community newsletter #3	A community newsletter was distributed in November 2010 which outlined the ASP, the REF display locations and details of the community information sessions to be held 27 November and 11 December. This newsletter was prepared by TCA and was distributed to nearby residents within approximately two kilometres of the stabling yard site and the proposed horn testing location on the main line at Lidcombe. Approximately 7000 newsletters were distributed. This newsletter was also distributed to commuters at Auburn Station on 15 November 2010.
Direct contact via phone calls and door knocking	Residents who were identified as being directly or indirectly affected by the ASP were contacted by the TCA project team to make them aware of the community information session and public display of the REF. Approximately 124 properties were door knocked in November 2010.

Tool	Purpose and activity to date
Newspaper advertisements	A newspaper advertisement to encourage attendance at the 27 November and 11 December 2010 community information sessions and inform the community about the REF display locations was placed in the Wednesday 17 November edition of the *Review Pictorial*. The newspaper advertisement was also translated and placed in the Wednesday 17 November edition of the *Sing Tao Chinese* newspaper, *Future* Arabic newspaper and the *Turkish Weekly*.
Letters to adjacent property owners	Approximately 1000 letters were sent to residents and businesses adjacent to the project site and the proposed horn testing location on the main line at Lidcombe in November 2010. Each letter outlined the ASP, the REF display locations and details of the community information session to be held 27 November and 11 December 2010.
Project website	Information about the ASP was made available on the TCA website www.tca.nsw.gov.au. The website provided details about the ASP and the REF.
Translation services	Translation services were included in four languages other than English on the community newsletter #3.

2.2.1 Community information sessions and displays

Community information sessions were held at the following times and locations:

- Saturday 27 November 2010, 10am to 12 noon at the corner of Manchester Road and Cumberland Road, Auburn. A Chinese/Mandarin interpreter was present to assist the local community. Approximately 35 members of the community attended this information session.
- Saturday 11 December 2010, 10am to 1pm at the Auburn Central Markets. Approximately eight members of the community attended this information session.

Community information displays were located at the following locations during the entire display period:

- Auburn Library, Civic Place, 1 Susan Street, Auburn during the following times Monday to Thursday 9.30am to 8pm, Friday 9.30am to 6pm, Saturday 9.30am to 4pm, Sunday 1pm to 4pm
- Granville Branch Library, 8 Carlton Street, Granville during the following times Monday and Thursday 10am to 8pm, Tuesday, Wednesday and Friday 10am to 5.30pm, Saturday 9.30am to 12 noon
- Transport Construction Authority, Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood during the following times Monday to Friday 8.30am to 5pm.

2.3 Consultation during preparation of Preferred Activity Report

During the preparation of the PAR, TCA consulted with community members, government agencies and other stakeholders that made submissions. In addition TCA held a community information session on Saturday 9 April 2011 to inform the community about changes to the ASP since display of the REF.

Table 2.5 lists the key engagement activities and tools, outlines the purpose of each tool and describes how each tool has been used to engage with the community and stakeholders during the preparation of the PAR.

Table 2.5 Key community and stakeholder engagement tools and activities during preparation of the PAR

Tool	Purpose and activity to date
Community newsletter #4	A community newsletter was distributed in April 2011 which outlined the ASP, the proposed staged delivery of the ASP and details of the community information session to be held 9 April 2011. This newsletter was prepared by TCA and was distributed to nearby residents within approximately two kilometres of the stabling yard site and the proposed horn testing location on the main line at Lidcombe. Approximately 7000 newsletters were distributed.
Newspaper advertisements	A newspaper advertisement to encourage attendance at the 9 April 2011 community information session and inform the community about the proposed staged delivery of the ASP was placed in the Wednesday 29 March 2011 edition of the *Review Pictorial*. The newspaper advertisement was also translated and placed in the Friday 1 April 2011 edition of the *Sing Tao Chinese* newspaper and *Future* Arabic newspaper.
Letters to adjacent property owners	Approximately 100 letters were sent to residents and businesses adjacent to the ASP site in March 2011. Each letter outlined the ASP, the proposed staged delivery of the ASP and details of the community information session to be held 9 April 2011.
Project website	Information about the ASP was made available on the TCA website www.tca.nsw.gov.au. The website provided details about the ASP and the REF.
Translation services	Translation services were included in four languages other than English on the community newsletter #4.

2.3.1 Community information sessions and displays

A community information session was held on Saturday 9 April 2011, 10am to 12 noon at the corner of Manchester Road and Chisholm Road, Auburn.

Over 20 local community members attended the street meeting. TCA project team members, planning approval consultants from GHD and a consultant from Wilkinson Murray Pty Ltd were present to discuss the proposed changes to the ASP since display of the REF, including the proposed staged delivery of the ASP, and receive further feedback on the ASP. A Chinese/Mandarin interpreter was present to assist the local community.

Feedback forms were provided to the community to comment on the changes to the ASP. Issues raised in the feedback forms have been considered and responded to in Chapter 5.

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2.3.2 Stakeholder meetings

The following stakeholder consultation was undertaken during the preparation of the PAR:

- Department of Environment, Climate Change and Water (now Office of Environment and Heritage) – Various discussions were undertaken with DECCW in relation to the need for groundwater monitoring during both construction and operation. Details of their concerns and the result of this consultation are provided in Section 3.14.4.
- Auburn City Council – a meeting was held at Auburn City Council 8 April 2011 to provide a status update on the ASP. No issues were raised by Council representatives at this meeting. Copies of the REF traffic assessment report were requested and later supplied by TCA.
- Janyon Pty Ltd – Discussions with Janyon Pty Ltd have been undertaken in relation to their concerns with the need for acquisition of their land. Details of their concerns and the result of the discussion are located in Sections 3.10.1 and 3.10.2.

2.4 Future consultation

Should the ASP be approved, ongoing consultation would be undertaken with community members, interested community groups, government agencies and other stakeholders during the detailed design, construction and commissioning phase of the ASP.

The following sections provide an overview of the consultation activities that would be undertaken during the pre-construction and construction phases of the ASP.

2.4.1 1800 number and email

The toll free 1800 project information line (1800 684 490), 24-hour construction response line (1800 775 465) and project email (mail@tca.nsw.gov.au) would be maintained as the continued key contact points for the project. These contact details would continue to be available for the community to contact TCA to discuss any questions or concerns regarding Stage One of the ASP.

Questions regarding Stage Two of the ASP would be forwarded to RailCorp for response.

2.4.2 Website

The project website (www.tca.nsw.gov.au) would be kept up to date with the latest ASP information on Stage One works. The website would provide an electronic copy of the REF, PAR, project and construction updates, and contact details for TCA to allow community members to raise their questions or concerns.

Should TCA deliver Stage Two, contact details for a 24-hour Construction Response Line (1800 775 465), Project Infoline (1800 684 490) and email address (mail@tca.nsw.gov.au) would be provided for ongoing stakeholder contact throughout the construction phase. Alternative details would be provided by those responsible for delivering Stage Two of the ASP.

2.4.3 Advertisements

Advertisements would be placed in local newspapers, including selected non-english speaking newspapers, advertising TCA's determination on whether to grant approval for the ASP.

Advertisements may continue to be used where appropriate to provide the community with information on any key construction or consultation activities.

2.4.4 Advice to submitters

A letter would be sent to individuals/organisations that sent a submission to TCA, advising them of the completion of the PAR, their submission number and the section of the PAR that responds to their submission.

2.4.5 Community newsletter – project update

A community newsletter would be sent to residents and business owners in the area surrounding the ASP advising them of TCA's determination as to whether to grant approval, and outlining the next steps.

Newsletter construction updates would then be distributed to provide information on key milestones throughout the delivery of the ASP.

Newsletters would also be sent to stakeholders on the project database.

2.4.6 Meetings

Meetings would be held with relevant government and non-government stakeholders, where required, to provide any updates on the ASP and outline the future steps. Ongoing consultation with other stakeholders and the community would occur during Stage One and Stage Two construction as required.

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3. Consideration of REF submissions

3.1 Overview

This chapter addresses the submissions made during the public display period of the REF. Submissions received during the preparation of the PAR are located in Chapter 5.

3.1.1 Number of submissions received

During the REF display period TCA received a total of 24 submissions. Eighteen were received from the community, one from a community group and five from Government departments, agencies and other stakeholders.

TCA's response to the issues raised in the submissions received during the public display period of the REF form the basis of this chapter.

3.1.2 Summary of issues raised

Table 3.1 provides a summary of the issues raised in submissions from community members and community groups.

Table 3.1 Summary of issues raised during public display of the REF

Issue	Number of submissions raising issue
Consultation	1
Project description	1
Noise and vibration	13
Traffic and transport	7
Hydrology, drainage and water quality	2
Biodiversity	1
Visual and urban design	2
Socio economic	3
Land use and property	2
Air quality	2
Demand on resources	1
Mitigation measures	1

Five Government agencies provided submissions during the public display period, these submissions raised the following issues:

- noise and vibration

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- traffic and transport
- hydrology, drainage and water quality
- non-Indigenous heritage
- hazards and risk
- *Protection of the Environment Operation Act 1997* licensing.

3.2 Consultation

Submissions

Submission 13

Issues raised

The submission concerned with consultation raised the following issue:

- Detailed consultation and negotiation with private landowners is required to provide detailed information about the nature and location of proposed works and RailCorp operations, how they will impact on private land, and how any impacts might be addressed and resolved.

TCA response

Detailed discussions with landowners (and occupiers) of land required for the ASP has been undertaken and would continue to be undertaken to discuss the potential impacts of the ASP on private land.

3.3 Project description

3.3.1 Security

Submissions

Submission 8

Issues raised

Submission concerned with security raised the following issues:

- Concerned about the security of the yard and the impacts it may have on the surrounding streets. This may include an increase in crime rate due to the attraction of stabling areas to graffiti vandals.
- Queried whether a proper security assessment been conducted.

TCA response

The design of the ASP has incorporated security measures such as security fences in accordance with RailCorp's security requirements. The ASP has the potential to improve security in the surrounding area given the increase in vehicular and pedestrian movements to, from and around the site, which would improve the passive surveillance of the surrounding area. The ASP would also include the installation of CCTV and an increase in lighting which would further increase

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surveillance within the immediate area of the ASP. Appropriate security measures would continue to be refined and considered during the detailed design phase in consultation with RailCorp.

3.4 Noise and vibration

3.4.1 Construction noise

Submissions

Submissions 3, 9 and 16

Issues raised

Submissions concerned with construction noise raised the following issues:

- Concern regarding the construction noise associated with the ASP and what strategies are proposed in minimise construction noise.
- Suggest that delivery of materials or equipment, or operation of noisy equipment should not be before 8am or after 5pm Monday to Friday or before 8am or after 12pm Saturday, or anytime on Sundays or public holidays.

TCA response

Noise modelling undertaken as part of the noise assessment for the REF has indicated that there would be mild to moderate exceedances of noise management levels during the construction phase. However these exceedances would only be encountered during the worse-case construction scenario, be relatively short term in nature and occur during standard work hours.

The REF included a set of mitigation measures which would be implemented during construction to minimise the impacts of construction noise on the surrounding area. These measures have been revised to reflect the staging of the ASP and are outlined in Chapter 7. A Construction Noise and Vibration Management Plan would be developed as per mitigation measure B.2.

The majority of the ASP would be constructed during standard works hours (with the exception of works at the Clyde and Auburn Junctions) to minimise the impacts of construction noise. Standard working hours are:

- Monday to Friday – 7am to 6pm
- Saturday – 8am to 1pm.

Any work outside these hours would be undertaken in accordance with TCA's *Construction Noise Policy* and any Environmental Protection Licence issued by the Office of Environment and Heritage. The community would be advised prior to any work commencing outside of standard work hours and every effort would be made to minimise noise.

The delivery of materials or equipment would be undertaken during standard work hours where possible. Deliveries would also be limited during school start and finish times where possible.

An *Addendum Noise and Vibration Assessment – Stage One* has been undertaken to assess the impacts of Stage One construction of the ASP (refer Section 4.3.2).

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3.4.2 General operational noise

Submissions

Submissions 3, 12, 16, 18, 19 and 20

Issues raised

Submissions concerned with general operational noise raised the following issues:

- The operation of the ASP would result in increased noise for nearby residents due to an increase in the number of trains and cars accessing the site in addition to the already increasing numbers which access the AMC and MainTrain sites. This increase in train and car movements would result in sleep disturbance issues particularly in noise catchment area (NCA) 1 (as defined in the REF) if noise mitigation is not provided. Concerns raised regarding the long term health impacts of daily sleep disturbance.
- Confirmation sought of what noise mitigation measures are to be adopted and what the updated noise levels would be.
- TCA should implement an ongoing noise monitoring program covering the area surrounding the site. Reporting to a community forum should be included with the data of noise monitoring and its compliance with site and project conditions should be presented.

TCA response

Noise modelling undertaken for operation of the ASP indicates that noise exceedances are expected. These exceedances would be reduced with the implementation of mitigation measures such as removing the need to test the country horn (confirmed by RailCorp that testing of the country horn is not required), construction of a noise mitigation barrier and testing of the town horn on the Main Line at the alternative location identified in the REF (confirmed by RailCorp as a suitable testing location).

The noise modelling undertaken for the REF identified that a number of dwellings would experience exceedances of sleep disturbance criteria particularly along Sheffield Street. Noise mitigation proposed (testing of only the town horns and testing of the town horns on the Main Line for Auburn bound trains at the alternate location identified in the REF) would reduce these impacts and the degree of the exceedances to an acceptable level.

Post-operation noise monitoring at representative locations would be undertaken to confirm the predicted noise source levels. If it is identified during the monitoring that the relevant noise criteria is exceeded, further noise modelling would be undertaken to investigate the potential for any further management measures.

Traffic noise would potentially impact on properties in Manchester Road. Traffic noise impacts are only considered to be of marginal impact to the upper floor of two storey residences along Sheffield Street. Impacts to properties along Manchester Road are considered negligible.

An *Addendum Noise and Vibration Assessment – Stage One* has been undertaken to assess the impacts of the Stage One operations of the ASP (details provided in Section 4.3.2).

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3.4.3 Noise mitigation barrier

Submissions

Submissions 1, 2, 7 and 22

Issues raised

Submissions concerned with the noise mitigation barrier raised the following issues:

- Concerned that the proposed noise mitigation barrier may reflect and project an increased noise level (beyond ambient noise) onto properties in the surrounding area and recommended that the noise mitigation barrier be noise absorbing and not noise reflecting.
- Recommended including a noise mitigation barrier along the Private Road and the ASP car park and also to extend the proposed noise mitigation barrier to the proposed overbridge.
- Identified that noise levels at Clarence Street in Lidcombe are already a problem and questioned why a noise wall has not been considered along Railway Parade and Samuel Street Lidcombe.

TCA response

The noise mitigation barrier location and length has been determined as an outcome of noise modelling undertaken as part of the Noise and Vibration Assessment prepared for the REF.

The noise assessment undertaken as part of the REF considered reflected noise. While the noise mitigation barrier proposed is not designed as an absorptive noise mitigation barrier, it is not considered to reflect noise towards residences. The noise assessment concluded that with the proposed noise mitigation barrier, noise levels are considered to be acceptable.

The assessment during the REF identified that the extension of the noise mitigation barrier along the southern boundary to the proposed MainTrain overbridge would not provide any substantial reduction in noise levels and was therefore not considered economically viable due to the low benefits it would provide. A natural barrier exists on the site as the existing MainTrain and proposed Stage Two tracks are in a cutting. The modelled noise mitigation barrier was shown to be sufficient in reducing noise impacts to the surrounding area to an acceptable level in conjunction with other recommended mitigation measures (such as the use of the alternative horn testing location identified in the Section 7.1.3 of the REF).

Noise monitoring would be undertaken during operation of the ASP to confirm predicted noise impacts. If relevant noise criteria impacts are identified a review of mitigation measures would be undertaken to reduce impacts to an acceptable level.

Existing noise issues along Clarence Street, Lidcombe are beyond the scope of the ASP. However the noise assessment undertaken as part of the REF considered impacts of horn testing at the alternate testing location (as described in Section 7.1.3 of the REF). Horn testing at this alternate location has been confirmed as suitable by RailCorp and now forms part of the ASP.

Noise modelling confirmed the viability of this location (see Section 7.1.3 of the REF). The noise levels are considered generally acceptable, especially in the context of the existing noise environment which comprises a major suburban railway and also traffic noise for receivers to the east. The impact of the predicted noise levels from horn testing at this location would be low considering the relatively high background noise levels (this is discussed further in Section 3.4.4).

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3.4.4 Horn noise

Submissions

Submissions 2 and 6

Issues raised

Submissions concerned with horn noise raised the following issues:

- Query whether it is possible to relocate the horn testing facility to a less densely populated area.
- Concerned about the sounding of horns at the alternate location proposed in the REF (Livingstone Road, Lidcombe).
- Concerned about the movement of trains and the sounding of horns within the ASP during operations, particularly during early morning operations. Identifies that the stabling facility at Gosford has had these problems.

TCA response

Existing RailCorp operating procedures require the testing of the town and country horns prior to departure and the leading (forward-facing) town horn to be sounded to signify movement of the trains within the stabling area. RailCorp has advised that for the ASP the testing of the country horn is not required, however the testing of the town horn is still required to occur in the vicinity of the ASP. The sounding of town horns for Clyde bound trains would occur within the ASP during Stage One and Two, while RailCorp has confirmed that the alternative testing location on the Main Line, as identified in the REF, would be used for the testing of town horns for Auburn bound trains during Stage Two.

Noise modelling confirmed the viability of this location (see Section 7.1.3 of the REF). For the best case scenario, up to 20 receivers were predicted to exceed the ECRTN sleep disturbance lower goal of 60 dBA (derived from 50 dBA internally), with no exceedances of the upper goal of 65 dBA predicted. The number of receivers exceeding the ECRTN sleep disturbance lower goal of 60 dBA increases to 62 under the worst case scenario. Of these only 3 receivers were predicted to exceed the ECRTN sleep disturbance upper goal of 65 dBA, although exceedances are not by more than 1 dB.

Noise levels of this magnitude are considered generally acceptable, especially in the context of the existing noise environment which comprises a major suburban railway and also traffic noise for receivers to the east. The impact of the predicted noise levels from horn testing at this location would be low considering the relatively high background noise levels, whereby existing L_{Amax} noise levels are regularly in excess of 70 dBA and even 80 dBA.

The sounding of the horn to signify movement within the stabling area would be required, however this would be undertaken using a yard horn (which produces lower levels of noise than the town horn) or short toot of the town horn to minimise the impacts.

While noise modelling indicates that some exceedances are expected during operation of the ASP, these would be minimised where possible through the implementation of mitigation measures (such as the alternate testing location, removal of the need to sound the country horn and the construction of the noise mitigation barrier along the southern edge of the site).

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Operational noise would be managed through the implementation of an Operational Noise and Vibration Management Plan as outlined in mitigation measures O.4.

Noise monitoring would be undertaken during operation to determine if further mitigation is required.

3.4.5 Vibration

Submissions

Submission 13 and 16

Issues raised

Submissions concerned with vibration raised the following issues:

- Concern raised regarding vibration impacts on existing and future owners and tenants of private land located to the south of the ASP. There are a number of industrial uses which cannot be subjected to vibration levels which would result from the operation of the ASP. Such vibration impacts are likely to limit the development potential of private land.
- At the completion of the project, any damage or deterioration in the external condition of the adjacent residences shall be made good by the TCA or appropriate compensation should be paid.

TCA response

As identified in the REF (see Sections 7.1.2 and 7.1.3) vibration levels during construction are expected to be below the structural damage and human criteria for the nearest residential dwellings, while levels would also be below the maximum commercial and industrial continuous vibration criteria. Future neighbouring uses are unknown at this time. Due to the levels of vibration being so low mitigation is not considered to be required.

Construction and operation vibration impacts during Stage One are outlined in Section 4.3.

3.5 Traffic and transport

3.5.1 Construction traffic

Submissions

Submission 3

Issues raised

The submission concerned with construction traffic raised the following issue:

- The ASP would result in increased traffic in the surrounding area.

TCA response

The REF noted that an additional 244 vehicle movements per day (including 54 heavy vehicle movements) would be generated during construction of the ASP. Modelling undertaken during the traffic assessment indicates that this increase would result in some impacts to the network, however, these impacts are minor and can be managed through the implementation of a

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Construction Traffic Management Plan. Construction staff would be required to park in a designated parking area (to be selected by the contractor) .This location would potentially be in the area of the proposed ASP car park.

As a result of further construction planning, the overall forecast number of trucks movements required for the construction of the ASP has been revised down from an estimated 22,400 to 11,270. This number has been reduced mainly due to the need for less fill. Heavy vehicle movements during construction of Stage One would account for a large percentage of the 11,270 movements due to the remediation and earthworks occurring during this stage. As discussed in Section 7.3.2 of the REF, the impacts on the surrounding road network of the 22,400 heavy vehicle movements were considered not to have a significant impact. As this number has been revised down to an estimated 11,270 movements and these movements are split between two stages (with the majority in Stage One), the impacts on the surrounding road network are considered to be less than those assessed in the REF.

An outline of the revised traffic numbers for the ASP and the split between Stages One and Two of the ASP is provided in Section 4.3.4.

The Construction Traffic Management Plan would investigate opportunities for reducing the number of private vehicle trips (e.g. car pooling).

3.5.2 Operational traffic

Submissions

Submission 3

Issues raised

The submission concerned with operational traffic raised the following issue:

- The ASP would result in increased traffic in the surrounding area.

TCA response

The operation of the ASP would result in approximately 106 additional vehicle movements during the morning and evening peak. As outlined in Section 7.3.3 of the REF this increase is not considered to significantly impact upon the operation of the surrounding road network.

Operational traffic numbers for Stage One of the ASP would be less than this, given the reduced stabling of trains. Further discussion is provided in Section 4.3.4.

3.5.3 Heavy vehicles

Submissions

Submissions 11 and 16

Issues raised

Submissions concerned with heavy vehicles raised the following issues:

- Queried whether other heavy vehicles can be diverted given the increased truck numbers as a result of the ASP.

- The use of heavy vehicles for deliveries should minimise the disruption to surrounding residential areas and should make use of vacant railway land and the railway corridor.

TCA response

As discussed in Section 7.3.2 of the REF, construction of the ASP would result in an increase in heavy vehicle movements (22,400 movements during the entire construction period which is equivalent to approximately six movements per hour). As a result of further construction planning this number has been revised down to an estimated 11,270 truck movements during construction. A Construction Traffic Management Plan would be developed and include measures to minimise the impacts of construction traffic. All heavy vehicle movements would utilise the nominated heavy vehicle routes to minimise impacts on residential areas. Materials deliveries would be minimised during school start and finishing times. The majority of heavy vehicles would access the site via the Private Road, with movements around the site to then occur on railway land. Figure 6.7 in the REF identifies the nominated heavy vehicle haulage routes.

Further discussion on heavy vehicle numbers during construction of Stages One and Two is provided in Section 4.3.4.

Heavy vehicle movements during operation of the ASP are considered to be very low (approximately two per day) and would not impact significantly on the local road network.

The diversion of other heavy vehicles along Manchester Road is out of the control of TCA and RailCorp, given it is a council maintained road which provides access to a number of properties (located on Private Road).

3.5.4 Overbridge

Submissions

Submissions 4, 5, 9 and 10

Issues raised

Submissions concerned with the overbridge raised the following issues:

- Clarification sought on the location of the proposed overbridge relative to street addresses and house numbers of the homes that are situated on the opposite side of Manchester Road.
- Opposition raised to the positioning of the proposed overbridge in front of home and requesting that the overbridge be moved further along the road where there are no homes.
- The proposed overbridge will result in increased traffic and noise impacts to residences positioned across from the overbridge, particularly during the night.
- The proposed overbridge would result in visual impacts and impacts on views.
- Cars will park outside house due to new overbridge (see response for parking in Section 3.5.5).

TCA response

Currently vehicles and pedestrians access the MainTrain site via a signalised level crossing. The overbridge is needed to improve safety for pedestrians, vehicles and staff accessing the MainTrain site by separating them from train movements accessing the ASP site.

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House numbers 30, 32, 34, 36 and 38-40 Manchester Road are located opposite the proposed overbridge.

The proposed location of the overbridge has been selected based on an existing cutting so that it does not dominate the visual landscape and provides the required clearances to the rail line. Moving the overbridge away from the cutting would make it more visible in the landscape due to the heights required to clear the railway tracks. Landscaping and tree planting options would be investigated during detailed design to minimise the visual impacts on neighbouring properties. Visual impacts are discussed in Section 7.8 of the REF and would be minimised through the implementation of mitigation measures I.1 to I.5 and T.1 to T.3 outlined in Section 7.2.

The southern side of Manchester/Private Road is lined with residential dwellings for its entire length with the exception of the vacant land located at the corner of Private Road and Chisholm Road. Positioning of the overbridge in this location would not align with the design and would require a large amount of acquisition of privately owned land.

The existing car park would continue to provide parking to MainTrain workers and the existing entrance to this car park would be retained. The proposed overbridge only replaces the existing level crossing and therefore movements across the bridge would be limited to delivery vehicles and some light vehicles. Staff would access the ASP site via a new access from the Private Road and would not utilise the new overbridge.

Traffic and noise impacts as a result of the new overbridge are considered to be minor as the new overbridge would only provide access to the MainTrain site. The new overbridge would not increase the number of vehicles accessing the site, rather it would alter the location of the access. Based on existing access to the MainTrain site approximately 106 vehicle movements (both heavy and light vehicles) are expected to use the new access to the proposed overbridge during the day period (6am to 6pm) and 14 movements during the night time period (6pm to 6am) (only light vehicles). These vehicle numbers are not considered to be high and are currently using Manchester Road to access MainTrain via the existing level crossing. As the majority of movements would occur during the day impacts, with no heavy vehicles accessing the site at night, impacts upon residents located near the new entrance are not considered significant.

Lighting in the vicinity of the new overbridge would be in accordance with the requirements of *AS 1158 Road Lighting, AS 4282 Control of the Obtrusive Effects of Outdoor Lighting* to minimise light spill impacts on neighbouring properties.

3.5.5 Parking

Submissions

Submissions 9, 11 and 16

Issues raised

The submissions concerned with parking raised the following issues:

- Parking along Manchester Road is at a premium especially as many properties do not have off street parking. Request the following measures be undertaken to ensure parking is available:
  - new parking spaces be created in lieu of any lost spaces on the street
  - parking all contractor and subcontractor vehicles on the ASP site

– impose residents and visitors only permit parking zone in all surrounding streets in consultation with Auburn City Council.

- Cars will park outside houses due to new overbridge.

TCA response

During construction, impacts on parking along Manchester Road are not expected as workers would park in a designated construction parking area on the ASP site as detailed in the Construction Traffic Management Plan (to be determined by the contractor).

During construction of the overbridge the MainTrain car park would operate at a reduced capacity due to the construction footprint required. This reduction in capacity is not considered to be an issue as the car park is rarely at capacity. If this reduction in capacity results in on-street parking by MainTrain workers, an alternative location would be investigated to remove any impact on on-street parking. A mitigation measure has been included to address this issue.

During operation, the ASP car park would provide the required capacity to minimise the occurrence of on-street parking, while there would be no net loss in parking within the MainTrain car park which would minimise the occurrence of on-street parking along Manchester Road.

The construction of the new overbridge and associated access would result in the loss of two or three on-street parking spaces along Manchester Road, which is considered minimal.

Operation of the overbridge is not considered likely to result in any on-street parking as those using the overbridge are provided with parking within the MainTrain site or are only accessing the road for deliveries.

Changing parking zones on Manchester Road to 'resident only" parking is a matter for Auburn City Council. TCA has contacted council and has forwarded this request for their consideration.

3.5.6 Impacts on existing roads

Submissions

Submission 16

Issues raised

The submission concerned with impacts on existing roads raised the following issue:

- The condition of adjacent road surfaces should be assessed prior to commencement of the project and any damage repaired by TCA. Road surfaces should be monitored for a further 12 months to consider rainwater damage.

TCA response

Road surfaces would be surveyed prior to works commencing and once again post construction. If it is deemed that works have resulted in damage, TCA/contractor would repair the roads to their pre-existing condition. Mitigation measure D.4 has been included to address this issue.

Post construction, the condition of the road network is the responsibility of Auburn City Council as the owner of the roads and would be subject to council's normal road maintenance regime. RailCorp is the owner of the Private Road and would be responsible for repairing damage to this road.

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3.5.7 Safety

Submissions

Submission 11

Issues raised

The submission concerned with road safety raised the following issue:

- Manchester Road is frequently used by negligent drivers (i.e. speeding and reckless driving). Safety of people needs to be considered along with traffic calming and signals.

TCA response

The safe use of Manchester Road to prevent negligent driving and the installation of traffic calming is not part of the scope of the ASP and would be a council and/or police matter. All staff of the ASP would be required to adhere to road rules.

As detailed in Section 6.2.12 of the REF, CCTV, lighting and security fencing are proposed for the ASP. While the security measures would focus on the ASP and not provide active surveillance of the surrounding area, the security measures would improve the passive surveillance of the surrounding area.

The installation of traffic calming devices and signals is a matter for Auburn City Council. The council has been contacted and this request has been forwarded for their consideration.

3.6 Hydrology, drainage and water quality

3.6.1 Drainage design

Submissions

Submissions 22

Issues raised

The submission concerned with drainage design raised the following issues:

- The following aspects should be considered in the design of the drainage and water systems for the ASP:
  - car park should be constructed of porous pavement and drain to retention basin to negate impacts on Duck River
  - wet detention basins should be built utilising local wetland vegetation for water polishing, resulting in increased habitat value on site
  - buildings with toilet plumbing or outside irrigation should use rainwater tanks
  - detention basins should be made into construction wetlands (similar to Sydney Olympic Park).

TCA response

As discussed in Section 7.4.3 of the REF, the drainage system for the ASP has been designed in accordance with Auburn City Council's detention, drainage and flooding requirements and the

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requirements recommended by the RAP. The treatment level of stormwater discharged from the site to Duck River would be in accordance with the targets identified in Landcom's *Water Sensitive Urban Design Strategy* (2009).

The ASP car park is to be connected into the trunk drainage system which was constructed as part of the AMC. This would assist in minimising impacts on Duck River as the trunk drainage system includes detention storage beneath the AMC car park. This storage would allow for periodic release of stormwater into Duck River and therefore minimise the impacts on the river.

Investigations into the materials used in the construction of the ASP car park would be undertaken during detailed design to minimise the amount of stormwater ending up in Duck River.

Two dry detention basins are proposed as part of the ASP. These would be designed to incorporate bio-filtration elements to improve the quality of run off from the site. The basins would be covered with topsoil and drought resistant prostrate grass species planted.

Other water sensitive urban design elements would be incorporated into the design of the dry detention basins during detailed design.

The use of rainwater tanks to supply water to toilets and for landscaping is to be provided as part of TCA's Sustainability Guidelines.

The majority of drainage works required would be constructed during Stage One. A description of the works which form part of Stage One can be found in Section 4.1.2 (under the heading of drainage works).

3.7 Biodiversity

Submissions

Submission 22

Issues raised

The submission concerned with biodiversity raised the following issues:

- Landscaping should utilise species local to the area and tall trees should be used where possible.
- Plan does not identify all possible biodiversity improvements that can be made in this area.

TCA response

As noted in mitigation measure H.6, all vegetation to be planted on site would generally consist of local native species and would be mature vegetation where feasible. Vegetation to be planted is to provide screening where possible. Planting would comply with RailCorp's policy on planting within the rail corridor.

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3.8 Visual and urban design

3.8.1 Visual and noise

Submissions

Submission 2

Issues raised

The submission concerned with visual and noise impacts raised the following issue:

- Large trees should be planted along the northern side of Manchester Road in order to provide noise shielding and visual screening of trains.

TCA response

The planting of trees along the northern side of the majority of Manchester Road is not proposed as this land is privately owned.

The ASP includes the construction of a noise mitigation barrier as part of Stage One along the southern boundary of the site. The wall would provide noise shielding and some visual screening to neighbouring land uses of the operations within the stabling area. The noise mitigation barrier would be designed to minimise the impacts on the visual environment.

Visual impacts of the ASP are discussed in Section 7.8 of the REF. These impacts would be minimised through the preparation of an Urban Design and Landscape Plan (refer mitigation measure I.1 in Section 7.2).

3.8.2 Lighting

Submissions

Submission 22

Issues raised

The submission concerned with lighting raised the following issue:

- There should be no light spill on Duck Creek. Landscaping should be maximised to block light pollution.

TCA response

Lighting for the ASP car park and roads would satisfy relevant Australian Standards, while lighting within the stabling yard would be designed in accordance with RailCorp Standards. The provision of lights within the ASP would result in an increase in safety due to the potential conflicts between trains, vehicles and workers during the night time when the facility experiences its peak use.

Detailed design of lighting on the ASP site would minimise the light spill impacts to surrounding residents and Duck River. Due to the distance to Duck River and the presence of existing RailCorp buildings between the ASP and Duck River, light spill impacts are not considered to be significant.

3.9 Socio-economic

3.9.1 Property values

Submissions

Submissions 9, 12, 19

Issues raised

Submissions concerned with property values raised the following issue:

- The presence of the ASP would result in a reduction in property values in the area surrounding the site and also result in an increase in insurance costs.

TCA response

It is difficult to predict the impacts on property value or insurance costs for an individual property as a result of the ASP. As the site has been used for railway purposes for more than 80 years, the ASP is consistent with the existing land use and operations on the site rather than the introduction of a new activity in the area. As a result, the ASP is expected to have little or no impact on property values.

3.10 Land use and property

3.10.1 Property acquisition

Submissions

Submissions 13 and 14

Issues raised

Submissions concerned with property acquisition raised the following issues:

- A private landowner has highlighted that no discussions have occurred regarding the proposed acquisition of their land and therefore have stated that they are not a position to comment on all implications of the ASP.
- The following issues have been raised relating to the proposed acquisition of private land:
  - Property boundary resulting from acquisition is very uneven. Any adjustment to the boundary should be in the shape of a gentle curve as is currently the case.
  - Acquisition would impact upon land which is currently subject to a development application. The area impacted is for landscaping and the loss of such area due to acquisition would potentially affect on the determination of the application due to Council's guidelines relating to the size of landscaped areas.
  - The land located along the northern edge of the private land is very narrow in width. Redesign is required to remove this impact.
  - Request that acquisition of the triangle piece of land on the eastern boundary be replaced with a similar sized piece of land on the western boundary which would provide access between the lot and Manchester Road to the west.

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TCA response

TCA commenced consultation with neighbouring landowners in November 2010 to discuss the impacts of required property acquisition.

The uneven boundary line along the southern edge of the ASP has been addressed as part of Stage One and full scope design, with the proposed boundary line smoothed out in consultation with the landowner.

TCA has also confirmed that land acquisition along the northern edge of the BlueScope site is required for the ASP. TCA has also held discussions with the adjacent landowner regarding the replacement of acquired land along the eastern boundary of the site with RailCorp land. The replacement of land would be required to occur from RailCorp land. Discussions between TCA, RailCorp and the landowner are ongoing.

TCA acknowledges the neighbouring tenant currently has a development application under consideration by Auburn City Council, however acquisition of the land along the northern edge of the Bluescope site is required. TCA would continue to work with the landowner, tenant and Auburn City Council to address, where possible, the impacts of the ASP land acquisition on the landscaping requirements of Council.

3.10.2 Development potential

Submissions

Submission 13

Issues raised

The submission concerned with development potential raised the following issue:

- Private landowner concerned about the impacts on the development potential of the land to the south of the ASP, particularly by:
  - increased noise levels
  - visual impacts as a result of proposed noise mitigation barrier
  - positioning of excavation and retaining walls. Details of these works are required in order to provide comment on the potential impacts to the development potential of the land.

TCA response

The REF and the associated specialist studies, have addressed the noise, visual and land use impacts of the ASP on the existing uses located on this neighbouring land and concluded there would be minimal impacts on these uses. An assessment of the impacts on any future development is unable to be undertaken as part of the REF and therefore impacts on the neighbouring land are considered to be appropriately addressed.

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3.11 Air quality

3.11.1 General

Submissions

Submission 22

Issues raised

The submission concerned with air quality raised the following issue:

- Landscaping should be maximised to block particulates from increased road traffic.

TCA response

As discussed in the REF, air quality impacts are considered to be minimal during both construction and operation (refer Section 7.11.3 of the REF) with the implementation of the mitigation measures identified in the REF. Therefore landscaping is not considered necessary to assist in reducing air quality impacts resulting from increased road traffic.

3.11.2 Air quality monitoring

Submissions

Submission 16

Issues raised

The submission concerned with air quality monitoring raised the following issues:

- TCA should implement ongoing dust monitoring covering the area of adjacent residences.
- Project should include reporting to a community forum with data of dust surveys and compliance with site and project conditions.

TCA response

Air quality monitoring would be undertaken during the construction period in line with the Air Quality Management Plan and the RAP. Where visible levels of dust are high, on site activities are to be reviewed, with additional control measures and/or varied site operations to be implemented as soon as possible. Air quality monitoring is not required during operation as dust levels would be low, as detailed in Section 7.11.3 of the REF.

Consultation activities during construction would provide the community and stakeholders with a high level of awareness of the processes and activities associated with the ASP.

3.12 Demand on resources

3.12.1 Sustainability in design

Submissions

Submission 22

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Issues raised

The submission concerned with sustainability in design raised the following issues:

- Satisfied with sustainability section of REF, however also suggested that the following should be incorporated into the design:
  - low energy use lighting systems
  - buildings to be built to 6 star NABERS rating
  - airspace to be utilised for photovoltaic energy production
  - use of motion sensors to minimise light spill, pollution and the carbon footprint
  - high vegetation to reduce light spill
  - low wattage lights to be used where possible.
- A full list of sustainability targets should be developed and agreed before construction. Cutting edge energy and water designs should be utilised.

TCA response

The lighting system would be designed in line with the relevant Australian Standards and RailCorp's standards for lighting. The system would take into account sustainability where possible, during the detailed design stage of the ASP.

Section 6.6 of the REF discussed the sustainability design initiatives addressed during the preliminary concept design. Further sustainability initiatives would be explored during future design stages, these include:

- optimising workspace lighting in the stabling yard
- further detailed analysis to explore the full range of low carbon and renewable energy technologies available on the market, their ease of integration into the ASP, their land use implications and visual integration, as well as capital costs, operational costs and energy generation rates
- update of the carbon footprint assessment as more detailed material mass/volume information becomes available and use of the outcomes of the assessment to inform material selection and specification in the design
- development of a materials procurement strategy
- assessment of indoor environmental quality of the primary staff facilities building in accordance with the building and construction industry Green Star - Office Design v3 and Green Star - Office As Built Technical Manuals
- development of Waste Management Plans for construction and operation, linked to procurement and materials strategy
- provision of cyclist facilities on site (i.e. bike racks, showers etc) to encourage staff to cycle to work
- further coordination of sustainability initiatives with regard to construction management strategies.

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3.13 Mitigation measures

Submissions

Submission 16

Issues raised

The submission concerned with mitigation measure raised the following issue:

- Project work should cease and neighbours should be advised when project consent conditions are exceeded and until procedures are implemented that ensure compliance with site consent conditions.

TCA response

The construction of the ASP would be undertaken in accordance with TCA's management system, which includes an environmental management system (EMS). The EMS would provide the framework for implementing the environmental management measures documented in the REF and any conditions of approval, licenses and permits. This would include non conformance management (including the identification and implementation of preventative and corrective actions in response to any non-compliances) and community consultation in the event of environmental incidents or non conformance.

3.14 Government agencies

3.14.1 Overview

A total of five submissions were received from government agencies during the public display period of the REF. The following agencies provided responses (submission number in brackets):

- Department of Environment, Climate Change and Water (now Office of Environment and Heritage) (submission 15)
- Heritage Council of NSW (now Office of Environment and Heritage) (submission 17)
- Transport NSW (now Department of Transport) (submission 21)
- NSW Roads and Traffic Authority (submission 23)
- NSW Fire and Rescue (submission 24).

3.14.2 Noise and vibration

Horn noise

Submissions

Submission 15

Issue

The submission concerned with horn noise raised the following issue:

- Acknowledges that with mitigation proposed the ASP would not result in any significant noise impacts to nearby residential receivers. However, discussions with RailCorp regarding removal

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of country and trailing horns indicate that they are unlikely to be implemented due to safety concerns. Mitigation proposed would not comply with the condition of the existing Environmental Protection Licence ((EPL)) or adequately meet the needs of the local community.

Response

Existing RailCorp operating procedures require the testing of the town and country horns prior to departure and the leading (forward-facing) town horn to be sounded to signify movement of the trains within the stabling area. RailCorp has advised that the testing of the country horn is not required within the ASP, however the sounding of the town horn is still required to occur in the vicinity of the ASP. The sounding of town horns for Clyde bound trains would occur within the ASP, while RailCorp has confirmed an alternative testing location on the Main Line, as identified in Section 7.1.3 of the REF, would be used for the testing of town horns for Auburn bound trains. The noise and vibration assessment undertaken during the REF, concluded that with the mitigation measures (e.g. the alternate horn testing located and testing of only the lead town horns) in place, noise levels were considered to be acceptable.

3.14.3 Traffic and transport

Construction traffic

Submissions

Submission 21

Issues raised

The submission concerned with traffic and transport raised the following issue:

- The Construction Traffic Management Plan should include options to minimise car based trips by construction workers given accessibility of the site to public transport.

TCA response

The Construction Traffic Management Plan would include a measure that alternate methods would be investigated to minimise the use of private vehicles (e.g. car pooling).

Operational traffic

Submissions

Submission 21

Issues raised

The submission concerned with operational traffic raised the following issue:

- Address potential for a location-specific sustainable travel plan (e.g. Workplace Travel Plan for workers and/or Travel Access Guides for future visitors to site). Programs should be developed to encourage staff to commute to site by public transport or cycling.

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TCA response

The use of public transport or bicycles by workers during operation would be investigated, with the potential for programs to be implemented through an Operational Traffic Management Plan. Such investigations form part of sustainability commitment of TCA for the ASP. Section 6.6 of the REF lists the sustainability initiatives considered for the ASP.

Bicycle parking

Submissions

Submission 21

Issues raised

The submission concerned with bicycle parking raised the following issue:

- Requests further detail regarding bicycle parking within the site (number of provided spaces, location, and compliance of the bicycle parking with Crime Prevention Through Environmental Design (CPTED) principles).

TCA response

The provision of bicycle parking for staff having regard to TCA's Sustainability Design Guideline (TCA 2009) would be confirmed during Stage One detailed design.

Emergency access

Submissions

Submission 24

Issues raised

The submission concerned with emergency access raised the following issue:

- Recommend that the project provide adequate access for emergency service vehicles, including the access road and bridge off Manchester Road.

TCA response

Access to and from and within the ASP site (via the new access road off the Private Road only) and the access to the MainTrain facility (via the proposed overbridge, as part of Stage Two) would be designed having regard to emergency service vehicles access requirements. An Emergency Response Plan would be developed for the ASP (mitigation measure Q.3).

3.14.4 Hydrology, drainage and water quality

Groundwater

Submissions

Submission 15

Issues raised

The submission concerned with groundwater raised the following issue:

- The REF does not adequately explore the impacts of remediation works on the mobilisation of existing contaminants into groundwater, or the need for groundwater monitoring at the site during and post construction. Consider that groundwater monitoring at the site boundary during and post construction is necessary to ensure that no contaminants migrate off site particularly to the Duck River.

TCA response

Groundwater contamination was not identified in contamination investigations undertaken as part of the RAP, with levels of contaminants found in the groundwater considered to be representative of groundwater contamination found across Sydney. Contaminants on site were found to not be migrating into the groundwater and therefore are not considered to be an issue.

Discussions with DECCW (now Office of Environment and Heritage) during the preparation of the PAR in relation to groundwater monitoring concluded after a review of further information that groundwater monitoring during and after construction would not be required.

3.14.5 Non-Indigenous Heritage

Submissions

Submission 17

Issues raised

The submission concerned with non-Indigenous heritage raised the following issue:

- The proposed mitigation measures are considered appropriate however if substantial subsurface elements are uncovered the Heritage Branch of the Office of Environment and Heritage must be notified. The first mitigation measure in Section 7.5.4 of the REF should be amended as follows:

  > *"If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are deemed to have heritage significance the advice of the Heritage Branch would be sought regarding appropriate management of the items. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery."*

  Documentation states that the *Heritage Impact Statement, Lidcombe to Granville Corridor Upgrade for RailCorp NSW, Weir Phillips October 2009* proposes demolition of the Auburn Signal Box. This item is listed on the State Heritage Register (Item No. 01023) and under the provisions of the *NSW Heritage Act 1977* it cannot be demolished without approval. Records show that no approval has been sought for works to this item and the Heritage Branch has not provided comment on any proposal for this item.

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TCA response

The Heritage Branch of the Office of Environment and Heritage would be contacted if any substantial subsurface elements are uncovered.

Mitigation measure F.1 in the REF has been amended at the request of the Heritage Branch of the Office of Environment and Heritage. See Section 7.1 for the amended mitigation measure.

The ASP would not result in any impacts to the Auburn Signal Box. Further environmental impact assessment in relation to impact on the Auburn Signal Box would be undertaken as part of the LGCUP.

3.14.6 Hazards and risk

Operation

Submissions

Submission 24

Issues raised

The submission concerned with operational hazards and risks raised the following issue:

- The following issues were raised by Fire and Rescue NSW in relation to the fire hydrant system for the ASP:
  - That building works should comply with the Building Code of Australia and relevant Australian Standards.
  - A non compliance to Clause 3.3 of AS 2419.1-2005 relating to hose coverage to all areas of the yard was previously identified. A final drawing indicating any hose coverage shortfalls for the project should be provided for a determination relating to the non compliance.
  - Recommends fire hydrants are provided at the north and south ends of each walkway servicing the 16 stabling lines, to provide hose coverage along the side of the trains in the stabling facility. The positioning of these hydrants is to be at least 10 metres from the ends of Line 1 and 16 or be constructed with a fire resistance level which is compliant with AS 2419.1 - 2005.
  - Fire and Rescue NSW would like the opportunity to comment on the fire hydrant system once a design is provided to them.
  - The minimum fire hydrant outlet flow rates and pressures at the project are required to meet AS 2419.1 – 2005.

TCA response

All building designs would comply with relevant Building Code of Australia and Australian Standards. The design would incorporate the recommendations provided in the submission, with the final design of the fire hydrant system to be provided to Fire and Rescue NSW for comment on the compliance of the system. A new mitigation measure would ensure that the above is undertaken during detailed design. This measure has been included in Section 7.2.1 (refer mitigation measure L.7).

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3.14.7 Protection of the Environment Operation Act 1997 licensing

Construction

Submissions

Submission 15

Issues raised

The submission concerned with *Protection of the Environment Operations Act 1997* licensing during construction raised the following issue:

- Contractors delivering the ASP will be responsible for obtaining an Environment Protection Licence (EPL) for the construction of the ASP and meeting its conditions.

TCA response

Noted. TCA confirms that an EPL is required.

Operation

Submissions

Submission 15

Issues raised

The submission concerned with *Protection of the Environment Operations Act 1997* licensing during operation raised the following issue:

- The ASP comprises 'Rail Infrastructure Facilities' as defined in Condition A2.2 of RailCorp's EPL No. 12208, and is therefore subject to the conditions of that licence

TCA response

Noted.

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4. Description and assessment of alterations to the project

This section describes the changes to the ASP as described in the REF, which have occurred as a result of further design refinement. Section 4.1.1 outlines the design changes which have been made to the ASP. The ASP is also now proposed to be undertaken in two stages to meet funding availability and network demand requirements. Details of the works to be undertaken in each stage are outlined in Section 4.1.2. An assessment of the impacts resulting from design changes is located in Section 4.2. An assessment of the impacts resulting from the staging of the ASP is located in Section 4.3.

4.1 Description of alterations of the project and staging

4.1.1 Description of alterations of the project

The following sections and Figure 4.1 to Figure 4.3 outline the proposed design changes that have occurred since the display of the REF.

Clyde Junction and access

Dual tracks were proposed in the Clyde Neck as part of the REF ASP design. The design has been revised to move the turn out towards the stabling area. This arrangement would result in a single track along the Clyde Neck resulting in only one track at the existing level crossing that provides access to the AMC. This also results in some adjustments to the track alignment within the Clyde Neck. As outlined in Section 1.1.2, part of the works required for the ASP along the Clyde Neck and at the Clyde Junction would be constructed as part of the LGCUP.

Noise mitigation barrier

It was proposed to construct the noise mitigation barrier in stages to meet the noise mitigation requirements for each stage of the ASP. However, as a result of feedback and submissions received from the community during the development of the PAR, both stages of the noise mitigation barrier would be constructed as part of Stage One works. The construction of the full noise mitigation barrier during Stage One has noise mitigation benefits for both stages of the ASP.

The noise mitigation barrier would be moved away from the track to follow the retaining wall and property boundary as shown in Figure 4.2.

A modification of the noise mitigation measure would need to be made to a section of the noise barrier during Stage Two of the ASP to integrate it with the new track and retaining wall.

Public address system

A public address (PA) system has been added to the design provide coverage to the following areas of the ASP:

- staff facilities building
- secondary amenities building
- stabling area
- area around the combined signalling equipment room and compressor building.

The system would have a maximum sound power level of 85 dBA and would be used in security/emergency situations only.

33kV and 11kv transmission line

A transmission line is proposed to bring the power supply onto the site from an aerial feeder which is located outside the stabling yard. The transmission line would be located underground along the access road into the stabling area.

Sectioning hut

The sectioning hut identified in the REF is no longer required and has been removed from the design.

Signalling hut, signalling room and compressor room

The signalling room and compressor room are to be relocated from the position identified in the REF (on the eastern side of the car turning loop) to the eastern boundary of the AMC car park. The signalling hut would also be relocated to this location with the three combined into a single signal equipment room and compressor room building.

Cable route

Existing cables along the Auburn Neck would be relocated and situated behind the proposed retaining wall, within the RailCorp property leased by Manildra.

Elevated walkway

The elevated walkway identified in the REF between tracks eight and nine has been removed from the design. In place of this full length walkway, seven metre long driver access platforms are to be installed to provide access to trains carriages one, four, five and eight on all 16 tracks.

Driver access platforms are to be positioned on the outside of the outer two tracks (tracks 1 and 16) with dual access platforms to be positioned on every second walkway between tracks throughout the stabling area.

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1:3,000 (at A4)

0 10 20 40 60 80 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

- Ancillary infrastructure
- Detention basin
- Proposed Track
- Existing Track
- Roads works
- Noise mitigation barrier
- Aspects of the ASP as described in REF
- Changes to ASP since REF
- Stockpile (temporary)

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TCA
Auburn Stabling Project

Job Number 21-19479
Revision A
Date 20 Apr 2011

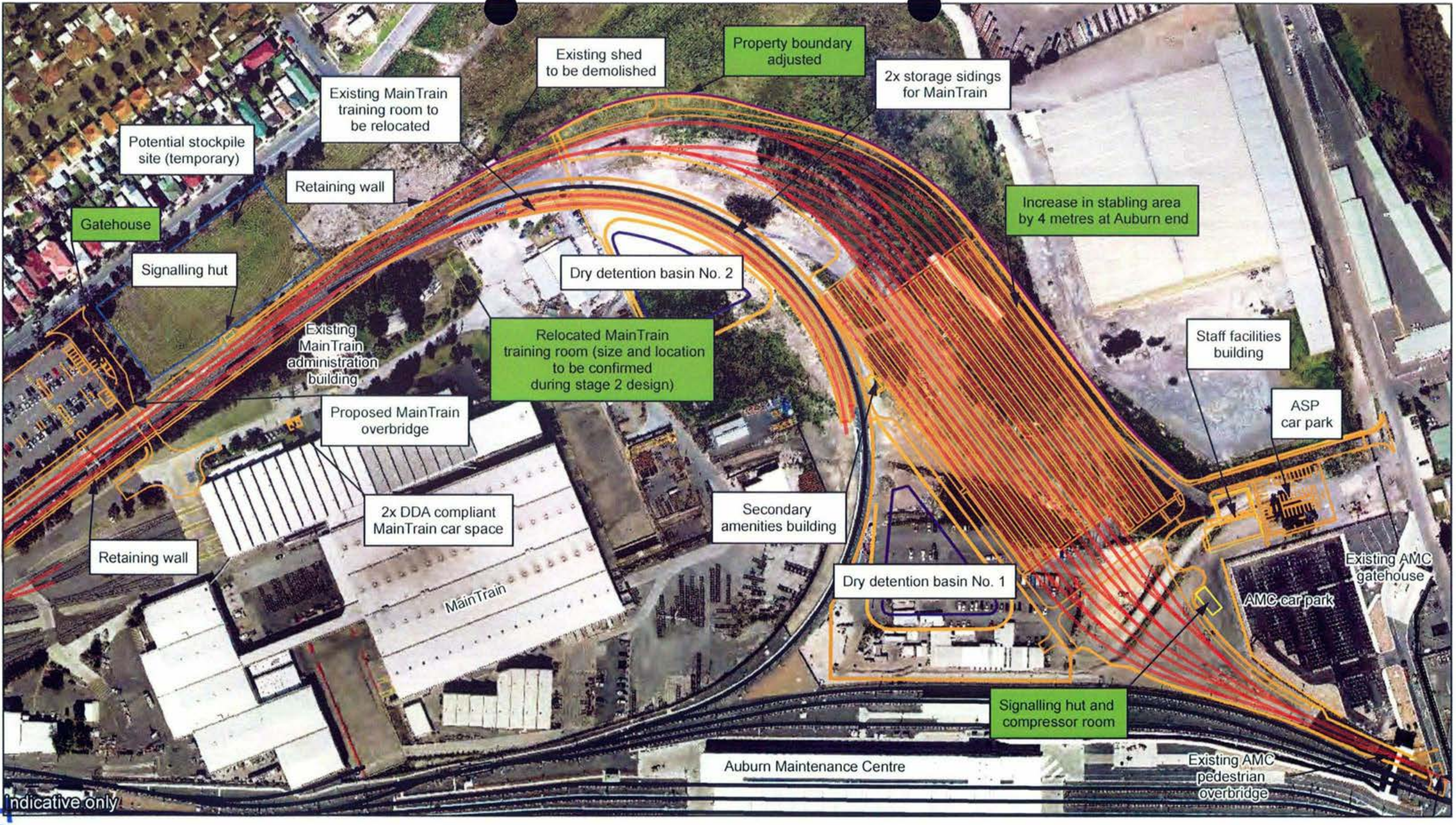
Stage Two ASP 1

Figure 4.1

G:\21\19479\GIS\Maps\MXD\21_19479_Z021_Stage_two_Of ASP2.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - 2010; NSW Department of Lands: Cadastre - 2010. Created by: Figure 4.1



TCA
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1:3,000 (at A4)

0 10 20 40 60 80 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

- Ancillary infrastructure
- Detention basin
- Proposed Track
- Existing Track
- Roads works
- Noise mitigation barrier
- Aspects of the ASP as described in REF
- Changes to ASP since REF
- Stockpile (temporary)

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TCA
Auburn Stabling Project

Job Number	21-19479
Revision	A
Date	20 Apr 2011

Stage Two ASP 2

Figure 4.2

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Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - 2010; NSW Department of Lands: Cadastre - 2010. Created by: Figure 4.2

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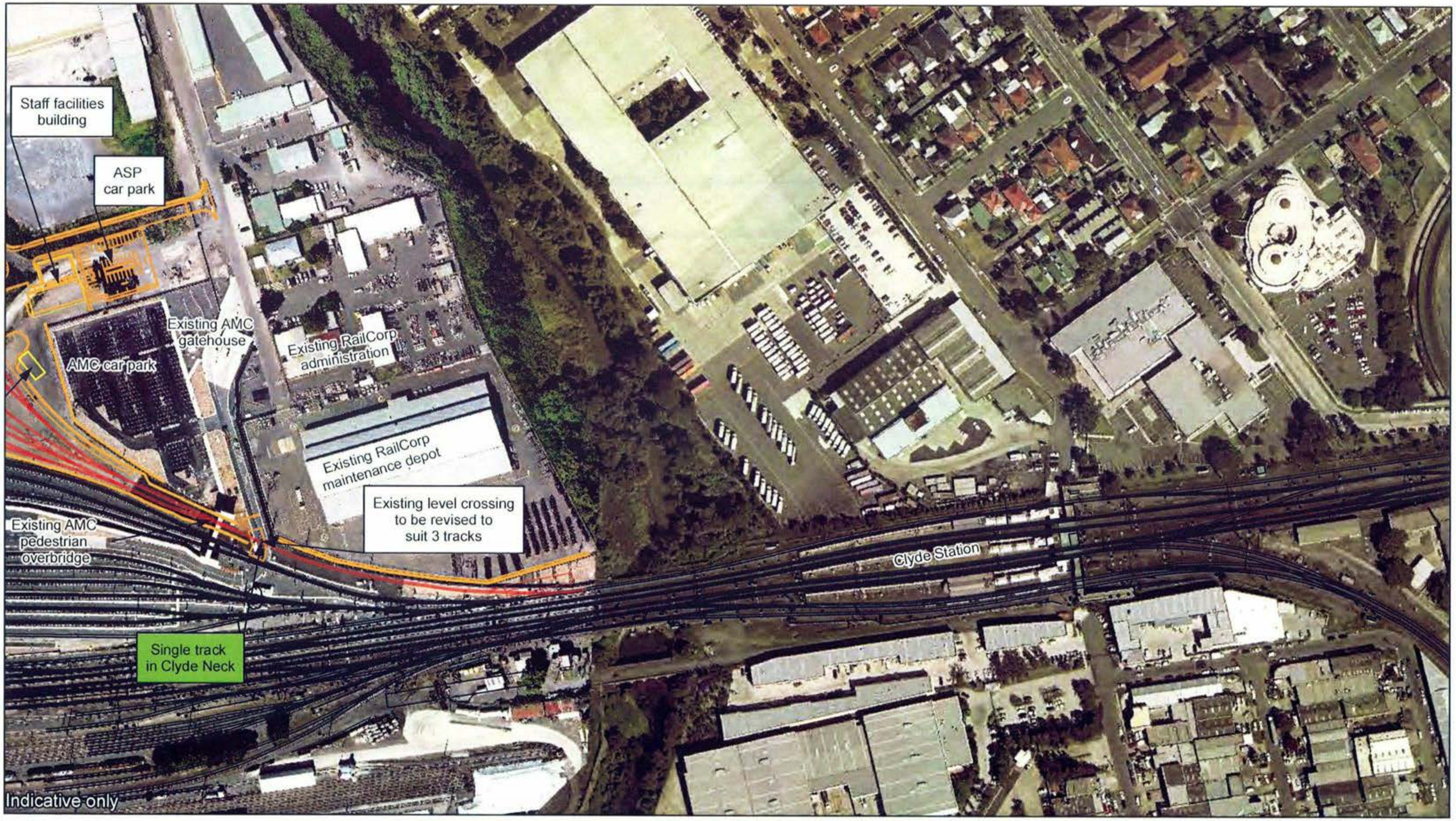

1:3,000 (at A4)

0 10 20 40 60 80 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

- Ancillary infrastructure
- Existing Track
- Aspects of the ASP as described in REF
- Detention basin
- Roads works
- Changes to ASP since REF
- Proposed Track
- Noise mitigation barrier
- Stockpile (temporary)

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TCA
Auburn Stabling Project

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Revision	A
Date	20 Apr 2011

Stage Two ASP 3

Figure 4.3

G:\21\19479\GIS\Maps\MXD\21_19479_Z021_Stage_two_Of ASP2.mxd

Level 15, 133 [illegible]astlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - 2010; NSW Department of Lands: Cadastre - 2010. Created by: Figure 4.3

Training room

The relocated training room (as described in the REF) has been enlarged during further design and is to be moved 25 metres to the west due to potential flooding in the location described in the REF. The details of the training room, including size and location, would be subject to detailed design for Stage Two.

Property acquisition

A change to the property boundary along the southern edge of the stabling area has been made in consultation with the private landowner to make the boundary line smoother (or more gently curved) than proposed in the REF (refer Figure 4.2).

Stabling space

The stabling area is to be lengthened by four metres which would allow for the amalgamation and separation of train sets within the stabling area. The extra length has been added to the Auburn end of the stabling yard for Stage One operations. The direction of extension for Stage Two would be confirmed during detailed design.

MainTrain

The REF includes the provision of stabling for MainTrain along the Auburn Neck. Additional overhead wiring for a four-car suburban set would now be provided in this siding.

MainTrain gatehouse

The gatehouse proposed in the REF has been redesigned to ensure that it is DDA compliant including the following:

- ramps have been included in the design
- provision of disabled parking space/s
- size of building enlarged particularly its length
- other minor changes to ensure DDA compliance.

The gatehouse would also be fitted with security cameras around its perimeter.

Noise attenuation structures and procedures

In order to mitigate horn noise for trains departing towards Auburn, the REF proposed two potential mitigation options: construction of an enclosure in which horns would be sounded; and the sounding of horns on the Main Line. Since display of the REF, RailCorp has confirmed the testing of horns would be undertaken at the alternative location on the Main Line during Stage Two. The testing of horns in this location means that the Auburn Neck enclosure structure described in the REF is no longer required as horns would be tested off the ASP site on the Main Line (see Section 7.1.4 of the REF).

Revision of the Remediation Action Plan

Section 6.2.16 of the REF provided an outline of the remediation works to be undertaken as part of the ASP. Since the public display of the REF, the RAP has been revised by updating the construction details of a number of capping systems (e.g. revision of one system and the inclusion

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of three additional systems) to reflect more detailed construction planning and the staging of the ASP.

A copy of the revised RAP is located in Appendix C.

4.1.2 Description of staging

A staged approach to construction has been developed and the ASP would be delivered through the initial construction of Stage One, with all remaining works to be undertaken in Stage Two as required. The staged approach for the ASP has been developed in order to meet funding availability and the forecast demand for stabling facilities in Sydney's inner-west and south-west. Due to the construction of a major stabling facility as part of SWRL, it was determined that facility to house 11 eight-car trains at Auburn would be sufficient to meet the current demand on the network. The expansion of the ASP by five stabling tracks (to provide a total of 16) would occur as required during Stage Two in line with future demand.

Figure 4.4 shows which parts of the ASP are to be constructed during Stage One. The works shown as part of Stage One include design changes as outlined in Section 4.1.

Stage One

Construction of Stage One would commence in late 2011 and would be integrated into the RailCorp network upon completion of works at the Clyde Junction by LGCUP. Stage One would provide stabling for 11 eight-car suburban train sets.

The works that form part of Stage One are as follows:

- construction and operation of 11 stabling tracks including at-grade access walkways
- connection of the stabling facility to the Down Relief at the Clyde end of the facility
- staff facilities building
- secondary amenities and storage building
- ASP staff car park
- overhead wiring and signalling to support the Stage One tracks
- combined signal equipment and compressor room
- drainage works (details which are described below)
- majority of remediation works of contaminated land to enable construction of the ASP
- construction of a noise mitigation barrier
- retaining walls (details which are described below)
- property acquisition
- lighting, electrical and relocation works
- PA system.

A description of those aspects of the ASP to be constructed during Stage One is provided below.

The ASP as described in the REF would not be fully completed by 2016 as remaining works would be undertaken later as part of Stage Two.

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Track configuration

Stage One involves the construction of approximately four kilometres of new track as illustrated in Figure 4.4. The stabling yard constructed as Stage One would be configured to contain a total of 11 terminating tracks which would merge down by installation of a number of turn outs to a single track connection to the Down Relief at Clyde Junction. This layout would involve modifications to the existing AMC level crossing to accommodate the additional stabling yard road.

Stage One operations

Stage One operations would allow for the stabling of 11 eight-car sets. The activities described in Section 6.5.2 of the REF would continue to occur within the stabling yard, albeit it at a reduced capacity.

Table 4.1 outlines the operational requirements during the morning and evening peaks for Stage One operations.

Table 4.1 Stage One operational train movements

Night	Arrive	Depart
Monday to Thursday	11	11
Friday Night/Saturday morning	11	6
Saturday Night/Sunday morning	6	6
Sunday Night/Monday morning	6	11

The testing of horns during Stage One would only occur within the stabling area as all trains would exit via the Clyde Junction. Trains that exit the stabling yard via the Clyde Junction and then travel towards Auburn would not be required to test their horn at the alternate testing location between Auburn and Lidcombe stations (as described in Section 7.1.3 and shown in Figure 7.3 of the REF).

As a result of the reduced stabling capacity of the ASP during Stage One, only 11 trains can be stabled in the yard, therefore, fewer drivers and guards would access the ASP during operation. In total, there would be 22 drivers and guards (11 of each) down from the 32 required for Stage Two operations. The reduction of the capacity of the ASP also results in fewer cleaning staff required with the total reduced from 13 to nine. The remaining staff numbers described in Section 6.5.3 of the REF would remain the same for Stage One operations.

Drainage works

Stage One would include construction of the proposed drainage works described in the REF, with the exception of works within the Auburn Neck and MainTrain site. This would include the construction of two detention basins, with a reduced scope for inter track drainage around the stabling tracks to accommodate 11 terminating tracks.

Drainage works within the existing MainTrain facility would be undertaken as part of Stage Two.

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Retaining walls

The retaining wall on the southern side of the ASP site would be constructed as part of Stage One but the length would be reduced by approximately 70 metres at the eastern end, as this section would not be required for Stage One.

Remediation works

The majority of the remediation works are likely to be undertaken during Stage One as the Stage One works are located on land that is the most contaminated. Land on which the Stage Two works are located may be remediated during either Stage One or Stage Two.

Noise mitigation barrier

The full noise mitigation wall along the southern and western side of the stabling area would be completed as part of Stage One works (see Section 4.1.1). This would provide noise mitigation for both stages of the ASP.

A modification of approximately 70 metres of the noise mitigation wall would be required during Stage Two of the ASP to integrate it with the new track and retaining wall.

Site compound and stockpiling location

The REF identified that a site compound and stockpiling site (see Figure 6.3 of the REF) would be located on private land located adjacent to the proposed overbridge. Due to the staging of the ASP this location is not required during Stage One works. An alternate location is proposed during Stage One and this would be located within the boundaries of the Stage One works. This location would be confirmed during construction planning and incorporated into the CEMP.

Stage Two

Stage Two would involve the remaining works as described in the REF as amended by the design alterations described in Section 4.1. Key components of Stage Two include:

- expansion of the stabling area to accommodate an additional five eight-car trains as described in the REF
- construction of tracks along the Auburn Neck to provide access to the stabling yard from the Auburn end (includes adjustments to access into the MainTrain buildings and the provision of two new sidings on the inside of the car turning loop
- construction of the MainTrain overbridge
- drainage works associated with works at MainTrain and along the Auburn Neck
- extension of retaining walls provided as part of Stage One and the construction of additional walls along the Auburn Neck
- changes to MainTrain gatehouse
- modifications to approximately 70 metres of the southern end of the noise mitigation barrier constructed in Stage One
- cable route including a portion within the Manildra property (leased from RailCorp)
- changes to the size and location of MainTrain training room
- remediation of contaminated land not undertaken during Stage One.

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Stage Two of the ASP is shown in Figure 4.1 to Figure 4.3. Works required to complete Stage Two would be undertaken as required after completion of Stage One.

Site compound and stockpile location

The site compound and stockpile location identified in the REF would potentially be used during construction of Stage Two. Details of this location would be confirmed during detailed design and would be incorporated into the CEMP.

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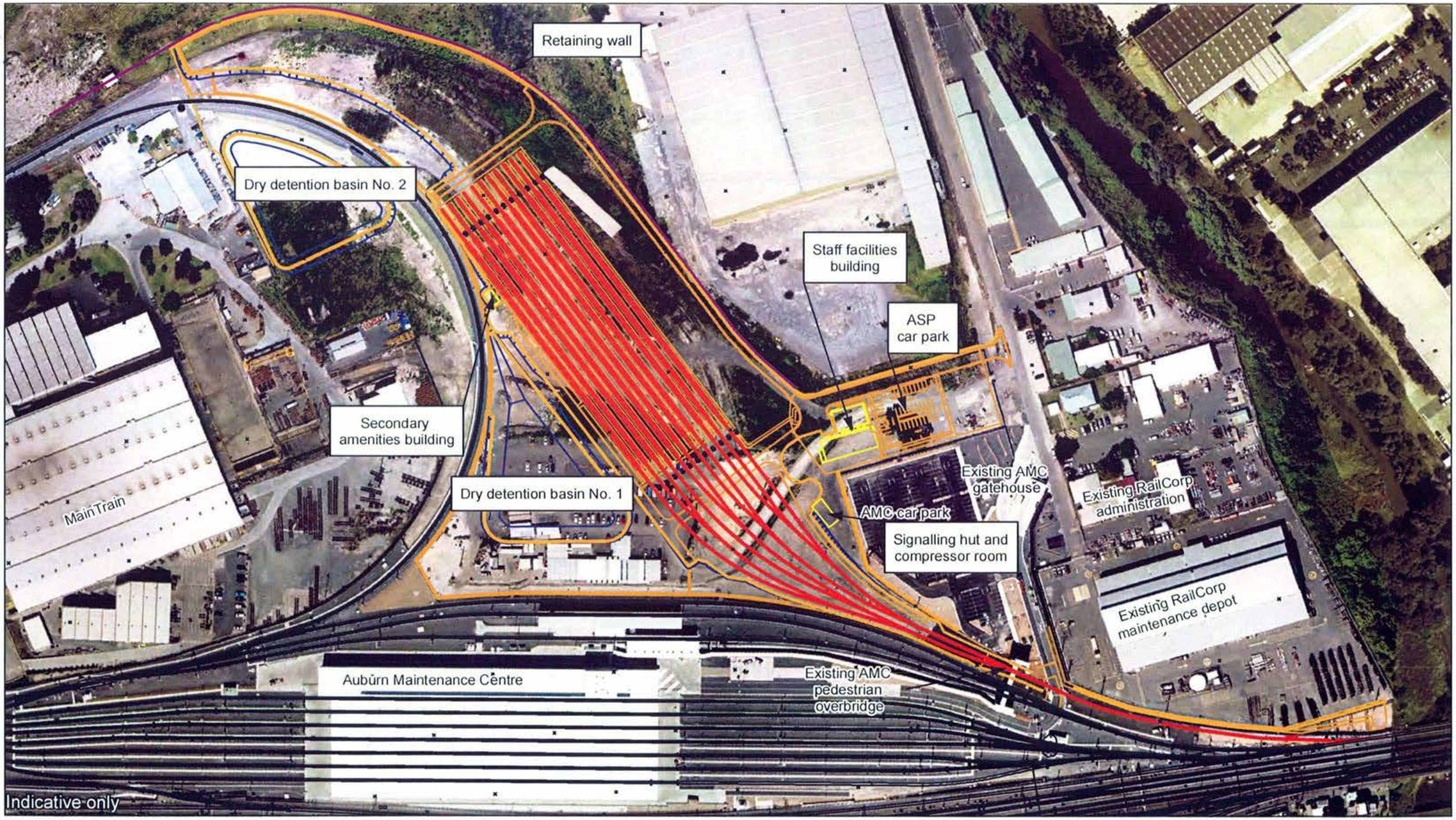

1:3,000 (at A4)

0 12.5 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

Ancillary infrastructure	Existing Track
Detention basin	Roads works
Proposed Track	Noise mitigation barrier

GHD

CLIENTS | PEOPLE | PERFORMANCE

TCA
Auburn Stabling Project

Job Number	21-19479
Revision	A
Date	06 May 2011

Stage One of ASP

Figure 4.4

G:\21\19479\GIS\Maps\MXD\21_19479_Z021_Stage_one_Of ASP.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data Source: Navigate StreetMap: StreetMap - 2010; NSW Department of Lands: Cadastre - 2010. Created by: qjchung

4.2 Assessment of impacts of alterations to the project

The ASP has not been significantly altered since the display of the REF. Overall, the impacts of the design alterations are not considered to be substantially different to those outlined in the REF. Discussion of potential impacts of the alterations are discussed below.

4.2.1 Public address system

The installation of the public address system would result in noise levels up to 85 dBA. These levels are above the criteria outlined in the REF however these exceedances are considered to be minor as the system is only expected to be used during security/emergency situations and therefore would only be used on rare occasions.

4.2.2 Cable route

The relocation of the cable route to within the Manildra property (leased from RailCorp) would result in some impacts which would occur during construction. The main potential impact would be the potential temporary loss of on-site parking for a period of between two and four weeks. This impact is considered to be minimal given the short time frame and the fact that the mitigation measures proposed require offset parking. Mitigation measures would be included in the Construction Traffic Management Plan developed for the ASP (see mitigation measure D.1).

4.2.3 Expansion of the stabling area

The expansion of the stabling area by four metres at the Auburn end of the facility would not result in visual impacts as the proposed noise mitigation barrier would shield the expanded stabling area from surrounding residences.

4.2.4 MainTrain

The ASP includes construction of a railway siding for the MainTrain facility. Additional overhead wiring for a four car set has been included in the design of the siding. This additional overhead wiring would result in some visual impacts. These impacts are considered minimal, as the new wiring would be located on the northern side of the overhead wiring proposed as part of the ASP along the Auburn Neck and therefore would not result in a significant increase in the impacts described in Section 7.8 of the REF.

4.2.5 Staged construction

An assessment of impacts for the staging of construction is located in Section 4.3

4.2.6 Noise attenuation enclosure

The removal of the noise attenuation enclosure from the design would not result in any impacts as the alternate testing location (see Section 7.1.4 of the REF) would serve a similar function to the enclosure (i.e. to minimise horn noise impact on receivers surrounding the ASP).

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4.2.7 Clyde Junction

The reduction of the number of tracks from two to one at the Clyde Junction would not have any implications for both Stage One and Stage Two.

4.2.8 MainTrain gatehouse

The gatehouse proposed in the REF has been redesigned to ensure that it is Disability Discrimination Act (DDA) compliant. The design alterations to the MainTrain gatehouse would not substantially alter the impacts described in the REF due to the minor nature of the alterations.

4.2.9 Other design changes

The remaining design alterations described in Section 4.1 are not considered likely to result in any additional impacts to those described in the REF.

4.3 Assessment of impacts of staging

4.3.1 General

As outlined in Section 4.1.2 it is now proposed to stage the ASP with construction of Stage One commencing in late 2011 and all remaining aspects of the ASP Stage Two to be constructed as required to meet funding availability and future demand on the CityRail network. The delivery of the ASP over stages would result in a change in some construction impacts, such as noise and traffic impacts. Overall these impacts are not considered to be significant and would not be any higher than those described in the REF. Stage One and Stage Two noise impacts are discussed in Sections 4.3.2 and 4.3.3 respectively. A discussion of the impacts on traffic as a result of the staging is provided in Section 4.3.4.

4.3.2 Stage One noise and vibration

Given the staging of the ASP, noise and vibration impacts resulting from the ASP would change given the extent and location of construction required and the altered in operations for Stage One of the ASP. An *Addendum Noise and Vibration Assessment – Stage One* was undertaken to assess the noise and vibration impacts of constructing and operating Stage One of the ASP (refer Appendix B). The assessment of impacts incorporates the design alterations described in Section 4.1.

During construction and operation of the ASP, noise would be audible at surrounding residential receivers, particularly those to the south on Manchester Road and the rear of Sheffield Street. While the Stage One assessment identifies that noise levels at the majority of receivers are predicted to comply with the appropriate criteria, some minor exceedances are predicted at some receivers. It is considered that with appropriate management practices and mitigation measures, noise levels would be able to satisfy appropriate DECCW noise criteria in both the *Industrial Noise Policy* (INP) and *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP).

It was proposed to construct the noise mitigation barrier in stages to meet the noise mitigation requirements for each stage of the ASP. However as the full noise mitigation barrier is required for Stage Two, and as result of feedback and submissions received from the community during the

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development of the PAR, both sections of the noise barrier would be constructed as part of Stage One works. The construction of the full noise mitigation barrier during Stage One has noise mitigation benefits for both stages of the ASP.

A modification to the noise mitigation barrier would be required during Stage Two of the ASP in order to integrate it with the new track and retaining wall to be constructed as part of Stage Two.

Construction noise is predicted to exceed the background + 10dBA Management Level criteria within the DECCW *Interim Construction Noise Guideline*, but remain below the Highly Affected Limit of 75dBA. This is typical for many construction sites in suburban areas. Mitigation is discussed in Section 7.2 and the contractor would be required to comply with the *TCA Construction Noise Strategy (Rail Projects).*

Traffic noise impacts are only considered to be of marginal impact to the upper floor of two storey residences along Sheffield Street. Impacts to properties along Manchester Road are considered negligible.

More information is available in the *Addendum Noise and Vibration Assessment – Stage One* located in Appendix B. A summary of the noise and vibration impacts for Stage One is provided below.

Noise and vibration criteria

The criteria for construction and operational noise and vibration for this assessment are the same as those provided in the REF.

Construction

Construction noise levels

Predicted noise levels resulting from the construction of Stage One are provided in Table 4.2.

Table 4.2 Predicted construction noise levels

Noise catchment area (NCA)	Criteria (dBA)	Predicted $L_{Aeq,15min}$ noise levels (dBA)				
		Earthworks		Trackworks		
		North	South	North	South	Clyde Neck
1 – Sheffield Street	47	33-51	37-57	26-39	29-50	18-33
2 – Manchester Road	51	25-50	29-58	18-43	22-50	15-33
3 – The Crescent	53	24-41	29-43	17-34	22-36	18-30
4 – Seventh Avenue	50	29-52	30-56	22-40	23-44	20-41
5 – Rawson Street	63	31-45	36-38	24-38	29-31	23-31

Predicted noise levels in Table 4.2 indicate that some mild to moderate exceedances of criteria are expected at the nearest receivers. It should be noted that the noise levels represent a worse-case scenario in terms of the use of plant. Actual noise levels would be expected to be lower than this for much of the construction period. These levels are similar to those described in Section 7.1.2 of

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the REF, however some aspects of the works (e.g. bridge works) would not occur during Stage One and therefore not result in any noise impacts to surrounding land uses.

Construction vibration impacts

Potential vibration impacts during Stage One are considered to be similar to those described in the REF. The potential for impacts would reduce as works would occur approximately 250 metres away from the nearest sensitive receivers (compared to 35 metres for Stage Two).

Construction traffic noise impacts

The construction traffic numbers used in the *Addendum Noise and Vibration Assessment – Stage One* are considered to be a worst case scenario and comprise the following:

- 80 light vehicle movements assumed to occur in the hour prior to 7am and after 5pm
- up to 10 heavy vehicles movements would occur per hour.

Details of the reduction of the traffic number as a result of staging of the ASP are located in Section 4.3.4.

Manchester Road residences

Based on the worst case scenario assessment, the arrival of 80 light vehicles in the hour between 6am and 7am would result in an increase in existing noise levels of less than 1dBA. This complies with the ECRTN allowance criterion and marginal impact would be expected.

Up to 10 heavy vehicles per hour during the daytime would result in a less than 1dBA increase on existing levels. This complies with the ECRTN allowance criterion and marginal impact would be expected during the busier construction phases.

Sheffield Street

Based on the worst case scenario assessment, the arrival of 80 light vehicles in the hour between 6am and 7am would result in a 2-3dBA increase in existing noise levels. This marginally exceeds the 2dBA allowance criteria in the ECRTN so some impact is expected during the busier construction phases in this hour.

Up to 10 heavy vehicles in an hour during the day would result in up to a 2dBA increase in existing noise levels. This meets the 2dBA allowance criteria in the ECRTN, although a small negative impact is expected during the busier earthworks phase.

Stage One operation

Operational noise impacts with mitigation

The following noise mitigation measures have been adopted for the ASP following discussion between TCA and RailCorp:

- noise mitigation barrier located along the southern edge of the ASP
- testing of the town horns only
- testing of the forward facing (or leading) horns only.

Details of the noise impacts to be experienced during the operation of Stage One of the ASP without the abovementioned mitigation measures can be found in Appendix B.

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Arrival and stabling noise without horns

The $L_{Aeq,15min}$ noise levels for the arrival and stabling of trains are predicted to be within DECCW guidelines and therefore mitigation of these sources would not be necessary.

Table 4.3 outlines the predicted noise levels resulting from brake exhaustion during the arrival and stabling scenarios with the installation of a three metre high noise mitigation barrier.

Table 4.3 Evening/night time brake exhaustion L_{Amax} predicted results summary with a three metre barrier

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)	Number exceeding goal	No. of receivers in NCA
1 – Sheffield Street	50	30 - 49	0	68
2 – Manchester Road	60	29 - 52	0	127
3 – The Crescent	60	18 - 40	0	37
4 – Seventh Avenue	52	23 - 46	0	201
5 – Rawson Street	60	33 - 44	0	31

With the inclusion of a three metre high noise mitigation barrier the L_{Amax} noise levels are predicted to comply at all receivers for Stage One.

Early morning preparation and departure with testing of only town horns

Testing only the town horns in the facility would result in a substantial reduction in noise emissions. RailCorp has confirmed that the need to sound the country horn is not required for the ASP.

Table 4.4 and Table 4.5 present the predicted worst case noise levels from testing the forward facing town horn only, with a three metre noise mitigation barrier.

Table 4.4 Early morning preparation and departure $L_{Aeq,15min}$ predicted results summary – testing town horns within ASP with modelled barriers

NCA	$L_{Aeq,15min}$ criteria (dBA)	Predicted $L_{Aeq,15min}$ range (dBA)	Number exceeding criteria	No. of receivers in NCA
1 – Sheffield Street	40	21 - 41	9	68
2 – Manchester Road	43	20 - 43	0	127
3 – The Crescent	45	8 - 31	0	37
4 – Seventh Avenue	42	14 - 36	0	201
5 – Rawson Street	50	24 - 35	0	31

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Table 4.5 Early morning preparation and departure L_{Amax} predicted results summary – testing town horns within ASP with modelled barriers

NCA	L_{Amax} goal (dBA)	Predicted L_{Amax} range (dBA)	Number exceeding goal	No. of receivers in NCA
		Town horn Clyde end	Town horn Clyde end	
1 – Sheffield Street	50	35 - 52	27	68
2 – Manchester Road	60	28 - 53	0	127
3 – The Crescent	60	25 - 47	0	37
4 – Seventh Avenue	52	32 - 55	9	201
5 – Rawson Street	60	32 - 57	0	31

Nine receivers in NCA 1 are predicted to exceed L_{Aeq} criteria, however the magnitude of these exceedances is limited to 1 dB. A 1 dB exceedance is considered negligible. All receivers in other NCAs are predicted to comply with L_{Aeq} criteria.

L_{Amax} noise levels are still predicted to substantially exceed the sleep disturbance screening goal, although the number and magnitude of predicted exceedances is relatively small. It is noted that the number of receivers predicted would be reduced to 21 with the construction of the full length noise mitigation barrier.

Alternative methods for signalling imminent movement

The noise levels discussed in the REF for the use of a yarn horn are still current, with the alternative methods not requiring investigation as noise levels would comply with the criteria without a three metre noise mitigation barrier.

Minor maintenance and cleaning

Noise impacts as a result of maintenance and cleaning are considered to be minimal and would not require mitigation.

Wheel squeal

Stage One is considered unlikely to generate wheel squeal due to the absence of sustained small radius bends. However, should wheel squeal occur after commissioning, suitable source mitigation would need to be investigated and employed (see mitigation measure O.7).

Operational vibration impacts

Potential vibration impacts during Stage One are considered to be similar to those described in the REF. Stage One works would actually reduce the potential for impacts as works would occur approximately 250 metres away from the nearest sensitive receivers (compared to 35 metres for works undertaken after Stage One).

Operational traffic noise impacts

An operational traffic noise assessment has been undertaken on the assumption that up to 20 light vehicle movements would occur per hour during the night time period. This has been based on the expected arrival and departure times for the operational workforce, as identified in Section 9.3 of the noise assessment located in Appendix B.

The operational traffic numbers used in the *Addendum Noise and Vibration Assessment – Stage One* (outlined above) are considered to be a worst case scenario. Details of the reduction of the traffic number as a result of staging of the ASP are located in Section 4.3.4.

Sheffield Street

At the rear of residences along Sheffield Street, which are not shielded by rear garden fences, up to 15 additional movements during the quietest hours of the night (where there are only five existing movements) would not increase noise levels above the base criterion of 50dBA. The level would increase from 44dBA to 51dBA for up to 20 additional movements (total of 25). During the busier hours (with over 30 existing movements) an additional 20 movements would not increase existing noise levels by more than 2dBA. At single storey residences, where some shielding exists, the criteria are met. Marginal impact is therefore expected at the upper floor of two storey residences.

Manchester Road

For Manchester Road the estimated 20 additional light vehicle movements would not increase existing levels by more than 2dBA. A negligible impact is therefore expected.

4.3.3 Stage Two noise and vibration impacts

The Stage Two noise and vibration impacts have been described in REF.

Since the display of the REF, it has been confirmed (with RailCorp) that the alternative horn testing location would be used for trains exiting the yard at the Auburn end. The impacts of this arrangement were described in the Section 7.1.3 of the REF. In summary, the REF concluded that noise levels at this location would be considered to be generally acceptable, especially in the context of the existing noise environment (i.e. busy rail corridor and traffic noise). The existing environment is subject to relatively high background noise levels in excess of 70 dBA and even 80 dBA. The use of this location has reduced the impacts to residences around the ASP.

4.3.4 Traffic impacts

Construction

Since the completion of the REF more detailed construction planning has occurred, which has resulted in the overall number of truck movements being revised down from an estimated 22,400 to 11,270 heavy vehicle movements over the whole project (i.e. Stage One and Stage Two). This number has been reduced due to the need for less fill to be imported and exported. Heavy vehicle movements during construction of Stage One would account for a large percentage of the estimated 11,270 movements due to the majority of remediation and earthworks occurring during this stage.

As discussed in Section 7.3.2 of the REF, the estimated 22,400 heavy vehicle movements was not considered to have a significant impact on the surrounding road network. As this number is expected to be reduced to an estimated 11,270 movements and given the split between two stages

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(with the majority in Stage One), the impacts on the surrounding road network are considered to be further reduced when compared to the assessment in the REF.

The heavy vehicle haulage routes identified in Figure 6.7 of the REF would continue be used during construction. However, movements to and from the site during Stage One would be via the Private Road access route, with Stage Two movement to be via Manchester Road. The concentration of movements to the Private Road access (during Stage One) and the Manchester Road access (during Stage Two) would not result in significant impacts as the assessments (i.e. traffic and noise) in the REF allowed for all vehicle movement to enter via the Private Road access.

Operation

During operation, impacts would be similar to those described in the REF as vehicle numbers for Stage One operations would be lower than those described in the REF and that are considered to be representative of Stage Two.

5. Consideration of submissions during preparation of Preferred Activity Report

5.1 Overview

This chapter addresses the submissions made during the preparation of the PAR. Submissions received during the preparation of the REF are addressed in Chapter 3.

5.1.1 Number of submissions received

During the preparation of the PAR, a community information session was held to discuss the changes to the ASP since the public display of the REF.

A total of 10 submissions were received from community members, comprising of nine feedback forms and one email.

TCA's response to the issues raised in the submissions received during the preparation of the PAR form the basis of this chapter.

5.1.2 Summary of issues raised

Table 3.1 provides a summary of the issues raised in submissions received during preparation of the PAR.

Table 5.1 Summary of issues raised during preparation of the PAR

Issue	Number of submissions raising issue
Noise and vibration	7
Traffic and transport	5
Socio economic	1
Air quality	1
Information request	3

5.2 Noise and vibration

5.2.1 General construction and operational noise

Submissions

Submissions 28 and 31

Issues raised

Submissions concerned with general noise and vibration raised the following issue:

- Concerned with noise impacts during construction and operation and queried if there is any procedure to mitigate against the noise impacts.

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TCA response

Noise impacts during construction and operation of the ASP were assessed for the REF (Sections 7.1.2 and 7.1.3 respectively), and during preparation of the PAR due to changes to the ASP (Sections 4.3.2 and 4.3.3). The detailed acoustic assessments undertaken to assess the impacts of noise during construction and operation of the ASP concluded that with the implementation of mitigation measures, the level of impact would be acceptable. The mitigation measures proposed to minimise potential construction and operational noise impacts during Stage One and Stage Two are included in Section 7.2 of this report.

5.2.2 Noise mitigation barrier

Submissions

Submissions 30, 32 and 34

Issues raised

Submissions concerned with the noise mitigation barrier raised the following issues:

- Concerned with noise impacts particularly during the night time and queried if there would be any noise mitigation barrier around the Manchester Road area to prevent noise from disturbing the residents.
- Requests that the noise mitigation barrier is extended an additional 70 metres as part of Stage One so that it is in line with the stop sign on Manchester Road. This will screen the development behind the wall.

TCA response

A noise mitigation barrier is proposed as part of the ASP. This would be located within the boundary of the ASP as a noise mitigation barrier is most effective when situated as close to the noise source as possible.

An *Addendum Noise and Vibration Assessment – Stage One* was undertaken to assess the impacts of constructing and operating Stage One of the ASP. The assessment of impacts incorporates the design alterations described in Section 4.1 .While the assessment determined that the southern most 70 metres of noise wall was not required until Stage Two, as a result of community feedback, the construction of this section of the noise wall has been brought forward to Stage One. This has some additional benefits for residents on Sheffield Street and Manchester Road once Stage One becomes operational.

5.2.3 Horn noise

Submissions

Submission 26

Issues raised

The submission concerned with horn noise raised the following issue:

- Concerned with horn noise disturbance.

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TCA response

As discussed in Section 3.4.4, existing RailCorp operating procedures require the testing of the town and country horns prior to departure and the leading (forward-facing) town horn to be sounded to signify movement of the trains within the stabling area.

RailCorp has advised that the testing of the country horn will not be required within the ASP, however the sounding of the town horn is still required to occur in the vicinity of the ASP. The sounding of town horns for Clyde bound trains in Stage One and Stage Two would occur within the ASP and be directed towards commercial and industrial areas.

RailCorp has confirmed an alternative testing location on the Main Line, approximately 1.2 kilometres from the ASP, between Auburn and Lidcombe stations (refer to Section 7.1.3 of the REF) would be used for the testing of town horns for trains exiting the ASP at the Auburn end. This would only be for Stage Two as trains exiting towards Clyde for Stage One would test their horn within the stabling area. The exception to this is the one train (per day) which would sound its horn within the stabling yard prior to exiting the yard. It would then terminate at Clyde Station, where the driver would change ends of the train. The horn would be tested again at Clyde Station when the train restarts its journey towards the city. The sounding of the horn for the single train heading to the city during Stage One has been included in the *Addendum Noise and Vibration Assessment – Stage One*.

Noise modelling undertaken during the REF indicates that some exceedances of the sleep disturbance criteria are expected during operation of the ASP, however these would be minimised where possible through the implementation of mitigation measures. Noise modelling undertaken for the alternate testing location identified in the REF indicated minor exceedances are expected due to relatively high existing background noise levels experienced at this location. The impacts of testing horns at this location are therefore considered to be relatively low (refer Section 7.1.3 of the REF).

The sounding of the horn to signify movement within the stabling area would be required, however this would be undertaken using a yard horn or short toot of the town horn to minimise the impacts.

Noise monitoring would be undertaken during operation to determine if further mitigation is required.

5.3 Traffic and transport

5.3.1 Construction traffic

Submissions

Submission 28

Issues raised

The submission concerned with construction traffic raised the following issue:

- Concerned that construction traffic during and after work hours will cause traffic congestion, noise, pollution and disturbance.

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TCA response

As discussed in Section 7.3.2 of the REF heavy vehicle movements during construction were not expected to significantly impact on the surrounding road network.

Since completion of the REF more detailed construction planning has occurred, which has resulted in the estimated number of trucks movements being reduced from 22,400 to 11,270 heavy vehicle movements over the construction of the whole project (i.e. Stage One and Stage Two). This number has largely been reduced due to the lower need for importation and exportation of fill. Heavy vehicle movements during construction of Stage One would account for a large percentage of the estimated 11,270 movements due to the majority of remediation and earthworks occurring during this stage.

Due to these revised truck movements, the impacts on the surrounding road network are considered to be further reduced when compared to the assessment in the REF.

A number of mitigation measures are provided in Section 7.2 which would manage and mitigate potential construction traffic impacts.

5.3.2 General traffic

Submissions

Submission 31

Issues raised

The submission concerned with general traffic raised the following issue:

- Concerned with traffic along Manchester Road.

TCA response

A response addressing construction traffic has been provided in Section 5.3.1.

The REF estimated that the operation of the ASP would result in approximately 106 vehicle additional movements during the morning and evening peak. As outlined in Section 7.3.3 of the REF this increase is considered to have a minor impact on the operation of the surrounding road network.

As a result of staging of the ASP, the operational traffic numbers during Stage One would be further reduced than numbers estimated in the REF due to a reduction in train drivers and guards as well as cleaning staff being required for the operation of the stabling facility during Stage One of the ASP.

5.3.3 Overbridge

Submissions

Submissions 26, 27 and 29

Issues raised

Submissions concerned with the overbridge raised the following issues:

TCA DM

- Concerned with the location of overbridge being in front of their house particularly due to the potential for vehicles using the overbridge to crash into their house should brakes fail.
- Consideration should be given to closing existing car park entry to MainTrain, having all access to the car park via the new overbridge, and installing traffic calming devices around the new overbridge entry.
- An alternative entry could be from Chisholm/Manchester Road intersection as this would alleviate the problem of the overbridge entry being in the middle of Manchester Road.

TCA response

The proposed overbridge replaces the existing level crossing into MainTrain and therefore movements across the bridge would be limited to delivery vehicles and some light vehicles. ASP staff would access the ASP site via a new access from the Private Road and would not utilise the new overbridge.

The existing access into the MainTrain facility would still be required by MainTrain for emergency use and special deliveries. The existing car park would continue to provide parking to MainTrain workers and the existing entrance to this car park would be retained. The closure of the existing access and provision of access to the car park from the proposed overbridge was considered during the design development however the grades/levels are such that there would end up being a loss of car parking to achieve this. This is due to the grades required for the overbridge (to address the levels from the street and to get sufficient clearance across the rail line), and the difference in levels between the proposed overbridge access and the adjacent land (which would be required to provide a ramp for access to the parking).

This would also result in potential conflicts between heavy vehicle and car movements if utilising the same access point.

Further investigation would be undertaken during Stage Two detailed design to consider access impacts and safety in relation to the overbridge. An additional mitigation measure has been provided in Section 7.2.2 (see mitigation measure D.6).

5.3.4 Parking

Submissions

Submission 27

Issues raised

The submissions concerned with parking raised the following issue:

- Parking on Manchester Road is at a premium. Consider making parking spots for Manchester Road residents only, equal to number of places lost.

TCA response

The potential impact of the proposed overbridge and required vehicle turning movements would need to be considered as part of Stage Two detailed design, in consultation with council.

Changing parking zones Manchester Road to 'resident only' parking is a matter for Auburn City Council. TCA has contacted council and has forwarded this request for their consideration.

TCA

5.4 Socio-economic

5.4.1 Property values

Submissions

Submission 28

Issues raised

The submission concerned with property values raised the following issue:

- Concerned that property price will be affected.

TCA response

As noted in Section 3.9.1, it is not possible to predict the impacts on property value or insurance costs for an individual property as a result of the ASP. As the surrounding land has been used for railway purposes for more than 80 years, the ASP represents a modification to the existing land use and operations on the site rather than the introduction of a new activity in the area. As a result, the ASP is expected to have little or no impact on property values.

5.5 Air quality

5.5.1 General

Submissions

Submission 28

Issues raised

The submission concerned with air quality raised the following issue:

- Concerned with pollution during construction affecting health.

TCA response

As discussed in Section 7.11 of the REF, air quality impacts are considered to be minimal during both construction and operation with the implementation of the mitigation measures identified in the REF and Section 7.2 of this PAR.

5.6 Information requests

5.6.1 General

Submissions

Submission 25, 27 and 33

Issues raised

The submissions requesting further information raised the following issues:

- Would like more information on noise issues specifically related to their house.

TCA DM

- Would like clarification of house numbers directly opposite proposed bridge.
- Would generally like more information.

TCA response

House numbers 30, 32, 34, 36 and 38-40 Manchester Road are located opposite the proposed overbridge.

TCA has responded to each of these community members in regards to their specific information requests.

TCA DM

6. Revised Clause 228 and EPBC Act considerations

Due to the changes made to the ASP since the public display of the REF, in particular the introduction of a staged approach to the ASP (see Section 4.1), there have been some changes to the impacts expected as a result of the ASP. A revised assessment of the ASP against the Clause 228 and EPBC Act considerations has been included in Sections 6.1.1 and 6.1.2 respectively to reflect the changes in the impacts resulting from alterations to the ASP.

6.1.1 Clause 228 considerations

Table 6.1 includes an updated assessment of the ASP against the Clause 228(2) factors, taking into account the proposed changes to the ASP and inclusion of a staged approach to construction.

Table 6.1 Compliance with Clause 228(2) of the EP&A Regulation 2000

Clause 228(2) factors	Overall impact
(a) Any environmental impact on a community?	
Comments:	
Some adverse effects on the local community are anticipated during both construction of Stage One and any subsequent works required to allow for Stage Two ASP operations, particularly in relation to noise, air quality, traffic and transport and visual impacts. Vehicle movements for the ASP are expected to peak during Stage One construction works due to the remediation and earthworks occurring during this stage.	Short-term negative
During operation, impacts of the ASP include noise, traffic (due to staff vehicles accessing the site) and visual impacts associated with the increase in rail infrastructure and potential light spill.	Long-term negative and positive
Long-term positive impacts include the opportunity to increase trains on the rail network catering for future increased passenger demand.	
Mitigation measures outlined in Section 7 would be implemented to manage and minimise any adverse impacts.	
(b) Any transformation of a locality?	
Comments:	
Overall the locality is not being transformed as a result of the ASP as the site has historically been used for railway purposes.	Neutral
During construction the ASP is not considered to involve a transformation of the locality due to the historical use of the site and the surrounding area for railway and industrial uses. Construction works have also been present in the locality due to the construction of the AMC over the past few years.	

TCA DM

Clause 228(2) factors	Overall impact
(c) Any environmental impact on the ecosystem of the locality?	
Comments:	
The impacts on biodiversity and ecosystems on or adjacent to the ASP site are considered to be relatively minor due the highly disturbed nature of the site, and its separation from the adjacent Duck River corridor by the Private Road. A population of the threatened Grey-headed Flying-fox is located adjacent to the ASP. Impacts on this population are considered unlikely during daylight hours when the population is present within the Duck River corridor. Impacts during the night (when the ASP is at its peak use) are considered to be minimal as the population would be away from the roost foraging. Some impacts during the early morning start up are expected when the bats are returning to the roost, however noise levels during this time are not likely to threaten the persistence of the flying-foxes from returning to the roost. A monitoring program would be undertaken upon start of Stage One and Stage Two operations in line with mitigation measure S.1.	Minor negative
(d) Any reduction of the aesthetics, recreational, scientific or other environmental quality or value of a locality?	
Comments:	
The ASP would result in visual impacts during both construction and operation. A general reduction in aesthetics would be associated with construction activities being undertaken at the site. During operation visual impacts are considered minimal as the ASP is to be in character with the surrounding land uses. Some visual impacts are considered likely due to light spill however these impacts would be minimised through the implementation of mitigation measures. The visual impacts associated with the MainTrain overbridge would not be experienced during Stage One works, however they would be experienced once the overbridge is constructed as part of Stage Two works. These impacts are considered to be minimal due to the existing views from residences along Manchester Road being of the existing MainTrain car park and the MainTrain facility.	Short-term negative Long-term minor negative
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present generations?	
Comments:	
The site is listed under the Auburn LEP and on the RailCorp Section 170 Register. It has been determined that the likelihood of finding significant archaeological items is low. No known Indigenous heritage items have been identified. Unidentified heritage items (both non-Indigenous and Indigenous) would be protected should they be uncovered during construction, until the required approvals are obtained for them to be removed (see mitigation measure F.1).	Neutral

TCA

DM

Clause 228(2) factors	Overall impact
(f) Any impact on habitat of any protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?	
Comments: The ASP would not require the clearance of vegetation that is considered to be potential habitat for protected fauna. The ASP site contains limited habitat value due to the past disturbance of the site and does not contain any important habitat resources (such as hollow bearing trees and rock outcrops).	Neutral
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	
Comments: The ASP is considered unlikely to endanger any threatened species due to the minimal vegetation to be removed. Vegetation to be removed is considered to be in a highly degraded state and is unlikely to be habitat for any endangered species. Operation of the ASP could potentially impact upon a threatened Grey-headed Flying-fox colony located adjacent to the site. Mitigation measures outlined in Section 7 would be implemented to minimise impacts on this colony.	Short-term negative Long-term neutral
(h) Any long-term effects on the environment?	
Comments: Some long-term negative impacts such as the impact of noise (as described in Section 4.3.2 for Stage One and in Section 7.1 in the REF for the Stage Two operations) and visual impact (as described in Section 7.8 of the REF, covering both Stage One and the Stage Two ASP visual impacts) are expected with the operation of the ASP. Mitigation measures would be implemented to manage long-term effects to an acceptable level.	Long-term negative
(i) Any degradation of the quality of the environment?	
Comments: The ASP includes the remediation of the ASP site as it is currently contaminated due to past uses. The ASP is therefore considered to improve the quality of the environment as the contaminants on site are to be removed from the ASP site or capped to prevent further movement around the ASP site and off site.	Positive
(j) Any risk to the safety of the environment?	
Comments: Construction safety hazards would be managed by an Occupational Health and Safety Plan. Management measures have been proposed to minimise contaminated/hazardous materials issues. The ASP has been designed to minimise safety risks for the movement of trains with the stabling yard.	Positive

TCA DM

Clause 228(2) factors	Overall impact
(k) Any reduction in the range of beneficial uses of the environment?	
Comments:	
The ASP would not result in a reduction in the range of beneficial uses of the environment as the ASP is proposed to be located on disused land.	Neutral
(l) Any pollution of the environment?	
Comments:	
There is potential for some short-term air, soil and water pollution during construction of the ASP. However this would be managed through the proposed mitigation measures (refer Section 7). Exceedences in noise levels during construction and operation would potentially impact receivers in surrounding areas, however, mitigation measures have been proposed to manage these impacts to an acceptable level. Water pollution during operation would be managed through the implementation of mitigation measures outlined in Section 7.	Short-term negative Long-term negative
(m) Any environmental problems associated with the disposal of waste?	
Comments:	
All waste would be managed and disposed of in accordance with the DECCW *Waste Classification Guidelines* (April 2008). Mitigation measures would be implemented to ensure waste is reduced, recycled or reused where applicable.	Neutral
(n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply?	
Comments:	
There would be no increase in demand on resources that are likely to become in short supply.	Neutral
(o) Any cumulative environmental effect with other existing or likely future activities?	
Comments:	
Cumulative effects of the ASP are as described in Section 7.16 of the REF. Where feasible, environmental management measures would be coordinated to reduce cumulative construction impacts. Mitigation measures would be implemented to manage impacts (refer Section 7).	Short-term negative Long-term neutral
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions.	
Comments:	
Due to the distance of the proposal from the coast it is considered unlikely that it would result in significant impacts on coastal process and coastal hazards.	Nil

6.1.2 Matter of national environmental significance

Table 6.2 includes an updated assessment of the ASP against the EPBC Act requirements, taking into account the proposed changes to the ASP.

Table 6.2 Compliance with Commonwealth EPBC Act requirements

EPBC Act Factors	Impact
Any environmental impact on World Heritage property?	
There are no World Heritage properties in the vicinity of the ASP site. The nearest site is located 4.5 kilometres away in Parramatta.	Nil
Any environmental impact on National Heritage places?	
There are no National Heritage Places in the vicinity of the ASP site. The nearest site is located 4.5 kilometres away.	Nil
Any environmental impact on wetlands of international importance?	
The ASP is located over 22 kilometres north-west of Towra Point Nature Reserve which is the nearest wetland of international importance. The ASP would not impact on this wetland of international importance as it is located within a different catchment. This wetland has been identified, as land within the 5 kilometre radius of the site is located within the same catchment as the wetland.	Nil
Any environmental impact on Commonwealth listed threatened species or ecological communities?	
The ASP would not involve the removal of any Commonwealth listed threatened species or ecological communities. The Grey-headed Flying Fox (*Pteropus poliocephalus*) is listed under the EPBC Act, with a colony of the species located directly adjacent to the ASP. No direct impacts are expected, however indirect impacts such as lighting and noise impacts have the potential to impact on the colony. An ecology assessment has been undertaken and determined that noise and lighting impacts are considered unlikely to impact upon the colony. Monitoring of the roost (see mitigation measure S.1) would be undertaken at the commencement of both Stage One and Stage Two operations to confirm whether any impacts on the colony have result from the operation of the ASP.	Nil
Any environmental impact on Commonwealth listed migratory species?	
Although 30 migratory species are likely to occur within a five kilometres radius of the ASP, the ASP site is considered to only provide marginal habitat for migratory species. The site is not considered to permanently support any individuals nor provide any important resources for these species. Due to the presence of alternative habitat (Duck River Corridor) impacts on these migratory species is considered minimal.	Nil
Does any part of the proposal involve nuclear action?	
The ASP does not involve a nuclear action.	Nil
Any environmental impact on a Commonwealth Marine area?	
No Commonwealth Marine Areas are located within 5 kilometres of the proposed site.	Nil

EPBC Act Factors	Impact
Any impact on Commonwealth Land?	
The ASP would not impact on Commonwealth Land.	Nil

7. Revised mitigation measures

This section provides a revised set of mitigation measures from those measures outlined in the REF in response to submissions received and design changes. Measures have also been separated to reflect Stage One and Stage Two of the ASP.

7.1 Changes measures

Since the display of the REF, further consultation and changes in the design, in particular the introduction of staged approach, have resulted in changes to and addition and removal of mitigation measures identified in the REF.

Appendix D outlines the proposed changes to the mitigation measures which have occurred since the display of the REF. Section 7.2 provides a revised set of mitigation measures which have incorporated the changes identified in Appendix D.

7.2 Revised mitigation measures

7.2.1 Stage One

Table 7.1 and Table 7.2 outline the revised mitigation measures which would apply to construction and operation of Stage One of the ASP.

Table 7.1 Construction mitigation measures – Stage One

ID Number	Measure
General	
A.1	A Construction Environmental Management Plan (CEMP) would be prepared prior to the commencement of construction. This plan would incorporate the mitigation measures outlined below.
A.2	Consultation with Auburn City Council would be undertaken under the requirements of ISEPP. This consultation would be in relation to council infrastructure services, local heritage items and works on flood liable land.
Noise and vibration	
B.1	Where practicable, any mitigation measures provided to control operational noise impacts shall be implemented as early as practicable to also provide a benefit during some of the construction phase.
B.2	A Construction Noise and Vibration Management Plan would be prepared prior to the construction of Stage One of the ASP. The Plan would be developed in accordance with TCA's *Construction Noise Strategy (Rail Projects)* and DECCW guidelines. The Plan would: • Detail the construction activities to be carried out, along with an indicative schedule for construction works. • Identify the reasonable and feasible mitigation measures to be implemented

TCA

ID Number	Measure
	to minimise noise impacts. ▸ Describe how the effectiveness of the proposed measures would be monitored during the works, including frequency and location of monitoring and recording and reporting of results. ▸ Identify how non-compliance with noise goals would be rectified. ▸ Identify procedures for notifying sensitive receivers and responding to noise complaints.
B.3	The Construction Noise and Vibration Management Plan would include a consultation program to keep the potentially affected receivers informed regarding the progress of the works, and to forewarn (through measures such as letterbox drops and meetings with surrounding tenants) of any anticipated changes in noise and vibration emissions prior to critical stages of the works.
B.4	A range of possible approaches for minimising the impact of construction noise would be considered during the detailed design phase and could include: ▸ Minimise tamping at night – Where feasible minimise tamping during night time periods. This activity has been determined to be the loudest noise source and incurs a 5 dB penalty. ▸ Localised barrier - The installation of temporary, localised plywood barriers could be considered around the location of noisy works. These could be located to provide shielding of up to 10dBA. ▸ Plant noise audit – Noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. To this end, testing should be established with the contractor. ▸ Operator instruction – Operators should be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission. ▸ Equipment selection - All fixed plant at the work sites should be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures in order to ensure that the total noise emission from each work site complies with DECCW guidelines. ▸ Site noise planning - Where practical, the layout and positioning of noise-producing plant and activities on each work site should be optimised to minimise noise emission levels.
B.5	The standard mitigation measures outlined in Section 3.1 4 of TCA's *Construction Noise Strategy (Rail Projects)* would be implemented and additional mitigation measures outlined in Section 6 of the strategy would be implemented when relevant noise goals are exceeded.
B.6	Construction work would be restricted to the hours of 7am to 6pm (Monday to Friday), 8am to 1pm (Saturday) and at no time on Sundays and public holidays, except as being permitted in accordance with TCA's *Construction Noise Strategy (Rail Projects)*.

ID Number	Measure
Soils and landscape	
C.1	An Erosion and Sediment Control Plan would be prepared. The plan is to include a monitoring program to assess the water quality downstream of the ASP site both during and after construction, until exposed soils are stabilised and deemed to be suitably stable for sedimentation controls to be removed.
C.2	Erosion and sedimentation from disturbed areas and stockpiles during construction would be controlled in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Auburn Development Control Plan 2010*.
C.3	Stockpiling of contaminated material would be undertaken in line with the measures outlined in the RAP.
C.4	All roads used for site access and work sites would be maintained free of dust, waste materials and mud as far as reasonably practicable. This would aid in preserving the normal characteristics and setting of the surrounding environment.
C.5	In the event that indications of additional contamination are encountered (i.e. odorous or visually contaminated materials) or the capping/marking layer is disturbed as a result of excavation during construction, work in the area would cease until an environmental consultant can advise on appropriate action.
C.6	All workers would attend a site induction outlining the location, nature, type and concentration of contaminants present on site. This induction would include an outline of the risks of contaminants, methods of identification for contaminants, monitoring to be undertaken and health and safety controls (e.g. PPE requirements as identified in the RAP) to mitigate against the risks.
C.7	Prior to earthworks commencing all visible asbestos-based fragments would be removed by an appropriately licensed contractor as required by the *Working with Asbestos: Guide* (WorkCover NSW, 2008).
C.8	Inspections by a suitably qualified person of excavated and filled surfaces would be made during construction to determine the presence of visible asbestos.
C.9	All contamination hotspots would be clearly marked in the field.
C.10	Contaminated soils would not be stockpiled on the structural fill layer or formation layers to avoid cross contamination.
C.11	In the event that excavated spoil which fails to meet landfill criteria is encountered, the spoil contingency plan outlined in the RAP would be implemented.
C.12	The unexpected finds protocols developed and included in the RAP, would be implemented in the event the following is found: - buried structures such as underground storage tanks and the associated pipe work - volatile contaminants - asbestos.

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DM

ID Number	Measure
C.13	In the event the cap is required to be excavated post placement due to construction, the contingency protocols outlined in the RAP would be followed.
C.14	Asbestos monitoring would be carried out on site and in the surrounding areas. This would include monitoring in the cabins of selected plant, on the perimeter of the site, change room and if required the decontamination unit.
C.15	Final cleanup after the works are complete would include removal of any erosion control devices and rehabilitation works of disturbed areas.
Traffic and Transport	
D.1	A Traffic Management Plan would be prepared and implemented that seeks to: ▸ minimise the level of disturbance created as a result of construction related vehicle movements (particularly in residential streets and outside of daytime working hours) to the road, pedestrian and cycle network within, and influenced by, the ASP ▸ minimise the impacts of construction related parking, including minimising the number of vehicles parking on surrounding streets by providing parking within construction site compounds ▸ minimise material delivery during school start and finish times ▸ minimise disturbances to the effective operation and reliability of existing transport services such as passenger and freight rail as well as bus routes ▸ advise drivers on protocol for access to site, covering loads, assessing soil tracking etc ▸ provide adequate signage to inform motorists and pedestrians of the presence of a worksite ahead to minimise the risk of road accidents ▸ investigate methods to minimise the use of private vehicles (e.g. car pooling).
D.2	Where work would be undertaken adjacent to the existing road network, the speed limit would be reduced to 40 kilometres per hour in accordance with the requirement of the RTA's *Traffic Control at Work Sites Manual 2003.*
D.3	Nominated heavy vehicle access routes would be identified in the Traffic Management Plan, and vehicle operators are to be made familiar with this plan as part of the induction process.
D.4	Road surfaces would be surveyed prior to works commencing and once again surveyed post construction. If it is deemed works have resulted in damage, TCA/contractor would repair the roads to their pre-existing condition.
Hydrology, drainage and water quality	
E.1	The Erosion and Sediment Control Plan would address waste water discharge from surface washing, washing vehicles and plant, and washing out concrete mixers and concrete trucks.
E.2	Final cleanup after the works are complete would include removal of any sediment in drainage lines that has been trapped by erosion control devices.

TCA DM

ID Number	Measure
E.3	Surface water management systems adopted on site would ensure the ASP does not adversely affect water quantity or quality in downstream watercourses.
E.4	Any water collected from the site is to be tested and discharged in accordance with current water quality guidelines and the RAP for the site in order to avoid any potential contamination or impacts on waters or local stormwater systems. The need for treatment of water requiring disposal is to be further investigated prior to construction, and implemented if required (treatment could be required to meet NSW Office of Environment and Heritage licence requirements for stormwater discharge or Sydney Water requirements for sewer discharge).
E.5	To reduce the impact of flooding, weather forecasts are to be regularly monitored and, as needed, works ceased and equipment removed from flow paths before the rainfall event.
E.6	Control of the movement of water onto, through, and off the site, such as diversion drains to direct upstream runoff around the site and collection and treatment of runoff prior to discharge from the site, would be investigated.
E.7	If dewatering is required on site, then water requiring off-site discharge would be disposed of in accordance with relevant guidelines, approvals and licences.
Non-Indigenous heritage	
F.1	If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are deemed to have heritage significance, the advice of the Heritage Branch of the Office of Environment and Heritage would be sought regarding appropriate management of the items. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery.
F.2	A heritage interpretation plan would be developed and implemented including the provision of interpretive signage that provides information on the heritage significance of the site.
F.3	Any significant findings would be documented and then reported to RailCorp so that the Section 170 listing for the site can be updated.
Indigenous heritage	
G.1	If previously unidentified Indigenous heritage items are uncovered during the work, all work in the vicinity of the find must cease and appropriate advice would be sought from the NSW Office of Environment and Heritage) and/or heritage consultants. Work in the vicinity of the find would not re-start until clearance has been received.
Biodiversity	
H.1	Mature trees and other native vegetation to be retained would be clearly delineated, with all construction activities excluded from these areas, in accordance with TCA procedures.

TCA

ID Number	Measure
H.2	Construction impacts would be restricted to the immediate surface disturbance area and previously degraded land through stockpiling of soils away from native vegetation areas to be retained.
H.3	Soil management systems would be implemented to ensure that topsoils are maintained in a form that would maintain their viability for use in landscaped portions of the final site layout and minimise the risks of erosion, sedimentation or the spread of environmental weeds, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and the RAP.
H.4	A Weed Management Plan would be developed for the ASP.
H.5	In line with TCA's *Biodiversity Offset Strategy*, a target of 100 per cent offset vegetation would be set for the removal of trees as part of the ASP.
H.6	All vegetation planted on site during Stage One would generally consist of local native species and would aim to provide screening of the facility, where required. Mature vegetation would be planted where feasible.
H.7	Should any trimming, cutting, pruning or removal of trees or vegetation beyond that assessed as part of this PAR and REF be required, approval from TCA in accordance with the *Application for Removal of Vegetation* would be required to be obtained.
H.8	Preclearance surveys for resident fauna would be undertaken by a qualified ecologist and any fauna sheltering within the construction footprint would be relocated to the nearest area of 'safe' habitat.
Visual and urban design	
I.1	An Urban Design and Landscape Plan would be prepared for the ASP during the detailed design stage. This plan would aim to: • minimise the visual impact of any noise mitigation barrier • minimise the visual impact of new driveway entrances • address the requirements for landscaping on site • minimise the impacts of lighting from the site The plan would detail how consultation regarding visual and urban design issues would be undertaken with stakeholders.
I.2	Loss or damage to vegetation would be avoided where practicable, particularly vegetation located on the ASP site's boundaries that provide a screening function. Alternatives to clearing such as trimming are to be considered in consultation with TCA to avoid the total removal of vegetation.
I.3	Use of lighting during night-time works would take into consideration the light spill impacts on surrounding residential dwellings. All lighting for the ASP would be designed and installed in accordance with the requirements of AS 1158 *Road Lighting* and AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible. Only those work areas being used would be lit at any time.

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ID Number	Measure
I.4	All temporary hoarding, barriers, traffic management and signage would be removed as soon as it is not expressly required for construction activities.
I.5	All construction materials and vehicles would be stored in an organised and tidy manner when work is not being undertaken on site. This would confine any associated adverse impacts to a distinct area.
I.6	Design would consider appropriate materials and colours for any noise mitigation barrier in order to blend in with the existing visual landscape.
Socio economic	
J.1	A Community Involvement Plan would be developed and implemented to engage with government agencies, Auburn City Council, landowners, community members and other stakeholders, as relevant, as part of ongoing design development and construction. This plan would identify all potential stakeholders and the best practice methods for consulting and informing these groups where appropriate. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the ASP where possible.
J.2	Contact details for a 24-hour Construction Response Line (1800 775 465), Project Infoline (1800 684 490), website at www.tca.nsw.gov.au and email address (mail@tca.nsw.gov.au) would be provided for ongoing stakeholder contact throughout the construction phase.
J.3	The community to be notified of any changes to access to local roads as a result of the ASP.
J.4	Fencing and signage would be erected around the construction area to ensure safety.
J.5	Access to neighbouring properties would be maintained at all times. In the event that property access is required to be removed, consultation with council, relevant stakeholders, owners and tenants would be undertaken to discuss alternate access arrangements including temporary relocation of property access.
Land use and property	
	No specific mitigation measures are proposed for land use during construction.

TCA

DM

ID Number	Measure
Air quality	
K.1	An Air Quality Management Plan would be prepared for the construction phase of the ASP. This plan would include the following measures: • water would be applied as appropriate to stock piles, internal unsealed access roadways and work areas. Application rates would be determined based on wind conditions, the intensity of construction operations and potential risks of contamination such as asbestos. To reduce potable water consumption, recycled water would be used for dust suppression where practicable • site rehabilitation would be undertaken as soon as practicable • disturbed areas would be stabilised as soon as practicable to prevent or minimise wind-blown dust • on site speed limits would be enforced for all construction vehicles at the ASP site • vehicle and machinery movements during construction would be restricted to designated areas • rumble grids and/or wheel wash facilities would be provided at the ASP site exit onto sealed roads to remove mud and dust from vehicles • sediment on roads that is likely to generate dust or wash into the local drainage system would be swept to remove dirt and mud • options for coating the exposed surface with a soil bonding substance to be explored if standard controls are ineffective • vehicles transporting material to and from the ASP site would be covered after loading to prevent wind blown dust emissions and spillages. Tailgates of road transport trucks would be securely fixed prior to loading and after unloading • construction plant and equipment would be well maintained and regularly serviced so that vehicular emissions remain within relevant air quality guidelines and standards • all site vehicles and machinery would be switched off or throttled down to a minimum when not in use • monitoring of dust would be undertaken daily. Where visible levels of dust are high, on site activities are to be reviewed, with additional control measures and/or varied site operations to be implemented as soon as practicable. Monitoring would include the requirements of the RAP.
K.2	In the event odours associated with contaminated soils are encountered, the protocols outlined in the RAP would be implemented.
Hazards and risks	
L.1	Construction works would be undertaken in accordance with the RAP.
L.2	Any storage of hazardous materials, and refuelling/maintenance of construction plant and equipment, would be undertaken in clearly marked designated areas that are designed to contain spills and leaks with appropriate bunding.

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ID Number	Measure
L.3	Machinery would be checked daily to ensure there is no leaking oil, fuel or other liquids.
L.4	An Occupational Health and Safety Plan would be developed to manage construction safety hazards for the ASP.
L.5	Contingency plans would be developed to deal with any spills which might occur during construction. This would include the following: ▪ All hazardous materials spills and leaks would be reported immediately to site managers and TCA. Actions would be immediately taken to remedy spills and leaks. ▪ Chemical spill kits would be readily available and accessible to construction workers. Kits would be kept at site compounds and on specific construction vehicles. Environmental control maps and/or site maps would illustrate the location of the spill kits.
L.6	All earthworks and other works below ground would be undertaken in consultation with the relevant utility providers to minimise the risk of accidents involving subsurface utilities.
L.7	Detailed design of the fire hydrant system is to be undertaken in accordance with all relevant standards and is to be reviewed by NSW Fire and Rescue.
Waste management	
M.1	A Waste Management Plan (WMP) would be prepared which would: ▪ identify all potential waste streams associated with the works ▪ identify the need to avoid the unnecessary use of resources ▪ identify opportunities to minimise the use of resources, and to reuse, recover and recycle materials ▪ outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities ▪ disposal would be undertaken in accordance with the *Protection of the Environment Operations Act* (PoEO Act).
M.2	Removal of wastes from the site would only be undertaken by a licensed contractor as required by the PoEO Act and with appropriate approvals obtained from the NSW Office of Environment and Heritage, if required.
M.3	All material to be recovered off-site would be appropriately classified in accordance with the *Resource Recovery Exemptions* (DECCW).
M.4	All material that requires off-site disposal would be appropriately tested and classified against the *Waste Classification Guidelines* (DECC, 2008).
M.5	Water captured in construction sediment basins would be reused for dust suppression, watering of landscaped areas and any other suitable construction activity, if it meets the relevant water quality guidelines.
M.6	Recyclable wastes would be separated and transported to a suitable recycler.

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ID Number	Measure
M.7	Construction waste material would not be left on site once the works have been completed.
M.8	Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.
M.9	Where possible native vegetation which is required to be cleared for construction would be converted to mulch and stockpiled for use during landscape planting works.
Sustainability	
N.1	Sustainability initiatives would be further investigated in the detailed design phase, and would consider waste management, material selection and alignment of sustainability initiatives with construction management strategies.

Table 7.2 Operation mitigation measures – Stage One

ID Number	Measure
Noise and vibration	
O.1	A yard horn or a short toot of the town horn would be used to warn of impending train movement within the stabling yard.
O.2	A three metre high noise mitigation barrier would be provided along the southern edge of the stabling yard. The exact location and length of the noise mitigation barrier would be confirmed during detailed design. To achieve maximum noise attenuation benefit, the noise mitigation barrier would be constructed as close to the noise source as possible.
O.3	Train horn testing for trains exiting the ASP at the Clyde end would be undertaken within the stabling yard and would only involve the use of the leading (forward facing) town horn of the train prior to departure. A single train would also be required to test its horn at Clyde Station after the driver has changed ends of the train to head back into the city.
O.4	An Operational Noise and Vibration Management Plan would be prepared in consultation with relevant stakeholders during the detailed design phase of the ASP. The Plan would: ▸ Identify the specific mitigation measures for controlling operational noise from the ASP, including the location, type and timing for the erection of permanent operational noise mitigation barriers and/or other noise mitigation measures. ▸ Include a consultation strategy to seek feedback from affected property owners on the specific mitigation measures. ▸ Predict the operational noise impacts at sensitive receivers based on the final design of the Stage One of the ASP. ▸ Identify a program for post-operation noise monitoring at representative locations to confirm the predicted noise source levels and to demonstrate compliance. If it is identified during the post-operation noise monitoring that the relevant noise criteria are exceeded, further noise modelling would be undertaken to investigate the potential for any further management measures.

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ID Number	Measure
O.5	The detailed design phase of the ASP would continue to consider and identify ways to minimise potential noise impacts.
O.6	Should a wheel squeal impact be identified during the post operational noise monitoring, friction modifiers or other suitable source mitigation measures would be employed.
O.7	Noise monitoring would be undertaken to confirm the traffic noise contribution at residential receivers once the ASP is operational. Subject to this review the need to provide further mitigation can be considered.
Soils and landscape	
P.1	A long-term site Environmental Management Plan (EMP) would be prepared to detail the ongoing management requirements for the long-term maintenance of the capping structures. This plan would include details included in the RAP. This plan would include provision of regular inspection and maintenance as necessary.
P.2	All employees (particularly those undertaking excavation works) would be made aware of the location of the capping layer and of the marking layer, to minimise exposing the contaminated land. In the event the cap is breached, contingency plans outlined in the RAP would be implemented.
Traffic and transport	
Q.2	The Operational Traffic Management Plan should include options to minimise car based trips by operation workers given accessibility of the site to public transport
Q.3	An Emergency Response Plan would be developed for the ASP to outline the procedures to be put in place in the event of an emergency.
Hydrology, drainage and water quality	
R.1	A Stormwater Management Plan would be developed for the ASP. This plan would be consistent with the Stormwater Management Plan for the AMC, any council requirements and any requirements outlined in the RAP. The Stormwater Management Plan would include protocols for the maintenance of water quality structures.
R.2	Stormwater management within the site would include treatment of stormwater runoff prior to discharge from the site by providing water quality treatment measures in accordance with the principles of Water Sensitive Urban Design (WSUD). The stormwater discharged from the site to Duck River would be treated prior to discharge in accordance with the targets identified in Landcom's *Water Sensitive Urban Design Strategy* (2009). The exact location and sizing of water quality treatment structures would be finalised during the detailed design. Design shall be in accordance with *Australian Runoff Quality* (IEAust, 2006). Discharge of this runoff would be undertaken in a controlled manner to prevent erosion at the discharge point to Duck River.
R.3	Drainage systems (including dry detention basins) would be maintained in line with RailCorp's existing maintenance procedures to ensure they are operating at full capacity at all times.

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ID Number	Measure
Non-Indigenous heritage	
	No operational mitigation measures were identified relating to non-Indigenous heritage as impacts are not expected.
Indigenous heritage	
	No operational mitigation measures were identified relating to Indigenous heritage as impacts are not expected.
Biodiversity	
S.1	Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist. Monitoring would be undertaken fortnightly during the first three months of operation of the Clyde Junction and then monthly for the next nine months. In the event that the monitoring demonstrates an impact, further investigation to identify the cause would be undertaken. A management plan would then be developed to address the impact through the implementation of mitigation measures.
S.2	A Weed Management Plan would be developed to manage the issue of weeds during operation and be integrated with RailCorp's existing maintenance procedures.
Visual	
T.1	All lighting for the ASP would be operated in accordance with the requirements of AS 1158 *Road Lighting*, AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* and RailCorps operational requirements to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible.
T.2	Landscaping on site would be maintained during operation in line with RailCorp's existing maintenance procedures to ensure that the visual environment is maintained. Where vegetation would be required to be replaced (due to damage or for health reasons), replacement vegetation is to be planted as soon as possible and be of a similar type and size to ensure screening is provided.
Socio-economic	
U.1	A RailCorp infoline would be available for ongoing stakeholder contact following commissioning.
Land use and property	
V.1	Any acquisition would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991.*
Air quality	
	No operational mitigation measures were identified for air quality as impacts are nil or minimal.

ID Number	Measure
Hazards and risks	
W.1	An incident emergency spill plan would be developed. The plan would include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways. An emergency spill kit would be kept on site at all times.
W.2	All staff would be made aware of incident emergency procedures and the location of emergency spill kits.
W.3	The ASP would be designed to achieve RailCorp's operational safety, signalling and operating procedures. Operational hazards would be managed through RailCorp's standard procedures for hazard and risk that are currently in place across the entire rail network.
Waste management	
X.1	Operational waste management would be managed through RailCorp's standard procedures.
Sustainability	
Y.1	Sustainability initiatives would be further investigated in the detailed design phase, and would consider operational waste management strategies and landscaping design.

7.2.2 Stage Two

Table 7.3 and Table 7.4 outline the revised mitigation measures which would apply to construction and operation phase respectively of Stage Two of the ASP.

Table 7.3 Construction mitigation measures – Stage Two

ID Number	Measure
General	
A.1	A Construction Environmental Management Plan (CEMP) would be prepared prior to the commencement of construction. This plan would incorporate the mitigation measures outlined below.
Noise and vibration	
B.1	Where practicable, any mitigation measures provided to control operational noise impacts shall be implemented as early as practicable to also provide a benefit during some of the construction phase.

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ID Number	Measure
B.2	A Construction Noise and Vibration Management Plan would be prepared prior to the construction of remaining aspects of the ASP to deliver the Stage Two ASP. The Plan would be developed in accordance with TCA's *Construction Noise Strategy (Rail Projects)* and DECCW guidelines. The Plan would: ▸ Detail the construction activities to be carried out, along with an indicative schedule for construction works. ▸ Identify the reasonable and feasible mitigation measures to be implemented to minimise noise impacts. ▸ Describe how the effectiveness of the proposed measures would be monitored during the works, including frequency and location of monitoring and recording and reporting of results. ▸ Identify how non-compliance with noise goals would be rectified. ▸ Identify procedures for notifying sensitive receivers and responding to noise complaints.
B.3	The Construction Noise and Vibration Management Plan would include a consultation program to keep the potentially affected receivers informed regarding the progress of the works, and to forewarn (through measures such as letterbox drops and meetings with surrounding tenants) of any anticipated changes in noise and vibration emissions prior to critical stages of the works.
B.4	A range of possible approaches for minimising the impact of construction noise would be considered during the detailed design phase and could include: ▸ Stockpile shielding – Localised shielding could be implemented for contained work areas such as the stockpile area. This could be achieved through purpose built temporary barriers or by managing the stockpile such that a mound is maintained on the Manchester Road boundary. ▸ Minimise tamping at night – Where feasible minimise tamping during night time periods. This activity has been determined to be the loudest noise source and incurs a 5 dB penalty. ▸ Localised barrier - The installation of temporary, localised plywood barriers could be considered around the location of noisy works. These could be located to provide shielding of up to 10dBA. ▸ Plant noise audit – Noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. To this end, testing should be established with the contractor. ▸ Operator instruction – Operators should be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission. ▸ Equipment selection - All fixed plant at the work sites should be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures in order to ensure that the total noise emission from each work site complies with DECCW guidelines. ▸ Site noise planning - Where practical, the layout and positioning of noise-producing plant and activities on each work site should be optimised to minimise noise emission levels.

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ID Number	Measure
B.5	The standard mitigation measures outlined in Section 3.1 of TCA's *Construction Noise Strategy (Rail Projects)* would be implemented and additional mitigation measures outlined in Section 6 of the strategy would be implemented when relevant noise goals are exceeded. These measures would be integrated into the Construction Noise and Vibration Management Plan for Stage Two by those constructing Stage Two of the ASP.
B.6	Construction work would be restricted to the hours of 7am to 6pm (Monday to Friday), 8am to 1pm (Saturday) and at no time on Sundays and public holidays, except as being permitted in accordance with TCA's *Construction Noise Strategy (Rail Projects)*.
Soils and landscape	
C.1	An Erosion and Sediment Control Plan would be prepared. The plan is to include a monitoring program to assess the water quality downstream of the ASP site both during and after construction, until exposed soils are stabilised and deemed to be suitably stable for sedimentation controls to be removed.
C.2	Erosion and sedimentation from disturbed areas and stockpiles during construction would be controlled in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Auburn Development Control Plan 2010*.
C.3	Stockpiling of contaminated material would be undertaken in line with the measures outlined in the RAP.
C.4	All roads used for site access and work sites would be maintained free of dust, waste materials and mud as far as reasonably practicable. This would aid in preserving the normal characteristics and setting of the surrounding environment.
C.5	In the event that indications of additional contamination are encountered (i.e. odorous or visually contaminated materials) or the capping/marking layer completed for Stage One is disturbed as a result of excavation during construction, work in the area would cease until an environmental consultant can advise on appropriate action.
C.6	All workers would attend a site induction outlining the location, nature, type and concentration of contaminants present on site and the remediation work completed for Stage One. This induction would include an outline of the risks of contaminants, methods of identification for contaminants, monitoring to be undertaken and health and safety controls (e.g. PPE requirements as identified in the RAP) to mitigate against the risks.
C.7	Prior to earthworks commencing all visible asbestos-based fragments would be removed by an appropriately licensed contractor as required by the *Working with Asbestos: Guide* (WorkCover NSW, 2008).
C.8	Inspections of excavated and filled surfaces would be made during construction by a suitably qualified person to determine the presence of visible asbestos.
C.9	All contaminated hotspots would be clearly marked in the field.

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ID Number	Measure
C.10	Contaminated soils would not be stockpiled on the structural fill layer or formation layers to avoid cross contamination.
C.11	In the event that excavated spoil which fails to meet landfill criteria is encountered, the spoil contingency plan outlined in the RAP would be implemented.
C.12	The unexpected finds protocols developed and included in the RAP, would be implemented in the event the following is found: ▸ buried structures such as underground storage tanks and the associated pipe work ▸ volatile contaminants ▸ asbestos.
C.13	In the event the cap is required to be excavated post placement due to construction, the contingency protocols outlined in the RAP would be followed.
C.14	Asbestos monitoring would be carried out on site and in the surrounding areas. This would include monitoring in the cabins of selected plant, on the perimeter of the site, change room and if required the decontamination unit.
C.15	Final cleanup after the works are complete would include removal of any erosion control devices and rehabilitation works of disturbed areas.
Traffic and Transport	
D.1	A Traffic Management Plan would be prepared and implemented that seeks to: ▸ minimise the level of disturbance created as a result of construction related vehicle movements (particularly in residential streets and outside of daytime working hours) to the road, pedestrian and cycle network within, and influenced by, the ASP ▸ minimise the impacts of construction related parking, including minimising the number of vehicles parking on surrounding streets by providing parking within construction site compounds ▸ minimise material delivery during school start and finish times ▸ determine the need to offset the loss of parking within the existing MainTrain car park during the construction period ▸ minimise impacts to the movement of vehicles to, from and around the MainTrain site ▸ minimise disturbances to the effective operation and reliability of existing transport services such as passenger and freight rail as well as bus routes ▸ advise drivers on protocol for access to site, covering loads, assessing soil tracking etc ▸ provide adequate signage to inform motorists and pedestrians of the presence of a worksite ahead to minimise the risk of road accidents ▸ investigate methods to minimise the use of private vehicles (e.g. car pooling).

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ID Number	Measure
D.2	Where work would be undertaken adjacent to the existing road network, the speed limit would be reduced to 40 kilometres per hour in accordance with the requirement of the RTA's *Traffic Control at Work Sites Manual 2003*.
D.3	Nominated heavy vehicle access routes would be identified in the Traffic Management Plan, and vehicle operators are to be made familiar with this plan as part of the induction process.
D.4	Road surfaces would be surveyed prior to works commencing and once again surveyed post construction. If it is deemed works have resulted in damage, TCA/contractor would repair the roads to their pre-existing condition.
D.5	Further investigation would be undertaken during Stage Two detailed design to consider access impacts and safety in relation to the overbridge.
D.6	A parking survey would be undertaken prior to the commencement of Stage Two and monitoring undertaken during construction of Stage Two. In the event an increase on-street parking occurs, as a result of the temporary loss of parking within the MainTrain car park, investigations would be undertaken to determine an alternative off-street location for temporary parking. Details of the alternate location would be located in the Traffic Management Plan.
Hydrology, drainage and water quality	
E.1	The Erosion and Sediment Control Plan would address waste water discharge from surface washing, washing vehicles and plant, and washing out concrete mixers and concrete trucks.
E.2	Final cleanup after the works are complete would include removal of any sediment in drainage lines that has been trapped by erosion control devices.
E.3	Surface water management systems adopted on site would ensure the ASP does not adversely affect water quantity or quality in downstream watercourses.
E.4	Any water collected from the site is to be tested and discharged in accordance with current guidelines and the RAP for the site in order to avoid any potential contamination or impacts on waters or local stormwater systems. The need for treatment of water requiring disposal is to be further investigated prior to construction, and implemented if required (treatment could be required to meet the NSW Office of Environment and Heritage licence requirements for stormwater discharge or Sydney Water requirements for sewer discharge).
E.5	To reduce the impact of flooding, weather forecasts are to be regularly monitored and, as needed, works ceased and equipment removed from flow paths before the rainfall event.
E.6	Control of the movement of water onto, through, and off the site, such as diversion drains to direct upstream runoff around the site and collection and treatment of runoff prior to discharge from the site, would be investigated.
E.7	If dewatering is required on site, then water requiring off-site discharge would be disposed of in accordance with relevant guidelines, approvals and licences.

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ID Number	Measure
Non-Indigenous heritage	
F.1	If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are deemed to have heritage significance, the advice of the Heritage Branch of the Office of Environment and Heritage would be sought regarding appropriate management of the items. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery.
F.2	Measure deleted see Table 7.4
F.3	Any significant findings would be documented and then reported to RailCorp so that the Section 170 listing for the site can be updated.
F.4	A five metre curtilage would be maintained around the Auburn Signal Box.
Indigenous heritage	
G.1	If previously unidentified Indigenous heritage items are uncovered during the work, all work in the vicinity of the find must cease and appropriate advice would be sought from NSW Office of Environment and Heritage and/or heritage consultants. Work in the vicinity of the find would not re-start until clearance has been received.
Biodiversity	
H.1	Mature trees and other native vegetation to be retained would be clearly delineated, with all construction activities excluded from these areas, in accordance with TCA procedures.
H.2	Construction impacts would be restricted to the immediate surface disturbance area and previously degraded land through stockpiling of soils away from native vegetation areas to be retained.
H.3	Soil management systems would be implemented to ensure that topsoils are maintained in a form that would maintain their viability for use in landscaped portions of the final site layout and minimise the risks of erosion, sedimentation or the spread of environmental weeds, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and the RAP.
H.4	A Weed Management Plan would be developed for the ASP.
H.5	In line with TCA's *Biodiversity Offset Strategy*, a target of 100 per cent offset vegetation would be set for the removal of trees as part of the ASP.
H.6	All vegetation planted on site during Stage Two would generally consist of local native species and would aim to provide screening of the facility, where required. Mature vegetation would be planted where feasible.

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ID Number	Measure
H.7	Should any trimming, cutting, pruning or removal of trees or vegetation beyond that assessed as part of this PAR and REF be required, approval from TCA in accordance with the *Application for Removal of Vegetation* would be required to be obtained.
H.8	Preclearance surveys for resident fauna would be undertaken by a qualified ecologist and any fauna sheltering within the construction footprint would be relocated to the nearest area of 'safe' habitat.
Visual and urban design	
I.1	An Urban Design and Landscape Plan would be prepared for the ASP during the detailed design stage. This plan would aim to: • minimise the visual impact of new MainTrain driveway entrance • address the requirements for landscaping on site • minimise the impacts of lighting from the site, particularly in relation to the new MainTrain overbridge. The plan would detail how consultation regarding visual and urban design issues would be undertaken with stakeholders.
I.2	Loss or damage to vegetation would be avoided where practicable, particularly vegetation located on the ASP site's boundaries that provide a screening function. Alternatives to clearing such as trimming are to be considered in consultation with TCA to avoid the total removal of vegetation.
I.3	Use of lighting during night-time works would take into consideration the light spill impacts on surrounding residential dwellings. All lighting for the ASP would be designed and installed in accordance with the requirements of AS 1158 *Road Lighting* and AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible. Only those work areas being used would be lit at any time.
I.4	All temporary hoarding, barriers, traffic management and signage would be removed as soon as it is not expressly required for construction activities.
I.5	All construction materials and vehicles would be stored in an organised and tidy manner when work is not being undertaken on site. This would confine any associated adverse impacts to a distinct area.
Socio economic	
J.1	A Community Involvement Plan would be developed and implemented to engage with government agencies, Auburn City Council, landowners, community members and other stakeholders, as relevant, as part of ongoing design development and construction. This plan would identify all potential stakeholders and the best practice methods for consulting and informing these groups where appropriate. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the ASP where possible.

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ID Number	Measure
J.2	Should TCA deliver Stage Two, contact details for a 24-hour Construction Response Line (1800 775 465), Project Infoline (1800 684 490), project website (www.tca.nsw.gov.au) and email address (mail@tca.nsw.gov.au) would be provided for ongoing stakeholder contact throughout the construction phase. If TCA is not delivering Stage Two of the ASP, alternative details would be provided by those responsible for delivering Stage Two.
J.3	The community to be notified of any changes to access to local roads as a result of the ASP.
J.4	Fencing and signage would be erected around the construction area to ensure safety.
J.5	Access to neighbouring properties would be maintained at all times. In the event that property access is required to be removed, consultation with council, relevant stakeholders, owners and tenants would be undertaken to discuss alternate access arrangements including temporary relocation of property access.
Land use and property	
	No specific mitigation measures are proposed for land use during construction.
Air quality	
K.1	An Air Quality Management Plan would be prepared for the construction phase of the ASP. This plan would include the following measures: • water would be applied as appropriate to stock piles, internal unsealed access roadways and work areas. Application rates would be determined based on wind conditions, the intensity of construction operations and potential risks of contamination such as asbestos. To reduce potable water consumption, recycled water would be used for dust suppression where practicable. • site rehabilitation would be undertaken as soon as practicable • disturbed areas would be stabilised as soon as practicable to prevent or minimise wind-blown dust • on site speed limits would be enforced for all construction vehicles at the ASP site • vehicle and machinery movements during construction would be restricted to designated areas • rumble grids and/or wheel wash facilities would be provided at the ASP site exit onto sealed roads to remove mud and dust from vehicles • sediment on roads that is likely to generate dust or wash into the local drainage system would be swept to remove dirt and mud • options for coating the exposed surface with a soil bonding substance to be explored if standard controls are ineffective • vehicles transporting material to and from the ASP site would be covered after loading to prevent wind blown dust emissions and spillages. Tailgates of road transport trucks would be securely fixed prior to loading and after unloading

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ID Number	Measure
	◗ construction plant and equipment would be well maintained and regularly serviced so that vehicular emissions remain within relevant air quality guidelines and standards ◗ all site vehicles and machinery would be switched off or throttled down to a minimum when not in use ◗ monitoring of dust would be undertaken daily. Where visible levels of dust are high, on site activities are to be reviewed, with additional control measures and/or varied site operations to be implemented as soon as practicable.
Hazards and risks	
L.1	Construction works would be undertaken in accordance with the RAP.
L.2	Any storage of hazardous materials, and refuelling/maintenance of construction plant and equipment, would be undertaken in clearly marked designated areas that are designed to contain spills and leaks with appropriate bunding.
L.3	Machinery would be checked daily to ensure there is no leaking oil, fuel or other liquids.
L.4	An Occupational Health and Safety Plan would be developed to manage construction safety hazards for the ASP.
L.5	Contingency plans would be developed to deal with any spills which might occur during construction. This would include the following: ◗ All hazardous materials spills and leaks would be reported immediately to site managers and TCA. Actions would be immediately taken to remedy spills and leaks. ◗ Chemical spill kits would be readily available and accessible to construction workers. Kits would be kept at site compounds and on specific construction vehicles. Environmental control maps and/or site maps would illustrate the location of the spill kits.
L.6	All earthworks and other works below ground would be undertaken in consultation with the relevant utility providers to minimise the risk of accidents involving subsurface utilities.
L.7	Detailed design of the fire hydrant system is to be undertaken in accordance with all relevant standards and is to be reviewed by Fire and Rescue NSW.

ID Number	Measure
Waste management	
M.1	A Waste Management Plan (WMP) would be prepared which would: ▸ identify all potential waste streams associated with the works ▸ identify the need to avoid the unnecessary use of resources ▸ identify opportunities to minimise the use of resources, and to reuse, recover and recycle materials ▸ outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities ▸ disposal would be undertaken in accordance with the PoEO Act.
M.2	Removal of wastes from the site would only be undertaken by a licensed contractor as required by the PoEO Act and with appropriate approvals obtained from the NSW Office of Environment and Heritage, if required.
M.3	All material to be recovered off-site would be appropriately classified in accordance with the *Resource Recovery Exemptions* (DECCW).
M.4	All material that requires off-site disposal would be appropriately tested and classified against the *Waste Classification Guidelines* (DECC, 2008).
M.5	Water captured in construction sediment basins would be reused for dust suppression, watering of landscaped areas and any other suitable construction activity, if it meets the relevant water quality guidelines.
M.6	Recyclable wastes would be separated and transported to a suitable recycler.
M.7	Construction waste material would not be left on site once the works have been completed.
M.8	Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.
M.9	Where possible native vegetation which is required to be cleared for construction would be converted to mulch and stockpiled for use during landscape planting works.
Sustainability	
N.1	Sustainability initiatives would be further investigated in the detailed design phase, and would consider waste management, material selection and alignment of sustainability initiatives with construction management strategies.

Table 7.4 Operation mitigation measures – Stage Two

ID Number	Measure
Noise and vibration	
O.1	A yard horn or a short toot of the town horn would be used to warn of impending train movement within the stabling yard.

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ID Number	Measure
O.3	Train horn testing would only be undertaken on the leading (forward facing) town horn of the train prior to departure: ▸ Testing of the town horn at the Clyde end would be undertaken within the stabling yard. ▸ Testing of the town horn at the Auburn end would be undertaken outside the stabling yard on the main line.
O.4	An Operational Noise and Vibration Management Plan would be prepared during the detailed design phase of the project in consultation with relevant stakeholders. The Plan would: ▸ Identify the specific mitigation measures for controlling operational noise from the ASP, including the location, type and timing for the erection of other noise mitigation measures. ▸ Include a consultation strategy to seek feedback from affected property owners on the specific mitigation measures. ▸ Predict the operational noise impacts at sensitive receivers based on the final design of the Stage Two ASP. ▸ Identify a program for post-operation noise monitoring at representative locations to confirm the predicted noise source levels and to demonstrate compliance. If it is identified during the post-operation noise monitoring that the relevant noise criteria are exceeded, further noise modelling would be undertaken to investigate the potential for any further management measures. ▸ Consider any noise impacts associated with the construction of the overbridge.
O.5	The detailed design phase of the ASP would continue to consider and identify ways to minimise potential noise impacts.
O.6	Should a wheel squeal impact be identified during the post operational noise monitoring, friction modifiers or other suitable source mitigation measures would be employed.
O.7	Noise monitoring would be undertaken to confirm the traffic noise contribution at residential receivers once the ASP is operational. Subject to this review the need to provide further mitigation can be considered.
Soils and landscape	
P.1	A long-term site Environmental Management Plan (EMP) would be prepared to detail the ongoing management requirements for the long-term maintenance of the capping structures. This plan would include provision of regular inspection and maintenance as necessary.
P.2	All employees (particularly those undertaking excavation works) would be made aware of the location of the capping layer and of the marking layer, to minimise exposing the contaminated land. In the event the cap is breached, contingency plans outlined in the RAP would be implemented.
Traffic and transport	
Q.1	Parking within the MainTrain car park would be reinstated to ensure that there is no net loss in parking at the MainTrain Facility.

TCA DM

ID Number	Measure
Q.2	The Operational Traffic Management Plan should include options to minimise car based trips by operation workers given accessibility of the site to public transport.
Q.3	An Emergency Response Plan would be developed for the ASP to outline the procedures to be put in place in the event of an emergency.
Hydrology, drainage and water quality	
R.1	A Stormwater Management Plan would be developed for the ASP. This plan would be consistent with the Stormwater Management Plan for the AMC, any council requirements and any requirements outlined in the RAP. The Stormwater Management Plan would include protocols for the maintenance of water quality structures.
R.2	Stormwater management within the site would include treatment of stormwater runoff prior to discharge from the site by providing water quality treatment measures in accordance with the principles of Water Sensitive Urban Design (WSUD). The stormwater discharged from the site to Duck River would be treated prior to discharge in accordance with the targets identified in Landcom's *Water Sensitive Urban Design Strategy* (2009). The exact location and sizing of water quality treatment structures Stage Two drainage work would be finalised during the detailed design. Design shall be in accordance with *Australian Runoff Quality* (IEAust, 2006). Discharge of this runoff would be undertaken in a controlled manner to prevent erosion at the discharge point to Duck River.
R.3	Drainage systems (including dry detention basins) would be maintained in line with RailCorp's existing maintenance procedures to ensure they are operating at full capacity at all times.
Non-Indigenous heritage	
	No operational mitigation measures were identified relating to non-Indigenous heritage as impacts are not expected.
Indigenous heritage	
	No operational mitigation measures were identified relating to Indigenous heritage as impacts are not expected.
Biodiversity	
S.1	Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist. Monitoring would be undertaken fortnightly during the first three months of operation of the Clyde Junction and then monthly for the next nine months. In the event that the monitoring demonstrates an impact, further investigation to identify the cause would be undertaken. A management plan would then be developed to address the impact through the implementation of mitigation measures.
S.2	A weed management plan would be developed to manage the issue of weeds during operation and be integrated with RailCorp's existing maintenance procedures.
Visual	
T.1	All lighting for the ASP would be operated in accordance with the requirements of

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ID Number	Measure
	AS 1158 *Road Lighting*, AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting* and RailCorps operational requirements to minimise light spill onto adjacent residences and the Grey-headed Flying-fox colony, and would include the use of baffles around light fixtures where possible.
T.2	Landscaping on site would be maintained during operation in line with RailCorp's existing maintenance procedures to ensure that the visual environment is maintained. Where vegetation would be required to be replaced (due to damage or for health reasons), replacement vegetation is to be planted as soon as possible and be of a similar type and size to ensure screening is provided.
Socio-economic	
U.1	A RailCorp infoline would be available for ongoing stakeholder contact following commissioning.
Land use and property	
V.1	Any acquisition would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.
Air quality	
	No operational mitigation measures were identified for air quality as impacts are nil or minimal.
Hazards and risks	
W.1	An incident emergency spill plan would be developed. The plan would include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways. An emergency spill kit would be kept on site at all times.
W.2	All staff would be made aware of incident emergency procedures and the location of emergency spill kits.
W.3	The ASP would be designed to achieve RailCorp's operational safety, signalling and operating procedures. Operational hazards would be managed through RailCorp's standard procedures for hazard and risk that are currently in place across the entire rail network.
Waste management	
X.1	Operational waste management would be managed through RailCorp's standard procedures.
Sustainability	
Y.1	Sustainability initiatives would be further investigated in the detailed design phase, and would consider operational waste management strategies and landscaping design.

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8. Conclusions and recommendations

8.1 Conclusion

This PAR has been prepared to ensure that that:

- TCA meets its statutory obligations in regard to environmental impact assessment and public display for the ASP (see Section 1.7)
- TCA considers the issues arising from the submissions received and responds to the issues raised as appropriate (see Chapters 3 and 5).

The impacts of the design and staging changes have been considered in the PAR and the *Addendum Noise and Vibration Assessment – Stage One.* Overall changes to the design and the introduction of a staged approach for constructing the ASP would not result in any significant increase to the impacts described in the REF.

The Clause 228 matters for consideration under the *Environmental Planning and Assessment Regulations* (EP&A Regulations) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) have also been revised considering the design and staging changes. The design changes would not affect Commonwealth land, nor would they have an impact on matters of national environmental significance under the EPBC Act. Furthermore, the alterations are unlikely to 'significantly affect the environment' within the meaning of Section 112(1) of the NSW EP&A Act; therefore, an Environmental Assessment under Part 3A would not be required.

A number of new or changed mitigation measures are proposed in response to the submissions received and the change to staging of the ASP that have occurred since the REF preparation. These changes would assist in minimising and mitigating impacts of the ASP.

As the determining authority for the ASP, TCA will consider the modifications outlined in this PAR in addition to the requirements of the REF and associated documentation, when determining the project and imposing conditions on any approval.

8.2 Next steps

TCA will review the REF and PAR prepared for the ASP and determine whether the requirements for assessment under Part 5 of the EP&A Act have been met. TCA will also determine whether issues raised by stakeholders and the community have been appropriately addressed and considered in the PAR.

Following this review, TCA will make a determination as to whether or not to proceed with the ASP, in accordance with the provisions of Part 5 of the *Environmental Planning and Assessment Act 1979.*

Should the ASP be approved, TCA will continue to consult with community members, government agencies and other stakeholders during the pre-construction and construction phases of Stage One of the ASP. An overview of the consultation activities that will be undertaken by TCA during the pre-construction and construction phases of the ASP is provided in Section 2.4.

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9. References

Below is s list of references located in the PAR:

GHD 2010. *Auburn Stabling Project: Review of Environmental Factors*. Volumes 1 and 2.

TCA 2009. *Sustainability Design Guidelines*

TCA OM

Transport Construction Authority

Appendix A

Submissions register

TCA

Submission number	Issue (based on REF chapter)	Sub issue	Summary
1	Noise and vibration	Noise wall	Concerned that the proposed noise barrier may reflect and project an increased noise level (beyond ambient noise) onto properties opposite (east) of the noise barrier.
2	Visual and urban design	Noise and visual	Plant large trees along northern side of Manchester Road for noise shielding and visual screening of the trains
2	Noise and vibration	Noise wall	Extend the noise wall to the proposed overbridge
2	Noise and vibration	Horn noise	If possible, relocate horn testing facility to a less densely populated area
3	Noise and vibration	General operation	ASP would result in lots of noise for nearby residents
3	Traffic and transport	Construction and operation	ASP would result in lots of traffic for nearby residents
4	Traffic and transport	Overbridge	Wants to know the street address and house numbers of the houses that are situated opposite the proposed overbridge
4	Traffic and transport	Overbridge	Concerned with visual impacts and views
4	Traffic and transport	Overbridge	Could the overbridge be moved further along the road where there are no houses.
5	Traffic and transport	Overbridge	Against the positioning of the proposed overbridge as it is directly in front of residence.
6	Noise and vibration	Horn noise	Concerned by train movements and horns during early morning operations. The stabling facility at Gosford had these problems.
7	Noise and vibration	Horn noise	Concerned about train horn sounding near Livingston Road Lidcombe.
7	Noise and vibration	Noise wall	Noise levels near residence (at Clarence Street) Lidcombe are already a problem. Wonder why a noise wall has not been considered along Railway Parade and Samuel Street Lidcombe.
8	Project Description		Security of the yard and the impact of surrounding streets. Increase in crime rate due to graffiti vandals. Has a proper security assessment been conducted?
9	Traffic and transport	Overbridge	Noise impacts as a result of new overbridge, particularly during the night and cars being parked outside their house.
9	Noise and vibration	Construction	What strategies are in place to stop construction noise?
9	Socio-economic	Property values	Concerned about property values and increases in insurance costs.
10	Traffic and transport	Overbridge	Concerned with the entrance and exit gates being in front of their house resulting in more traffic and noise.
11	Traffic and transport	Safety	Manchester Road is frequently used by hoons. Safety of people needs to be considered along with traffic calming and signals.
11	Traffic and transport	Heavy Vehicles	As ASP will result in increased truck numbers can other heavy vehicles be diverted.
11	Traffic and transport	Parking	Parking is at a premium along Manchester Road especially as some houses do not have off street parking. Can new parking spaces be created equal to the number of spaces lost on the street.
12	Noise and vibration	General operation	Concern over sleep disturbance issues in NCA 1 due to operation of the ASP, particularly if noise mitigation is not provided. Concern for the long term health impacts of daily sleep disturbance. Would like confirmation of what noise mitigation measures are confirmed to be adopted and what the updated noise level impact would be.
12	Socio-economic	Property values	Concerns that the ASP would result in possible reduction in property values.
13	Consultation		Detailed consultation and negotiation with Janyon is required to provide detailed information about the nature and location of proposed works and RailCorp operations, how they will impact on Janyon land, and how any impacts might be addressed and resolved.
13	Landuse and property	Property acquisition	No discussions have been had with Janyon regarding proposed acquisition of their land. Janyon therefore not in a position to comment on all the implications of the ASP.
13	Landuse and property	Property acquisition	The proposed acquisition would result in a very uneven boundary line. Any adjustment to the boundary should be in the shape of a gentle curve as is currently the case.
13	Landuse and property	Property acquisition	The proposed acquisition would impact upon land which is currently subject to a DA to council on the Bluescope land. The area impacted is for landscaping area and the loss of such area due to acquisition would potentially have a detrimental effect on the determination of the application due to councils guidelines relating to the size of landscaped areas.

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13	Landuse and property	Development potential	Presence of trains and noise wall indicate that there will be a significant increase in noise levels in the surrounding area including Janyon land. This issue may impact on Janyon's ability to deal with and develop its land in the future.
13	Landuse and property	Development potential	The proposed noise barrier may have a significant visual impact which may impact on developing this land in the future.
13	Noise and vibration	Construction vibration	Concerned about the likely impact of vibration on existing and future owners and tenants of Janyon land. There are a number of industrial uses which can not be subject to the vibration levels to result from the operation of the ASP. Vibration impacts likely to limit development potential of Janyon's land.
13	Landuse and property	Development potential	Would require further details of the excavation and retaining walls (including sections and elevations) in order to comment on the potential impacts of such works on Janyon's capacity to use and develop their land.
14	Landuse and property	Property acquisition	That land located along the northern edge of the Janyon land (occupied by BlueScope Distribution Pty Ltd) is resumed due to it being very narrow in width. Discussions with TRC indicated that a redesign could remove this impact. Can this be confirmed?
14	Landuse and property	Property acquisition	Request that the triangle piece of land on the eastern boundary to be acquired be replaced with a similar sized piece of land on the western boundary which would provide access between the lot and Manchester Road to the west. Discussions with TRC advised this may potentially be possible and request that this issue be confirmed.
15a	Government agencies	POEO Licensing	The REF should state that RailCorp's EPL No.12208 allows the construction of stabling yards under the licence 'except where it will result in significant noise impacts in residential areas'
15a	Government agencies	Hydrology, drainage and water quality	The REF does not adequately explore the impacts of remediation works on the mobilisation of existing contaminants into groundwater. The REF does not adequately explore the need for groundwater monitoring at the site during and post construction. DECCW considers that groundwater monitoring at the site boundary during and post construction is necessary to ensure that no contaminants migrate off site particularly to the Duck River.
15a	Government agencies	Noise and vibration	Acknowledges that with mitigation proposed the ASP would not result in any significant noise impacts to nearby residential receivers. However, discussions with RailCorp regarding removal of country and trailing horns, indicate that they are unlikely to be implemented due to safety concerns. Mitigation proposed would not comply with the condition of the existing EPL or adequately meet the needs of the local community.
15a	Government agencies	POEO Licensing	As the project is anticipated to have significant noise impacts, it will not be covered by the existing EPL. A variation to the existing EPL would be required or an new licence obtained for the ASP. To undertake the ASP under the existing licence a commitment from RailCorp is required to be obtained to implement all noise mitigation measures.
15b	Government agencies	POEO Licensing	If contractors will have management and control of the construction activity they will need to apply for an Environmental Protection Licence (EPL) for the works.
15b	Government agencies	POEO Licensing	The ASP comprises 'Rail Infrastructure Facilities' as defined in Condition A2.2 of RailCorp's EPL No. 12208, and is therefore subject to the conditions of that licence
15b	Government agencies	Hydrology, drainage and water quality	The REF does not adequately explore the impacts of remediation works on the mobilisation of existing contaminants into groundwater. The REF does not adequately explore the need for groundwater monitoring at the site during and post construction. DECCW considers that groundwater monitoring at the site boundary during and post construction is necessary to ensure that no contaminants migrate off site particularly to the Duck River.
15b	Government agencies	Noise and vibration	Acknowledges that with mitigation proposed the ASP would not result in any significant noise impacts to nearby residential receivers. However, discussions with RailCorp regarding removal of country and trailing horns, indicate that they are unlikely to be implemented due to safety concerns. Mitigation proposed would not comply with the condition of the existing EPL or adequately meet the needs of the local community.
16	Noise and vibration	General operation	TCA should implement ongoing noise monitoring covering the area of adjacent residences.
16	Air Quality		TCA should implement ongoing dust monitoring covering the area of adjacent residences.
16	Air Quality		Condition of adjacent residences should be assessed prior to commencement of project for exterior condition including presence of dust.
16	Noise and vibration	General operation and construction	Project should include reporting to a community forum with data of noise surveys and compliance with site and project conditions.
16	Air Quality		Project should include reporting to a community forum with data of dust surveys and compliance with site and project conditions.

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16	Mitigation measures		Project work should cease and neighbours advised when project consent conditions are exceeded. Project work should cease until procedures are implemented that ensure compliance with site consent conditions.
16	Noise and vibration	Construction vibration	At the completion of the project, any damage or deterioration in the external condition of the adjacent residences shall be made good by the TCA or appropriate compensation should be paid.
16	Air Quality		At the completion of the project, any damage or deterioration in the external condition of the adjacent residences shall be made good by the TCA or appropriate compensation should be paid.
16	Traffic and transport	Parking	Parking of contractor and sub contractor vehicles should be on vacant railway land and not on adjoining residential streets.
16	Noise and vibration	Construction	Delivery of materials or equipment, or operation of noisy equipment should not be before 8am or after 5pm Monday to Friday or before 8am or after 12pm Saturday, or anytime on Sundays or Public Holidays.
16	Traffic and transport	Parking	TCA shall cooperate with Auburn Council to impose residents and visitors only permit parking zone in all surrounding residential streets.
16	Traffic and transport	Heavy vehicles	Delivery access should minimise disruption to lifestyle in surrounding residential areas and should make use of vacant railway land and the railway corridor.
16	Traffic and transport	Impacts on existing road network	The condition of adjacent road surfaces should be assessed prior to commencement of the project and any damage repaired by TCA. Road surfaces should be monitored for a further 12 months to consider rainwater damage.
17	Government agencies	Non-Indigenous heritage	The proposed mitigation measures are considered appropriate however if substantial subsurface elements are uncovered the Heritage branch must be notified.
17	Government agencies	Non-Indigenous heritage	The first mitigation measure in Section 7.5.4 should be amended as follows: "If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are deemed to have heritage significance the advice of the Heritage Branch would be sought regarding appropriate management of the items. Additional assessment and approval may be required prior to works continuing in the affected area or areas based on the nature of the discovery.
17	Government agencies	Non-Indigenous heritage	Documentation states that the *Heritage Impact Statement, Lidcombe to Granville Corridor Upgrade for RailCorp NSW, Weir Phillips October 20009* proposes demolition of the Auburn Signal Box. This item is listed on the SHR (Item No. 01023) and under the provisions of the *NSW Heritage Act 1977* it cannot be demolished. Records show that no approval has been sought for works to this item and the Heritage Branch has not provided comment on any proposal for this item.
18	Noise and vibration	General operation	There is already a lot of noise and trains and cars will affect their ability to sleep at night.
19	Noise and vibration	Operation	Object to the project due to noise of the trains and cars.
19	Socio-economic	Property values	Believe houses will lose value.
20	Noise and vibration	General operation	Do not want more noise from the trains and cars.
21	Government agencies	Traffic and transport	Requests further detail regarding bicycle parking within the site (number of provided spaces, location, and compliance with Crime Prevention Through Environmental Design (CPTED) principles).
21	Government agencies	Traffic and transport	The construction traffic management plan should include options to minimise car based trips by construction workers given accessibility of the site to public transport.
21	Government agencies	Traffic and transport	Address potential for a location-specific sustainable travel plan (eg Workplace Travel Plan for workers and/or Travel Access Guides for future visitors to site).
22	Demand on resources	Sustainability in design	Suggests low energy use lighting systems be installed, building to be built to 6 star Nabers rating, and airspace to be utilised for photovoltaic energy production.
22	Hydrology, drainage and water quality	Drainage Design	Car park should be constructed of porous pavement and drain to retention basin to negate impacts on Duck River.
22	Hydrology, drainage and water quality	Drainage Design	Wet detention basins should be built utilising local wetland vegetation for water polishing, resulting in increasing habitat value on site.
22	Hydrology, drainage and water quality	Drainage Design	Buildings with toilet plumbing or outside irrigation should use rainwater tanks.
22	Noise and vibration	Noise wall	Sound barriers may reflect exterior noise back into the surrounding suburbs. Recommend sound barriers to be noise absorbing, not noise reflecting. Suggest noise barriers along Private Road and the car park.

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22	Demand on resources	Sustainability in design/Lighting	Lighting to utilise motion sensors to minimise light spill/pollution and carbon footprint. Where constant lighting is needed, high vegetation should be used to block light spill. Low wattage lights to be used where possible.
22	Biodiversity		Utilise species local to the area - tall trees should be used where possible.
22	Visual and urban design	Lighting impact/Landscaping	There should be no light spill on Duck Creek. Landscaping should be maximised to block light pollution and particulates from increased road traffic.
22	Air quality		Landscaping should be maximised to block particulates from increased road traffic.
22	Demand on resources	Sustainability in design	A full list of sustainability targets should be developed and agreed before construction. Cutting edge energy and water designs should be utilised.
22	Traffic and transport	Construction Traffic	Program should be developed to encourage staff to commute to site by public transport or cycling.
22	Biodiversity		Plan is lacking to identify all possible biodiversity improvements that can be made in this area.
22	Hydrology, drainage and water quality	Drainage Design	Detention basins should be made into constructed wetlands (similar to Sydney Olympic Park).
22	Demand on resources	Sustainability in design	Happy with the comprehensive sustainability section
23	Traffic and transport	General traffic	Raise no objection to the REF as it will not have any significant impact on the classified road network.
24	Government agencies	Traffic and transport	Recommends that the project provide adequate access for emergency service vehicles, including the access road and bridge off Manchester Road.
24	Government agencies	Hazards and risks	Recommends that building works comply with the Building Code of Australia and relevant Australian Standards.
24	Government agencies	Hazards and risks	A previous non compliance to Clause 3.3 of AS 2419.1-2005 relating to hose coverage to all areas of the yard was identified. A final drawing indicating any hose coverage shortfalls for the project should be provided for a determination relating to the non compliance to be provided.
24	Government agencies	Hazards and risks	Recommends fire hydrants are provided at the north and south ends of each walkway servicing the 16 stabling lines, to provide hose coverage along the side of the trains in the stabling facility. The positioning of these hydrants is to be at least 10 metres from the ends of Line 1 and 16 or be constructed with a fire resistance level which is compliant with AS 2419.1 - 2005.
24	Government agencies	Hazards and risks	FRNSW would like the opportunity to comment on the fire hydrant system once a design is provided to them.
24	Government agencies	Hazards and risks	The minimum fire hydrant outlet flow rates and pressures at the project are required to meet AS 2419.1 - 2005
25	Noise and vibration	Operation	Would like more information on the ASP REF/Stage 1 - specifically the noise impacts on 97 Sheffield Street (with and without the noise barrier) (location and levels)
26	Traffic and transport	Overbridge	Concerned with the location of overbridge in front of their house and safety should vehicles exiting the facility have brake failure and crash into their house.
26	Noise and vibration	Horn noise	Concerned with horn noise disturbance
27	Information request	Information request	Would like a CD of the proposal
27	Traffic and transport	Overbridge	Consider closing car park entry to Maintrain and install traffic calming devices around overbridge entry
27	Traffic and transport	Overbridge	Alternative entry from Chisholm/Manchester Road intersection would alleviate problem of overbridge entry in middle of Manchester Road.
27	Traffic and transport	Parking	Parking on Manchester Road is at a premium. Consider making parking spots for Manchester Road residents only, equal to number of places lost
27	Information request	Information request	Would like clarification of house numbers directly opposite proposed bridge.
28	Noise and vibration	General operation and construction	Concerned with noise impacts
28	Traffic and transport	Construction Traffic	Concerned with construction traffic during and after work hours as this will cause traffic congestion, noise, pollution and disturbance
28	Socio-economic	Property values	Concerned that property price will be affected.
28	Air Quality		Concerned with pollution during construction affecting health
29	Traffic and transport	Overbridge	Concerned that traffic using overbridge could crash into their house
30	Noise and vibration	Noise wall	Worried about noise level especially during the night time. Would there be any noise barrier around the Manchester Road area to prevent noise from disturbing the residents
31	Noise and vibration	General operation and construction	Concerned with noise during construction and operation. Is there any procedure to mitigate the noise issue
31	Traffic and transport	General traffic	Concerned with traffic along Manchester Road
32	Noise and vibration	Noise wall	Requests that the noise barrier is continued for another 70 metres in Stage 1

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33	Information request	Information request	Would like more information. Does not specify what information.
34	Noise and vibration	Noise wall	Would like an extension of the barrier for the immediate start of stage 1. In addition, would like the length of the noise barrier increased for Stage 1 or 2, another 100 metres to align with the stop sign on Manchester Road. This will screen the development behind the wall.

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Appendix B

Addendum Noise and Vibration Assessment Stage One

Wilkinson Murray Pty Ltd

TCA DM

AUBURN STABLING PROJECT

ADDENDUM NOISE & VIBRATION ASSESSMENT - STAGE ONE

ACOUSTICS AND AIR

REPORT NO. 10083-B
VERSION E

WILKINSON MURRAY

A DM

AUBURN STABLING PROJECT

ADDENDUM NOISE & VIBRATION ASSESSMENT - STAGE ONE

REPORT NO. 10083-B
VERSION E

APRIL 2011

PREPARED FOR

TRANSPORT CONSTRUCTION AUTHORITY (TCA)
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GLOSSARY OF TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph overleaf, are here defined.

L_{Amax} – The L_{Amax} level over a sample period is the maximum level, measured on fast response. This is normally similar to the $L_{A1,1min}$ for most noise sources.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

L_{A50} – The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Pantograph – The device that is connected to the top of electric trains and collects electric current from the overhead wires.

Reduced Level (RL) – A height above (or below) a datum. In Australia, this datum is called the "Australian Height Datum" (AHD).

Turnout – A turnout, switch or set of points is a mechanical installation enabling trains to be guided from one track to another.

Sectioning Hut – A building containing electrical switching/transformer equipment.

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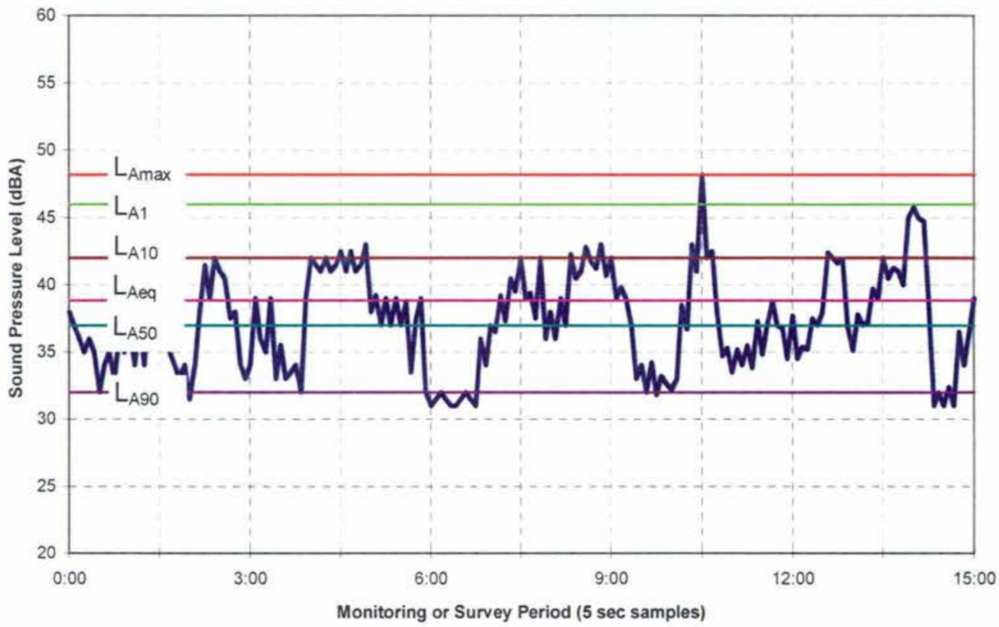
60
55
50
45
40
35
30
25
20
Sound Pressure Level (dBA)
LAmax
LA1
LA10
LAeq
LA50
LA90
0:00
3:00
6:00
9:00
12:00
15:00
Monitoring or Survey Period (5 sec samples)

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1 INTRODUCTION

The Auburn Stabling Project (ASP) is located in an area formerly known as the Clyde Marshalling Yards to the south-west of the Main West Line rail corridor between Auburn Station (to the east) and Clyde Station (to the west). The ASP would ultimately allow for the stabling of up to 16 eight-car train sets at any time. The area is also occupied by the Auburn Maintenance Centre (AMC), which has been recently commissioned, and the MainTrain Facility.

The ASP is being delivered by the Transport Construction Authority (TCA), formerly Transport Infrastructure Development Corporation. A staged construction approach has been developed and the Project will now be delivered in two stages.

Stage One construction will commence in late 2011 and would be integrated into the main network by 2017. Stage One consists of the following:

- Construction and operation of 11 of a total planned 16 stabling tracks.
- A short rail neck linking the facility to the main line at the Clyde end of the facility.
- Remediation works.
- Drainage works and the construction of two detention basins.
- Staff facilities building and car park.
- Potential sectioning hut, overhead wiring and signalling.

A site plan, showing the indicative project boundary of Stage One, is presented in Figure 1-1. Due to the revised design the construction compound has been moved into the land already owned by RailCorp as shown in Figure 1-1 to minimise land that would otherwise need to be leased from adjacent private land owners..

Wilkinson Murray has previously assessed the noise and vibration impacts associated with the completed Project being delivered in one stage (*WM Report 10083 Ver G*, October 2010). This report details, as an addendum, an assessment of those impacts associated with Stage One only.

This noise and vibration assessment considers both the construction and operational phases of Stage One of the ASP, including off site traffic noise.

The purpose of the report is to assess the noise and vibration impacts of the ASP and recommend appropriate measures to mitigate any impacts. The report identifies surrounding noise sensitive receivers and establishes noise level criteria based on NSW Government guidelines including *Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP), the *Industrial Noise Policy* (INP), the *Interim Construction Noise Guidelines* (ICNG), *Assessing Vibration: A Technical Guideline, TCA Construction Noise Strategy (Rail Projects)* and the *Environmental Criteria for Road Traffic Noise* (ECRTN). Noise and vibration levels from typical operations have been predicted at these receivers and where necessary mitigation measures have been recommended to minimise potential impacts.

Figure 1-1 Proposed Site Plan – Stage one

Note: Figure is indicative only and is subject to detailed design

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2 ASSESSMENT PROCESS

The noise and vibration considerations associated with the environmental impact assessment process and approval phase of the ASP have been identified below.

Preliminary Assessment Stage

Open dialogue was held with targeted community members and relevant agencies during the initial noise and vibration assessment to determine the environmental noise and vibration

↓

Environmental Impact Assessment Stage (This Report)

1. Determine the noise and vibration trigger levels for Stage One. Refer to the following sections of this report.
   - Operational Noise (IGANRIP, INP, Sleep Disturbance) – Section 6.1
   - Operational Vibration – Section 7.1 and 7.2
   - Construction Noise (ICNG) – Section 8.1
   - Construction Vibration – Section 8.4.1
   - Traffic Noise (ECRTN) – Section 9.1
2. Undertake a noise and vibration assessment to determine locations where the noise and vibration trigger levels may be exceeded as a result of Stage One of the project. Refer to the following sections of this report.
   - Operational Noise – Section 6.2 and 6.3
   - Operational Vibration – Section 7.3
   - Construction Noise – Section 8.2
   - Construction Vibration – Section 8.4.2
   - Traffic Noise – Section 9.3 and 9.4
3. At locations predicted to exceed the noise and vibration trigger levels evaluate possible mitigation measures for Stage One. Refer to Section 6.4, 8.3, 9.3.3 and 9.4.3.

↓

Public Exhibition and Submissions Report Stage

1. Undertake targeted consultation with property owners/residents most likely to be affected by noise and vibration impacts of Stage One and inform them of the outcomes of the assessment process and proposed mitigation measures and seek their feedback.
2. Review the proposed mitigation measures following community consultation and produce a report (e.g. submissions report) documenting the proposed mitigation measures and achievable noise and vibration levels for the project.

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Planning Approval Stage

Achievable noise and vibration levels and/or mitigation measures for the project are included in the approval conditions.

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Post Approval Stage

1. Implement Conditions of Approval.
2. Post operational noise monitoring to confirm noise goals are met. Further consultation undertaken if required.

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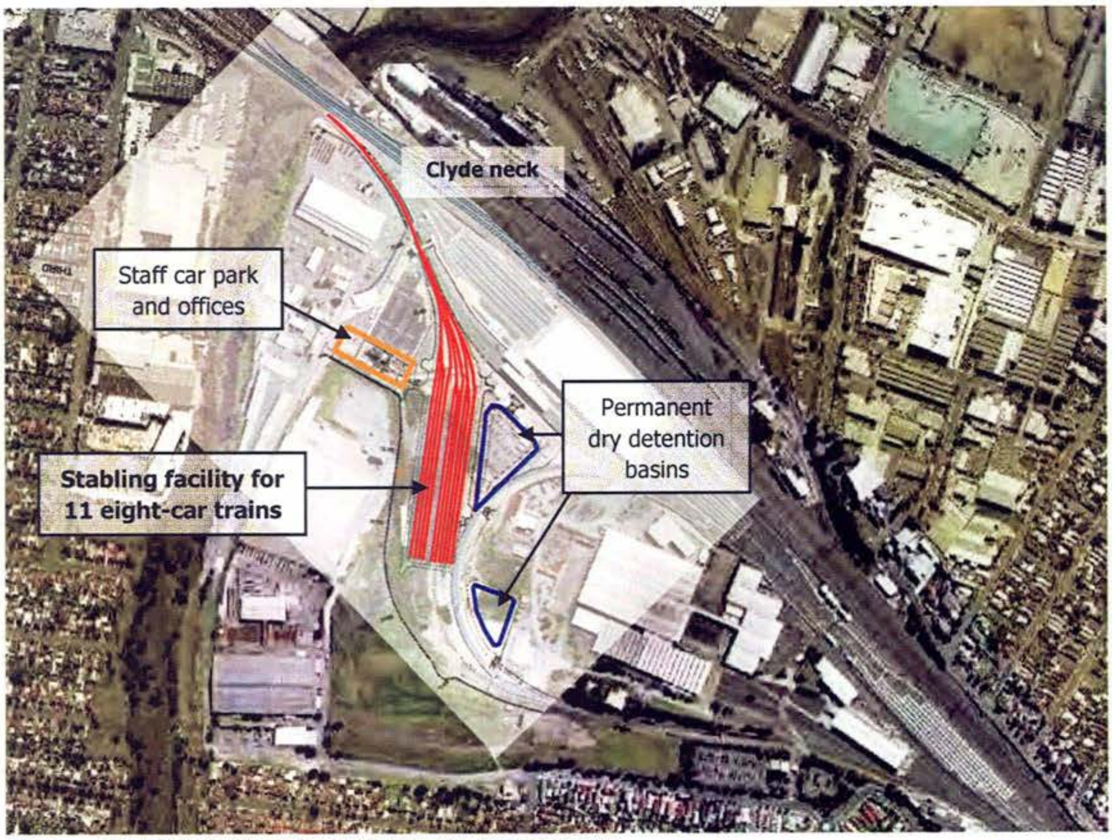
3 PROJECT DESCRIPTION AND PROPOSED STABLING OPERATIONS

The key features of Stage One of the ASP are highlighted in Figure 3-1 and the relevant noise aspects are discussed below.

Figure 3-1 Site Layout



Note: Figure is indicative only and is subject to detailed design

Stage One of the ASP includes a new 11 track stabling area and associated amenity buildings. A sectioning hut may also be required to assist in powering the stabling yard and has been included for the purposes of the acoustic impact assessment. Trackworks are required on the western access rail lines to include new turnouts.

The main ASP Stage One operations would involve:

- The arrival of trains for stabling between approximately 7.00pm and 12.00 midnight.
- Overnight stabling of up to 11 eight-car sets on 11 tracks.
- Interior cleaning and preparation of the trains.
- Departure from the stabling facility between approximately 3.30am and 6.00am.

At any time, the facility can be used for cleaning, preparation and inspection of trains and also minor rolling stock maintenance. These activities are described in Sections 3.2 to 3.5.

Trains would arrive and depart to the west along new tracks. The number of trains accessing the facility is summarised in Table 3-1.

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Table 3-1 Indicative Future ASP movements

Night	Arrive	Depart
Mon to Thurs	11	11
Fri Night / Sat Morning	11	6
Sat Night / Sun Morning	6	6
Sun Night / Mon Morning	6	11

During peak departure periods, between 4.00am and 5.00am weekdays, up to 8 train movements per hour are expected. During peak arrival times up to 4 train movements per hour are scheduled. The signposted train speed within the yard will be 13km/hr. On the access rail lines the proposed speed is up to 25km/hr.

At these low speeds $L_{Aeq,15min}$ noise levels would be controlled by the train auxiliaries (air-conditioning, inverters, and air compressors) rather than the wheel-rail noise. Train arrivals and departures would include intermittent noise from air brake valves, similar to that included in Table 3-2 for brake tests. Trains entering the sidings would pass through new turnouts which can result in higher noise levels than continuously welded rail.

Normal train speeds on the Sydney suburban network are approximately between 60–80km/hr, with some slower speeds through tight radius curves and also approaching/ departing stations.

3.1 Train Types and Fleet Mix

The noise generated by the stabling process is train type dependent and the mix of trains would change over the life of the facility.

It is planned that Waratah, Millennium, and the older C, K, R and S Sets would use the stabling facility. Tangara trains are not proposed to use the facility. TCA and RailCorp have provided the following information:

- **R Sets and S Sets:** These are the oldest of the double deck suburban passenger fleet. The major noise source on this type of car is the air compressor which is located underfloor at the driver's end of motor cars; there are two air compressors for each four-car train set. The passenger areas of these cars are not air-conditioned; however, the train crew areas are being fitted with small roof mounted air-conditioning units. Electrical equipment is powered by roof mounted static invertors which generate very low noise levels in comparison to other auxiliary systems.
- **C Sets and K Sets:** These sets are equipped with two roof mounted air-conditioning (AC) units per car for the passenger areas. The AC units are powered by underfloor motor-alternator (MA) sets, with two MA sets per four-car train set. The MA sets run continuously while the pantographs are up. These cars are also equipped with air compressors.
- **M Sets (Millennium):** These sets are equipped with two roof mounted AC units per car and two static inverter (SIV) units per four-car set. The sets are equipped with air compressors which are mounted in an acoustic enclosure under the driver's end. The noise levels of equipment on the Millennium trains are generally quieter than on the older sets because of more rigorous noise specifications for rolling stock.

- **A Sets (Waratah):** For the purpose of noise emissions the auxiliary systems on Waratahs are similar to Millennium Sets.
- **Tangara Sets:** (Provided for completeness; however, these are not proposed to be stabled). These sets are equipped with two roof mounted AC units per car and two roof mounted SIV units per four-car set. The SIV units are mounted over the driver's cab and usually operate continuously while the pantographs are up. Each four-car set is equipped with two underfloor air compressors located at the driver's end.

In the first 5 years after opening of the ASP, the proportion of the older C, K, R and S-Sets would be higher so this would represent a worst case scenario.

3.2 Train Stabling and Preparation

When a train is stored in a stabling siding there are a number of procedures which are normally followed, depending on the location and circumstances. Once a train is brought to a standstill in a siding, the driver must apply the brakes by exhausting the brake pipe and then engage the parking brake. Exhausting the brake pipe releases compressed air to the atmosphere, causing a single noise emission for a short duration. This action is always performed in the driver's cab with the air exhausting underfloor in the vicinity of the driver's cab.

After applying the parking brake, a train would normally be left with the pantographs up and all auxiliary equipment operating. In this situation, air compressors would cycle on to replenish air lost through leaks and, depending on the ambient temperature, roof mounted air-conditioning units may cycle on and off. At night, the heat load would be sufficiently low that the AC units would not normally run; however, during hot nights in summer, individual units may occasionally operate.

The static inverters on Millennium, Tangara and R/S Sets and the motor-alternators on C/K Sets operate continuously while the pantographs are up. Trains are often operating in this condition to supply lighting for train presentation staff and to ensure that temperatures in the passenger areas are satisfactory when trains return to service.

Newer trains, such as Millenniums and A Sets, have a "stabled mode", in which auxiliary systems do not run. Older suburban trains are not readily able to be powered down as it is both inefficient and inherently problematic to re-power them. If older trains are powered down the compressors and air conditioning systems (where fitted) are required to run at full power for considerable time to replenish compressed air and re-establish internal temperatures. Furthermore the older electrical systems on these trains do not always allow for easy restarts of trains that have been powered down. Therefore stabling older trains in an unpowered state would not be considered for the ASP.

When a train is stabled "powered up", the air compressors cycle on-off over an approximate time interval of 7 minutes. During the "on" cycle, the compressor is operational for approximately 45 seconds.

The preparation process takes up to 1 hour before any train is returned to service. At this time all train systems are running normally and there is, under current RailCorp practices, the need to test two types of train horns (town and country) at both ends of the train. Additionally a driver must make several brake applications by exhausting air from the brake pipe.

Based on data acknowledged by RailCorp, the source Sound Power Levels (SWLs) presented in Table 3-2 have been used in the noise model to predict the $L_{Aeq,15min}$ and $L_{A1,1min}$ noise levels at surrounding noise sensitive receivers, which are presented in Section 6.2.

Table 3-2 Sound Power Levels for Train Stabling Noise

Train Type	Noise Source	Sound Power Level for Source	Location of Noise Sources[3]
Millennium	Full Air Compressor Cycle [1]	81dBA – L_{Aeq}	Under floor
	Inverter Noise	76dBA – L_{Aeq}	Top of train
	Air-Conditioner	80dBA – L_{Aeq}	Top of train
Tangara	Full Air Compressor Cycle [1]	90dBA – L_{Aeq}	Under floor
	Inverter Noise	83dBA – L_{Aeq}	Top of train
	Air-Conditioner	83dBA – L_{Aeq}	Top of train
		<62dBA – L_{Aeq} (vent only)	Top of train
Double Deck Suburban	Full Air Compressor Cycle [1]	93dBA – L_{Aeq}	Under floor
	Motor-Alternator (C & K Set only)	98dBA – L_{Aeq}	Under floor
	Air-Conditioner (C & K Set only)	83dBA – L_{Aeq}	Top of train
		<62dBA – L_{Aeq} (vent only)	Top of train
Tangara, Millennium, Waratah and Double Deck Suburban	Horn [2]	Town: 136dBA – $L_{A1,1min}$ Country: 142dBA – $L_{A1,1min}$ Town Horn Short "Toot": 110dBA – $L_{A1,1min}$	End of train, under floor
	Broadband Yard Horn (Waratah)	110 dBA – $L_{A1,1min}$	End of train, under floor
	Brake Test/Release	107-120dBA – $L_{A1,1min}$	End of train, under floor

Notes: 1 The term "Compressed Air Cycle" refers to the air compressor plus the cyclic air discharge noise associated with the air dryers, valves, etc.

2 Horn noise is dependent on how the drivers operate the horns and can vary from a short "toot" to a louder, longer "blast". The modelling assumes that some horn events would be the longer "events" as it is understood that drivers have been instructed to operate horns for a least 0.5 seconds in order to ensure that they register on the "black box" recorder. It is normal practice for drivers to operate the horn when preparing a stabled train for traffic and again just before moving the train. The Waratah trains activate a solenoid, such there is no driver control, on horn blast. We understand this results in a 0.25s full blast.

3 For the full compressed air cycle on Millennium and Double Deck Suburban trains, the source of noise emission would occur at two locations for each 4-car set (assumed to be located on Cars 1 and 4). The Millennium Inverter noise would be generated at two locations for each 4-car set (Cars 1 and 4). Noise from the K Set Motor Alternator is generated at two locations for each 4-car set (Cars 2 and 3). The air-conditioning noise would occur at two locations for each car. An 8-car set is made up of two 4-car sets.

The L_{Aeq} sound power levels in Table 3-2 are representative of the equivalent steady noise level when trains are stabled with the pantographs up and all auxiliary equipment turned on. The $L_{A1,1min}$ sound power levels are representative of the compressed air discharges and horn operation. The $L_{A1,1min}$ descriptor is equivalent to the L_{Amax} descriptor in the assessment of sleep disturbance.

Many of the sources exhibit directional noise emissions both individually and also when interacting within a group of stabled trains. Table 3-3 details the directivities used in this assessment. These have been determined from recent measurements conducted by Wilkinson Murray and other consultants.

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Table 3-3 Directivity* for Train Stabling Noise

Source	Direction from train (0°)	Difference (dBA) from 0° direction (i.e. "on-axis")				
		0°	45°	90°	135°	180°
Horns	Parallel with train (forward +ve)	0	-4.5	-8	-10	-11
Motor Alternator	Perpendicular to train	0	-5	-12	-5	0
Rooftop Plant	Vertical (up +ve)	0	0	0	-9	-15

* Directivity, in the context of a noise source, is used to define how much noise is projected in each direction. It is generally defined relative to the loudest, or "on-axis", direction. A classic example of a directional source is the human voice – it is much easier to hear someone if they are facing towards you than if they are facing away from you.

Note that the SWLs presented in Table 3-2 refer the equivalent omni-directional noise source (i.e. no directivity) having the same "on-axis" noise level. However, for example, applying directivity to a horn would reduce the SWLs by 8 dBA at 90°.

3.3 Horn Noise

Train horns are a necessary safety device; alerting pedestrians, road traffic users, other trains and also maintenance personnel of the train's imminent movement. It is RailCorp procedure to test train horns as part of the preparation procedure before trains leave the stabling yard, to ensure this integral safety system is functioning properly and is available if required.

Commuter trains used on the RailCorp network have two horns – town and country. The town horns are quieter and are used in densely populated residential areas to lessen the nuisance impacts of horn noise. Country horns are louder than town horns, as the higher train speeds outside metropolitan areas requires audibility at greater distances to still give sufficient warning of the approaching train. Due largely to the noise impacts, country horns are predominantly used outside of metropolitan areas.

At the time of preparing this assessment RailCorp were reviewing the need to test country horns as part of the train departure preparation at the ASP. Country horns have been included in this assessment, however removing the need to test these horns in the facility is considered to potentially occur by the time of opening and so this has been included as a mitigation option.

RailCorp procedure also requires trains to sound their town horn to warn of impending train movement as the train departs.

Drivers would not be required to sound their horn on approach to the ASP and would be encouraged not to do so, except when acknowledging a rail worker's hand signal. In this instance, the drivers of pre-Millennium trains typically give a very short 'toot' as they are merely acknowledging a hand signal from a rail worker and do not require excessive noise level or duration to gain somebody's attention. Millennium and Waratah train horns are activated electronically and drivers no longer have ability to only sound the horn briefly.

3.4 Cleaning

Information provided by RailCorp indicates cleaning does not require the use of any noisy equipment external to the train. The noisiest activity would be a vacuum cleaner inside the train, although doors may be open. There may be a need for a light van to transport staff and material/garbage around the site. The noise contribution from this process as an $L_{Aeq,15min}$ is negligible in relation to multiple train systems running and is unlikely to be audible at surrounding residences.

3.5 Maintenance

Whilst no major maintenance is scheduled for the stabling facility it is expected that some minor maintenance would occur to allow trains to return promptly to service. The type of maintenance expected to occur involves fixing loose panels, replacing a windscreen wiper, seat or window. Minor maintenance may require use of small power tools, such as electric drills and very occasionally the use of hammers. Maintenance staff may use a light vehicle to drive around the site. The noise contribution from this process as an $L_{Aeq,15min}$ is negligible in relation to multiple train systems running, but has been included in this assessment. It is possible some maintenance activity may be audible at times.

3.6 Wheel Squeal

Wheel squeal is a high frequency tonal squeal generated by lateral slip at the wheel rail interface. Wheel squeal is usually generated on tight radius curves, though misaligned axles or bogies can also generate wheel squeal on tangent track. Long term monitoring by RailCorp has shown that wheel squeal noise levels can be well in excess of 100dBA at a distance of 15 metres from the track. Furthermore the high-frequency tonal characteristic of this squeal makes it clearly identifiable to surrounding receivers.

The likelihood of wheel squeal being generated at the ASP is decreased somewhat due to the low speed at which trains would travel. However, if wheel squeal is generated it would be clearly audible at many surrounding receivers.

As the prediction of wheel squeal is largely arbitrary, with noise levels and durations, as well as the frequency of occurrence varying considerably between sites, trains or even days, no numerical inclusion has been made in our assessment. Should wheel squeal be found to occur, after commissioning, then friction modifiers or other suitable source mitigation measures should be employed.

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4 SURROUNDING RESIDENTIAL RECEIVERS

The aerial photograph in Figure 4-1 shows the nearest residential and sensitive receivers are located in the following noise catchment areas (NCA):

1. To the south at the rear of properties along Sheffield Street approximately 250 metres from the stabling area. These are generally single storey residences, although some two-storey residences have been constructed. The closest residences have line of sight to the stabling area. These are currently exposed to some traffic noise as well as industrial noise.
2. To the south at the front of residences along Manchester Road approximately 250 metres from the stabling area. These are generally single storey residences, although some two-storey residences have been constructed. The closest residences have line of sight to the stabling area. These are exposed to relatively high levels of traffic noise as well as industrial noise from MainTrain.
3. To the south-east along The Crescent and over 600 metres from the stabling area, which is mostly shielded by the MainTrain buildings. These include some two-storey residences. St Josephs Hospital is located one block away on Normanby Road. These are exposed to relatively high levels of traffic noise as well as industrial noise.
4. To the west at residences on Seventh Street, Myrtle Street, Mimosa Street, Nielsen Street and Factory Street and further north in First and Second Street. These are generally single storey residences and are mostly shielded to the stabling area by other industrial buildings. The residences to the north in First Street are at least 350 metres from the Clyde neck (and much closer (150 metres) to the existing rail lines). These are exposed to some industrial noise.
5. To the east on the opposite side of the existing Main West Line rail corridor along Rawson Street. These are generally single storey residences approximately 600 metres from the stabling area. These are shielded by the existing rail line and industrial buildings. These are exposed to relatively high levels of traffic noise.

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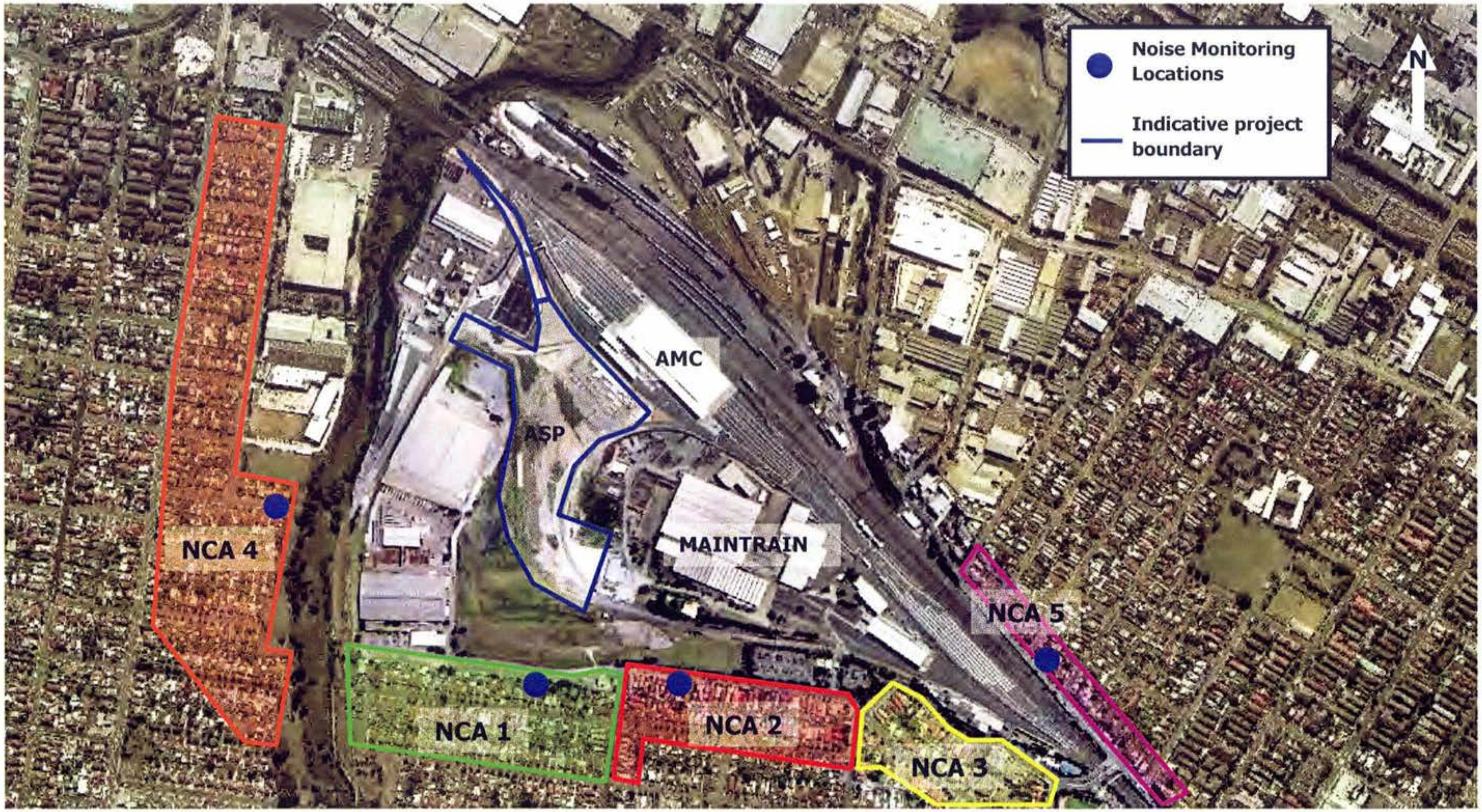
Figure 4-1 Noise Catchment Areas and Approximate Monitoring Locations



5 AMBIENT NOISE SURVEY

Determining appropriate noise criteria in accordance with the various NSW Government guidelines requires knowledge of the existing ambient noise environment at surrounding noise sensitive receivers. In this regard, noise from other rail activities within the Clyde Marshalling Yards is considered to be part of the existing ambient noise. The existing noise levels at the nearest residences were measured using attended and unattended noise monitoring.

Long-term unattended noise measurements were conducted generally from 14 May to 28 May 2010 at the following locations (refer Figure 4-1):

- NCA 1, 79 Sheffield Street – rear garden shielded from Manchester Road (data only from 16 May as logger memory full).
- NCA 2, 60 Manchester Road – front façade.
- NCA 4, 5 Seventh Street – side garden.
- NCA 5, 195 Rawson Street – front façade.

Due to the wet weather during this survey, seven days of valid data were not collected in the two week period. For this reason the noise loggers were redeployed from 1 July to 12 July 2010. The noise logging graphs are shown in WM Report 10083 Ver G.

It was not possible to deploy a logger securely at an appropriate residence in NCA 3 in The Crescent. However, as part of the attended survey noise monitoring was conducted during the daytime and night time at this location. Noise levels were similar to Manchester Road.

The unattended noise monitoring equipment used for these measurements consisted of three ARL EL215 and one RTA II environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1 per cent, 10 per cent and 90 per cent of the sample time respectively (see Glossary of Terms for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period and is used to calculate both the Assessment Background Level (ABL) and Rating Background Level (RBL). The L_{Aeq} level is the Equivalent Continuous Sound Level and has the same sound energy over the sampling period as the actual noise environment with its fluctuating sound levels. The L_{Aeq} is the standard descriptor for road, rail and industrial noise. Rail noise also requires consideration of typical L_{Amax} noise levels.

To supplement the unattended survey and assess the level of industrial noise at both day and night time, attended noise measurements were conducted at the same locations when the loggers were collected and also between 1.30am and 3.30am in the early hours of Friday 21 May 2010. The results are shown in Table 5-1.

All attended measurements were conducted using a Bruel and Kjaer Type 2260 Sound Level Meter. This sound level meter conforms to Australian Standard 1259 *Acoustics - Sound Level Meters* as a Type 1 Precision Sound Level Meter which has an accuracy suitable for field and laboratory use. The A-Weighting filter of the meter was selected and the time weighting was set to "Fast" so that quickly varying noise was recorded. The calibration of the meter was checked before and after the measurements with a Bruel and Kjaer Type 4231 sound level calibrator and no significant drift was noted.

Table 5-1 Attended Noise Level Results and Comments

Location & Time	**Time Period**				**Comments**
	Daytime (7am – 6pm)		**Night time (10pm – 7am)**		
	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}	
1 79 Sheffield Street (outside boundary) 2.30pm / 2.15am	44	53	40	44	Daytime traffic and industry including diesel locomotive at MainTrain, night time industry (MainTrain and from west) and intermittent rail noise from main line.
1(a) 79 Sheffield Street (within garden) 4.15pm	36	50	-	-	Daytime traffic and intermittent noise occurrences.
2 60 Manchester Road 9am / 2.30am	48	67	42	52	Daytime traffic and industry. Hum from industry audible during lulls in traffic noise. Night time levels influenced by industry (MainTrain) and intermittent rail noise from main line.
3 2A The Crescent 10.45am / 2.45am	55	67	40	54	Day and night traffic. Hum from MainTrain audible in the background during lulls in traffic noise plus intermittent noise occurrences. At daytime train idling at MainTrain resulting in elevated background.
4 5 Seventh Street 10.15am / 1.45am	36	40	40	50	Day traffic and industry. Night time hum from adjoining industry dominates plus intermittent noise occurrences.
5 195 Rawson Street 3.30pm / 3.15am	62	74	50	69	Day and night traffic and intermittent rail, freight trains, trains at Auburn Station.

The results of both periods of noise logging were processed in accordance with the Department of Environment, Climate Change and Water (DECCW) procedures to establish the RBLs and L_{Aeq} noise levels for each period of the day and are presented in Table 5-2 and Table 5-3.

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Table 5-2 Rating Background Levels (RBL)

NCA & Location	Time Period All levels dBA		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night time (10pm – 7am)
1 79 Sheffield Street	37	37	35
2 60 Manchester Road	41	41	38
3 The Crescent	No logger deployed as no secure location – see Table 5-1 for attended noise levels. RBL based on comparison to NCA 2 and considered to be 2dBA higher.		
4 5 Seventh Street	40	43	37
5 195 Rawson Street	53	50	46

The amenity criteria, to be discussed in the next section, are based on the existing industrial noise. The measured ambient L_{Aeq} levels from the logger data are given in Table 5-3.

Table 5-3 L_{Aeq} Noise Levels

Location	Time Period		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night time (10pm – 7am)
1 79 Sheffield Street	52	46	45
2 60 Manchester Road	65	62	59
3 The Crescent	No logger deployed as no secure location – see Table 5-1 for attended noise levels. LAeq based on comparison to NCA 2 and considered to be 2dBA higher.		
4 5 Seventh Street	55	55	47
5 195 Rawson Street	69	67	65

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6 OPERATIONAL NOISE ASSESSMENT

6.1 Operational Noise Criteria

This section of the report establishes site specific noise criteria for the assessment of operational noise for Stage One.

Rail noise is normally assessed using the NSW Government *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP) (DECC/DOP 2007). This document mainly relates to either new rail lines or redevelopment of existing rail lines and some other ancillary rail activities where noise is likely to be generated. Specifically, the document does not apply to projects involving maintenance facilities for rolling stock which it stipulates should be assessed in accordance with the NSW *Industrial Noise Policy* (INP) (NSW EPA 2000).

Whilst the ASP is not a maintenance facility, the types of activities occurring within the facility including trains in a stationary position "on air" with systems running and cleaning/ maintenance and preparation activities occurring would be more closely related to the type of noise generated for a maintenance facility than that from rail movements along a rail line.

Considering the information provided above and consistency with other similar recent projects, the area at which the tracks start to fan out entering the ASP has been assessed according to the INP. However, for the access rail lines to and from the stabling area, since the only activity occurring along these zones are rail movements typical of rail noise generation on any existing or new line, it is appropriate to assess the noise from these areas in accordance with the IGANRIP requirements.

In addition to assessment against INP and IGANRIP, assessment against DECCW guidelines for sleep disturbance has also been undertaken to determine the impact of short-term high noise level events such as train horns. Figure 6-1 below shows the areas of the ASP and the assessment approaches which apply for rail noise generated within these zones for Stage One.

Figure 6-1 Applicable Noise Assessment Guidelines

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6.1.1 Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP)

IGANRIP specifies trigger levels, which are non mandatory targets that can be used to initiate an assessment of noise impacts and consideration of feasible and reasonable mitigation measures.

For residential receivers the noise trigger levels for absolute levels of rail noise have two components, L_{Aeq} and L_{Amax}. The L_{Aeq} contribution level of rail noise is assessed over both day and night periods. The application of the L_{Amax} descriptor for residential land uses recognises that rail events are not adequately described solely by the L_{Aeq} descriptor in terms of their effect on residential amenity and wellbeing. Table 6-1 presents the IGANRIP noise trigger levels (both L_{Aeq} and L_{Amax} descriptors) for residential land uses.

Table 6-1 Airborne Rail Traffic Noise Trigger Levels for Residential Land Uses

<table>
<tr><th>Type of Development</th><th>Day (7am – 10pm)</th><th>Night (10pm – 7am)</th><th>Comment</th></tr>
<tr><td rowspan="2">New rail line development</td><td colspan="2">Development increases existing rail noise levels and resulting rail noise levels exceed:</td><td rowspan="2">These numbers represent external levels of noise that trigger the need for an assessment of the potential noise impacts from a rail infrastructure project.</td></tr>
<tr><td>60 $L_{Aeq(15hr)}$
80 L_{Amax}</td><td>55 $L_{Aeq(9hr)}$
80 L_{Amax}</td></tr>
<tr><td rowspan="2">Redevelopment of existing rail line</td><td colspan="2">Development increases existing rail noise levels and resulting rail noise levels exceed:</td><td rowspan="2">An 'increase' in existing rail noise levels is taken to be an increase of 2dBA or more in L_{Aeq} in any hour or an increase of 3dBA or more in L_{Amax}.</td></tr>
<tr><td>65 $L_{Aeq(15hr)}$
85 L_{Amax}</td><td>60 $L_{Aeq(9hr)}$
85 L_{Amax}</td></tr>
</table>

[Source: Extract of Table 1 of the DECCW's IGANRIP]

In determining whether a rail line is considered a new or redeveloped rail line IGANRIP states:

> *'Redevelopment of an existing rail line applies where residential or noise-sensitive receivers are subject to existing rail noise at or above the noise trigger levels in* [Table 6-1] *for a new rail line development.'*

However, to simplify the IGANRIP approach TCA adopt the most appropriate description for the proposed project and then apply that criterion to all receivers. In this case the determination of appropriate criteria was made in our initial report, considering the completed (all stages) ASP. As three of the five NCAs currently experience rail noise levels that are sufficiently low that the development would be classified a 'new rail line development', the trigger levels for a new rail line development would apply. For consistency these same criteria have been maintained.

In order for the development to be considered to exceed the above criteria the total rail noise must exceed the absolute level criteria and the increase in rail noise level must be sufficient to constitute an 'increase' as defined in Table 6-1.

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Typically assessment against IGANRIP requires knowledge of the existing rail noise levels at affected receivers. Determination of existing rail noise levels from the Main West Line has not been undertaken. In the absence of this information the night time trigger levels for a 'new rail line development' have been applied to rail noise from the ASP (i.e. 55 $L_{Aeq(9hr)}$ and 80 L_{Amax}).

Should predicted rail noise levels from the ASP approach these trigger levels further investigation may be warranted, however this is considered unlikely. This detailed investigation would include determination of existing rail noise levels and consideration of the most applicable criteria for each NCA.

6.1.2 Industrial Noise Policy (INP)

The INP is designed to assess noise using the following two approaches:

- Intrusive noise impacts in the short term for residences
- Amenity for particular land uses such as residences.

In relation to using the INP it is essential to define the project as only the noise from the proposed ASP and not other existing/approved rail noise associated with other separate rail activities within the Clyde Marshalling Yards, including the AMC and MainTrain Facility. Separately there are other industrial uses adjoining the site. Noise from these activities are all considered to form part of the ambient/background noise levels, such that the dual intrusiveness and amenity approaches allow appropriate criteria to be set.

Ultimately, since the AMC is constructed, but at the time of noise monitoring was not yet operational, and MainTrain does not regularly operate during the quietest hours in the middle of the night/early morning and the proposed stabling operations are most intensive at this time, the existing background noise levels at night time are currently not affected by other industrial noise from within the Clyde Marshalling Yards (i.e. they can be considered to be true background noise for the purpose of setting criteria for the ASP).

The INP intrusive goal is set 5dBA above the RBL for each time period (daytime, evening or night time). The RBL is derived from the measured background L_{A90} noise levels.

The amenity goal sets an upper limit to the total noise level ($L_{Aeq,period}$) in an area from all industrial noise (existing and future). The criterion depends on the time of day, area classifications and the relationship of the total measured $L_{Aeq,period}$ (and contribution from existing industrial noise) to determine the ANL for the ASP. Traffic noise may also be taken into account in areas where the noise environment is significantly affected by traffic noise including Rawson Street, The Crescent and Manchester Road. Similarly, consideration of future noise as a holistic approach (Section 2.2.4 of the INP) is required in determining amenity criteria for day, evening or night time.

The potentially most affected residential areas would all be classified as Suburban by the INP. Accordingly the acceptable amenity levels ($L_{Aeq,period}$) which apply over the whole day, evening or night period are as follows:

- Daytime (7am to 6pm) 55dBA
- Evening (6pm to 10pm) 45dBA
- Night time (10pm to 7am) 40dBA

Where the existing industrial noise is more than 2dBA above the acceptable levels, and the existing industrial noise is unlikely to decrease in the future, the amenity criterion is set at 10dBA below the existing levels.

Similarly in high traffic noise areas, where traffic noise is unlikely to decrease in the future, the amenity criterion is set at 10dBA below the existing traffic noise levels.

Determining site specific noise criteria for the residential receivers requires consideration of the measured levels to determine whether the intrusive criterion or amenity criterion is more stringent, although in some cases it is necessary to compare both criteria. To adopt one of the criterion, the review of data needs to address the difference between intrusiveness which is assessed over any 15 minute period, whereas amenity is assessed over 9 hours (night period). In addition, Manchester Road, The Crescent, and Rawson Street are high traffic noise areas. Table 6-2 presents the INP amenity criteria for each noise catchment area, for the day, evening and night periods with the inclusion of adjustments for high traffic noise levels.

Table 6-2 Amenity Criteria Allowing for High Traffic Noise $L_{Aeq,period}$

NCA	Time Period All levels dBA		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night time (10pm – 7am)
1 Sheffield Street	55	45	40
2 Manchester Road	55	52	49
3 The Crescent	57	54	51
4 Seventh Street	55	45	40
5 Rawson Street	59	57	55

In order to simplify the dual INP intrusive and amenity approach and to avoid having two different numerical criterion relating to different time periods, a typical busy 15 minute intrusive criterion can be adopted at all receivers which would ensure the amenity criterion (including high traffic areas) would be met over day, evening or night periods based on typical operations.

At Seventh Street the higher background noise levels in the evening are considered "real" and have been adopted, however since this period is not as sensitive as the night time period, this does not alter the consideration of overall noise impacts.

Table 6-3 Site Specific Residential Noise Criteria $L_{Aeq,15min}$

NCA	Time Period All levels dBA		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night time (10pm – 7am)
1 Sheffield Street	42	42	40
2 Manchester Road	46	46(1)	43(1)
3 The Crescent	48	48(1)	45(1)
4 Seventh Street	45	48(2)	42(3)
5 Rawson Street	58(1)	55(1)	51(1)

Notes: 1 Achieving the intrusive levels over a busy 15 minutes is estimated to achieve the high traffic amenity criterion over the relevant day, evening or night period.
2 Achieving these levels over a busy 15 minutes is estimated to achieve 45dBA over a 4 hour evening period.
3 Achieving these levels over a busy 15 minutes is estimated to achieve 40dBA over a 9 hour night period.

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There are no other noise sensitive receivers (such as hospitals or schools) sufficiently close to the ASP that could potentially be more affected than those receivers which have been identified. Therefore the identified study area is considered appropriate.

6.1.3 Sleep Disturbance

Short-term high noise level events such as train horns have the potential to cause sleep disturbance if they emerge significantly above the background level. Neither IGANRIP nor the INP specifically address sleep disturbance from these types of noise level events. IGANRIP does address sleep disturbance in relation to ground-borne noise from trains in tunnels, although this is not relevant for the ASP.

The DECCW recommends in their *Noise Guide to Local Government* (NGLG) that the $L_{A1,1min}$ noise level should not exceed the background L_{A90} level by more than 15dBA, which we consider should be used as a screening test. Meeting this goal is unlikely to result in sleep disturbance, however exceeding this goal does not necessarily mean sleep disturbance will occur. A more relevant document is the DECCW *Environmental Criteria for Road Traffic Noise* (ECRTN) which includes the following statements based on transportation type noise for internal noise levels.

'Maximum internal noise levels below 50-55dBA are unlikely to cause awakening reactions'

'One or two events per night, with maximum internal noise levels of 65-70dBA, are not likely to affect health and well being significantly.'

Given there would be more than one or two events per night, the 50-55dBA range inside should be adopted as a noise goal and allowing an industry accepted 10dBA difference from outside to inside with an open window, this equates to maximum external levels of 60-65dBA.

For residences in Manchester Road, The Crescent and Rawson Street, where there is already existing transportation noise and background noise levels are relatively high, the 50-55dBA internal level from the ECRTN is adopted (i.e. an external level of 60-65dBA).

For residences in Sheffield Street and to the west, where background levels at night are 35dBA and 37dBA respectively, as a conservative approach the DECCW goal of background + 15dBA is considered appropriate (i.e. 50dBA and 52dBA respectively) in the first instance as a screening criteria. Exceeding this screening criterion does not constitute non-compliance but rather indicates that further investigation is warranted. In this instance noise levels should be considered in greater detail, including the frequency of occurrence etc, and at this stage consideration of the ECRTN goals is appropriate.

Table 6-4 Summary of Recommended Night Time Noise Goals L_{Amax}

Location (NCA)(1)	Approach	Goal (dBA)
1	NGLG – RBL + 15dB	50
2	ECRTN 50-55dBA Internal + 10dB²	60-65
3	ECRTN 50-55dBA Internal + 10dB²	60-65
4	NGLG – RBL + 15dB	52
5	ECRTN 50-55dBA Internal + 10dB²	60-65

Notes: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.
2 10dBA has been allowed for the attenuation of sound from outside to inside. This is an industry accepted adjustment.

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6.2 Stabling Yard Operational Noise Assessment (INP and Sleep Disturbance)

Noise would be generated by train movements (arrivals and departures per weeknight) in and out of the stabling facility and whilst they are shunted around the facility. Some insignificant noise (as discussed earlier) would also be generated by the cleaning and minor maintenance processes. A sectioning hut may also be required as part of the ASP, however given the distance to the residences the noise levels from this component can be controlled, such that it would not measurably contribute to the noise levels from other activities.

Prior to departure, trains are prepared and inspected, which according to current RailCorp procedures requires testing the town and country horns. Another significant part of safe train operation is to sound the town horn to signal imminent movement upon departure. Given that the majority of departures, which require horns at each end of the train to be tested, would occur during the night time period (peak departure period 3am-5am) this particular operation would need to be considered carefully in the context of sleep disturbance to surrounding residences.

There is also potential for disturbance during the night time arrival period as a result of the noise associated with train movements. From Monday to Friday, the peak arrival period is between 9.00pm-10.00pm, however some trains are scheduled to arrive at the facility after this time and until 2.00am. On Saturday and Sunday nights, fewer trains are scheduled to arrive in the evening period; however, similarly to weeknights, several trains are scheduled to arrive up until 2.00am.

Based on the general description of proposed stabling operations over a 24 hour period, three operational scenarios have been identified for the purpose of providing a worst case noise assessment and presenting noise contours. These are described below.

- **Evening/Night Time Arrival Scenario –** During this late evening period (9.00pm to 12.00 midnight) it is likely a number of trains would arrive at the facility, go through their shut down procedure and be left in stabling mode during the night time period.
- **Night Time Stabling –** This scenario is meant to represent the typical operation during the middle of the night (1am to 3am) when all trains are stabled and some trains are being cleaned. This scenario would also be typical of the daytime period between the morning and afternoon peak hours when background noise levels would be significantly higher.
- **Early Morning Train Preparation and Departure –** This scenario represents the busiest time within the stabling facility as trains are being prepped for departure and start to depart the facility, representative of the time between 4am and 5am.

For the purpose of assessing the $L_{Aeq,9hr}$ rail noise on the approach to the stabling yards the total number of train arrivals and departures during the night time period has also been modelled.

6.2.1 Generic Noise Model Inputs

A computer noise model was developed using the CADNAA software. Topographic data for the site and immediate surrounds was obtained from TCA in the form of 0.5 metre equal height ground contours, which includes the design RL of the new stabling facility. Ground heights for the remainder of the study area were obtained from the Department of Lands topographic maps (10 metre contours). These were supplemented by observations made during our site survey and pertinent features, such as the road overpass at the eastern end of the ASP, were manually added.

Railway rolling noise levels were determined from RailCorp's *Rail Noise Database* (2003) and measurements undertaken by Wilkinson Murray at other similar facilities. A 6dBA correction was applied to the rolling noise (i.e. not to auxiliary systems) on a 10 metre section of the track in the vicinity of turnouts to account for the increase in noise compared with continuously welded track due to track discontinuity.

Noise levels from train auxiliary systems were determined from a review of previous assessments for similar RailCorp facilities and recent measurements of C and K sets as well as a Millennium set. These noise levels are detailed in Section 3.

The noise model assumed 10 degrees air temperature and 70 per cent relative humidity. Isothermal still conditions were modelled as representative of typical neutral night time conditions.

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6.2.2 Noise Modelling and Mitigation Process

The process for the assessment of the operational noise impacts of the stabling yard against the INP and sleep disturbance criteria, and the identification of possible mitigation measures, is identified below.

"Do Nothing" Scenario

The L_{Aeq} and L_{Amax} noise levels of the unmitigated Stage One facility were predicted and assessed against criteria.

Noise sources included in these scenarios were:

- Testing both town and country horns within the stabling yard
- Sounding the town horn to signal imminent movement
- Auxiliary systems
- Rolling noise

↓

Consideration of Available Mitigation

Mitigation measures available to minimise noise emissions were then reviewed for Stage One based on following prioritisation:

1. Continuous noise L_{Aeq}: auxiliary systems etc.
2. Intermittent noise L_{Aeq}: from intermittent events such as train arrivals and departures in the absence of horn noise.
3. Intermittent noise L_{Amax}: again in the absence of horn noise. Events such as brake exhaustion on arrival.
4. Horn noise L_{Aeq}: the L_{Aeq} noise level for arrivals and departures with the inclusion of horn noise.
5. Horn noise L_{Amax}: the instantaneous noise levels produced by horns with the potential to cause sleep disturbance.

The above prioritisation was applied to simplify the potential combinations of mitigation options. By examining noise emissions in this order the minimum mitigation measures which are possible to mitigate continuous or non-removable noise sources have been included in all mitigation options for the louder noise sources such as horns.

↓

Mitigation Selection

Applying the above methodology, the following mitigation priorities were developed for Stage One:

1. Engineering: 3 metre barrier in strategic locations.
2. Removal: Testing only the town horns (and not the country horns).
3. Removal: Testing only the leading horns (and not the trailing horns).
4. Substitution: Signalling imminent movement with either a short toot (for non-solenoid activated horns) or with a broadband yard horn ("Quacker") on newer trains.

The scenarios considering each of the above mitigation options are cumulative, i.e. Scenario 2 includes the mitigation measures in Scenario 1. The only exception to this is Scenario 6, which includes measures in Scenarios 1-4 but excludes Scenario 5.

6.2.3 Evening/Night Time Arrival

The evening/night time arrival scenario represents the predicted noise emissions from the facility with some trains stabled and others progressively arriving. The modelled scenario would occur typically between 7-10pm on weeknights during the peak arrival period, though train arrivals would continue beyond this period. Similar noise levels, in particular L_{Amax} noise levels, would result from the sporadic arrival of trains later at night.

Note that this portion of the assessment is considered in relation to the INP and thus does not consider the noise from the rail neck approaching the facility. This is assessed in Section 6.3.

Based on the information provided by RailCorp the following features were modelled to be representative of a typical worst-case scenario:

- All 11 tracks would be operational during this time.
- Stabled Trains: Two K Sets and one C Set with auxiliary systems operating, five A Sets with pantographs down (unpowered).
- 2 K Sets entering from the west at 13 km/h.
- Brake exhaustion upon arrival. A Sound Exposure Level (SEL) for these events was determined based on a 5 second duration, $L_{A1,1min}$ 120dBA and a 10dB/sec decay.

Table 6-5 and Table 6-6 present a summary of the modelling results for this scenario. Noise contours are shown in Appendix B and a full table of results at each receiver in the NCA is included in Appendix C.

Table 6-5 Evening/Night Time Arrival $L_{Aeq,15min}$ Predicted Results Summary

NCA(1)	$L_{Aeq,15min}$ Criteria(2) (dBA)	Predicted $L_{Aeq,15min}$ Range (dBA)	Number of receivers Exceeding Criteria	No. of Receivers in NCA
1	40	16 - 39	0	68
2	43	17 - 37	0	127
3	45	7 - 29	0	37
4	42	11 - 34	0	201
5	51	23 - 33	0	31

Notes: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.
2 Criteria derived from INP.

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Table 6-6 Evening/Night Time Brake Exhaustion L_{Amax} Predicted Results Summary

NCA[1]	L_{AMax} Goal (dBA)	Predicted L_{Amax} Range (dBA)	Number Exceeding Goal	No. of Receivers in NCA
1	50	32 - 54	4 (All comply with ECRTN)	68
2	60	32 - 53	0	127
3	60	23 - 44	0	37
4	52	24 - 52	0	201
5	60	36 - 46	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

The $L_{Aeq,15min}$ noise level from this scenario is predicted to comply with criteria at all receivers.

Four receivers in NCA 1 are predicted to receive noise levels exceeding the sleep disturbance screening goal by up to 4dB. The ECRTN goal of 60dBA is achieved at all receivers.

6.2.4 Night Time Stabling

This scenario represents the predicted noise emissions from the facility with all trains stabled. This scenario would typically occur between approximately 1am and 3am.

Based on the information provided by RailCorp the following features were modelled to be representative of a typical worst-case scenario:

- Five K Sets trains stabled with auxiliary systems operating.
- Six Waratah trains (A Sets) stabled with pantographs down in sleep mode (i.e. auxiliary systems not operating).
- 50 per cent load on AC systems which is considered conservatively high.
- Auxiliary systems on the stabled trains were modelled by individual point sources.
- A sound power level of 95dBA for hand tools used for maintenance was included in two discrete locations near each end of the facility though, as stated, this source had a negligible impact on the overall noise emissions from the site.

Table 6-7 presents a summary of the modelling results for this scenario. It is noted that this modelled scenario does not include the horn or sleep disturbance criteria scenario as all trains are stabled. Noise contours are included at Appendix B and a full table of results at each receiver in the NCA is included at Appendix C.

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Table 6-7 Night Time Stabling $L_{Aeq,15min}$ Predicted Results Summary

NCA(1)	$L_{Aeq,15min}$ Criteria (dBA)	Predicted $L_{Aeq,15min}$ Range (dBA)	Number Exceeding Criteria	No. of Receivers in NCA
1	40	14 - 36	0	68
2	43	15 - 35	0	127
3	45	5 - 28	0	37
4	42	10 - 32	0	201
5	50	22 - 31	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

A review of these results shows that all receivers are predicted to comply with the relevant $L_{Aeq,15min}$ criteria.

6.2.5 Early Morning Train Preparation and Departure

This scenario represents the predicted noise emissions from the facility in the early morning period when stabled trains are being prepared to return to service. The A Sets are scheduled to primarily depart between 3.00am and 4.30am. In the hour prior to their departure A Sets would raise their pantographs and run auxiliary systems. In the context of the total noise emissions from the entire site the noise from several A sets would make negligible difference to the noise level because all the stabled K Sets would be operating. K Sets are scheduled to depart primarily between 4am and 5am, after the A Sets.

RailCorp is currently reviewing the horn testing/sounding procedure. Outcomes of this assessment may involve modification of the horn testing procedure, but would require a full review by RailCorp prior to implementation. Current operating procedure requires both town and country horns are sounded at both ends of the train as part of the testing procedure. The town horn would also be sounded at the leading end of the train to warn of imminent movement upon departure. Modifications to this procedure, including only testing the leading town horn, testing horns outside the stabling yard and using a broadband yard horn to warn of imminent movement within the ASP are considered in Section 6.4.

Based on the information provided by RailCorp the following features were modelled to be representative of a typical worst-case scenario:

- Two K Sets stabled with auxiliary systems operating.
- Two K Sets departing.
- Levels were calculated both with and without the horn test procedure in order to demonstrate the contribution of this activity to overall receiver levels. Levels presented without the horn test also exclude any horn used to signal imminent movement.

Table 6-8 present a summary $L_{Aeq,15min}$ of the modelling results for this scenario. Noise contours are shown in Appendix B and a full table of results at each receiver in the NCA is included in Appendix C.

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Table 6-8 Early Morning Preparation and Departure $L_{Aeq,15min}$ Predicted Results Summary

NCA(1)	$L_{Aeq,15min}$ Criteria (dBA)	Predicted $L_{Aeq,15min}$ Range (dBA)		Number Exceeding Criteria		No. of Receivers in NCA
		Without Horns	With Horns	Without Horns	With Horns	
1	40	15 - 38	26 - 53	0	54	68
2	43	16 - 36	26 - 50	0	33	127
3	45	7 - 29	13 - 37	0	0	37
4	42	11 - 33	18 - 43	0	2	201
5	50	23 - 32	28 - 38	0	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

Table 6-9 Early Morning Preparation and Departure L_{Amax} Predicted Results Summary – Horn at Auburn End

NCA(1)	L_{Amax} Goal (dBA)	Predicted L_{Amax} Range (dBA)		Number Exceeding Goal		No. of Receivers in NCA
		Town Horn Auburn End	Country Horn Auburn End	Town Horn Auburn End	Country Horn Auburn End	
1	50	43 - 72	49 - 78	63	67	68
2	60	44 - 69	50 - 75	56	105	127
3	60	29 - 55	35 - 61	0	1	37
4	52	28 - 62	34 - 68	70	86	201
5	60	41 - 48	47 - 54	0	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

Table 6-10 Early Morning Preparation and Departure L_{Amax} Predicted Results Summary – Horn at Clyde End

NCA(1)	L_{Amax} Goal (dBA)	Predicted L_{Amax} Range (dBA)		Number Exceeding Goal		No. of Receivers in NCA
		Town Horn Clyde End	Country Horn Clyde End	Town Horn Clyde End	Country Horn Clyde End	
1	50	34 - 56	41 - 63	25	59	68
2	60	27 - 52	34 - 59	0	0	127
3	60	25 - 47	31 - 53	0	0	37
4	52	31 - 56	38 - 61	10	64	201
5	60	34 - 56	38 - 63	0	4	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

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$L_{Aeq,15min}$ levels produced by the horn preparation are predicted to exceed criteria at receivers in NCA 1, 2 and 4. In the absence of these horn events the $L_{Aeq,15min}$ criteria are predicted to be satisfied.

A review of these results shows that many of the identified receivers are predicted to receive L_{Amax} noise levels well in excess of sleep disturbance screening criteria. The greatest noise levels are predicted to occur in NCAs 1, 2 and 4. Noise contours for this scenario indicate that exceedances would also be expected some distance outside the study area.

6.3 Operational Rail Noise on the Approach Neck (IGANRIP)

Noise on the rail tracks connecting the facility to the Main West Line are assessed in accordance with IGANRIP. Because the majority of movements would occur in the more sensitive night time period, when criteria are lower, only the $L_{Aeq,9hr}$ night time noise level has been calculated.

Based on the information provided by RailCorp the following features were modelled to be representative of a typical worst-case scenario:

- Two C Sets entering and then leaving with auxiliary systems operating travelling at 25km/h.
- Five K Sets trains entering and then leaving with auxiliary systems operating travelling at 25km/h.
- Four A Sets trains entering and then leaving with auxiliary systems operating travelling at 25km/h.
- A 6dBA correction for the increased noise over turnouts was applied over a 10 metre section of track.
- All levels are predicted at the façade of the residence in accordance with IGANRIP requirements which includes a 2.5dBA allowance.

Table 6-11 and Table 6-12 present a summary of the modelling results for this scenario.

Table 6-11 Night Time IGANRIP $L_{Aeq,9hr}$ Predicted Results Summary

NCA(1)	$L_{Aeq,9hr}$ Trigger Levels (dBA)	Predicted $L_{Aeq,9hr}$ Range (dBA)	Number of Receivers Exceeding Trigger Levels	No. of Receivers in NCA
1	55	6 - 24	0	68
2		0 - 24	0	127
3		0 - 20	0	37
4		8 - 29	0	201
5		7 - 22	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

The $L_{Aeq,9hr}$ noise levels are well below the relevant trigger levels. This is to be expected for such a small number of events, relative to a busy main line, occurring at low speeds and with considerable setback to receivers.

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Table 6-12 Rail Neck L_{Amax} Predicted Results Summary

NCA(1)	L_{Amax} Trigger Levels (dBA)	Predicted L_{Amax} Range (dBA)	Number Exceeding Trigger Levels	No. of Receivers in NCA
1	80	39 - 50	0	68
2		34 - 49	0	127
3		32 - 46	0	37
4		40 - 51	0	201
5		39 - 45	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

L_{Amax} noise levels from train passbys are also predicted to be well within IGANRIP trigger levels.

6.4 Operational Noise Mitigation Options for Stage One

This section of the report considers the need and options for mitigation with and without the use of horns on the site. RailCorp has advised that they are currently reviewing the operating procedures to identify measures by which the impact of train horn noise can be minimised, while also ensuring that future trains operate in a safe manner. At this stage, RailCorp has identified the following means of minimising the impact of horn use at the ASP:

- Use of a broadband yard horn to warn of impending train movement within the stabling yard
- Eliminating the need to sound country horns
- Eliminating the need to test trailing horns

RailCorp proposes to implement these operational changes subject to the required assessment of safety and operational aspects and obtaining all necessary approvals. Assuming these changes are acceptable, RailCorp envisage that these approvals would be resolved ahead of project completion of the ASP.

6.4.1 Arrival and Stabling L_{Aeq} Noise without Horns

The noise predictions indicate that $L_{Aeq,15min}$ noise levels will satisfy DECCW guidelines. As such mitigation of these sources would not be necessary.

6.4.2 Arrival and Stabling L_{Amax} Noise without Horns

Brake exhaustion is predicted to produce L_{Amax} noise levels exceeding sleep disturbance screening criteria by up to 4dB at 4 receivers in NCA 1.

This magnitude of exceedance is not considered significant and possibly doesn't warrant mitigation. However some potential noise impacts from the use of horns is predicted and so consideration of a barrier at this stage, which would also mitigate other scenarios, is considered reasonable.

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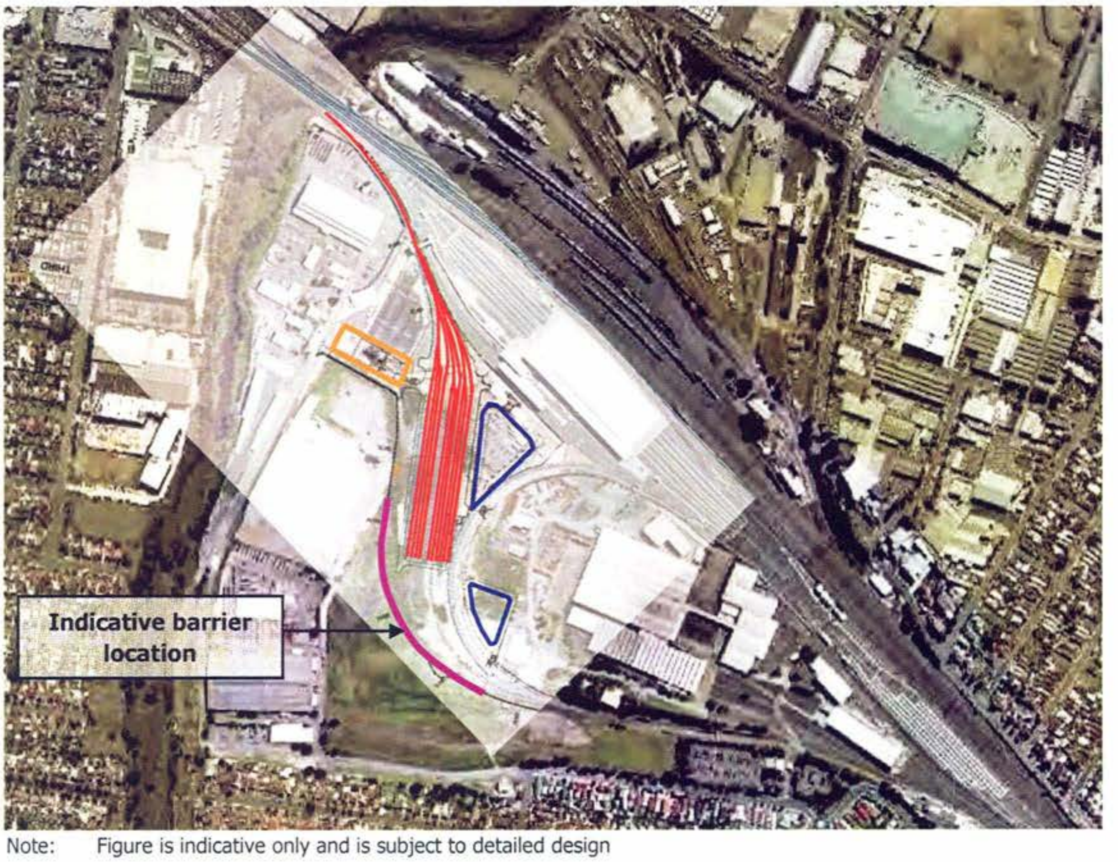
Furthermore many receivers are predicted to receive noise levels approaching the $L_{Aeq,15min}$ criteria so any benefits gained through mitigating the brake exhaustion noise, through means of a barrier, would also provide benefits to these receivers.

Figure 6-2 shows an indicative 3 metre noise barrier in red for Stage One. The location of the barrier in Figure 6-2 has been identified for the purposes of determining the potential noise benefit achieved by this form of mitigation. The location, length, height and materials of the proposed noise barrier are subject to detailed design and the design of this barrier, including the removal of some sections, may be altered at this stage.

Table 6-13 presents the predicted brake exhaustion L_{Amax} noise levels with the inclusion of the indicative barrier. The height of this indicative barrier has a top reduced level (RL) of 14 metres (varies in height above the ground). For reference this is approximately 3 metres above the height of the stabling yard.

Figure 6-2 Preliminary Modelled Barrier Location for Stage One



Note: Figure is indicative only and is subject to detailed design

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Table 6-13 Evening/Night Time Brake Exhaustion L_{Amax} Predicted Results Summary with a 3 metre Barrier

NCA(1)	L_{Amax} Goal (dBA)	Predicted L_{Amax} Range (dBA)	Number Exceeding Goal	No. of Receivers in NCA
1	50	30 - 49	0	68
2	60	29 - 52	0	127
3	60	18 - 40	0	37
4	52	23 - 46	0	201
5	60	33 - 44	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

With the inclusion of the 3 metre barrier the L_{Amax} noise levels are predicted to comply at all receivers for Stage One.

Note that the assessment of this mitigation measure excludes horn noise which is dealt with separately below.

6.4.3 Horn Noise

In relation to horn noise, it is expected that a management strategy would need to be investigated for the ASP to minimise the need for sounding of both the town and country horns (without compromising safety) and provide additional mitigation measures if necessary. Clearly reducing the maximum noise level and/or the number of occurrences would minimise potential impacts.

The use of country horns within the yard is predicted to cause the highest noise levels. Therefore removing the need to test these horns in the facility presents an effective mitigation option.

Under current RailCorp procedures, the greatest operational noise impact occurs from the testing of the horn at the southern end of the trains. In this regard, there is an opportunity to eliminate the testing of trailing horns, thus limiting horn usage to the northern (Clyde) end of the yard.

Further reduction in the number of horn events would be achieved if an alternative method is used to signal imminent movement within the facility. It is envisaged that, as a minimum, older non-solenoid activated horns could be sounded as a short "toot" and that the new A Sets could be fitted with a broadband yard horn (e.g. "quacker"). There is potential for the older train sets (i.e. C and K sets) to be retrofitted with broadband yard horns; however it is unlikely that this would be implemented prior to the operation of Stage One of the ASP.

6.4.4 Mitigating Horn Noise within the ASP

Noise levels with the barrier shown in Figure 6-2 have been calculated with the inclusion of horn noise. As this barrier, or a portion of it, is considered necessary to mitigate brake exhaustion noise, this scenario is considered to present the "starting" condition for horn noise mitigation. All subsequent mitigation options would also include this barrier.

For continuity only relevant scenarios are presented and these are generally limited to the worst case scenario for each mitigation option.

Table 6-14 and Table 6-15 present a summary of the results with a 3 metre barrier and can be used as the basis for assessing further mitigation options discussed later in this Section.

Table 6-14 Early Morning Preparation and Departure $L_{Aeq,15min}$ Predicted Results Summary – Testing Town and Country Horns within ASP with Modelled Barriers

NCA(1)	$L_{Aeq,15min}$ Criteria (dBA)	Predicted $L_{Aeq,15min}$ Range (dBA)	Number Exceeding Criteria	No. of Receivers in NCA
1	40	26 - 48	45	68
2	43	25 - 49	31	127
3	45	12 - 36	0	37
4	42	18 - 39	0	201
5	50	28 - 38	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

Table 6-15 Early Morning Preparation and Departure L_{Amax} Predicted Results Summary – Testing Town and Country Horns within ASP with Modelled Barriers

NCA(1)	L_{Amax} Goal (dBA)	Predicted L_{Amax} Range (dBA)		Number Exceeding Goal		No. of Receivers in NCA
		Country Horn Clyde End	Country Horn Auburn End	Clyde End	Auburn End	
1	50	41 - 58	49 - 73	54	67	68
2	60	34 - 59	50 - 74	0	105	127
3	60	31 - 53	35 - 60	0	0	37
4	52	38 - 61	35 - 64	64	86	201
5	60	38 - 63	47 - 53	4	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

The results show that significant exceedances of both L_{Aeq} and L_{Amax} criteria are predicted even allowing for the 3 metre barrier. Therefore consideration of additional mitigation is necessary.

Modelling showed little benefits in raising the height of this barrier to 6m (which is considered to be the highest practical barrier for engineering reasons).

6.4.5 Testing Only Town Horns

Country horns are responsible for the greatest noise emissions. Testing only town horns in the facility would present a significant reduction in noise emissions.

Table 6-16 and Table 6-17 present the predicted worst case noise levels from testing the town horn only. Note that this assumes the 3 metre barrier discussed previously.

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Table 6-16 Early Morning Preparation and Departure $L_{Aeq,15min}$ Predicted Results Summary – Testing Town Horns within ASP with Modelled Barriers

NCA(1)	$L_{Aeq,15min}$ Criteria (dBA)	Predicted $L_{Aeq,15min}$ Range (dBA)	Number Exceeding Criteria	No. of Receivers in NCA
1	40	21 - 41	9	68
2	43	20 - 43	0	127
3	45	8 - 31	0	37
4	42	14 - 36	0	201
5	50	24 - 35	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

Table 6-17 Early Morning Preparation and Departure L_{Amax} Predicted Results Summary – Testing Town Horns within ASP with Modelled Barriers

NCA(1)	L_{Amax} Goal (dBA)	Predicted L_{Amax} Range (dBA)		Number Exceeding Goal		No. of Receivers in NCA
		Town Horn Clyde End	Town Horn Auburn End	Town Horn Clyde End	Town Horn Auburn End	
1	50	35 - 52	43 - 67	27	62	68
2	60	28 - 53	44 - 68	0	48	127
3	60	25 - 47	29 - 54	0	0	37
4	52	32 - 55	29 - 58	9	39	201
5	60	32 - 57	41 - 47	0	0	31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

The results show significant reductions as compared with testing country horns. Nine receivers in NCA 1 are predicted to exceed L_{Aeq} criteria, however the magnitude of these exceedances is limited to 1dB. A 1dB exceedance is considered negligible. All receivers in other NCAs are predicted to comply with L_{Aeq} criteria.

L_{Amax} noise levels are still predicted to significantly exceed sleep disturbance screening goal, though the number and magnitude of predicted exceedances is reduced.

The greatest residual noise impacts are predicted to result from testing the town horn at the southern end of the facility.

6.4.6 Testing Only Leading Horns

Testing trailing horns has a significant impact on receiver noise levels. By removing the need to test this horn, the worst-case $L_{Aeq,15min}$ would reduce by 1-2dB at most receivers.

Table 6-17 shows that far fewer exceedances of L_{Amax} goals are predicted to occur from the use of horns at the Clyde end as compared to the Auburn end. Therefore eliminating the need to sound trailing horns, which for Stage One means the horns at the Auburn end, is considered to present significant benefits.

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Further examination of the noise levels in NCAs predicted to contain exceedances with only leading town horns, shows L_{Amax} noise levels up to 52dBA and 55dBA in NCA 1 and 4 respectively. These represent 2dB and 3dB exceedances of the respective goals.

This does not mean that awakening reactions are actually likely from these events, but only that further investigation is warranted. The probability of awakening reactions is dependant on a number of factors including the existing ambient environment and individual's sensitivities to noise events. Statistically the likelihood of these events causing awakening reactions is quite low (once individuals are conditioned to having these events in their noise environment). Compiling the results of 11 studies into the probability of awakening Bullen, Hede and Williams[1] conclude that the probability of an average person awakening from internal noise levels of 46dBA (allowing 10dB attenuation through an open window) is less than 1 per cent. Depending on the controls implemented on horn usage, this would correspond to between one awakening every 10 nights and one every 3 nights.

For reference, studies indicate that the average person experiences approximately 1.5 (remembered) awakenings per night for reasons unrelated to noise.

In this context the noise levels predicted to be produced by town horns, with the mitigation discussed (3m barrier, leading horns only), are considered acceptable.

6.4.7 Alternative Methods for Signalling Imminent Movement

With the elimination of country horns and trailing horns, the town horn would be sounded twice per train preparation; once as a test and again to signal imminent movement. This section of the report investigates alternatives to a full town horn blast to signal imminent movement.

We note that these alternatives would not negate the need to sound the horn as part of the testing procedure and so consider that the mitigation options discussed here would also require the implementation of other mitigation measures discussed up to this point.

The assessment assumes that older trains, which activate the horn via a manual valve, would be operated such that only a "toot" is produced. RailCorp has informed us that such a "toot" has been measured to produce a L_{Amax} sound power level of 110dBA. The duration of this event would be sufficiently short that L_{Aeq} emissions are negligible.

The new A Sets are capable of being fitted with a broadband yard horn (commonly referred to as a "quacker"). These are being trialled by RailCorp to signal imminent movement in lieu of a horn. The procedure using this alarm involves sounding the alarm, which has a maximum sound power level of 110dBA for 30 seconds. Considering this source averaged over a 15 minute period the L_{Aeq} is below the cumulative auxiliary systems noise, which has been demonstrated to comply without the 3 metre barrier.

Therefore, quantitative assessment of the L_{Aeq} from these alternatives is not warranted as they would be compliant without the provision of the 3 metre barrier.

Similarly, the L_{Amax} noise level is much lower than that of the brake exhaustion which was shown to comply with the sleep disturbance goal with the inclusion of the 3 metre barrier. Therefore, L_{Amax} noise levels from either the "toot" or broadband yard horn would also be compliant.

[1] "*Sleep Disturbance Due to Environmental Noise: A Proposed Assessment Index*", Robert Bullen, Andrew Hede, Tony Williams, Acoustics Australia, 1996

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6.4.8 Horn Testing at Clyde Station

RailCorp have indicated that one train per night will be required to exit the ASP to Clyde station before departing towards the city. In the even that procedures are modified so that trailing horns are not required to be tested in the ASP, this train will require the city-bound horn to be tested at Clyde station. Though this event will occur outside the ASP and is in effect on the return journey of the train, it is sufficiently close to the ASP to warrant consideration.

Sounding horns in Clyde station is favourable from an acoustic perspective. The surrounding land uses are generally commercial or industrial and as such will not be impacted during the early morning period. The nearest residential receivers are located in William and Factory Streets. These locations are shielded by surrounding industrial buildings and also benefit from reduced noise levels due to the train horn's directivity. Furthermore these residences are exposed to existing rail noise, which includes freight trains, and so the relative impact of additional low-level noise from horns will be reduced. The nearest unshielded receivers are over 1000m to the southeast, adjacent to the railway line.

In the context of the existing railway environment we consider that Clyde station provides an ideal location to test 1-2 horns per night. It is likely that the receivers potentially impacted by these events will associate these events with the existing railway noise.

6.4.9 Minor Maintenance and Cleaning

In relation to cleaning and minor maintenance, no mitigation is considered necessary. If possible, procedures should be in place to ensure that trains requiring noisier maintenance are located such that other trains can provide some degree of shielding for noise-sensitive receivers.

Should a particular maintenance activity be determined to be unacceptable in terms of potential noise impacts, it should be deemed a major maintenance activity which is not suitable to occur at this particular site. The Operational Noise and Vibration Management Plan for the site would need to adopt the sleep disturbance criteria for maintenance activities. It is recommended that noise monitoring be undertaken during the early years of operation to determine which activities are suitable to occur at the site. The duration that this monitoring is required to be undertaken will be dependant on the variability of activities within the facility and the results of initial noise monitoring. The details of the monitoring regime would be provided in the Operational Noise and Vibration Management Plan.

6.4.10 Wheel Squeal

Technologies for mitigating wheel squeal are developing. It is considered that for newly installed track, the design (including superelevation on radius) should incorporate best practice mitigation measures to eliminate wheel squeal.

Stage One of the ASP is considered unlikely to generate wheel squeal due to the absence of sustained small radius bends. However, should wheel squeal be found to occur, after commissioning, then suitable source mitigation measures would need to be investigated and employed.

6.5 Recommended Operational Noise Mitigation Measures

Based on the assessment of the potential mitigation options, the following mitigation measures are recommended to minimise the operational noise impacts associated with Stage One of the ASP:

- A yard horn or a short toot of the town horn would be used to warn of impending train movement within the stabling yard.
- Approximately 3 metre high noise barriers would be provided in strategic locations around the stabling yard. The exact location and length of the noise walls would be determined during detailed design. To achieve maximum noise attenuation benefit, the noise wall would be constructed as close to the noise source as possible.
- Train horn testing would only be undertaken on the leading (forward facing) town horn of the train prior to departure.

The implementation of these measures is subject to the required assessment of safety and operational aspects and obtaining all necessary approvals.

An Operational Noise and Vibration Management Plan would be prepared during the detailed design phase of the project. The Plan would provide the following in respect of Stage One of the ASP:

- Identify the specific mitigation measures for controlling operational noise from Stage One of the ASP, including the location, type and timing for the erection of operational noise barriers and/or other noise mitigation measures.
- Include a consultation strategy to seek feedback from affected property owners on the specific mitigation measures.
- Predict the operational noise impacts at sensitive receivers based on the final design of Stage One of the ASP.
- Identify a program for post-operation noise monitoring at representative locations to confirm the predicted noise source levels and to demonstrate compliance. If it is identified during the post-operation noise monitoring that the relevant noise criteria are exceeded, further noise modelling would be undertaken to investigate the potential for further management measures, if required.

Due to the relatively low train speeds to access the ASP, the noise impacts resulting from train movements and wheal squeal would be minimal. To date, a number of design measures have been incorporated to minimise these potential noise impacts. Such measures include continuously welded track, the use of ballast along the access tracks, and utilising the natural landscape, where possible, to provide noise attenuation. The detailed design phase of the ASP would continue to consider and identify ways to minimise potential noise impacts. Should a wheel squeal impact be identified during the post operational noise monitoring, friction modifiers or other suitable source mitigation measures would be employed.

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7 OPERATIONAL VIBRATION ASSESSMENT

Operational vibration can be generated through the wheel rail interface and then transmitted through the ground to nearby sensitive receivers. Vibration is normally considered in relation to the risk to structural or architectural damage to buildings and also human comfort within buildings. In some instances it may also be necessary to consider the effects on sensitive equipment such as medical imaging.

Various standards, such as German Standard DIN 4150 and British Standard BS 7385: Part 2 – 1993, set vibration limits to protect buildings against damage resulting from operational vibration. Guidelines for human comfort within buildings are given by the DECCW in their document *Environmental Noise Management: Assessing Vibration A Technical Guideline*, and these are based on BS 6472:1992. Of all the considerations, the human comfort limits are the most stringent, in the sense that where compliance with these limits is achieved, compliance with the other objectives would also be achieved.

7.1 Protecting Neighbouring Buildings and Structures

The German Standard DIN 4150 suggests a limit for short-term vibration in residential buildings in terms of peak particle vibration velocity (PPV). This limit depends on the vibration frequency, but is as low as 5 millimetres per second at 10 Hertz. Similarly, the British Standard BS 7385: Part 2 – 1993 sets a limit that also depends on the vibration frequency, but is as low as 7.5 millimetres per second PPV (at 4.5 Hertz). For the likely frequency content associated with trains, a limit of approximately 10 millimetres per second PPV can be conservatively applied, based on either of these standards.

For commercial receivers in modern reinforced concrete framed structures, higher limits of 25 millimetres per second would apply in accordance with the British Standard. For vibration-sensitive heritage buildings, a vibration limit of 3 millimetres per second is suggested by DIN 4150. However, it is understood that there are no such buildings close to the proposed track.

7.2 Prevention of Disturbance of Human Comfort

British Standard BS 6472:1992 sets vibration limits for human comfort in terms of a vibration dose value (VDV), which is expressed in units of metres per second$^{1.75}$. This is calculated from the weighted acceleration measured during each pass-by, and summed over pass-bys using a root-mean-quad procedure. Vibration should be measured at the point of entry to the affected person, which is often taken to occur at the centre of a floor span. However, vibration levels measured in the ground outside a residence can generally be taken as a conservative estimate of these levels.

Criteria derived from BS 6472:1992, expressed in terms of the VDV, include:

- residential buildings, daytime (7am-10pm): 0.2 to 0.4
- residential buildings, night time (10pm-7am): 0.13.

These criteria define conditions that the Standard describes as giving "low probability of adverse comment", and do not necessarily imply that vibration would not be detectable.

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7.3 Assessment of Operational Vibration

From an operational perspective, trains would be moving at relatively low speed (less than 25km/hr) along the neck and into the stabling facility. The nearest receivers are approximately 250 metres away from the stabling area and 250 metres away from the approach neck. At these distances with slow train speeds and relatively low number of movements, it is expected vibration would not be perceptible and would be below both structural damage and human comfort limits.

Based on the above, it is not considered that operational vibration impacts warrant further detailed assessment.

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8 CONSTRUCTION NOISE AND VIBRATION

Given the residential setbacks from the major locations of construction activity and the likelihood that the vast majority of works would be undertaken during standard construction hours, the impacts of noise during the construction period are considered relatively low, albeit construction noise at times would be clearly audible.

Given there are requirements to integrate the ASP with the existing Main West Line, certain construction works would need to be undertaken during rail track shutdowns in order to finish works in a safe and timely manner. These works would typically occur over a few weekends and possibly into the evening and night time periods in conjunction with shutdowns for other works, so are not addressed in detail in this report. These works would be located at the end of the Clyde neck and would typically include the installation of new turnouts and provision of overhead wiring. For daytime works criteria are expected to be achieved, but if these works are required at night time some exceedances are likely in First and Second Streets.

These works would all require more detailed assessment prior to construction approval, to identify if and where exceedances are likely and address feasible and reasonable mitigation measures.

Two scenarios have also been considered for the construction noise assessment, based on duration of works and proximity to residences described as follows:

- **Stabling Yard:** The bulk of the activity would occur around the stabling area itself with the capping process earthworks to bring the ground to the finished level then associated track works and other rail infrastructure/superstructure. The highest noise generation is likely to occur during the earthworks phase.
- **Clyde Neck Trackwork:** The Clyde neck would require the installation of new track linking the facility to the main line. These works would also incorporate the construction of new turnouts on the main line.

8.1 Construction Noise Criteria for Residences

The NSW DECCW Interim Construction Noise Guideline recommends the following objectives:

Recommended standard hours of work:

- Monday to Friday 7am to 6pm
- Saturday 8am to 1pm
- No work on Sundays or Public Holidays

Quantitative Management Noise Goals

Noise goals are detailed in Table 8-1.

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Table 8-1 Noise at Residences using Quantitative Assessment

Time of Day	Management Level $L_{Aeq\ (15\ min)}$	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10dB(A)	• The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	• The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noisy such as before and after schools, or mid-morning or mid-afternoon for works near residences; and 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

The proposed construction hours are 7am to 6pm Monday to Friday and 8am to 1pm Saturday. The criteria specific to this project based on background noise levels presented in Section 5 are shown in Table 8-2.

Table 8-2 L_{Aeq} Construction Noise Criteria

Location	Criteria (L_{Aeq})
1 79 Sheffield Street	47
2 60 Manchester Road	51
3 2A The Crescent	53
4 5 Seventh Street	50
5 195 Rawson Street	63

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8.2 Predicted Construction Noise Levels

The proposed construction period is to be approximately two years commencing in late 2011 for site remediation and 2012 and 2013 for construction.

The typical L_{Aeq} Sound Power Level (SWL) of all the plant likely to be used at various stages of works is identified in Table 8-3. These SWLs have been determined from Wilkinson Murray's database of measured noise levels at other similar construction sites under various conditions and at various distances from plant.

Table 8-3 Typical L_{Aeq} Construction Plant Sound Power Levels (SWL)

Equipment	$L_{Aeq,15min}$ SWL	$L_{Aeq,15min}$ SWL + Correction for Tonality / Impulsiveness etc.
Semi-trailer	105	105
Dump Trucks	105	105
Flatbed Truck	105	105
Concrete Truck	107	107
Concrete Pump	103	103
Concrete Adgi/Vibro	105	105
HIAB Truck	105	105
Water Cart	108	108
5t Excavator	100	100
10t Excavator	105	105
20t Excavator	110	110
Franna Crane	106	106
Front End Loader	110	110
10t Vibratory Roller	101	106
50t Mobile Crane	106	106
200t Mobile Crane	111	111
Tamping Machine	111	116
Ballast Regulator	107	107
Rail Grinder	110	115
Dozer	115	115
Grader	107	107
Rock Breakers	118	123
Rock Saw (Excavator)	114	119
Concrete Saw (Handheld)	112	117
Bored Piling Rig	115	115

The identified SWLs make some allowance for the expected use of the equipment.

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Note that the modifying factor for impulsiveness or tonality is shown above for reference only. The application of such a correction for these characteristics needs to be assessed at the residence, i.e. the character of the sound that the residence is exposed to. Wherever such a correction is considered applicable it will be discussed and applied in the following sections.

8.2.1 Earthworks

Earthworks would occur across the new facility to bring the level up to the required design level. There would also be some earthworks on the neck to permit the new rail line to be installed.

The equipment expected to be used during this phase of construction is as follows:

- Semi-trailer
- Dump Trucks
- Concrete Truck
- Concrete Pump
- Concrete Adgi/Vibro
- HIAB Truck
- Water Cart
- 5t Excavator
- 10t Excavator
- 20t Excavator
- Franna Crane
- Front End Loader
- 10t Vibratory Roller
- Dozer
- Grader
- Rock Breakers
- Rock Saw (Excavator)
- Concrete Saw (Handheld)
- Bored Piling Rig

Noise modelling has assumed that for the typical worst mobile plant operations, the cumulative L_{Aeq} sound power level would be dominated by the rock breakers, and hence a sound power level of 118dBA is assigned for this scenario.

It is noted that this activity requires a 5dBA correction for impulsiveness. This is applied at the receiver if the construction noise protrudes above ambient noise levels, and the resultant sound character exhibits traits warranting the adjustment. In order to quantify this, a 5dBA correction for noise levels at the receiver which are 5dBA above background has been applied.

The earthworks were modelled in two locations, at the north and south ends of the stabling yard.

A stockpile site would be established at the southern end of the stabling area, immediately adjacent to the proposed tracks.

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8.2.2 Trackworks

Trackworks would occur across the new facility and also on the neck joining the facility to the main line.

The equipment expected to be used during this phase of construction is as follows:

- Semi-trailer
- Flatbed Truck
- HIAB Truck
- Franna Crane
- 50t Mobile Crane
- 200t Mobile Crane
- Tamping Machine
- Ballast Regulator
- Rail Grinder

Noise modelling has assumed that for the typical worst mobile plant operations, the cumulative L_{Aeq} sound power level would be dominated by the tamping machine and rail grinder, though the two are unlikely to occur simultaneously. A sound power level of 111dBA is assigned for this scenario.

Similarly to the rock breakers, both the tamping machine and rail grinder require a 5dBA correction if noise levels at receivers are sufficiently high for their respective sound characteristics to become annoying. Again this has been quantitatively identified as being a level 5dBA above background noise levels.

Trackworks were modelled at the northern and southern ends of the stabling area and also on the Clyde approach neck.

8.2.3 Construction Noise Prediction Results

The predicted noise levels from construction stages are shown in Table 8-4.

Table 8-4 Predicted Construction Noise Levels

NCA	Criteria (dBA)	Predicted $L_{Aeq,15min}$ Noise Levels (dBA)				
		Earthworks		Trackworks		
		North	South	North	South	Clyde Neck
1	47	33 - 51	37 - 57	26 - 39	29 - 50	18 - 33
2	51	25 - 50	29 - 58	18 - 43	22 - 50	15 - 33
3	53	24 - 41	29 - 43	17 - 34	22 - 36	18 - 30
4	50	29 - 52	30 - 56	22 - 40	23 - 44	20 - 41
5	63	31 - 45	36 - 38	24 - 38	29 - 31	23 - 31

Note: 1 NCAs 1 Sheffield Street, 2 Manchester Road, 3 The Crescent, 4 Seventh Avenue, 5 Rawson Street.

A review of the predicted noise levels indicates that some mild to moderate exceedances of criteria are expected at the nearest receivers. It should be noted that the presented noise levels represent the typical worst case use of plant and thus noise levels would be expected to be lower than those presented for much of the construction period.

8.3 Recommended Construction Noise Mitigation

Mitigation measures would need to be in place to minimise disturbance during these periods. Where practicable, any mitigation measures provided to control operational noise impacts shall be implemented as early as practicable to also provide a benefit during some of the construction phase.

A Construction Noise and Vibration Management Plan would be prepared prior to the construction of the ASP. The Plan would be developed in accordance with TCA's *Construction Noise Strategy (Rail projects)* and DECCW guidelines. The Plan would:

- Detail the construction activities to be carried out, along with an indicative schedule for construction works.
- Identify the reasonable and feasible mitigation measures to be implemented to minimise noise impacts.
- Describe how the effectiveness of the proposed measures would be monitored during the works, including frequency and location of monitoring and recording and reporting of results.
- Identify how non-compliance with noise goals would be rectified.
- Identify procedures for notifying sensitive receivers and responding to noise complaints.

The Plan would include a consultation program to keep the potentially affected receivers informed regarding the progress of the works, and to forewarn (through measures such as letterbox drops and meetings with surrounding tenants) of any anticipated changes in noise and vibration emissions prior to critical stages of the works.

A range of possible approaches for minimising the impact of construction noise would be considered during the detailed design phase and could include:

- *Minimise Tamping at Night* – Where feasible minimise tamping during night time periods. This activity has been determined to be the loudest noise source and incurs a 5 dB penalty.

- *Localised Barrier* - The installation of temporary, localised plywood barriers could be considered around the location of noisy works. Alternatively, constructing the operational noise barrier at the start of construction would achieve some shielding for the remainder of the construction works. These barriers, either temporary or permanent operational, could be located to provide shielding of up to 10 dBA for some of the nearest construction works.

- *Plant Noise Audit* – Noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. To this end, testing should be established with the contractor.

- *Operator Instruction* – Operators should be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission.

- *Equipment Selection* - All fixed plant at the work sites should be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures in order to ensure that the total noise emission from each work site complies with DECCW guidelines.

- *Site Noise Planning* - Where practical, the layout and positioning of noise-producing plant and activities on each work site should be optimised to minimise noise emission levels.

In addition, the standard mitigation measures outlined in Section 3.1 of TCA's *Construction*

Noise Strategy (Rail projects) would be implemented.

In accordance with TCA strategy, the standard mitigation measures include managing the construction program to schedule noisier works during daylight hours, proactively notifying the community of intended works, incorporating respite periods into the works, providing contact details to nearby residents, and the temporary relocation of residents if noise levels are predicted to be greater than 30dBA above background noise levels (for night time works).

Section 6 of TCA's *Construction Noise Strategy (Rail projects)* identifies additional mitigation measures that should be implemented when the relevant noise goals are exceeded. Table 8-5 identifies the additional mitigation measures aimed at mitigating these exceedances. Table 8-6 provides the reference for the abbreviations identified in Table 8-5.

Table 8-5 TCA *Construction Noise Strategy* - Additional Mitigation Measures

Time Period		Mitigation Measures $L_{Aeq(15minute)}$ Noise Level above Background (RBL) Qualitative Assessment of Noise Levels			
		0 to 10dBA Noticeable	**10 to 20dBA Clearly Audible**	**20 to 30dBA Moderately Intrusive**	**>30dBA Highly Intrusive**
Standard	Mon-Fri (7am-6pm) Sat (8am-1pm) Sun/Pub Hol (Nil)	-	-	LB, M	LB, M
Out of Hours Work	Mon-Fri (6pm-10pm) Sat (1pm-10pm) Sun/Pub Hol (8am-6pm)	-	LB	M, LB	M, IB, LB, RO, PC, SN
Out of Hours Work	Mon-Fri (10pm-7am) Sat (10pm-8am) Sun/Pub Hol (6pm-7am)	LB	M, LB	M, IB, LB, PC, SN	AA, M, IB, LB, PC, SN

Table 8-6 TCA *Construction Noise Strategy* - Additional Mitigation Measure Abbreviations

Measure	Abbreviation
Alternative Accommodation	AA
Monitoring	M
Individual Briefings	IB
Letter Box Drops	LB
Project Specific Respite Offer	RO
Phone Calls	PC
Specific Notifications	SN

As general advice the TCA *Construction Noise Strategy* recommends that no additional mitigation measures need to be employed for standard construction hours if the $L_{A10,15min}$ noise

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levels are within 20dBA of the background noise level. This is the case for all of the construction during standard hours.

For works that are undertaken outside standard construction hours the TCA *Construction Noise Strategy* recommends a number of actions, such as letter box drops and door knocks, to proactively keep the community informed.

The works would be audible at many of the identified receivers and for this reason it is considered prudent to keep the community well informed of the works and to provide practical warning of upcoming noisy works.

8.4 Construction Vibration Assessment

In relation to construction vibration, the bulk of the major earthworks and compaction will occur further than 250 metres away from Sheffield Street whilst trackwork on the Clyde neck will occur further than 250m away from receivers in William and Factory Streets.

8.4.1 Vibration Criteria

Vibration limits are typically established to meet two objectives:

- human comfort in buildings affected by the construction
- avoidance of damage to buildings affected by construction vibration.

Human Comfort

The DECCW's *Assessing Vibration: A Technical Guideline* provides acceptable values for continuous and impulsive vibration in the range 1-80 Hertz. Both preferred and maximum vibration limits are defined for various locations and are shown in Table 8-7.

Table 8-7 Preferred and Maximum Peak Particle Velocity (PPV) values for Continuous and Impulsive Vibration

Location	Assessment Period (1)	Preferred Values	Maximum Values
Continuous vibration			
Critical areas (2)	Day or night time	0.14	0.28
Residences	Daytime	0.28	0.56
	Night time	0.20	0.40
Offices, schools, educational institutions and places of worship	Day or night time	0.56	1.1
Workshops	Day or night time	1.1	2.2
Impulsive vibration			
Critical areas (2)	Day or night time	0.14	0.28
Residences	Daytime	8.6	17.0
	Night time	2.8	5.6
Offices, schools, educational institutions and places of worship	Day or night time	18.0	36.0

Location	Assessment Period (1)	Preferred Values	Maximum Values
Workshops	Day or night time	18.0	36.0

Notes: 1 Daytime is 7.00am to 10.00pm and night time is 10.00pm to 7.00am.
2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas. Source BS 6472-1992.

Building Damage

In regard to potential building damage, the German Standard DIN4150 suggests a limit of between 5-20mm/s PPV, depending on the dominant frequency of vibration, within dwellings and buildings of similar construction. For the typical frequencies produced by construction activities this limit is usually around 10mm/s. Without precise knowledge of the vibration frequency, which is both activity and site specific, Wilkinson Murray conservatively applies a limit of 5mm/s. For commercial buildings these limits increase to between 20-50mm/s due to their more substantial construction. British Standard BS7385: Part 2 - 1993 also sets a limit within buildings which depends upon the vibration frequency, but is as low as 7.5mm/s PPV (at 4Hz).

8.4.2 Vibration Source Levels

Table 8-8 provides typical vibration levels at a range of distances from the various construction activities to be undertaken at this site.

Table 8-8 Typical Vibration Emission Levels from Construction Plant

Activity	PPV Vibration Level (mm/s) at Distance		
	10m	20m	30m
Rock Sawing	0.5	0.3	0.2
10-Tonne Vibratory Roller (High)	2.0-2.4	0.4-1.2	0.2-0.8
Hydraulic Hammer (30t)	3	1.5	1.0

At the typical distances to residential receivers, vibration levels are predicted to be significantly less than both structural damage and human comfort criteria.

The nearest industrial and commercial buildings to any part of construction site are approximately 15-20 metres away. A review of vibration levels in Table 8-8 indicates that levels would be below the maximum commercial continuous vibration criteria at these locations.

Accordingly, no adverse impact associated with vibration from construction is predicted at nearby industrial, commercial or residential receivers in relation to structural damage.

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9 TRAFFIC NOISE ON LOCAL ROAD NETWORK

Traffic during both the construction and operational phases of the ASP would access the site along Manchester Road and via the Private Road through the industrial area.

9.1 Traffic Noise Criteria

Applicable noise criteria for proposals which have the potential to increase traffic on roads are presented in the DECCW's *Environmental Criteria for Road Traffic Noise* (ECRTN).

For noise assessment, Manchester Road can be considered as a collector road east of Chisholm Street and a local road west of Chisholm Street. The applicable noise criteria are:

For *land use developments with the potential to create additional traffic on collector roads* the base criteria are:

- $L_{Aeq,1hour}$ 60dBA during daytime (7am – 10pm)
- $L_{Aeq,1hour}$ 55dBA during night time (10pm – 7am).

For *land use developments with the potential to create additional traffic on local roads* the base criteria are:

- $L_{Aeq,1hour}$ 55dBA during daytime (7am – 10pm)
- $L_{Aeq,1hour}$ 50dBA during night time (10pm – 7am).

Where these criteria are already exceeded by existing traffic noise levels the ECRTN recommends the following:

> *'In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2dB.'*

9.2 Existing Traffic Noise Levels and Volumes

Noise logging conducted on Manchester Road and at the rear of Sheffield Street indicates the following existing traffic noise levels.

Table 9-1 Existing Traffic Noise and Volumes

Location	Day / Night Base Criteria	Typical Range of Measured and Predicted $L_{Aeq,1hr}$ Noise Levels, dBA		Typical Range of Traffic Volumes
		Measured	Predicted (Unshielded)	
60 Manchester Road	Day (60)	60-67	58-66	50-280, typically 200-250 with 12%HV at 57km/hr
	Night (55)	53-63	55-66	25 to 350 with 9% HV at 57km/hr
Sheffield Street	Day (55)	42-53(1)	49-57	15-90, typically 70-80 with 15%HV at 53km/hr
	Night (50)	39-51(1)	44-57	<5 to 100 with 12% HV at 53km/hr

Note: 1 Measurement location shielded by rear fence in rear garden – prediction at facade.

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It is clear that existing traffic noise levels at the residences on Manchester Road exceed the base criteria of 60dBA and 55dBA during most hours. There is no opportunity to provide noise mitigation at the roadside to reduce noise levels hence a criterion of +2dBA applies.

For the rear of Sheffield Street, existing levels at most hours of the day or night time are below the base criteria of 55dBA and 50dBA, with the exception of the morning peak hours.

9.3 Operational Phase

There are few truck deliveries necessary as part of the stabling operations. However, car movements associated with train drivers, guards and cleaning staff would occur sporadically throughout the day and night as staff arrive and leave for work. Generally up to 9 cleaning staff would arrive typically prior to 9pm and then 11 drivers and 11 guards would depart between 9pm and 1am. There would be little movement between 1am and 3am. After 3am, approximately 11 drivers and 11 guards would gradually arrive to undergo train preparation and return the trains to service. Cleaning staff would typically depart after 5am. On this basis, up to 20 light vehicle movements per hour are predicted during the night time.

9.3.1 Sheffield Street

At the rear of residences along Sheffield Street, which are not shielded by rear garden fences, up to 15 additional movements during the quietest hours of the night (where there are only five existing movements) would not increase noise levels above the base criterion of 50dBA. For up to 20 additional movements (total of 25), the level would increase from 44dBA to 51dBA. During the busier hours (over 30 existing movements) an additional 20 movements would not increase existing noise levels by more than 2dBA. At single storey residences, where some shielding exists, the criteria are met. Marginal impact is therefore expected at the upper floor of two storey residences.

9.3.2 Manchester Road

For Manchester Road the additional 20 light vehicle movements would not increase existing levels by more than 2dBA. Negligible impact is therefore expected.

9.3.3 Mitigation of Operational Phase Traffic Noise Impacts

Since the predictions indicate only a marginal non-compliance on Sheffield Street under worst case conditions it is recommended that noise monitoring is undertaken to confirm the traffic noise contribution at residential receivers once the ASP is operational to monitor both increases in noise level and absolute noise levels. Subject to this review the need to provide further mitigation can be considered.

9.4 Construction Phase

During the construction phase it is expected that the part of the site recently used for construction of the AMC would be used for construction vehicles – both staff and delivery/spoil trucks.

It is expected a work force would generate a total of 95 arrivals and departures. Not all vehicles will arrive at the same time every day. On this basis 80 light vehicle movements are assumed to occur in the hour prior to 7am and after 5pm. There is an average 54 truck movements per day during the first year of the project which includes the earthworks phase reducing to 24 truck movements per day during the second year. On this basis and assuming some bunching of movements we have assumed up to 10 truck movements past any one residence in a typical worst case hour during earthworks.

The assessment assumes that all vehicles would access the site via the Private Road

9.4.1 Sheffield Street

The arrival of 80 light vehicles in the hour between 6am and 7am would result in a 2-3dBA increase in existing noise levels from 55dBA to 57-58dBA. This marginally exceeds the 2dBA allowance criteria in the ECRTN so some impact is expected during the busier construction phases in this hour.

Up to 10 heavy vehicles in an hour during the day would result in up to a 2dBA increase from typically between 55-57dBA to 57-58.5dBA. This meets the 2dBA allowance criteria in the ECRTN, although marginal impact is expected during the busier earthworks phase.

9.4.2 Manchester Road

The arrival of 80 light vehicles in the hour between 6am and 7am would result in an increase in existing noise levels (66dBA) of less than 1dBA. This complies with the ECRTN allowance criterion and marginal impact would be expected.

Up to 10 heavy vehicles per hour during the daytime would result in a less than 1dBA increase from existing levels of typically between 64-66dBA to 65-66.5dBA. This complies with the ECRTN allowance criterion and marginal impact would be expected during the busier construction phases.

9.4.3 Mitigation of Construction Phase Traffic Noise Impacts

As Sheffield Street has much lower existing traffic flow volumes, the predicted noise impacts are relatively higher at this location. There is little opportunity to minimise construction traffic noise impacts through any physical measures. The contractor should encourage car pooling or a mini bus to local stations in an attempt to limit private vehicle trips to the site.

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10 SUMMARY & CONCLUSIONS

This report has assessed the potential noise and vibration impacts associated with the operation and construction of Stage One of the ASP.

During operation, both stabling and the arrival and departure of trains would generate noise which would be audible at surrounding residential receivers, particularly those to the south on Manchester Road and the rear of Sheffield Street In addition, much of the activity for the ASP Stage One is concentrated during the most sensitive night time period.

However, it is considered that with appropriate management practices and mitigation measures, noise levels would be able to satisfy appropriate DECCW noise criteria in both the *Industrial Noise Policy* (INP) and *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP). The INP is able to allow the cumulative noise impacts from multiple uses in the Clyde Marshalling Yard to be effectively considered.

Horn noise has been identified as one component of noise which would result in non-compliance of both the INP intrusive and in particular sleep disturbance screening goals at the nearest residences, mainly to the south in Sheffield Street and Manchester Road, and to the west in the area identified by NCA 4. It would be necessary to review the need to test both town and country horns as well as leading and trailing horns. These are discussed in more detail in Section 6.4.

In the absence of horn noise, compliance with the INP is predicted at the surrounding receivers as a result of auxiliary system (air-conditioning, inverters and compressors) noises on stationary and slow moving trains. However, other short term noise events such as brake release would still result in non compliance with sleep disturbance screening goals. Mitigation measures to further reduce these noises are discussed in Section 6.4.

Construction noise is predicted to exceed the background + 10dBA Management Level criteria within the DECCW *Interim Construction Noise Guideline*, but remain below the Highly Affected Limit of 75dBA. This is typical for many construction sites in suburban areas. Mitigation is discussed in Section 8.3 and the contractor would be required to comply with the TCA *Construction Noise Strategy (Rail Projects)*.

Operational vibration is not considered to result in any impact at residences. During construction, some vibration may be perceptible, but would comply with structural damage criteria and can be managed to meet human comfort criterion.

Traffic noise during operations is predicted to comply with the DECCW *Environmental Criteria for Road Traffic Noise* (ECRTN) based on typical night movements, although increases in noise above the base criterion are possible at the rear of Sheffield Street where up to 20 additional movements occur during the middle of the night. More detailed noise monitoring is recommended once the ASP is operational to confirm actual impacts and review the need for suitable mitigation as discussed in Section 9.3.3.

During the construction phase traffic noise is predicted to exceed the allowances in the ECRTN at the residences in Sheffield Street during the busier phases. Options to mitigate are discussed in Section 9.4.3.

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Note

All materials specified by Wilkinson Murray (Sydney) Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose. The information contained in this document produced by Wilkinson Murray is solely for the use of the client identified on front page of this report. Our client becomes the owner of this document upon full payment of our **Tax Invoice** for its provision. This document must not be used for any purposes other than those of the document's owner. Wilkinson Murray undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

Quality Assurance

We are committed to and have implemented AS/NZS ISO 9001:2008 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Version	Status	Date	Prepared by	Checked by
A	Draft	17 January 2011	Adam Bioletti	Rob Bullen
B	2nd Draft	24 January 2011	Adam Bioletti	
C	3rd Draft	21 February 2011	Adam Bioletti	Rob Bullen
D	Final	11 March 2011	Adam Bioletti	
E	Revised Final	14 April 2011	Adam Bioletti	

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APPENDIX A

IDENTIFIED RECEIVERS

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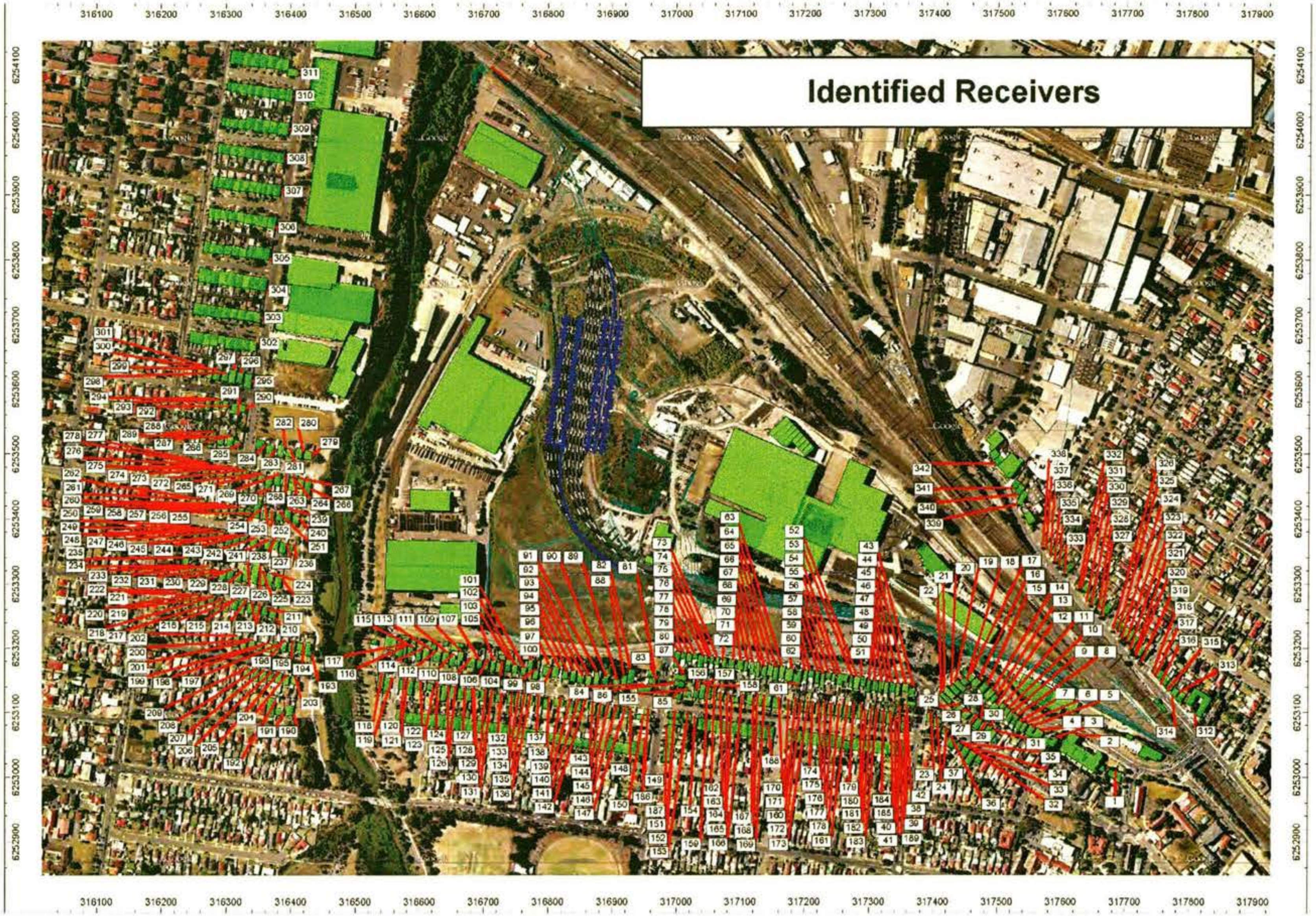
Identified Receivers
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6254100 6254000 6253900 6253800 6253700 6253600 6253500 6253400 6253300 6253200 6253100 6253000 6252900

APPENDIX B

NOISE LEVEL CONTOURS

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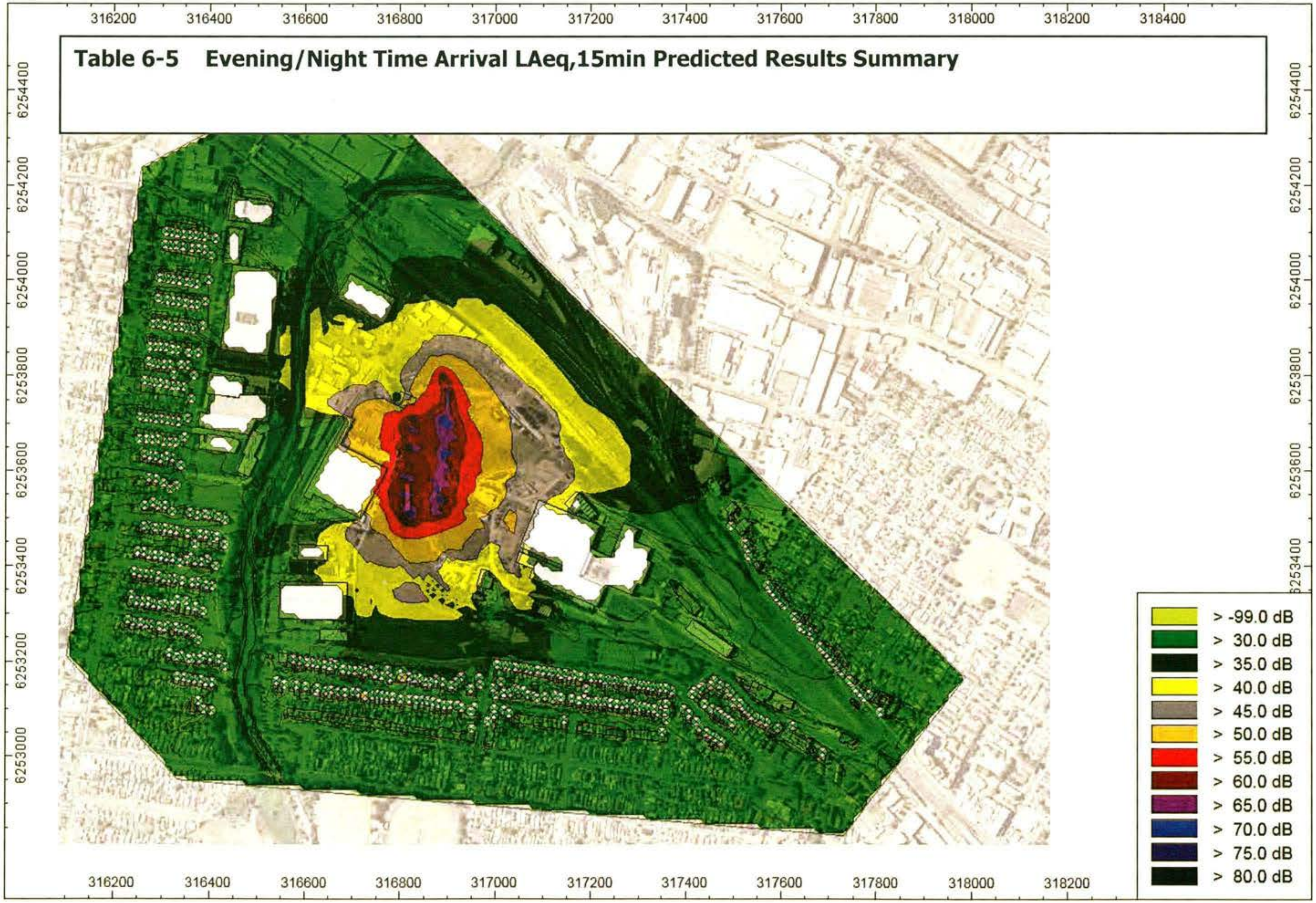
Table 6-5 Evening/Night Time Arrival LAeq,15min Predicted Results Summary



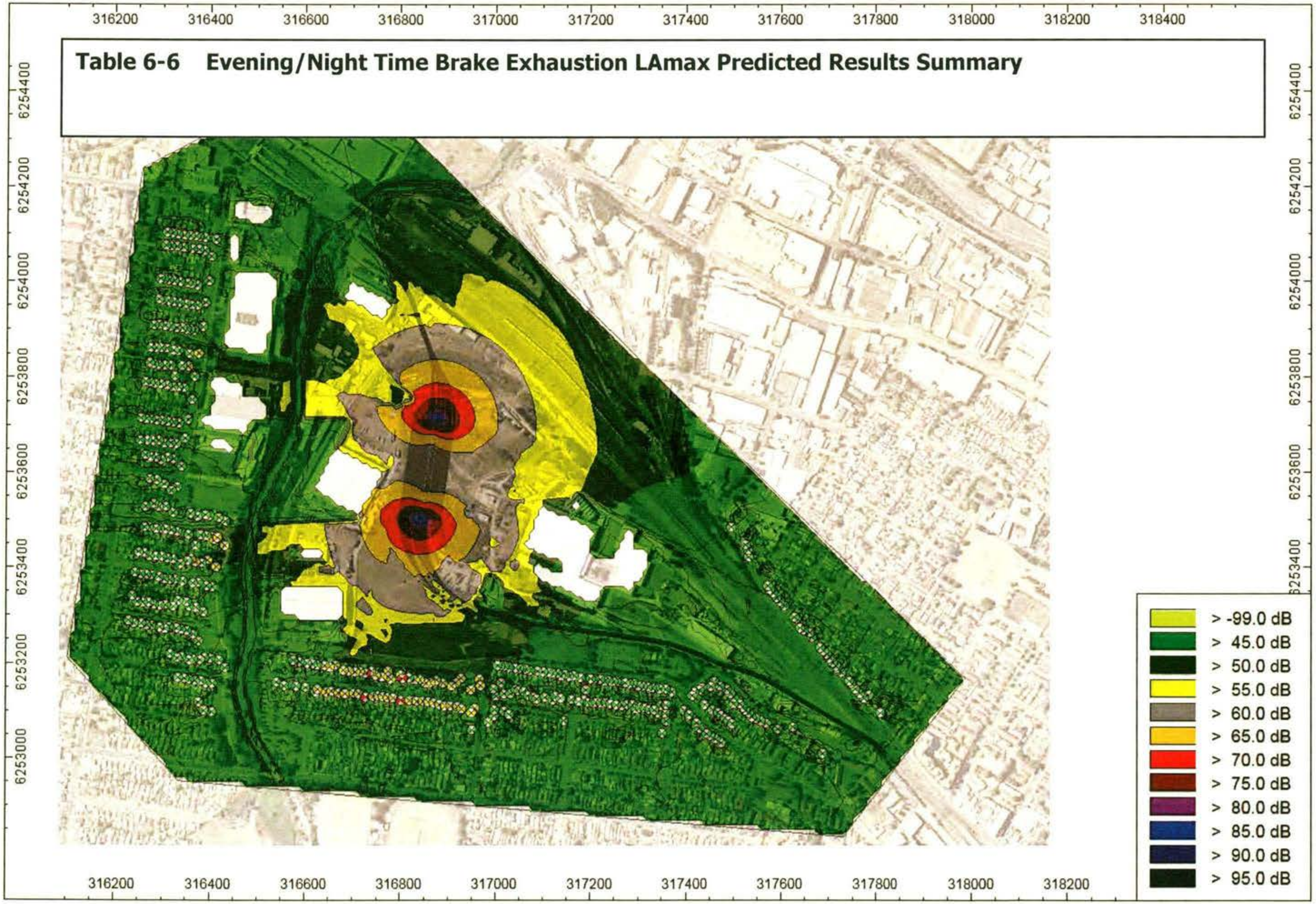


Table 6-6 Evening/Night Time Brake Exhaustion LAmax Predicted Results Summary

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Table 6-7 Night Time Stabling LAeq,15min Predicted Results Summary

Table 6-8 Early Morning Preparation and Departure LAeq,15min Predicted Results Summary

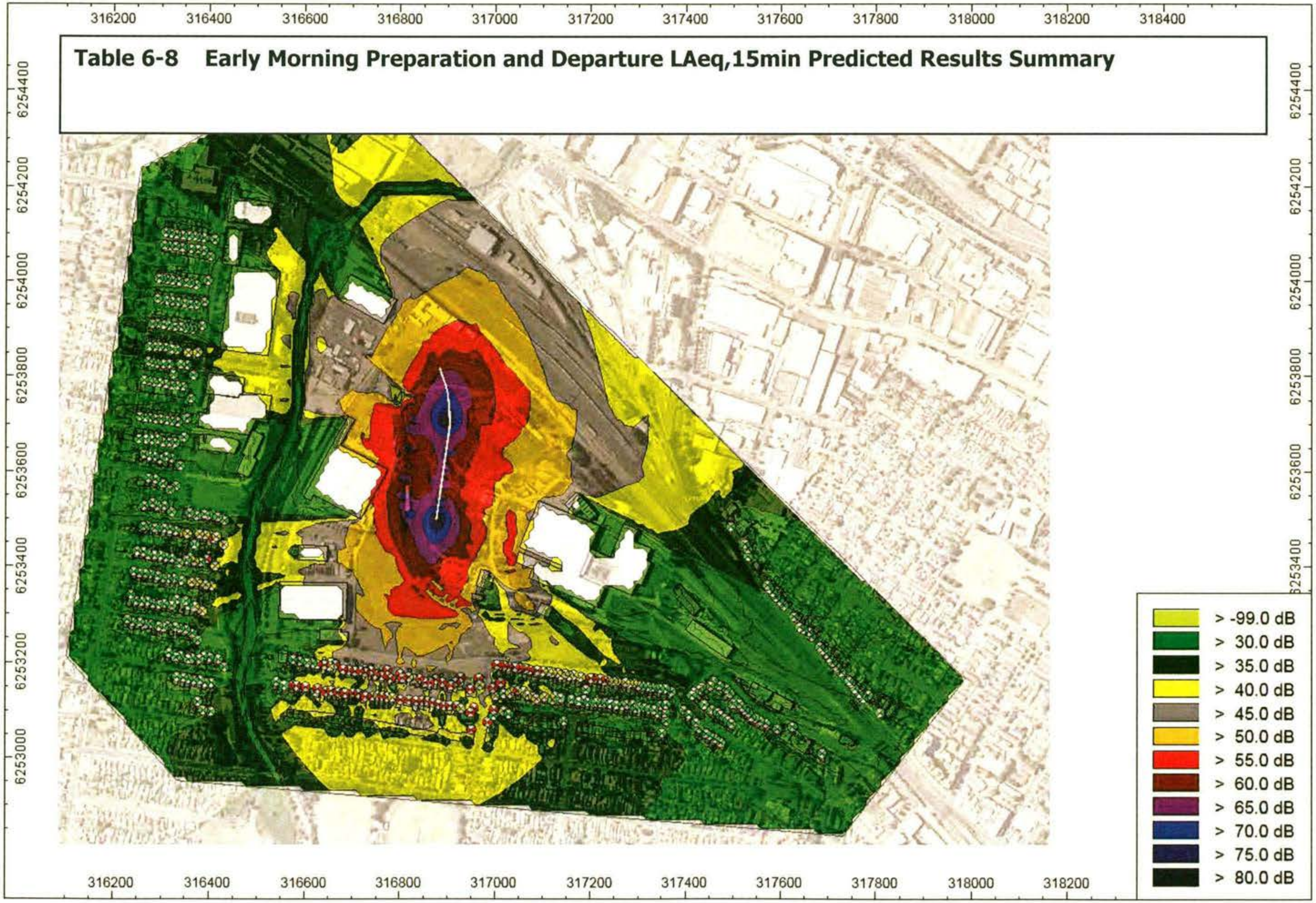

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Table 6-9 Early Morning Preparation and Departure LAmax Predicted Results Summary – Horn at Auburn End

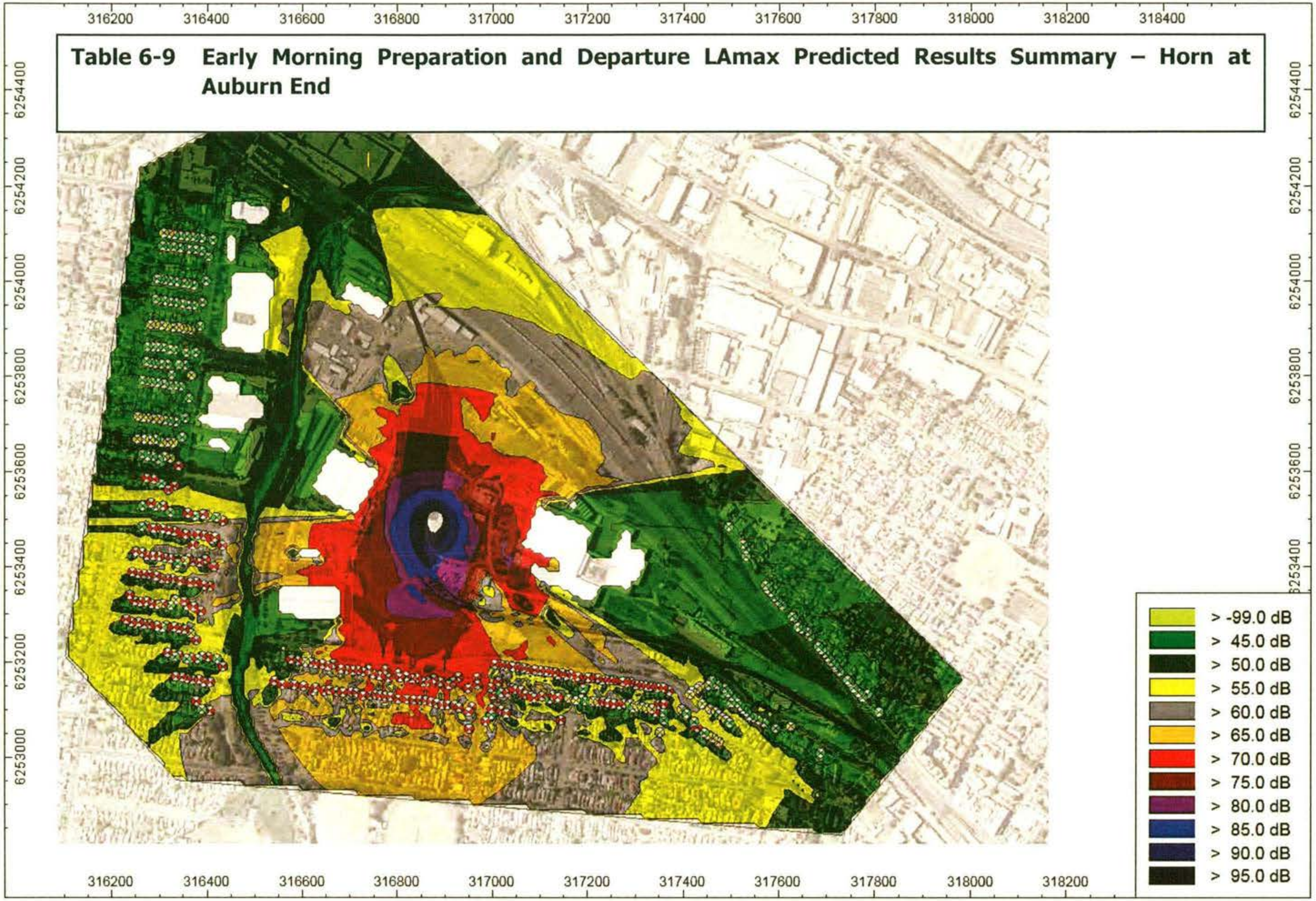

Table 6-10 Early Morning Preparation and Departure LAmax Predicted Results Summary – Horn at Clyde End

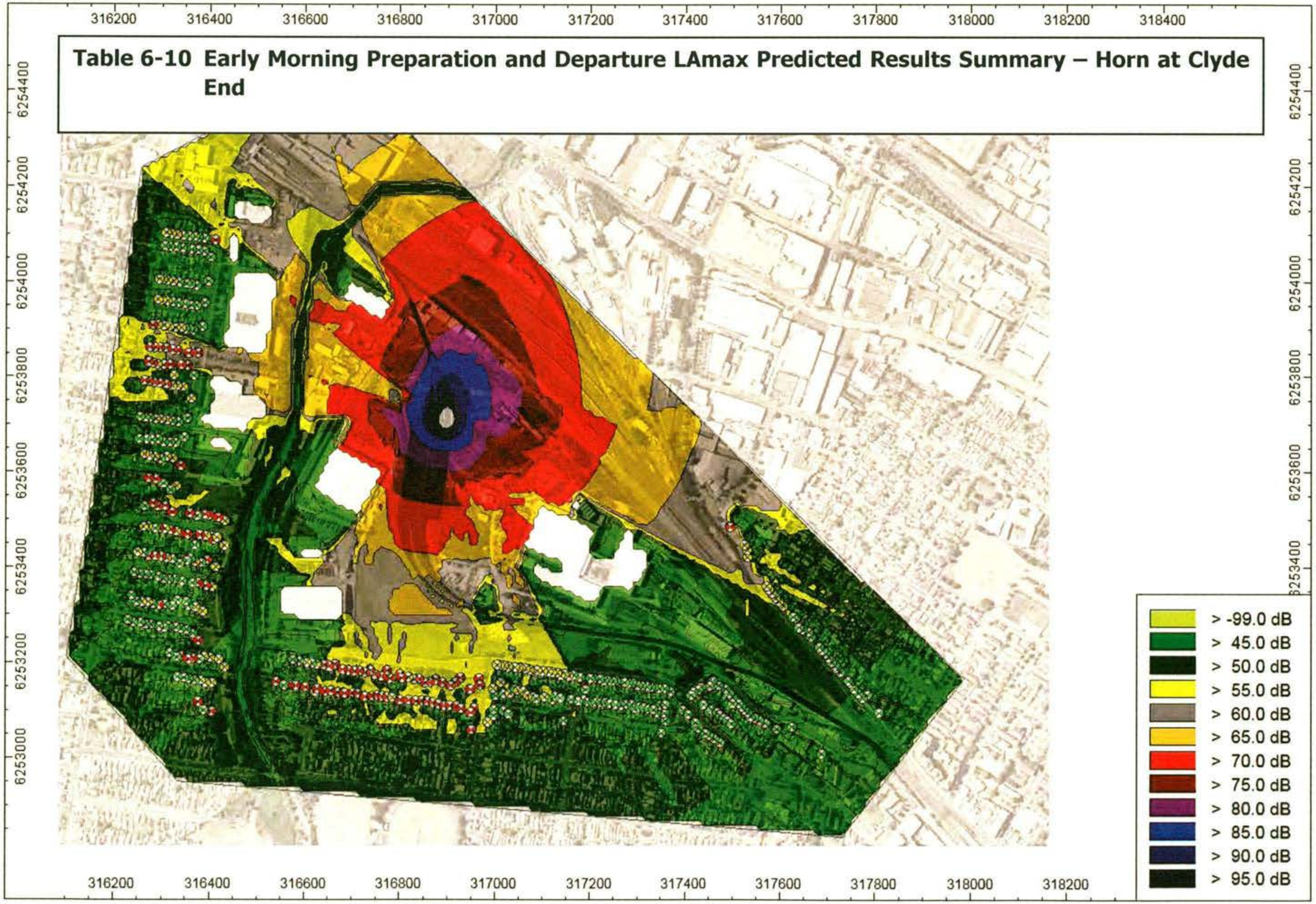

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Table 6-13 Evening/Night Time Brake Exhaustion LAmax Predicted Results Summary with a 3 metre Barrier

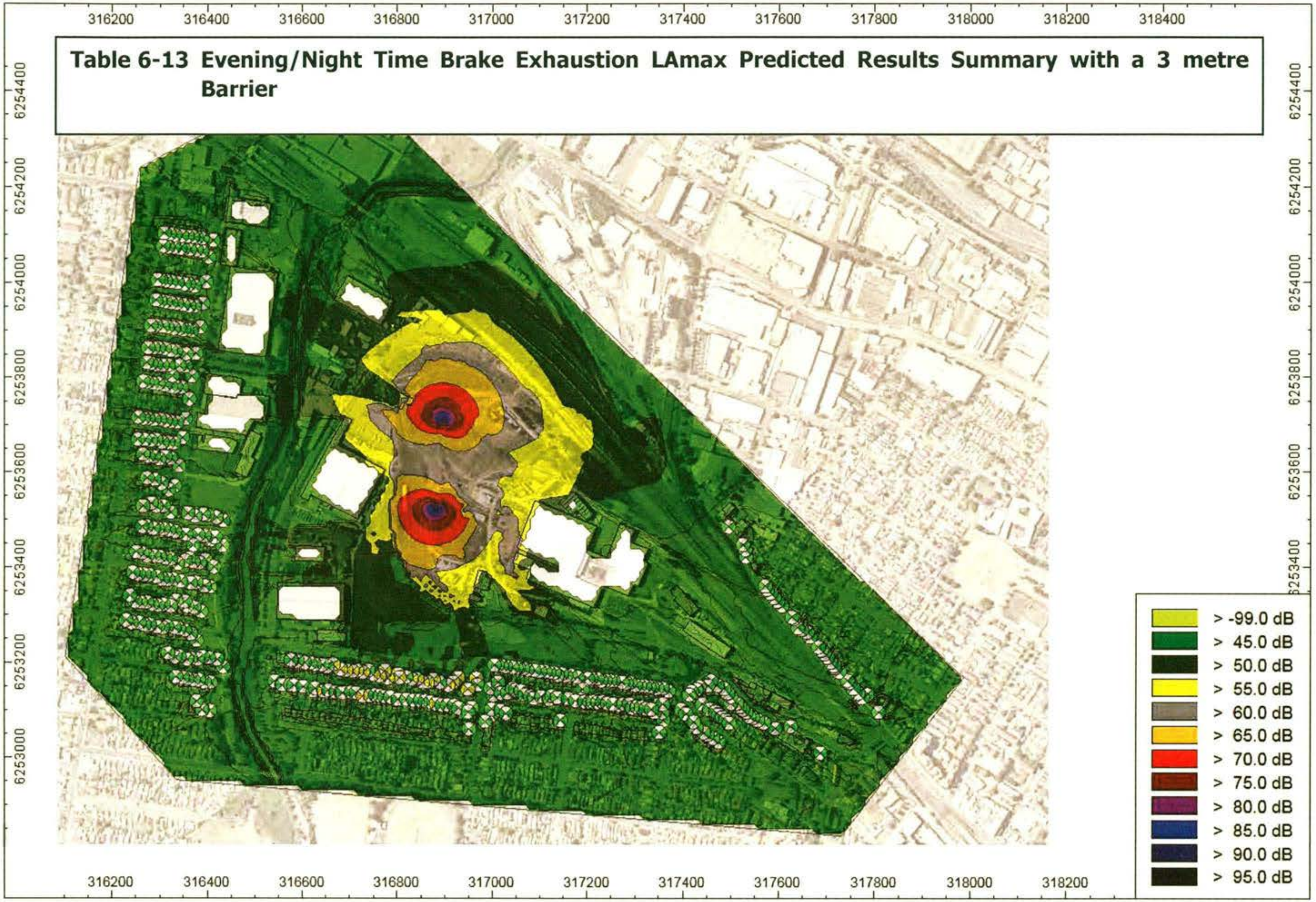

Table 6-14 Early Morning Preparation and Departure LAeq,15min Predicted Results Summary – Testing Town and Country Horns within ASP with Modelled Barriers

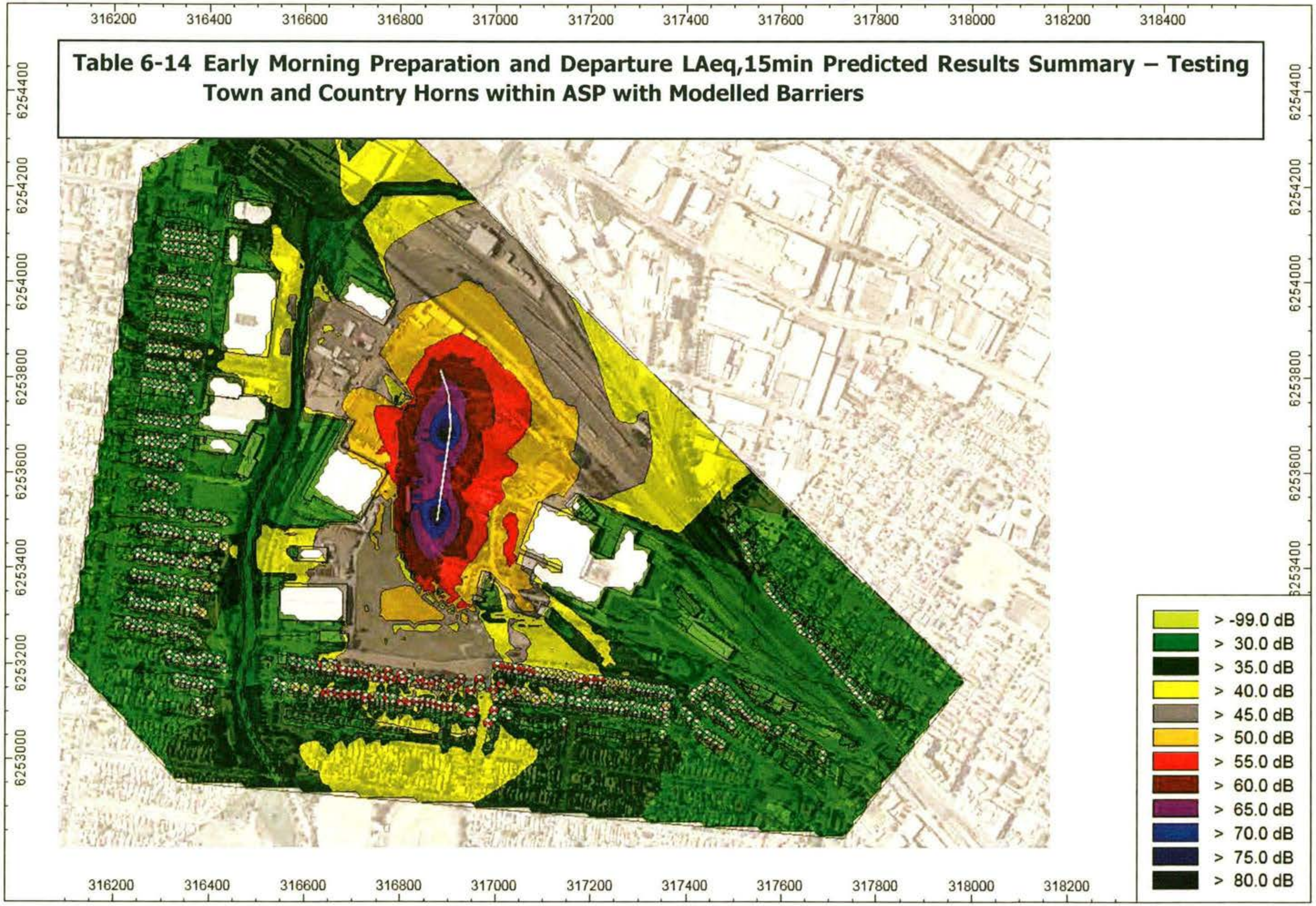

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Table 6-15 Early Morning Preparation and Departure LAmax Predicted Results Summary – Testing Town and Country Horns within ASP with Modelled Barriers – Auburn End

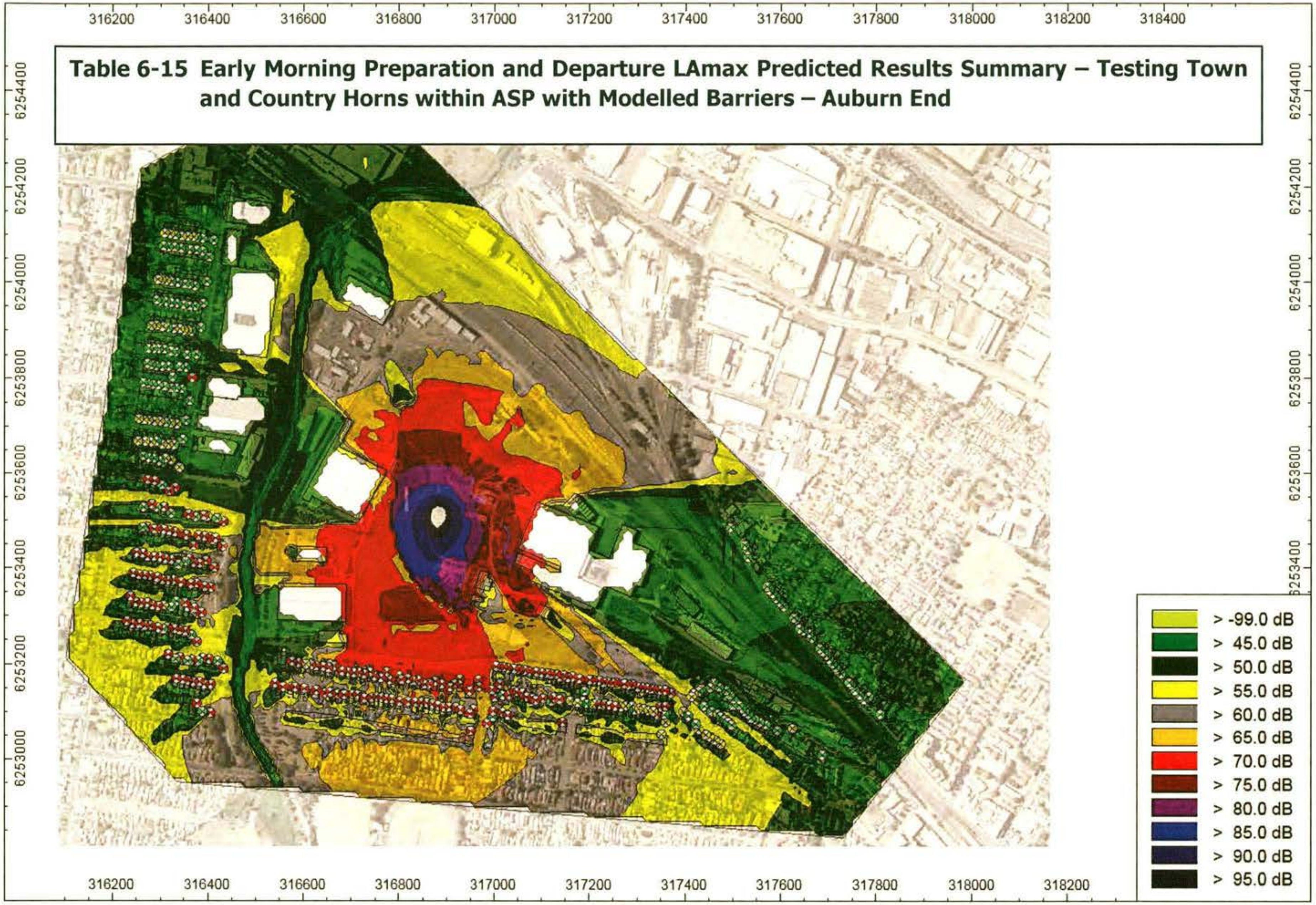

Table 6-15 Early Morning Preparation and Departure LAmax Predicted Results Summary – Testing Town and Country Horns within ASP with Modelled Barriers – Clyde End

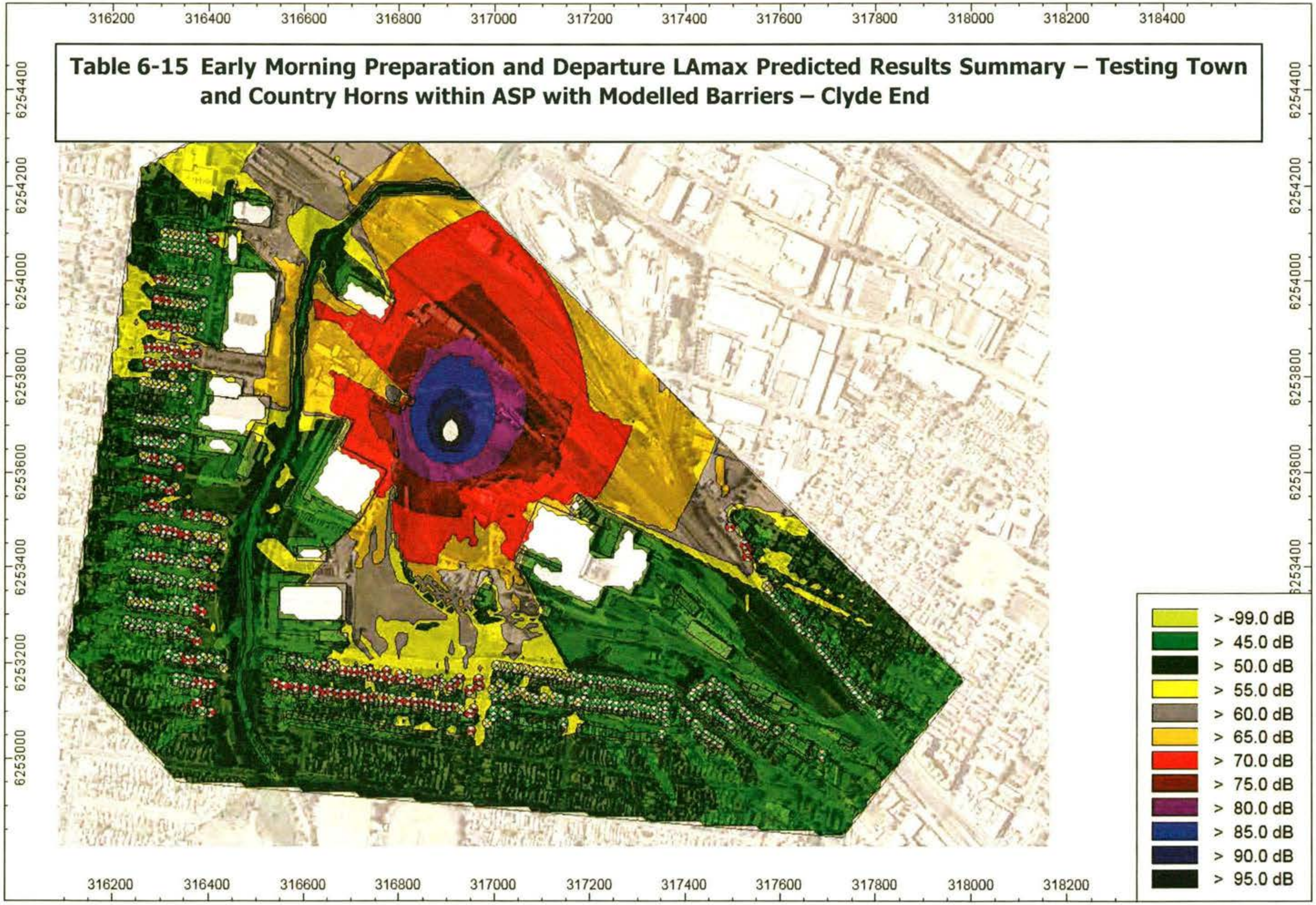

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Table 6-16 Early Morning Preparation and Departure LAeq,15min Predicted Results Summary – Testing Town Horns within ASP with Modelled Barriers

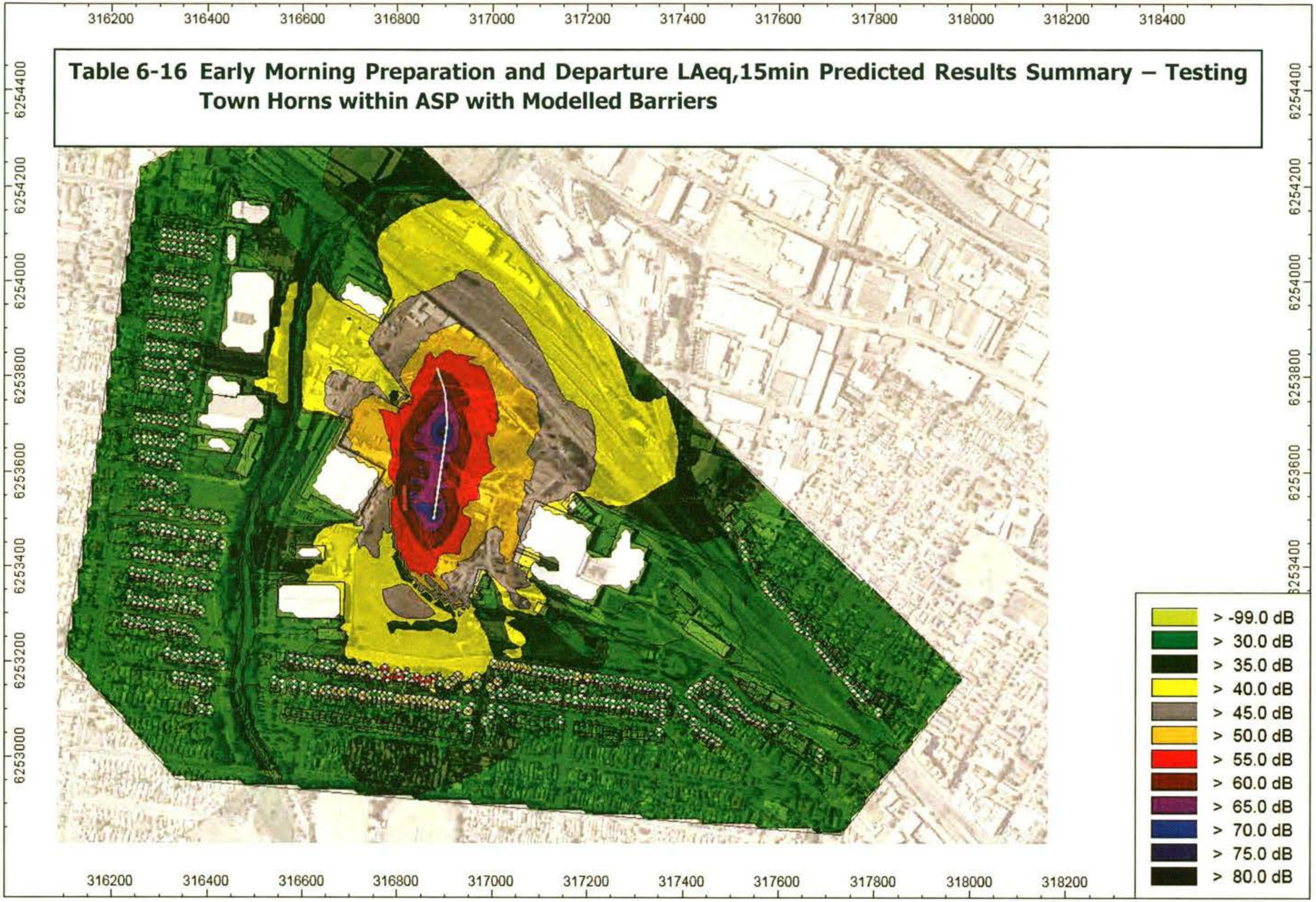

Table 6-17 Early Morning Preparation and Departure LAmax Predicted Results Summary – Testing Town Horns within ASP with Modelled Barriers – Auburn End

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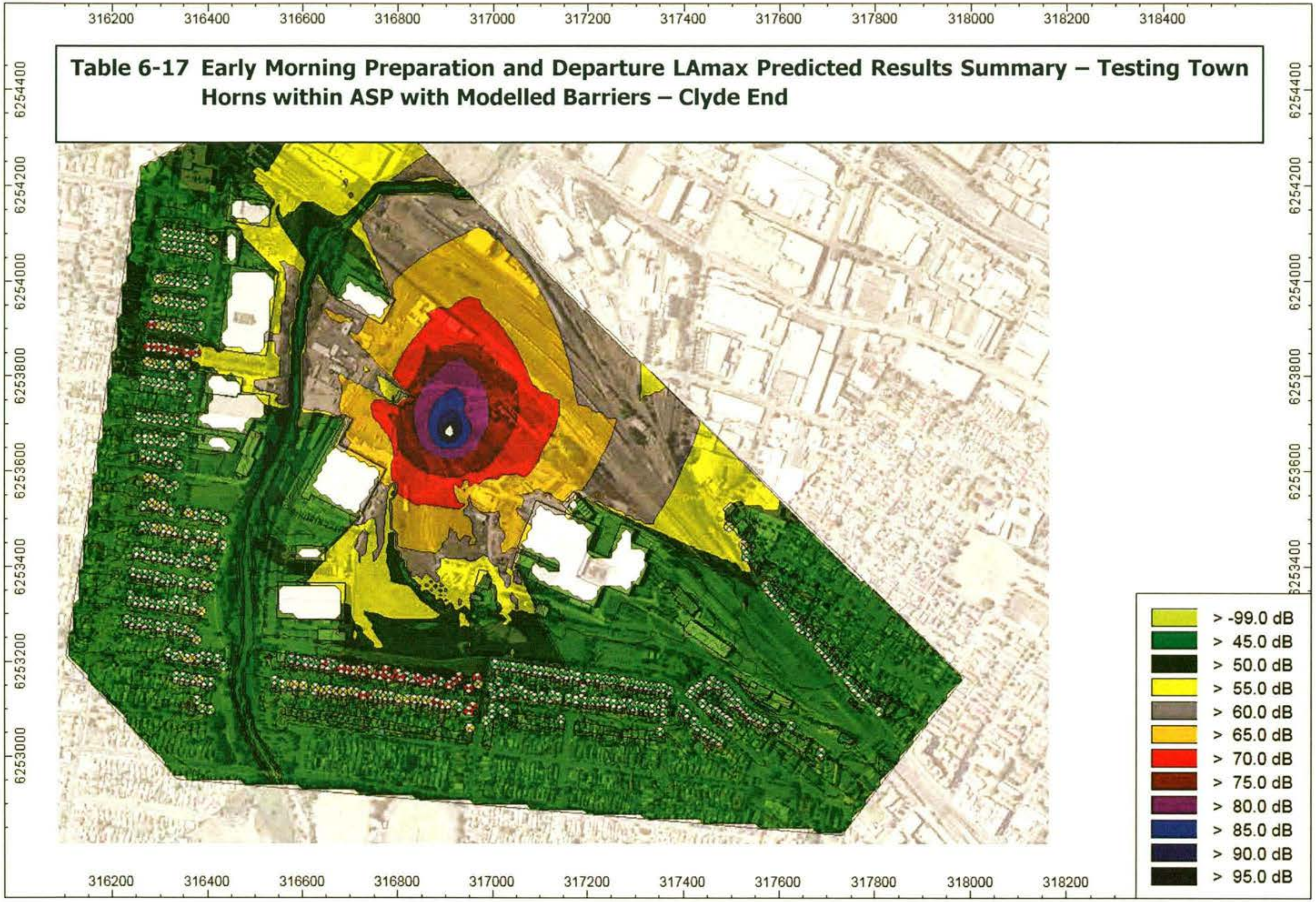
Table 6-17 Early Morning Preparation and Departure LAmax Predicted Results Summary – Testing Town Horns within ASP with Modelled Barriers – Clyde End



APPENDIX C

TABLE OF RESULTS
(RECEIVER L_{Aeq} NOISE LEVELS)

Nomenclature: B=Building, F=Façade, St=Storey,

i.e. B342_F4_St1 = Building 342, Façade 4, Storey 1 (ground)

Receiver	**Predicted Noise Level $L_{Aeq,15min}$ (dBA)**				
			Departure		
	Arrival	**Stabled**	**Without Horns**	**Town & Country Horns**	**Town Horns, 3m Barrier**
	Table 6-5	**Table 6-7**	**Table 6-8**	**Table 6-8**	**Table 6-16**
Leq_B1_F5_St1	7	5	7	13	9
Leq_B2_F12_St4	27	26	27	33	29
Leq_B3_F1_St1	25	23	24	30	26
Leq_B4_F1_St1	26	24	26	31	28
Leq_B5_F1_St1	25	23	25	30	27
Leq_B6_F1_St1	26	24	26	32	28
Leq_B7_F1_St1	21	19	21	28	23
Leq_B8_F1_St1	25	22	24	31	27
Leq_B9_F1_St1	15	13	15	19	16
Leq_B10_F1_St1	15	13	14	19	16
Leq_B11_F1_St1	19	17	18	22	19
Leq_B12_F1_St1	14	12	13	19	15
Leq_B13_F1_St1	13	11	13	18	15
Leq_B14_F1_St1	16	12	15	19	16
Leq_B15_F1_St1	22	19	21	27	24
Leq_B16_F1_St2	27	25	26	31	28
Leq_B17_F1_St1	23	20	22	27	24
Leq_B18_F2_St2	23	20	23	29	26
Leq_B19_F4_St1	27	26	27	34	28
Leq_B20_F8_St1	27	26	27	35	28
Leq_B21_F8_St1	28	26	27	36	29
Leq_B22_F6_St1	28	27	27	36	31
Leq_B23_F1_St1	25	24	25	35	26
Leq_B24_F1_St1	18	16	17	27	20
Leq_B25_F3_St1	26	24	25	35	27
Leq_B26_F1_St1	20	19	20	31	21
Leq_B27_F1_St2	29	28	29	35	31
Leq_B28_F1_St2	24	22	24	32	26
Leq_B29_F1_St2	26	25	26	35	28
Leq_B30_F1_St2	26	24	25	34	27
Leq_B31_F1_St1	23	21	23	28	25
Leq_B32_F1_St1	26	25	26	34	28
Leq_B33_F1_St1	26	24	25	34	27
Leq_B34_F1_St1	25	23	25	33	27

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B35_F1_St1	24	21	23	32	26
Leq_B36_F5_St2	28	27	28	37	30
Leq_B37_F1_St1	20	18	19	27	20
Leq_B38_F1_St1	21	20	21	30	22
Leq_B39_F2_St2	22	21	22	28	23
Leq_B40_F3_St2	30	29	30	38	32
Leq_B41_F4_St2	31	29	30	38	32
Leq_B42_F1_St2	31	29	30	38	32
Leq_B43_F3_St1	28	27	28	36	32
Leq_B44_F1_St1	29	27	28	37	32
Leq_B45_F1_St1	29	28	28	37	32
Leq_B46_F3_St1	29	28	29	37	32
Leq_B47_F2_St1	29	28	29	37	31
Leq_B48_F1_St1	29	28	29	38	31
Leq_B49_F1_St1	30	28	29	38	31
Leq_B50_F1_St1	30	29	29	38	31
Leq_B51_F5_St1	30	29	30	39	31
Leq_B52_F1_St1	31	29	30	39	32
Leq_B53_F1_St1	31	29	30	39	31
Leq_B54_F1_St1	31	30	31	39	32
Leq_B55_F3_St1	31	30	30	40	32
Leq_B56_F1_St1	31	30	31	42	32
Leq_B57_F1_St1	32	30	31	44	34
Leq_B58_F2_St1	32	31	31	44	34
Leq_B59_F1_St1	33	32	32	45	35
Leq_B60_F1_St1	33	32	33	45	35
Leq_B61_F5_St2	20	19	20	29	22
Leq_B62_F6_St2	35	34	34	42	37
Leq_B63_F1_St1	33	32	33	42	35
Leq_B64_F9_St1	34	32	33	42	35
Leq_B65_F1_St1	34	32	33	42	35
Leq_B66_F8_St1	34	33	33	43	36
Leq_B67_F2_St1	34	33	34	43	36
Leq_B68_F13_St1	35	32	34	43	36
Leq_B69_F11_St1	35	33	34	43	36
Leq_B70_F1_St1	35	33	34	43	36

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B71_F2_St1	35	33	34	44	36
Leq_B72_F9_St1	35	33	35	44	36
Leq_B73_F10_St1	35	34	35	44	36
Leq_B74_F12_St1	36	34	35	45	37
Leq_B75_F11_St1	36	34	36	45	37
Leq_B76_F3_St1	36	34	35	45	37
Leq_B77_F5_St1	35	33	35	45	36
Leq_B78_F7_St1	35	33	35	45	36
Leq_B79_F5_St1	35	33	35	46	36
Leq_B80_F19_St1	35	33	35	46	38
Leq_B81_F4_St1	34	33	33	46	38
Leq_B82_F2_St1	34	32	34	47	38
Leq_B83_F2_St1	31	29	31	39	31
Leq_B84_F5_St1	34	32	33	46	38
Leq_B85_F4_St1	34	32	33	42	33
Leq_B86_F4_St1	35	33	35	45	38
Leq_B87_F7_St2	37	35	36	50	39
Leq_B88_F5_St1	34	32	34	47	38
Leq_B89_F6_St1	34	32	33	47	38
Leq_B90_F8_St1	32	30	31	45	32
Leq_B91_F4_St1	34	32	33	48	39
Leq_B92_F4_St1	34	32	33	48	39
Leq_B93_F3_St1	34	32	33	48	39
Leq_B94_F5_St1	34	32	33	48	36
Leq_B95_F3_St1	34	32	33	48	39
Leq_B96_F1_St1	25	23	24	39	26
Leq_B97_F3_St1	34	32	33	48	39
Leq_B98_F2_St2	39	36	38	53	40
Leq_B99_F1_St1	34	32	33	47	38
Leq_B100_F1_St1	34	32	33	48	38
Leq_B101_F3_St1	34	32	33	47	38
Leq_B102_F8_St1	34	32	33	46	35
Leq_B103_F4_St1	33	31	32	45	33
Leq_B104_F2_St1	35	32	34	46	36
Leq_B105_F1_St1	34	32	33	46	38
Leq_B106_F3_St1	34	32	33	46	37

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B107_F1_St1	34	32	33	46	37
Leq_B108_F2_St1	34	32	33	45	37
Leq_B109_F1_St1	32	29	31	45	36
Leq_B110_F1_St1	29	27	28	40	30
Leq_B111_F1_St1	32	29	31	43	33
Leq_B112_F3_St1	27	25	26	43	29
Leq_B113_F3_St1	19	17	18	34	24
Leq_B114_F3_St1	22	19	21	27	23
Leq_B115_F3_St1	16	14	15	26	20
Leq_B116_F4_St1	20	18	19	31	22
Leq_B117_F4_St1	17	14	16	26	20
Leq_B118_F1_St1	24	22	24	31	26
Leq_B119_F2_St1	24	22	24	35	25
Leq_B120_F2_St1	26	23	25	42	28
Leq_B121_F1_St1	27	24	26	42	29
Leq_B122_F7_St1	28	25	27	42	29
Leq_B123_F5_St1	25	23	23	34	24
Leq_B124_F7_St1	31	29	30	43	32
Leq_B125_F8_St1	33	30	32	44	36
Leq_B126_F8_St1	33	32	32	44	33
Leq_B127_F13_St1	33	30	32	44	33
Leq_B128_F21_St1	32	30	31	44	33
Leq_B129_F1_St1	34	31	33	44	34
Leq_B130_F4_St2	34	32	33	48	34
Leq_B131_F1_St1	33	30	32	45	33
Leq_B132_F5_St2	37	35	36	50	38
Leq_B133_F4_St1	33	31	32	46	34
Leq_B134_F4_St1	32	30	31	39	32
Leq_B135_F4_St1	31	30	30	45	30
Leq_B136_F4_St1	33	31	32	46	33
Leq_B137_F6_St1	31	30	30	38	31
Leq_B138_F21_St1	33	30	33	47	34
Leq_B139_F16_St1	33	31	32	47	33
Leq_B140_F1_St1	34	32	33	47	34
Leq_B141_F1_St1	33	31	32	47	34
Leq_B142_F1_St1	34	31	33	47	34

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
			Departure		
	Arrival	Stabled	Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B143_F1_St1	33	31	33	47	33
Leq_B144_F1_St1	33	31	32	46	37
Leq_B145_F1_St2	35	33	34	47	35
Leq_B146_F1_St1	32	30	31	46	33
Leq_B147_F1_St1	33	31	32	45	33
Leq_B148_F1_St1	31	29	30	38	31
Leq_B149_F1_St1	32	30	31	44	32
Leq_B150_F2_St1	31	29	31	45	32
Leq_B151_F3_St1	19	17	18	29	21
Leq_B152_F5_St1	34	32	33	44	36
Leq_B153_F6_St1	31	29	30	39	31
Leq_B154_F2_St1	29	28	29	38	30
Leq_B155_F1_St1	20	18	19	29	22
Leq_B156_F1_St1	32	30	31	42	33
Leq_B157_F2_St1	32	30	31	40	33
Leq_B158_F1_St1	32	30	31	39	33
Leq_B159_F1_St2	36	34	35	44	37
Leq_B160_F1_St2	32	31	32	40	34
Leq_B161_F1_St2	31	29	30	39	34
Leq_B162_F1_St1	32	31	32	42	33
Leq_B163_F1_St1	32	30	31	42	33
Leq_B164_F1_St1	32	30	31	42	33
Leq_B165_F6_St1	32	30	31	42	33
Leq_B166_F4_St1	32	30	31	41	33
Leq_B167_F3_St1	17	15	16	26	20
Leq_B168_F5_St1	31	30	31	39	32
Leq_B169_F14_St1	31	29	30	37	31
Leq_B170_F4_St1	28	26	27	33	29
Leq_B171_F5_St1	30	28	29	37	31
Leq_B172_F5_St1	28	27	28	31	28
Leq_B173_F3_St1	26	25	26	31	26
Leq_B174_F3_St1	27	26	26	32	27
Leq_B175_F3_St1	28	27	28	33	28
Leq_B176_F3_St1	29	28	29	38	29
Leq_B177_F3_St1	29	28	28	38	30
Leq_B178_F3_St1	28	27	28	37	28

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B179_F5_St1	27	26	27	37	28
Leq_B180_F3_St1	27	26	27	33	27
Leq_B181_F3_St1	19	18	19	26	21
Leq_B182_F3_St1	27	26	26	34	27
Leq_B183_F3_St1	27	26	26	34	27
Leq_B184_F3_St1	27	25	26	34	27
Leq_B185_F3_St1	27	25	26	34	27
Leq_B186_F34_St1	31	28	30	41	31
Leq_B187_F11_St1	32	30	31	44	33
Leq_B188_F7_St1	31	29	30	38	32
Leq_B189_F5_St1	26	25	26	34	27
Leq_B190_F2_St1	27	24	26	36	28
Leq_B191_F3_St1	14	12	13	22	17
Leq_B192_F2_St2	28	25	27	37	29
Leq_B193_F2_St1	25	22	24	33	26
Leq_B194_F4_St1	19	15	19	27	23
Leq_B195_F3_St1	26	24	25	33	27
Leq_B196_F3_St1	27	24	26	34	27
Leq_B197_F4_St1	14	12	13	21	16
Leq_B198_F4_St1	27	25	26	35	28
Leq_B199_F2_St1	25	23	24	30	27
Leq_B200_F3_St1	28	25	27	36	28
Leq_B201_F3_St1	17	12	15	21	17
Leq_B202_F4_St1	26	24	25	35	26
Leq_B203_F1_St1	26	24	25	34	27
Leq_B204_F1_St1	26	24	25	34	27
Leq_B205_F1_St1	26	24	25	34	27
Leq_B206_F1_St1	26	24	25	34	26
Leq_B207_F1_St1	25	23	24	34	25
Leq_B208_F1_St1	23	20	22	34	23
Leq_B209_F1_St1	22	20	21	34	23
Leq_B210_F1_St1	28	26	27	35	29
Leq_B211_F2_St1	13	12	13	23	15
Leq_B212_F2_St1	28	27	28	36	28
Leq_B213_F2_St1	26	25	26	36	26
Leq_B214_F2_St1	26	24	25	35	26

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B215_F1_St1	26	24	25	36	27
Leq_B216_F2_St1	14	12	13	22	16
Leq_B217_F3_St1	26	24	25	35	26
Leq_B218_F2_St1	25	23	25	34	26
Leq_B219_F2_St1	25	24	25	34	26
Leq_B220_F2_St1	25	23	24	34	26
Leq_B221_F1_St1	25	23	24	34	26
Leq_B222_F1_St1	24	22	24	33	25
Leq_B223_F4_St1	30	28	29	41	31
Leq_B224_F4_St1	30	28	29	39	31
Leq_B225_F5_St1	28	27	28	37	29
Leq_B226_F6_St1	26	24	25	35	27
Leq_B227_F6_St1	19	16	18	26	21
Leq_B228_F5_St1	15	13	14	22	17
Leq_B229_F5_St1	23	20	22	29	24
Leq_B230_F5_St1	26	23	25	31	27
Leq_B231_F3_St1	27	24	26	34	27
Leq_B232_F2_St1	26	24	25	34	27
Leq_B233_F2_St1	27	25	26	35	28
Leq_B234_F2_St1	26	24	26	35	28
Leq_B235_F2_St1	25	24	25	34	26
Leq_B236_F2_St1	30	28	30	38	31
Leq_B237_F2_St2	31	29	30	39	33
Leq_B238_F1_St1	30	29	30	38	31
Leq_B239_F1_St2	34	32	33	43	35
Leq_B240_F3_St1	33	31	33	40	33
Leq_B241_F1_St1	30	29	29	38	30
Leq_B242_F1_St1	29	28	28	37	30
Leq_B243_F1_St1	26	24	26	36	27
Leq_B244_F1_St1	26	24	25	36	28
Leq_B245_F1_St1	26	24	25	34	26
Leq_B246_F2_St1	26	24	25	34	26
Leq_B247_F1_St1	26	24	25	35	27
Leq_B248_F1_St1	26	24	25	35	27
Leq_B249_F1_St1	25	23	25	35	27
Leq_B250_F1_St1	25	22	24	34	28

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B251_F5_St1	24	22	24	34	27
Leq_B252_F7_St1	32	30	32	39	32
Leq_B253_F6_St1	32	30	31	38	33
Leq_B254_F1_St1	20	17	19	27	21
Leq_B255_F1_St1	17	15	17	23	19
Leq_B256_F2_St1	25	23	25	35	26
Leq_B257_F2_St1	26	24	26	36	28
Leq_B258_F2_St1	28	26	27	36	30
Leq_B259_F2_St1	28	26	27	36	31
Leq_B260_F2_St1	27	25	27	36	31
Leq_B261_F2_St1	26	23	26	35	29
Leq_B262_F2_St1	26	23	25	35	29
Leq_B263_F1_St1	30	27	30	39	33
Leq_B264_F2_St2	33	29	33	43	35
Leq_B265_F2_St2	31	28	30	42	33
Leq_B266_F3_St1	33	31	33	40	35
Leq_B267_F4_St1	33	27	32	39	35
Leq_B268_F5_St1	30	26	29	39	33
Leq_B269_F5_St1	29	26	29	38	33
Leq_B270_F2_St1	25	20	25	36	27
Leq_B271_F7_St1	29	26	28	38	32
Leq_B272_F5_St1	28	26	27	37	31
Leq_B273_F7_St1	28	26	28	37	32
Leq_B274_F7_St1	27	25	27	36	31
Leq_B275_F7_St1	28	26	27	37	32
Leq_B276_F2_St1	27	25	26	37	30
Leq_B277_F2_St1	26	24	26	36	29
Leq_B278_F4_St1	21	19	21	26	23
Leq_B279_F3_St1	27	25	27	36	30
Leq_B280_F3_St1	26	24	25	30	27
Leq_B281_F4_St1	26	23	25	31	28
Leq_B282_F3_St1	28	25	27	35	30
Leq_B283_F2_St1	18	16	17	23	19
Leq_B284_F2_St2	30	27	29	37	32
Leq_B285_F2_St1	24	19	23	32	28
Leq_B286_F3_St1	28	26	28	36	31

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B287_F3_St1	26	24	26	32	29
Leq_B288_F4_St1	28	26	27	34	30
Leq_B289_F3_St1	18	16	17	23	20
Leq_B290_F2_St1	27	24	26	33	29
Leq_B291_F5_St1	26	24	25	32	27
Leq_B292_F2_St1	16	15	16	21	18
Leq_B293_F2_St1	27	25	26	33	29
Leq_B294_F1_St1	27	25	26	33	30
Leq_B295_F2_St1	26	24	25	32	28
Leq_B296_F3_St1	25	23	24	30	27
Leq_B297_F3_St1	25	23	24	30	27
Leq_B298_F4_St1	17	16	17	22	19
Leq_B299_F3_St1	24	22	23	29	26
Leq_B300_F3_St1	24	23	24	28	26
Leq_B301_F5_St1	25	23	24	29	26
Leq_B302_F5_St1	19	17	18	23	20
Leq_B303_F4_St1	17	16	17	22	19
Leq_B304_F5_St1	20	18	19	25	22
Leq_B305_F21_St1	28	28	28	30	28
Leq_B306_F9_St1	34	32	33	39	36
Leq_B307_F2_St1	17	15	16	21	18
Leq_B308_F2_St1	16	15	16	21	18
Leq_B309_F2_St1	16	14	15	20	17
Leq_B310_F2_St1	17	15	16	21	18
Leq_B311_F11_St1	25	22	25	34	30
Leq_B312_F6_St2	24	23	23	30	26
Leq_B313_F4_St2	24	23	24	31	27
Leq_B314_F10_St1	24	23	23	30	26
Leq_B315_F7_St1	24	23	24	31	27
Leq_B316_F7_St1	24	23	24	31	27
Leq_B317_F5_St1	25	23	24	31	27
Leq_B318_F4_St1	25	23	24	31	27
Leq_B319_F4_St1	25	24	25	31	27
Leq_B320_F4_St1	25	24	25	31	27
Leq_B321_F6_St1	25	24	25	31	27
Leq_B322_F4_St1	26	24	25	31	27

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B323_F4_St1	26	24	25	31	28
Leq_B324_F4_St1	26	24	25	31	28
Leq_B325_F4_St1	26	24	25	31	28
Leq_B326_F4_St1	26	25	26	31	28
Leq_B327_F1_St1	28	26	27	33	29
Leq_B328_F4_St1	23	22	23	28	24
Leq_B329_F6_St1	25	24	25	28	26
Leq_B330_F8_St1	27	26	27	32	29
Leq_B331_F8_St1	27	25	27	32	29
Leq_B332_F5_St1	27	25	27	32	29
Leq_B333_F4_St1	28	26	28	34	31
Leq_B334_F4_St1	28	26	27	34	31
Leq_B335_F4_St1	28	25	28	34	31
Leq_B336_F5_St1	28	26	28	36	32
Leq_B337_F7_St1	28	26	28	36	32
Leq_B338_F6_St1	29	26	28	36	32
Leq_B339_F7_St1	30	28	30	37	33
Leq_B340_F4_St1	31	29	30	37	34
Leq_B341_F6_St1	31	29	31	37	34
Leq_B342_F4_St1	33	31	32	38	35
Leq_B302	20	19	20	27	23
Leq_B302	21	20	21	27	23
Leq_B302	23	21	22	28	24
Leq_B302	18	16	17	22	19
Leq_B302	22	21	22	28	24
Leq_B302	22	21	22	28	24
Leq_B302	23	21	22	28	24
Leq_B303	21	19	20	26	22
Leq_B303	21	20	21	26	23
Leq_B303	22	20	21	27	24
Leq_B303	22	21	22	27	24
Leq_B303	23	22	23	28	25
Leq_B303	22	21	22	26	23
Leq_B303	23	22	22	27	24
Leq_B303	22	21	22	26	23
Leq_B304	19	18	19	25	22

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B304	20	19	20	27	23
Leq_B304	21	18	20	27	24
Leq_B304	23	21	22	29	26
Leq_B304	23	21	23	30	27
Leq_B304	23	20	23	31	27
Leq_B304	24	21	23	32	28
Leq_B304	25	22	24	32	28
Leq_B305	30	26	30	37	34
Leq_B305	29	25	28	37	33
Leq_B305	22	20	21	28	25
Leq_B305	25	22	24	32	28
Leq_B305	25	21	24	31	27
Leq_B305	23	18	22	28	24
Leq_B305	25	22	24	32	28
Leq_B305	26	24	26	33	29
Leq_B306	33	31	33	38	35
Leq_B306	33	31	32	37	35
Leq_B306	32	31	32	37	34
Leq_B306	32	30	32	37	34
Leq_B306	32	30	31	37	34
Leq_B306	32	30	31	36	34
Leq_B306	31	29	31	36	33
Leq_B307	22	20	21	29	24
Leq_B307	24	24	24	29	26
Leq_B307	26	25	25	30	27
Leq_B307	27	26	26	30	28
Leq_B307	29	28	28	31	29
Leq_B307	29	29	29	31	29
Leq_B307	30	29	29	31	30
Leq_B307	31	30	30	32	31
Leq_B307	31	30	30	35	32
Leq_B308	19	17	18	22	20
Leq_B308	20	18	19	23	21
Leq_B308	21	19	20	24	22
Leq_B308	22	21	22	25	23
Leq_B308	23	22	23	26	24

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Receiver	Predicted Noise Level $L_{Aeq,15min}$ (dBA)				
	Arrival	Stabled	Departure		
			Without Horns	Town & Country Horns	Town Horns, 3m Barrier
	Table 6-5	Table 6-7	Table 6-8	Table 6-8	Table 6-16
Leq_B308	24	23	23	27	25
Leq_B308	25	23	24	28	26
Leq_B308	25	24	25	28	26
Leq_B309	19	17	18	23	20
Leq_B309	20	19	19	24	21
Leq_B309	21	20	20	25	22
Leq_B309	22	21	22	26	23
Leq_B309	24	22	23	27	24
Leq_B309	24	23	24	27	25
Leq_B309	25	23	24	28	26
Leq_B309	25	24	25	28	26
Leq_B310	13	11	13	18	15
Leq_B310	13	11	12	18	15
Leq_B310	12	10	11	18	15
Leq_B310	11	10	11	18	14
Leq_B310	12	10	11	18	14
Leq_B310	13	12	13	19	16
Leq_B310	12	10	11	18	14
Leq_B310	12	10	11	18	15
Leq_B311	14	12	13	20	16
Leq_B311	20	18	20	25	22
Leq_B311	21	19	20	25	22
Leq_B311	22	20	21	26	23
Leq_B311	23	21	22	27	24
Leq_B311	24	22	23	27	25
Leq_B311	25	23	24	28	25
Leq_B311	25	23	24	29	26

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Transport Construction Authority

Appendix C

Revised Remediation Action Plan

Douglas Partners

CM

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Geotechnics • Environment • Groundwater

Integrated Practical Solutions

REMEDIATION ACTION PLAN

AUBURN STABLING PROJECT SITE
CLYDE MARSHALLING YARDS, AUBURN

Prepared for
TRANSPORT CONSTRUCTION AUTHORITY

Project 71654.02 Ver 02
March 2011
TCA Doc # 1262376

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REMEDIATION ACTION PLAN

AUBURN STABLING PROJECT SITE
CLYDE MARSHALLING YARDS, AUBURN

Prepared for
TRANSPORT CONSTRUCTION AUTHORITY

Project 71654.02 Ver 02
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TCA Doc # 1262376

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ACEA
The Association of Consulting Engineers Australia

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EXECUTIVE SUMMARY

Douglas Partners Pty Ltd (DP) has been commissioned by the Transport Construction Authority (TCA) to develop this Remediation Action Plan (RAP) for the remediation of contaminated soils at the site of the proposed Auburn Stabling Project (the ASP site). The ASP site is located on RailCorp owned land known as the Clyde Marshalling Yards (CMY), Auburn. It is understood that the remediation strategy detailed in this RAP would be taken into account in the environmental impact assessment (EIA) being prepared by TCA to satisfy the requirements of the *Environmental Planning and Assessment Act* (EP&A Act).

This RAP outlines procedures for the remediation of the site and provides an appropriate scope for validation works to demonstrate that the site has been made suitable for the intended use as a train stabling facility and continued use for railway purposes.

The remediation strategy described in this RAP has primarily been established on the basis of the findings of a contamination investigation conducted at the ASP site by DP in July 2010. The results of the DP July 2010 contamination assessment have shown that the fill at the site is contaminated with asbestos, medium to heavy fraction petroleum hydrocarbons (TPH C_{10}-C_{36}) and polycyclic aromatic hydrocarbons (PAHs). The TPH C_{10}-C_{36} and PAHs in the fill were noted to have low leachable concentrations and were found to be associated with the ash, slag, charcoal and cinder that are present sporadically in the fill material. Importantly, the results of the assessment also showed that the contaminated fill had not impacted the groundwater at the site.

This RAP has generally been prepared in accordance with the appropriate NSW Environment Protection Authority (EPA, now incorporated into the Department of Environment, Climate Change and Water, DECCW) guidelines, specifically, the EPA publication *Guidelines for Consultants Reporting on Contaminated Sites* (1997).

The assessment process, including the approval of this RAP, would be independently reviewed by Mr. Mike Hayter, a NSW Department of Environment, Climate Change and Water (DECCW, incorporating NSW EPA) accredited Site Auditor.

In view of the nature of the contaminants and the heterogeneity of the fill, the preferred remedial strategy is the, 'Encapsulation of the Contaminated Soil by Constructing a Properly Designed Physical Barrier System'. The strategy involves the installation of an engineered

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physical barrier system to limit the exposure of site users and/or off-site receptors to contaminants. The remedial strategy seeks to minimise potential exposure pathways (routes) to the underlying contaminants. To achieve this, the site would be capped with a range of cap types depending on the type of construction planned in any area. All caps would be underlain with a marker layer (geogrid, geotextile or similar) laid on the final surface of the contaminated fill material. Given the anticipated low leachability of the contaminants, the cap does not need to be impermeable. The building slabs, hardstand areas and roads would, however, provide a very low permeability cap and the rail tracks would incorporate subsoil drains. Surface slabs, road pavements and sub-soil drains would thereby reduce stormwater infiltration.

Given the nature of the proposed development (as a rail stabling yard within the CMY), the minimum constructional requirements for a suitable cap is considered to be a permanent, engineered pavement (concrete, asphalt, etc) thickness of 100 millimetres thickness overlying a marker layer. Most of the proposed development, however, would actually have a cap substantially greater than the minimum cap thickness. The total cap thickness would be based on the engineering designs of these elements, such as rail tracks, buildings, hardstands and roads and pavements. High access areas such as the car parks, roads and the maintenance building would also have the concrete or bitumen pavements, including the imported pavement layers (sub-base, base course etc), acting as the capping layer.

By following the RAP and demonstrating compliance with the requirements of the 'Planning Guidelines SEPP 55 – Remediation of Land', a validation assessment report will be prepared by a qualified environmental consultant in general accordance with the NSW EPA Contaminated Sites *Guidelines for Consultants Reporting on Contaminated Sites* (1997) and other appropriate guidance documentation. The procedures for long-term management of the cap will be detailed in an Environmental Management Plan (EMP) as agreed by all parties.

The validation report shall confirm whether the site has been remediated to a suitable standard for the proposed commercial/industrial development and that no related adverse human health and environmental effects have occurred as a result of the temporary works.

Subject to proper implementation of the RAP it is considered that the site can be rendered suitable for the proposed commercial/industrial land-use.

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GLOSSARY

ANSTO	Australian Nuclear Science and Technology Organisation
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BTEX	Benzene, Toluene, Ethyl Benzene and Xylenes
C10-C36	long to medium chain hydrocarbons
C6-C9	short chain hydrocarbons
COC	chain of custody
D.P.	Deposited Plan
DP	Douglas Partners
DQI	data quality indicator
DQO	data quality objective
EAW	Earth, Air and Water Consulting and Monitoring Pty Ltd
EPA	Environmental Protection Authority
GIL	groundwater investigation level
HIL	human health based investigation level
NATA	National Association of Testing Authorities
NEPM	National Environment Protection Measure
NSW DECCW	New South Wales Department of Environment, Climate Change and Water (was previously known as the NSW Environment Protection Authority (EPA), Department of Environment and Conservation (DEC) and Department of Environment and Climate Change (DECCW))
OCP	organochlorine pesticides
OPP	organophosphate pesticides
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PID	photoionisation detector
PPIL	phytotoxicity based investigation level
ppm	parts per million
PQL	practical quantification limit
PRG	primary remediation goal
Pty Ltd	Propriety Limited
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RPD	relative percentage difference
SAC	site acceptance criteria
SAQP	sampling analysis and quality plan
SMF	synthetic mineral fibres
TCLP	toxicity characteristic leaching procedure
TOPIC	total photoionisable compounds
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compounds

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Project 71654.02 –RAP Ver 02
9 March 2011

REMEDIATION ACTION PLAN
AUBURN STABLING PROJECT
CLYDE MARSHALLING YARDS, AUBURN

1. INTRODUCTION

Douglas Partners Pty Ltd (DP) has been commissioned by the Transport Construction Authority (TCA) to develop this Remediation Action Plan (RAP) for the remediation of contaminated soils at the site of the proposed Auburn Stabling Project (the ASP site). The ASP site is located on RailCorp owned land known as the Clyde Marshalling Yards (CMY), Auburn. The site is within the Auburn local government area. For descriptive purposes, the ASP site has been subdivided into three distinct areas viz., the southern portion of the Auburn Maintenance Centre site (AMC site), the Greenfields site and the MainTrain site. The location of the ASP site and its boundaries are shown in Figure 1 below and Drawing 1, Appendix A. It is understood that the remediation strategy detailed in this RAP would be taken into account in the environmental impact assessment (EIA) being prepared by TCA to satisfy the requirements of the *Environmental Planning and Assessment Act* (EP&A Act).

The remediation strategy described in this RAP has primarily been established on the basis of the findings of a contamination investigation conducted at the ASP site by DP in July 2010 (refer to Section 2.3). The results of the DP investigation were reported in *Final Contamination Assessment Report, Auburn Stabling Project, Clyde Marshalling Yards* reference 71654.01 dated July, 2010 (DP 2010a). The previous DP report (2010a) also makes reference to earlier assessments undertaken by other consultants since *circa* 1999.

This RAP outlines procedures for the remediation of the site to a condition suitable for the proposed train stabling facility development and continued use for railway purposes. It is noted that the site is located within the (larger) CMY and the current site use would remain

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unchanged in that the site would continue to be used for rail related operations which are considered to be an industrial landuse. The RAP also provides guidance on how the remedial strategy is to be implemented including construction details of the different capping systems and occupational and environmental controls to be adopted. These would apply from the start of excavation and through the interim period when the subgrade is exposed prior to the commencement of construction of permanent capping systems.

The assessment process, including the approval of this RAP, would be independently reviewed by Mr. Mike Hayter, a NSW Department of Environment, Climate Change and Water (DECCW, incorporating NSW EPA) accredited Site Auditor.

Figure 1: ASP Site Boundaries.

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1.1 Legislative and Guideline Framework

The legislative framework for the RAP is based on guidelines that have been issued and/or endorsed by the NSW Department of Environment, Climate Change and Water (DECCW) (incorporating the NSW EPA) under the following Acts/Policies:

- Section 105 of the "*Contaminated Land Management Act*" 1998 (CLM Act).
- "*State Environmental Planning Policy No- 55*" 1998 (SEPP 55).
- "*Protection of the Environment Operations Act*" 1997 (POEO Act).
- "*Waste Avoidance and Resource Recovery Act*" 2001 (WARR Act).

The relevant guidelines issued under the provisions of the above-mentioned Acts/Policies include:

- Department of Urban Affairs and Planning and NSW EPA (1998) "*Managing Land Contamination: Planning Guidelines - SEPP55 - Remediation of Land*".
- NSW EPA (1994), "*Contaminated Sites: Guidelines for Assessing Service Station Sites*".
- NSW EPA (1995), "*Contaminated Sites: Sampling Design Guidelines*".
- NSW EPA (2000), "*Guidelines for Consultants Reporting on Contaminated Sites*".
- NSW EPA (2006), "*Contaminated Sites: Guidelines for NSW Site Auditor Scheme*".
- NSW DECCW (2009) "*Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*".
- NEPM (1999), "*National Environment Protection (Assessment of Site Contamination) Measure*", National Environment Protection Council (NEPC).
- NSW DEC (2007) "*Guidelines for the Assessment and Management of Contaminated Groundwater*".
- Australian and New Zealand Environment and Conservation Council (ANZECC) (2000) "*Australian and New Zealand Guidelines for Fresh and Marine Water Quality*".
- ANZECC (1992) "*Assessment and Management of Contaminated Sites*".
- ANZECC (1999), "*Guidelines for the Assessment of On-site Containment of Contaminated Soil*" 1999.
- NSW DECCW (2008) "*Waste Classification Guidelines*" revised December 2009.

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1.2 Proposed Development

RailCorp is planning to expand its CityRail services to meet the forecast growth in passenger demand to 2020. The additional services require expansion in both rolling stock and stabling. The fundamental purpose of the ASP would be to provide storage for train sets that provide services to the inner-west and south-west core. The ASP would provide facilities that allow trains to be cleared of rubbish, receive minor repairs and to protect them from vandalism. The overall site is currently, and would continue to be, used for railway purposes with the construction of the proposed train stabling facility.

Based on information provided by TCA, it is understood that the ASP would be delivered in two stages namely; Stage 1 and Stage 2. The overall ASP development is expected to comprise the design and construction of:

- A train stabling facility - to accommodate 16 eight car suburban train sets, located in the central portion of the "greenfields" site. The stabling yard will be an open, flat area, approximately 90 m x 180 metres, and will include 16 associated rail lines (Rail lines 1-16) with train access platforms. In this regard it is noted that as part of the Stage 1 works, the entry and exit points at the Clyde end and rail lines 1-11 will be constructed. The Stage 2 works will comprise the construction of all works from the Auburn junction, through MainTrain, to the construction of the remaining stabling roads 12-16. As part of the Stage 2 works, the previously constructed roads 6-11 will also become through roads with access from both Clyde and Auburn. The rail lines and walkway are likely to be supported on shallow spread footings. Subsequent to the completion of the Stage 1 and Stage 2 works, trains would enter/exit the stabling yard through dual rail lines which would connect to the Main Western Line at the far north-western and south-eastern corners of the site. At this stage it is anticipated that the design levels for the rail lines will be in the order of reduced levels (RL) 11.1 metres (m) – RL 11.3 metres relative to Australian Height Datum (AHD) in the yard and RL 7.0 m AHD at the down-relief connection. Based on surface levels determined at the test locations, placement of filling of about 2 – 3 metres is likely to be required to achieve the proposed rail levels. Numerous 3 metre high masts for lights and security cameras, plus overhead wire structures (OHWS), which are likely to be supported on shallow spread footings or piles, would be located throughout the yard.

- Ancillary buildings - a single level administration/staff facilities building with a floor area of approximately 550 square metres would be located adjacent to the proposed carpark. A staff amenities building is proposed immediately to the east of the stabling yard, approximately 50 square metres in area. All ancillary buildings are likely to be supported on shallow spread footings.
- Two dry detention basins - a 6,500 square metres basin (Basin 1) is proposed immediately to the east of the proposed stabling yard and a 5,500 square metres basin (Basin 2) located to the south of the stabling yard. Bulk excavation levels of approximately RL 7.80 metres and RL 7.55 metres respectively are anticipated. Subsurface drainage products, such as "Atlantis Cells" or equivalent, are anticipated to be placed below parts of the site to provide additional on-site detention and drainage.
- Carpark – As part of the Stage 2 works, a carpark of approximately 50 metres x 50 metres, is to be located towards the north-western corner of the site off Manchester Road, adjacent to the recently constructed AMC carpark. The proposed finished ground surface level is approximately RL 10 metres.
- Removal of the existing rail tracks, sleepers, ballast and signalling is necessary with replacement by new tracks to satisfy current standards. This would include some of the existing infrastructure within the MainTrain and AMC sites.
- For the Stage 2 works, a road and pedestrian overbridge is to be constructed to provide access from the existing MainTrain Carpark to the MainTrain Facility. The bridge would include two lanes for vehicles plus one pedestrian lane, with a 12 metres wide concrete deck and a 20 metres (approximate) long central span over the existing dual rail lines and the proposed single siding rail line for MainTrain. The bridge would be designed for T44 loading (AS 5400 Bridge Design) and would possibly involve reinforced earth embankments and concrete bored piles or large strip footings to support the abutments.

In view of the nature of the proposed development viz., a railway stabling facility, the site would only be accessible to authorised railway personnel. In other words, persons that would be potentially exposed to the soils would be the staff working at the facility, with typical exposure periods of 8 hours/day for 7 days/week. Based on the exposure setting and the nature of the development, the site is deemed to be an industrial site in accordance with *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM) 1999.

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1.3 Objectives of the RAP

The objective of the RAP is to describe the works which are necessary to remediate the site to a standard suitable for its industrial use and to provide an appropriate scope of validation works sufficient to demonstrate that the site has been successfully remediated. The works would be carried out in an acceptable manner to minimise the environmental and occupational health impacts. Therefore, the RAP provides a strategy for site remediation which:

- Minimises impacts from the site on the environment and on public health and safety during both the short term, during construction, and during the long term operation of the facility.
- Maximises the protection of workers involved with remediation.
- Renders the site safe for the proposed landuse and eliminates potential exposure pathways to contaminants in the soil.
- Minimises impacts on the local environment during and following site remediation.

The RAP also provides an outline working plan for the cap construction, excavation, stockpiling, management and disposal of spoil and sediment controls, as well as a contingency plan to handle and store materials which exceed landfill disposal guidelines pending treatment and disposal.

The objectives would have been deemed to be achieved when a Validation Report has been completed which shows that the site has been capped in accordance with the requirements of the RAP and approved by the appointed site auditor.

1.4 Environmental Procedures

The RAP outlines a strategy to be adopted during the construction works, in particular, for the bulk and detailed earthworks, to ensure that the impacts to the environment are negligible or reduced to acceptable levels by the implementation of industry standard procedures. The bulk and detail earthworks phase includes the remediation of the ASP

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site which contains soil contaminated with asbestos, medium to heavy fraction total petroleum hydrocarbons (TPH C_{10}-C_{36}) and polycyclic aromatic hydrocarbons (PAH) associated with ash and slag. It also includes an outline strategy and procedures for the protection of worker health and safety in relation to works involving contaminated soil. The RAP is a conceptual document under which specific documentation would be devised for the works by the individual contractors contracted by TCA. Such documentation would include safe work method statements, contract specific environmental management plans, sedimentation and erosion control plans and occupational health and safety plans which would incorporate the principles and strategies outlined in this RAP.

2. SITE INFORMATION

2.1 Site Description

The ASP site is situated off Manchester Road, Auburn, and is located within the CMY. The site is an irregular shaped land parcel that covers an area of approximately 11 hectares and comprises parts of Lot 1, 2, 3 and 4 in DP 1007656, part of Lot 52 in Deposited Plan 1097362 and part of Lot 1 in Deposited Plan 833989. It is located within the Parish of Liberty Plains, County of Cumberland and is within the Local Government Area of Auburn Council. Two existing rail facilities are also located on the CMY viz. the MainTrain maintenance facility and the recently constructed AMC. These facilities are located to the south-west and north-west of the ASP site respectively.

The site is bordered by the AMC railway lines and the Main West Line along the northern boundary and towards the eastern and western ends. To the north of the central portion (i.e. north-west of the overall ASP site) are the MainTrain Facility and numerous warehouses/workshops. Vacant grassed land and commercial and residential properties border the site to the south. Industrial workshops and Manchester Road are located to the west. Duck River is located approximately 30 – 40 metres to the west (beyond the industrial workshops and Manchester Road).

As shown in Figure 1, Section 1, the ASP site comprises three distinct areas viz., the southern section of the AMC site, the Greenfields site and the MainTrain site.

The key characteristics of the three areas are described below:

Southern Section of the AMC Site

- The southern section of the AMC site is bounded by the Main West Line to the north and the CMY at the eastern and western ends. A driveway leads from Manchester Road on the western boundary to the main portion of the site. A hardstand carpark is located at the entrance to the site, to the north of the driveway. The area south of the driveway comprises overgrown vegetation and the Greenfields site.
- The main portion of the AMC site is covered by crushed sandstone and roadbase. The central portion of this area was used as a carpark. At the time of the DP July 2010 assessment, a number of demountable buildings were present on the site, which were in the process of being removed. The main John Holland (JH) construction office building was located opposite the fenced off train wash bay sheds located to the north. The Clyde rail turn back loop is located on the eastern and south-eastern boundary of the site.
- Areas of the site are unsealed and prone to flooding due to poor drainage. The majority of the site is relatively flat, with the exception of the north-western corner, towards the western car park. This area dips relatively steeply and was generally saturated due to poor drainage.

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Greenfields Site

- The AMC site is located to the north of the Greenfields site. Access is available between the two sites.
- The Greenfields site is generally relatively flat and typically comprises unpaved surfaces and loose gravel/road base/ crushed sandstone for roadways. Overgrown weeds and grass were observed over a majority of the unpaved areas. General rubbish such as scrap metal, litter, timber sleepers, was observed in vegetated/unpaved areas.
- Disused rail lines cross the site. A disused, corrugated iron roofed rail shed with tracks through it is located on the Manchester Road boundary of the site. The shed is in reasonable condition. This area is overgrown with weeds and grass and general litter and disused timber steel reels were present.
- Adjacent to the eastern boundary of the site is the MainTrain site. The Clyde rail turn-back loop runs through the eastern portion of the site, and also runs across a culvert. A large hill (comprising fill material) has been cut into it in order to construct the rail loop. The hill, approximately 4 – 5 metres higher than the rest of the site, is generally overgrown with lantana and other weeds, with some scrap metal and general rubbish observed.
- A fence separates the eastern and southern portions of the site from the MainTrain and an open space area. A gate is located in the south-eastern corner, allowing train access to the rail turn-back loop. A hardstand area is located in the south-eastern corner, with an access gate to the MainTrain site for vehicles and pedestrians.

MainTrain Site

- The MainTrain site is located to the south-east of the Greenfields site and mainly comprises a railway corridor with two railway lines.
- Adjacent to the southern section of the railway corridor is a carpark and grassed area.

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2.2 Site History

The site history information provided herein is sourced from the DP (2010a) contamination assessment report.

Whilst the overall CMY was utilised for railway and industrial purposes since the 1870s, the current study area (i.e. ASP site) was not intensively utilised until the 1950s due to the low site levels. Further, the majority of the CMY was previously utilised by the State Rail Authority (SRA) as a disposal area for products ranging from ash to train carriages. As a result of the dumping activities, between 1940 and 1950, site levels in various sections of the CMY are understood to have been raised. The available information suggests that waste tipping activities may have occurred over parts of the ASP site. Further, boiler ash sourced from the adjoining railway loop tracks may have also been deposited and graded across sections of the ASP site. Anecdotal information sourced from the previous environmental assessments at the ASP and CMY sites suggests that development works that were undertaken in the 1970s at the site adjacent to the ASP site, resulted in the placement of 'heavily contaminated soils' along the boundary of the ASP site. Intrusive investigations undertaken during previous assessments at the CMY site indicated that filling material comprising gravel, ash, metal scraps and construction debris are present across the entire CMY up to nominal depths of around 3.2 metres below ground level (bgl).

2.3 Previous Investigations

Whilst there have been a number of previous investigations conducted at parts of the ASP and the overall CMY site [Environmental Earth Sciences (August 1999), HLA Envirosciences (July 2001) and Various letters prepared by David Lane and Associates (2006)], the following reports were prepared specifically for the proposed works and are the principal documents used in the preparation of this RAP:

- DP *Final Contamination Assessment Report, Auburn Stabling Project, Clyde Marshalling Yards*" reference: 71654.01 dated July 2010 (2010a).
- DP *Acid Sulphate Soil Assessment, Proposed Auburn Stabling Facility, Clyde Marshalling Yards* reference: 71654.01 dated July 2010 (2010b).

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A summary of the findings of the DP July 2010 reports is given below.

2.3.1 Summary of DP July 2010 Contamination Assessment Report

The assessment was undertaken to verify whether a 'cap and contain' strategy would be the most suitable and cost effective remedial strategy to render the site suitable for the proposed development, and to confirm if off-site migration of contaminants was occurring, thereby requiring remedial works. It comprised a review of the available site history information (summarised in Section 2.2), soil sampling from 34 test pits and 10 test bores and groundwater sampling from seven groundwater monitoring wells. The DP sampling locations are shown in Drawing 1, Appendix A. Based on the results of the assessment (refer Sections 2.3.1.1 – 2.3.1.3 below), the DP report concluded that in view of random pockets of TPH, PAH and asbestos contamination, the low leachability of the chemical contaminants, the absence of unacceptable groundwater impacts through contaminant migration, the low sensitivity landuse of the site (industrial), the large quantity of fill present and the straightforward nature of the required remediation, a 'cap and contain' strategy is considered to be a practical means of making the site suitable for the proposed industrial land use. The results of the DP (2010a) assessment are summarised in Sections 2.3.1.1 – 2.3.1.4 below.

2.3.1.1 Subsurface Conditions

The subsurface profile encountered during the DP investigation comprised uncontrolled filling to nominal depths ranging between 0.4 metres bgl to 4.5 metres bgl underlain by natural silty/shaly clays and shale/laminite/sandstone bedrock. The filling typically comprised poorly to moderately compacted proportions of clay, silt, sand and gravel with some railway ballast, basalt (roadbase) gravel, ash, cinder, metal, slag, ceramic, glass, crushed sandstone and building rubble. In addition to the above, the following observations were also made:

- Sections of a dilapidated tank of less than 1 cubic metre volume were encountered in TP 39. The tank was noted to contain soil with a hydrocarbon odour.
- Large fragments of scrap metal, steel, sandstone and concrete boulders plus timber sleepers, ranging between about 200 – 1200 millimetres in length, were observed within a minority of the test pits.

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- A profile of coal filling with cinder, ash and slag was observed in TP34 at a nominal depth of 1.5 metres bgl.
- Fibre-cement/asbestos fragments were observed in :
  - BH5 – in the fill profile present between 0.6 metres - 5.2 metres bgl.
  - TP10 – in the fill profile present between 2.0 metres – 4.5 metres bgl.
  - TP19 – in the fill profile present between 0 metres – 1.9 metres bgl.
  - TP23 – in the fill profile present between 0.5 metres – 3.0 metres bgl.
  - TP28 – in the fill profile present between 1.5 metres – 1.8 metres bgl.
  - TP36 – in the fill profile present between 0.5 metres – 0.9 metres bgl.
  - TP39 – in the fill profile present between 0.5 metres – 0.8 metres bgl.
  - TP43 – in the fill profile present between 0 metres – 1.5 metres bgl.
  - TP44 – in the fill profile present between 0 metres – 1 metres bgl.

Groundwater seepage was observed towards the base of the filling whilst excavating a number of the test pits. Further, no free product was observed. The DP report (2010a) considered that the observed water represented infiltration of rainwater that had accumulated within the filling at the less permeable natural clays rather than representing a natural groundwater table. Further, the absence of groundwater in the shallower of the two nested wells installed during the DP assessment indicated that the observed water at the filling/clay interface was not representative of the groundwater table at the site but rather, represented localised perched water.

2.3.1.2 Soil Analytical Results

The analytical for the soil samples showed that contaminants in the following samples exceeded the adopted site assessment criteria (SAC) for a commercial/industrial landuse:

- TP17/0.3-0.4 with TPH C_{10}-C_{36} concentrations of 1060 mg/kg.
- TP18/0.1-0.2 with asbestos.
- BH22/0.4-0.5 with TPH C_{10}-C_{36} concentrations of 5650 mg/kg (hotspot concentration i.e. 2.5 times the threshold criteria).
- TP23/0.1-0.2 with TPH C_{10}-C_{36} concentrations of 1300mg/kg and PAH concentrations of 6.8 mg/kg.

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- TP23/2.2-2.3 with TPH C_{10}-C_{36} concentrations of 1350 mg/kg.
- TP25/0.1-0.2 with TPH C_{10}-C_{36} concentrations of 1030 mg/kg and PAH concentrations of 5.8 mg/kg.
- TP34/1.5-1.6 with TPH C_{10}-C_{36} concentrations of 50280 mg/kg (hotspot concentration) and PAH concentrations of 6.1 mg/kg (associated with a profile of ash, cinder and coal).
- TP45/0.5-0.6 with TPH C_{10}-C_{36} concentrations of 1770 mg/kg.

Further, laboratory analysis undertaken on fibre-cement samples collected from TP10 at a depth of 2.3 - 2.4 m bgl, TP23 at a depth of 1.5 - 1.6 m bgl and TP36 at a depth of 0.6 - 0.7 m bgl tested positive for chrysotile, amosite and crocidolite asbestos. The DP sampling locations where asbestos, TPH and PAH exceedances and hotspots were detected are shown in Drawing 2, Appendix A.

2.3.1.3 Groundwater Analytical Results

The analytical results for the seven groundwater samples showed that with the exception of zinc concentrations in five samples, all other contaminant concentrations were within the adopted groundwater investigation levels (GILs). Noting the urbanised nature of the area, the elevated zinc concentration was attributed to the background conditions of the groundwater and it was therefore considered not to have a significant impact. Importantly, the concentration of TPH C_{10}-C_{36} and PAH in both up-gradient and down-gradient monitoring wells were less than the limit of reporting showing that there had been no apparent impact on the groundwater from the TPH C_{10}-C_{36} and PAH concentrations in the fill. The DP report (2010a) also noted that, although elevated concentrations of medium to heavy fraction hydrocarbons (TPH C_{10}-C_{36}) were detected during previous assessments undertaken by others (HLA 2001), these results were not replicated during the DP (2010a) assessment and were therefore not considered to be representative of the current groundwater quality at the site. Based on the analytical results for the groundwater samples, the DP report concluded that the groundwater at the site had not been impacted by the sporadic pockets of hydrocarbon and PAH contamination that was present in the fill.

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Further, the low concentration of TPH C_{10}-C_{36} and PAHs in the down-gradient monitoring wells confirmed that contaminants were not migrating off the site through the groundwater.

2.3.1.4 Waste Classification

The DP assessment (2010a) included toxicity characteristic leaching procedure (TCLP) tests for metals and PAHs on selected fill samples to obtain a provisional waste classification for the material. The results showed that the leachable lead concentrations in the fill ranged between 0.2 mg/L and 19 mg/L. Based on the total and leachable lead concentrations and in view of the presence of random pockets of asbestos, the fill at the ASP site was provisionally classified as Restricted Solid Waste and Special Waste (asbestos contaminated) suitable for disposal to a Restricted Solid Waste landfill licensed to accept asbestos waste.

However, the DP report also noted that in view of the heterogeneous nature of the general fill and the limited TCLP analysis that was carried out during the assessment, there was a limited potential for the waste classification to be further reduced to General Solid Waste or Special Waste. Therefore, the report recommended that if any excess filling does require off-site disposal, the waste classification should be reassessed by *ex situ* sampling prior to disposal.

2.3.2 Summary of DP July 2010 Acid Sulphate Soil Assessment Report

The DP acid sulphate soil assessment (2010b) was undertaken in conjunction with the contamination assessment and comprised soil sampling from three of the environmental test bores (viz. bores 2, 5 and 6) to nominal depths of 4 metres bgl (or into natural), field screening the soil samples for pH and oxidised pH and laboratory analysis on 16 selected samples for suspended peroxide oxidation combined acidity and sulphate (SPOCAS). Based on the results of the assessment, the report concluded that the filling and the natural silty clay/clay/shaly clays within the soil profiles tested were not considered to be actual or potential acid sulphate soils. Further, the report also noted that in view of the proposed works, an acid sulphate soils management plan was not required.

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3. REGIONAL GEOLOGY, TOPOGRAPHY AND HYDROGEOLOGY

Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the ASP site is located close to a boundary between Quaternary alluvial and estuarine sediments (west) and Ashfield Shale of Triassic Age (east). The Quaternary sediments are mapped as silty to peaty quartz sand, silt and clay. The Ashfield shale of the Wianamatta typically comprises black to dark grey shale and fine grained sandstone-siltstone laminite, which generally weathers to form clays of high plasticity.

The Sydney 1:100,000 Soils Landscape Sheet indicates that the site is located within a "disturbed terrain". Disturbed terrains typically comprise landscapes that have been extensively disturbed by human activity such as removal and/or burial of soil, rock, building and waste materials. Typical limitations of this soil type includes mass movement hazards, unconsolidated low wet-strength materials, impermeable soil, poor drainage, localised very low fertility and toxic materials. The subsurface conditions were confirmed during the DP assessment (2010a).

A review of the Salinity Hazard Map for Western Sydney 1:100,000 Sheet indicates the site soils have moderate salinity hazard potential.

A review of the former Department of Land and Water Conservation Acid Sulphate Soil Risk Map (Edition 2, 1997) indicates that the western portion of the site includes disturbed terrain of unknown potential acid sulphate soils (PASS) whilst the central portion of the site has no known occurrence of PASS. The results of the DP July 2010 acid sulphate soil assessment verified that acid sulphate soils were not present at the site.

Site levels fall towards the north-west, from about RL 20 metres relative to AHD in the south-east, to RL 8 metres AHD near Duck River to the north-west. It is anticipated that the regional direction of surface and groundwater flow would be towards the north-west (Duck River). Groundwater flow directions were estimated during the DP contamination assessment (2010a) using Surfer ® Version 6 and found to be in a north-westerly direction typically towards Duck River.

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4. REMEDIATION ACCEPTANCE CRITERIA (RAC)

4.1 Soil

The assessment is based on the proposed development of the site as a train stabling yard. From a technical standpoint it is considered that the scenario of the subsoil exposure under the proposed ASP would be comparable with an industrial landuse. In accordance with DEC's *Guidelines for the NSW Site Auditor Scheme (2nd Edition)* 2006 (Appendix 1: Decision-making process for assessing urban redevelopment sites), sites subject to industrial land uses should be assessed against the Health-based Investigation Levels (HILs) for industrial land use (Appendix II, Column 4) as shown in Table 1. With regard to petroleum hydrocarbons (TPH and benzene, toluene, ethylbenzene and xylene [BTEX]) as comprehensive health-based criteria are not available, other relevant NSW EPA guidelines for sensitive landuse viz., NSW EPA's *Guidelines for Assessing Service Station Sites,* December 1994 (which are endorsed by the DECCW) were used. Further, in view of the proposed industrial land use, Provisional Phytotoxicity Based Investigation levels (PPIL) have not been considered.

Based on the above Guidelines, the Remediation Acceptance Criteria (RAC) are summarised in Table 1 below.

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Table 1 - Threshold Concentrations for Soils

Contaminant	RAC (mg/kg)	Rationale
TPH[a]		[a] NSW EPA[1] Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils.
$C_6 - C_9$	65	
$C_{10} - C_{36}$	1000	
BTEX		With relation to TEX compounds it is noted that the less stringent guideline which is based on protection of human health, not terrestrial organisms, is generally more applicable to commercial land use.
Benzene	1	
Toluene	130	
Ethylbenzene	50	
Xylene	25	
Metals		NSW DEC[1] Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for Commercial and Industrial sites (HIL Column 4). ` All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment.
Arsenic (total)	500	
Cadmium	100	
Chromium`	500	
Copper	5000	
Lead	1500	
Mercury	75	
Nickel	3000	
Zinc	35000	
Total Phenols	42500	
PAH		
Total	100	
Benzo(a)Pyrene	5	
PCB	50	
OCP		
aldrin + dieldrin	50	
chlordane	250	
DDT (including DDD, DDE, DDT)	1000	
Heptachlor	50	
Asbestos	No asbestos present in soil at the surface	Correspondence from NSW EPA[1] Director of Contaminated Sites to Accredited Site Auditors

1. now part of Department of Environment, Climate Change and Water (DECCW)

A contaminant concentration in soil/filling material is considered to be significant if:

i) The concentration of the contaminant is more than 2.5 times RAC. Any location more than 2.5 times the RAC is classified as a 'hotspot', requiring further assessment/ management.

ii) For a data of like material, with respect to the health-based criteria, the calculated 95% Upper Confidence Limit (UCL) of average concentrations (excluding any 'hotspot' concentrations) exceeds the RAC.

iii) The standard deviation of the results is greater than 50% of the health-based investigation levels (HIL).

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4.2 Groundwater

Groundwater contamination was not identified during the DP assessment (2010a) and, therefore, further assessment and/or remediation of groundwater is not considered necessary. However, as a contingency provision, if signs of concern are observed during remedial/validation works and further groundwater assessment is deemed necessary, a set of groundwater investigation levels (GILs) have been established. If required, the GILs would be applied as screening values whilst taking into account up-gradient and regional groundwater conditions as well as hardness modified screening levels for heavy metals. Groundwater remediation would only be considered necessary if the groundwater results indicate the contamination would cause significant impacts on the health of site users and the environment.

The levels of contaminants in groundwater would be assessed against Groundwater Investigation Levels (GILs) adopted from applicable guidelines, specifically, the ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. The ANZECC 2000 Guidelines and their source documents are detailed in Table 2. Guidelines for freshwaters would be adopted.

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Table 2 - Groundwater Investigation Levels (GIL)

Contaminant	Adopted Criteria (GIL) (µg/L)	Source
TPH[1] C6 – C9 >C9	 150 µg/L 600 µg/L	[1]At this stage, there are no high reliability guideline values for TPH in ANZECC 2000 or endorsed by DECCW. For reference purposes, DP has referred to other available Australian guidelines for TPH viz. Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination. It should be noted however that these have not been endorsed by DECCW and are used as 'screening levels' only. It is also noted that there is a 'low reliability' Interim Working Values (Section 8.3.7) final chronic value of 7 µg/L for petroleum hydrocarbon but that commercial laboratories are not generally able to achieve the necessary detection limits to demonstrate compliance.
BTEX Benzene[2] Toluene[3] Ethylbenzene[3] Xylene[3]	 950 µg/L 300 µg/L 140 µg/L 380 µg/L	[2]ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species [3]NSW EPA Contaminated Sites Guidelines for Assessing Service Station Sites (1994) Threshold concentrations for sensitive land use, Protection of Aquatic Ecosystem is adopted in the absence of other comprehensive investigation levels for toluene, ethyl benzene and xylene in freshwater.
Metals Arsenic (III) Cadmium Chromium (III)[4] Copper Lead Mercury Nickel Zinc	 24 µg/L 0.2µg/L 27.4 µg/L 1.4 µg/L 3.4µg/L 0.6 µg/L 11 µg/L 8 µg/L	ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species. GILs are adjusted for hardness. [4]GIL for Chromium (III) adopted from marine water trigger value in the absence of a freshwater trigger value.
PAH Total Benzo(a)Pyrene Naphthalene Anthracene Phenanthrene Fluoranthene	 Not Specified 0.2 µg/L[5] 16 µg/L 0.4 µg/L[5] 2.0 µg/L[5] 1.4 µg/L[5]	ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species [5]. low reliability trigger value *ANZECC (2000)*
Total Phenols	320	ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species
PCB Aroclor 1016[5] Aroclor 1221[5] Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254	 0.001 µg/L[6] 1 µg/L[6] 0.3 µg/L[6] 0.3 µg/L 0.3 µg/L[6] 0.01 µg/L	ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species [6]. low reliability trigger value *ANZECC (2000)*
OCP's Chlordane DDT Endosulfan Endrin Heptachlor Aldrin DDE Dieldrin Methoxychlor	 0.08 µg/L 0.01 µg/L 0.2 µg/L 0.02 µg/L 0.09 µg/L 0.001 µg/L[7] 0.03 µg/L[7] 0.01 µg/L[7] 0.005 µg/L[7]	ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species. [7]. low reliability trigger value *ANZECC (2000)*

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Contaminant	Adopted Criteria (GIL) (µg/L)	Source
OPP		ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species. [8]. low reliability trigger value *ANZECC (2000)*
Demeton-S-methyl	4 µg/L [8]	
Diazinon	0.01 µg/L	
Dimethoate	0.15 µg/L	
Chloropyrifos	0.01 µg/L	
Malathion	0.05 µg/L	
Azinophos Methyl	0.02 µg/L	
Fenitrothion	0.2 µg/L	
Parathion (ethyl)	0.004 µg/L	

a. Australian and New Zealand Environment and Conservation Council *'Australian and New Zealand Guidelines for Fresh and Marine Water Quality – October 2000'.*

In the absence of DECCW endorsed or other Australian guidelines for many volatile organic compounds (VOC) DP has supplemented the ANZECC guidelines by other international guidelines as screening criteria. These include the Dutch Intervention Value (Dutch IV) from the *Environmental Quality Standards in the Netherlands* 2006, amended 2008 and USEPA *Mid- Atlantic Risk Assessment – Regional Screening Levels* (RSL). The guideline values are reproduced in Table 3.

Table 3 - VOC Groundwater Investigation Levels (GIL)

Analyte	ANZECC (2000) [1] µg/L	Dutch Intervention[2] µg/L	USEPA RSL
Dichlorodifluoromethane	-	-	-
Chloromethane	-	-	160
Vinyl Chloride	100[2]	-	0.02[5]
Bromomethane	-	-	8.7
Chloroethane	-	-	4.6[5]
Trichlorodifluoromethane	-	-	1300
1,1-Dichloroethene	700[2]	-	340
Trans-1,2-dichloroethene	-	-	120
1,1-dichloroethane	90[2]	900	810
Cis-1,2-dichlorethene	-	-	61
Bromochloromethane	-	-	-
Chloroform	370[2]	400	0.17[5]
2,2-dichlorpropane	-	-	-
1,2-dichloroethane	1900[2]	400	0.12[5]
1,1,1-trichloroethane	270[2]	300	3200
1,1-dichloropropene	500[2]	-	-
Carbon tetrachloride	240[2]	-	0.17
Benzene	950	30	-
Dibromomethane	-	-	-
Trichloroethene	330[2]	-	0.028[5]

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Analyte	ANZECC (2000) [1] µg/L	Dutch Intervention[2] µg/L	USEPA RSL
Bromodichloromethane	-	-	1.1[5]
trans-1,3-dichloropropene	-	-	-
cis-1,3-dichloropropene	-	-	-
1,1,2-trichloroethane	1900[3]	130	0.2[5]
Toluene	180[2]	1000	720
1,3-dichloropropane	1100[2]	-	120
Dibromochloromethane	-	-	0.13
1,2-dibromoethane	-	-	0.0056[5]
Tetrachloroethene	70[2]	40	0.1[5]
1,1,1,2-tetrachloroethane			0.43[5]
Chlorobenzene	55[2]	-	110
Ethylbenzene	80[2]	150	1300
Bromoform	-	-	8.5[5]
m+p-xylene	200+75[2]	-	-
Styrene	-	300	2100
1,1,2,2-tetrachloroethane	400[2]		0.055[5]
o-xylene	350[2]	-	210
1,2,3-trichloropropane	-	-	0.0056[5]
Isopropylbenzene	30[2]	-	6.2
Bromobenzene	-	-	20
n-propyl benzene	-	-	240
2-chlorotoluene	-	-	-
4-chlorotoluene	-	-	-
1,3,5-trimethyl benzene	-	-	12
Tert-butyl benzene	-	-	240
1,2,4-trimethyl benzene	-	-	12
1,3-dichlorobenzene	260[2]	-	180
Sec-butyl benzene	-	-	240
1,4-dichlorobenzene	60[2]	-	0.5[5]
4-isopropyl toluene	-	-	-
1,2-dichlorobenzene	160[2]	-	370
n-butyl benzene	-	-	-
1,2-dibromo-3-chloropropane	-	-	0.048[5]
1,2,4-trichlorobenzene	80[2]	-	-
Naphthalene	70	70	6.2
Hexachlorobutadiene	-	-	0.86
1,2,3-trichlorobenzene	3[2]	-	-

Notes

1. ANZECC (2000) – 95% Level of Protection (LOP). A 95% LOP has been adopted in view of the surrounding commercial and urban land-use (assumed to be a 'moderately disturbed ecosystem').
2. ANZECC (2000) Low reliability trigger value for marine water.
3. ANZECC (2000) Moderate reliability trigger value.
4. USEPA *RSL* for tap water - HQ = 1.
5. USEPA *RSL* - Tap Water Cancer Risk = 1x 10^{-6}.

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6. The Ministry of Housing, Spatial Planning and the Environment (1994) Environmental Quality and Standards in the Netherlands) – Groundwater intervention values.

\- No guideline value available.

4.3 Waste Classification

For waste classification purposes, soil/filling materials would be assessed against:

- The DECCW's publication *Waste Classification Guidelines* (2008) revised December 2009.

Waste classification would take into account all previous "*in situ*" testing results. However, for materials that are to be disposed off site, an ex *situ* waste classification assessments would be conducted to confirm the appropriate waste classification and to allow for segregation of materials if and when appropriate.

The waste classification criteria for the contaminants of concern are provided in Tables 4 and 5.

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Table 4 - Contaminant Threshold Values (CT1 and CT2) for Classifying Waste by Chemical Assessment without the Leaching (TCLP) Test

Contaminant	Maximum Values of specific contaminant concentration for classification without TCLP	
	General Solid Waste[1]	Restricted Solid Waste
	CT1 (mg/kg)	CT2 (mg/kg)
Arsenic	100	400
Benzene	10	40
Benzo(a)pyrene[2]	0.8	3.2
Cadmium	20	80
Chromium (IV)[3]	100	400
Ethyl Benzene	600	2400
Lead	100	400
Mercury	4	16
Nickel	40	160
C6-C9 Petroleum Hydrocarbons	NA[4]	NA[4]
C10-C36 Petroleum Hydrocarbons	NA[4]	NA[4]
Phenol	288	1152
Polychlorinated Biphenyls	NA[4]	NA[4]
Polycyclic Aromatic Hydrocarbons (total)	NA[4]	NA[4]
Scheduled Chemicals	NA[4]	NA[4]
Toluene	288	1152
Xylenes (total)	1000	4000

Notes:

1. Values are the same for both general solid waste (putrescible) and general solid waste (non-putrescible)
2. There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence
3. These limits apply to chromium in the +6 oxidation state only
4. NA means not applicable, because these contaminants are only assessed using SCC – See Table 7.

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Table 5 - Leachable Concentrations (TCLP) and Specific Contaminant Concentrations (SCC) Values for Classifying Waste by Chemical Assessment

	Maximum values for leachable for Leachable Concentration and Specific Contaminant Concentration when Used Together			
	General Solid Waste[1]		**Restricted Solid Waste**	
	TCLP1 (mg/L)	SCC1 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)
Arsenic	5.0[2]	500	20	2000
Benzene	0.5[2]	18	2	72
Benzo(a)pyrene[3]	0.04[4]	10	0.16	23
Cadmium	1.0[2]	100	4	400
Chromium (IV)[5]	5[2]	1900	20	7600
Ethyl Benzene	30[6]	1080	120	4320
Lead	5[2]	1500	20	6000
Mercury	0.2[2]	50	0.8	200
Nickel	2[6]	1050	8	4200
C6-C9 Petroleum Hydrocarbons	NA[7]	650	NA[7]	2600
C10-C36 Petroleum Hydrocarbons	NA[7]	10000	NA[7]	40000
Phenol	14.4[8]	518	57.6	2073
Polychlorinated Biphenyls	NA[7]	<50	NA[7]	<50
Polycyclic Aromatic Hydrocarbons (total)	NA[7]	200	NA[7]	800
Scheduled Chemicals	NA[7]	<50	NA[7]	<50
Toluene	14.4[8]	518	57.6	2073
Xylenes (total)	50[9]	1800	200	7200

Notes:

1. Values are the same for both general solid waste (putrescible) and general solid waste (non-putrescible)
2. See Hazardous Waste Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule (USEPA 1990) for TCLP levels
3. There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence
4. Calculated from Hazardous Waste – Identification and Listing – Protocol Rule (USEPA 1995)
5. These limits apply to chromium in the +6 oxidation state only
6. Calculated from Australian Drinking Water Guidelines (NHMRC 1994)
7. No TCLP Analysis is required
8. Proposed level for phenol and toluene in Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule (USEPA 1990)
9. Calculated from Guidelines for Drinking Water Quality (WHO 1993)

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Virgin Excavated Natural Materials (VENM) that require off-site beneficial re-use/disposal would be assessed against published background concentrations viz.:

- NEPC (1999). *National Environmental Protection (Assessment of Site Contamination) Measure* Schedule B(1) Guidelines on the Investigation Levels for Soil and Groundwater, Background Ranges; and/or
- Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (ANZECC/NHMRC): *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* (1992), Environmental Soil Quality Guidelines Column A Background (ANZECC A) [for inorganic analytes only].

The background concentrations for the analytes of concern are provided in Table 6.

Table 6 - Published Australian Background Soil Concentrations

Contaminant	ANZECC 1992 (mg/kg)	NEPC 1999 (mg/kg)
Arsenic	0.2-30	1-50
Cadmium	0.04-2	1
Chromium	0.5-110	5-1000
Copper	1-190	2-100
Lead	<2-200	2-200
Mercury	0.001-0.1	0.03
Nickel	2-400	5-500
Zinc	2-180	10-300
PAHs	0.95-5	ND

Organic analytes (TPH, BTEX, OCP, PCB and phenols) would be assessed against the laboratory reporting limit. In other words, for organic analytes, VENM analysis results must be within the laboratory PQL (practical quantification limit) to be classified as VENM.

If the excavated filling material from the site is to be beneficially re-used at another site and/or if non-VENM material is to be imported to the site for beneficial re-use, then the material would be assessed against:

- *DECCW (2008) 'The Excavated Natural Material Exemption 2008'*

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The excavated natural material (ENM) criteria are provided in Table 7 below.

Table 7 – ENM Criteria

Column 1	Column 2	Column 3	Column 4
Chemicals and other attributes	Maximum average concentration for characterisation (mg/kg 'dry weight' unless otherwise specified)	Absolute maximum concentration (mg/kg 'dry weight' unless otherwise specified)	Test method specified within Section
1. Mercury	0.5	1	12.1
2. Cadmium	0.5	1	12.2
3. Lead	50	100	12.2
4. Arsenic	20	40	12.2
5. Chromium (total)	50	100	12.2
6. Copper	50	100	12.2
7. Nickel	30	60	12.2
8. Zinc	100	200	12.2
9. Electrical Conductivity	1.5 dS/m	3 dS/m	12.3
10. pH *	6 to 9	5.5 to 10	12.3
11. Total Polycyclic Aromatic Hydrocarbons (PAHs)	20	40	12.4
12. Benzo(a)pyrene	0.5	1	12.4
13. Total Petroleum Hydrocarbons (TPHs)	250	500	12.5
14. Total Chlorinated Hydrocarbons	0.5	1	12.6
15. Rubber, plastic, bitumen, paper, cloth, paint, wood and other vegetable matter	0.05%	0.10%	12.7

* Note: The ranges given for pH are for the minimum and maximum acceptable pH values in the excavated natural material.

5. REMEDIATION RATIONALE AND STRATEGY

5.1 Remediation Rationale

The main objectives of site remediation works are to render the site suitable for the proposed continued use for railway purposes (industrial use), and to ensure that the works will not pose unacceptable risk to human health or to the environment.

5.1.1 Typical Remedial Options Available

A number of remedial options were reviewed. The suitability of the remedial options was examined with respect to the requirements of the proposed development, whilst taking into account the provisions of a number of relevant guideline documents, including:

- ANZECC/NHMRC document *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Lands* 1992 (ANZECC 1992).
- Department of Environment and Conservation (now DECCW), *Contaminated Site: Guidelines for the NSW Site Auditor Scheme* (2nd Edition) 2006.
- ANZECC, *Guidelines for the Assessment of On-site Containment of Contaminated Soil'* (ANZECC 1999).

Typical remedial options that may achieve the remedial objectives are identified as:

- Removal of contaminated material to landfill.
- On-site treatment and re-use of contaminated material.
- Encapsulation of the contaminated soils by a physical barrier system.

The preferred remediation hierarchy for this RAP has been made with reference to Section 3.1.8 of the *Australia and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*, ANZECC 1992 and to the principles of the Waste Hierarchy established by the DECCW under the *Waste Avoidance and Resource Recovery Act 2001*.

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5.1.1.1 Removal of Contaminated Material to Landfill

Excavation and removal to landfill involves physically excavating and transporting impacted soil to an off-site location for storage, treatment or disposal. Disposal to landfill may require prior treatment of the impacted soil if the chemical levels exceed landfill criteria as determined in the NSW DECCW *Waste Classification Guidelines* (2008) Revised December 2009.

Given the sporadic nature of the contaminants within the filling material, it is envisaged that isolation of the various contamination pockets would not be possible and therefore, removal of the contaminated filling would effectively require bulk excavation. Noting also that similar filling, most probably with comparable concentrations of contaminants, would remain within the greater CMY, the overall environmental benefits gained by bulk excavation of filling within the ASP site is considered to be negligible. This option would also impose an unnecessary burden on the capacity of the receiving landfill and contradict the principles of the *Waste Avoidance and Resource Recovery Act*, 2001.

Excavation and removal of the contaminated filling is not a preferred option based on:

(i) The contamination appears to be sporadic in nature (i.e. contaminants spread over the bulk of the filling in a random manner). Attempts to delineate the extent of contamination may prove futile as there are no traceable trends or distribution pattern.

(ii) The volume of material requiring excavation and disposal (to landfill) would be significant.

(iii) The fact that similar filling, most probably with comparable concentrations of contaminants, would remain within the greater CMY, the overall environmental benefits gained by bulk excavation of filling within the ASP site area is likely to be negligible.

This option is therefore not considered further.

5.1.1.2 On-site Treatment and Reuse

On-site treatment of the asbestos impacted soil is not considered to be a suitable remedial option as asbestos cannot be effectively "destroyed" via treatment. Further, the PAH exceedances that were detected at the site were associated with the ash, slag and asphalt

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present in the filling material. As such, the PAHs are expected to be well bonded to the ash and slag fragments which are not be readily separable from the soil matrix. This strategy is therefore not considered to be an appropriate remedial option for the site.

5.1.1.3 Encapsulation of the Contaminated Soil by Construction of a Physical Barrier System

Construction of a physical barrier system over contaminated filling would remove the exposure pathway to site users. This option typically comprises construction of barriers on top of (or in some cases around) the impacted material, or relocating the contaminants on site to a constructed entombment. In addition, the physical barrier is also used to control the emission of odours or volatile organic compounds (there were no significant detections) and to reduce erosion, infiltration and improve site aesthetics.

Physical barrier layers typically include the placement of low permeability soils such as clays, although synthetic membranes such as high density polyethylene (HDPE), bituminous materials, paving and concrete may also be suitable. Appropriate site grading and drainage systems may also be required to remove water from the capped areas (pavements and slabs) and to control surface run-off. The long term management of the integrity of the capping layer would be outlined in an appropriate environmental management plan (EMP) with provisions of regular inspection and maintenance included as necessary.

5.2 The Preferred Remediation Strategy

The preferred remedial option is, therefore, 'Encapsulation of the Contaminated Soil by Constructing a Properly Designed Physical Barrier System'. This option involves the installation of an engineered physical barrier system to limit the exposure of site users and/or off-site receptors to contaminants.

Under the proposed development scenario this remedial strategy is considered to be the most practical and cost effective. The option would result in a substantial reduction in health and environmental risk to an acceptable level, whilst also achieving minimisation of waste. The option calls for the construction of an appropriately engineered capping layer

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over the filling, which is both technically feasible and easy to manage and maintain in the long run. The preferred option, therefore, attains an optimal balance amongst the various remediation objectives including risk reduction, environmental integrity, cost and long term manageability.

Cap designs have been developed for areas of:

- Rail Tracks (refer Section 6.1.1).
- Hardstands, roads and pavements (refer Section 6.1.2).
- Building slabs (refer Section 6.1.3).
- Landscaped areas (refer Section 6.1.4).
- Service Trenches including Atlantis Cells (refer Section 6.1.5).
- Maintenance storage areas (refer Section 6.1.6).
- Future trackwork areas (refer Section 6.1.7).
- Dry detention basins (refer Section 6.1.8).

Different cap designs are shown in Drawings 3 - 7, Appendix A.

6. CAP DESIGNS

6.1 Details of Cap Construction

The remedial strategy seeks to minimise potential exposure pathways (routes) to the underlying contaminants. To achieve this, the site would be capped with a range of cap types depending on the type of construction planned in any area. The cap types to be adopted are shown in Drawings 3 – 6, Appendix A and described below. All caps would be underlain with a marker layer (geogrid, geotextile or similar) laid on the final surface of the contaminated fill material. Given the anticipated low leachability of the contaminants, the cap does not need to be impermeable. The building slabs, hardstand areas and roads would, however, provide a very low permeability cap and the rail tracks would incorporate subsoil drains. Surface slabs, road pavements and sub-soil drains would thereby reduce stormwater infiltration.

Given the nature of the site (as a rail stabling yard within the CMY), the minimum constructional requirements for a suitable cap is considered to be a permanent, engineered pavement (i.e., concrete, asphalt, etc) thickness of 100 millimetres thickness overlying a marker layer. Most of the proposed development, however, would actually have a cap substantially greater than the minimum cap thickness. The total cap thickness would be based on the engineering designs of these elements, such as rail tracks, buildings, hardstands, roads, pavements and maintenance storage areas. High access areas such as the car parks, roads and the maintenance building would also have the concrete or bitumen pavements, including the imported pavement layers (sub-base, base course etc), acting as the capping layer. More information on specific areas of the site and the associated cap construction is provided below.

6.1.1 Rail Tracks

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary ensuring a woven geotextile or geogrid (marker layer) is installed over the contaminated fill.
- Depending on the design levels, an optional 500 millimetres of select fill material profile (SFL) may be required to build up site levels. This SFL could comprise either contaminated fill sourced from the site or clean imported fill such as crushed sandstone or other materials (as specified in the contract) that has been validated as complying with the RAC (refer Section 4). If the SFL comprises imported clean fill that has been validated as complying with the RAC, then the marker layer can be placed below the SFL and a formation layer (as specified for the contract) of 150 millimetres can be placed over the marker layer and clean imported SFL. Alternatively, if the SFL comprises contaminated fill sourced from the site, then the marker layer should be placed directly above the SFL. Subsequently, a formation layer (as specified for the contract) should be placed over the SFL and the marker layer to a minimum thickness of 150 millimetres (i.e., the marker layer will be placed between the contaminated SFL and the formation layer that has a minimum thickness of 150 millimetres).
- Over the formation layer, ballast, sleepers and track would be installed as part of the capping system.

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A typical cap design for the rail tracks is shown in Drawing 3, Appendix A.

6.1.2 Pedestrian Pavements, Hardstands and Roads

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary, ensuring a marker layer is installed over the contaminated fill.
- Over the marker layer, pavement depths of varying thickness would be constructed depending on the type of construction. A minimum permanent engineered pavement thickness of 100 millimetres is required for the marker layer to be placed directly underneath. If the thickness is less than 100 millimetres, then the clean, imported pavement material (as specified in the contract), together with the engineered pavement (i.e., concrete or asphalt) would form a part of the capping system. For example if the asphalt on the vehicle access road was 50 millimetres thick, then the marker layer would be required to be below the imported pavement material layer (i.e., DGB 40), with a minimum thickness of 50 millimetres.

6.1.3 Building Slabs

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary ensuring a marker layer is installed over the contaminated fill.
- Over the marker layer, lower base materials such as the blinding slab would be placed prior to the construction of the permanent concrete building slab as part of the capping system (Refer Drawing 4, Appendix A).

6.1.4 Landscaped Areas

Based on the current design plans, the ASP will include landscaped areas at a number of locations. In view of the extent of landscaped areas, two landscape cap design options (viz., Option 1 - landscaped areas with topsoil/grass and Option 2 - landscaped areas with mulch) have been provided below.

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6.1.4.1 Option 1 - Landscaped Areas with Topsoil and Grass

This cap design option could potentially be utilized in the majority of the landscaped areas as long as the long-term integrity of the cap can be maintained by means of suitable mechanisms to restrict breaching of the cap (such as demarcation fences, restricted/authorised excavations, etc). As discussed in Section 9.5, the details of the mechanisms in place to maintain the cap should be included in the EMP which would be subject to approval by the DECCW accredited site auditor (Mr. Mike Hayter). In general, this cap would be installed in the following manner:

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary. The sub-grade should then be prepared as per the contract specifications for the landscaping and a marker layer should be installed over the contaminated fill.
- Imported landscape soils or site soils (modified for landscape purposes as specified) that have been adequately validated as complying with the RAC (refer to Section 4) should be placed over the marker layer to a minimum thickness of 200 millimetres. Over the validated landscaped soils, 100 millimetres of validated topsoil or other materials as specified elsewhere (refer Drawing 5, Appendix A) should be placed and subsequently topped with a suitable turf or hydromulch. The imported landscape soil and/or modified site soil that meets the RAC together with the 100 millimetres of topsoil (that also meets the RAC) plus the turf or hydromulch would form the cap (Refer Option 1 on Drawing 5, Appendix A).

6.1.4.2 Option 2 - Landscaped Areas with Mulch

This cap design option would be suitable for smaller landscaped areas, such as garden beds and other areas where grass/turf is not a practical option. Similar to option 1, the mechanisms for maintaining the long-term integrity of the cap should be detailed in an EMP that will be subject to approval by the DECCW accredited site auditor (Mr. Mike Hayter) (as discussed in Section 9.5). In general, this cap would be installed in the following manner:

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary. The sub-grade should then be prepared as per the contract specifications for the landscaping and a marker layer should be installed over the contaminated fill.

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- Imported landscape soils or site soils (modified for landscape purposes as specified) that have been adequately validated as complying with the RAC (refer to Section 4) should be placed over the marker layer to a minimum thickness of 200 millimetres and topped with 50-75 millimetres of mulch or other materials as specified elsewhere (refer Option 2 in Drawing 5, Appendix A). The imported landscape soil and/or modified site soil that meets the RAC together with the mulch would form the cap in the landscaped areas.

6.1.5 Service Trenches

Following establishment of the final contaminated fill levels and/or completion of the SFL, service trenches (including trenches for the Atlantis Cells) would be excavated across the site in areas that have already been capped as described above. This may also involve breaching of the cap and the marker layer. Subsequent to the excavation, a new marker layer would be installed on the bottom and sides of the trench and backfilled with 'clean' imported material such as VENM or certified quarry run material or as specified for the contract (e.g. sand or gravel). The marker layer would be laid as shown in Drawing 3, Appendix A. Any excavation of the service trenches after the placement of the marker layer would need to be conducted in accordance with established protocols. This would include:

- Management of material that is excavated from below the cap so that it will not cross-contaminate the cap materials (e.g. over excavation of the SFL on which the excavated trench material is placed).
- Re-instatement of the marker layer at the appropriate position after completion of the works.
- Re-instatement of the capping layers using similar materials.
- Placement of fill below the marker layer in other parts of the site or waste classification and off-site disposal of soil as necessary.

6.1.6 Maintenance Storage Areas

The proposed ASP will include maintenance storage areas which will potentially be used as temporary storage areas. Based on the ASP contract specifications, these areas may either comprise engineered caps (as per Sections 6.1.2 and 6.1.3) or remain as unpaved areas.

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Should the maintenance storage areas remain unpaved, then the cap would be installed as follows:

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary, ensuring a marker layer is installed over the contaminated fill.
- Over the marker layer, a minimum of 0.5 m of a select fill layer SFL (SFL, such as crushed sandstone or clean fill that has been adequately validated as complying with the RAC (refer to Section 4)) and/or DGB40 (or as specified in the contract) should be placed and compacted as necessary. The validated SFL and/or DGB40 (or as specified in the contract) with a combined thickness of 0.5m would form the cap in these areas (Refer Drawing 6, Appendix A).

6.1.7 Future Trackwork Areas

Under the proposed two stage delivery approach for the ASP, stabling roads 12-16 will be constructed at a later stage. Therefore, the contaminated fill in these areas will need to be capped in the interim. In view of this, two interim cap design options have been provided for the future trackwork areas (viz., Option 1 – Capping with 0.5 m SFL and Option 2 – Capping as a landscaped area with grass).

6.1.7.1 Option 1 – Capping with 0.5 m SFL

This cap design option would be similar to the proposed cap in the unpaved areas of the Maintenance storage areas (as per Section 6.1.6). If this option is adopted by the Design and Construction (D&C) contractor, it would be installed as follows:

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary, ensuring a marker layer is installed over the contaminated fill.
- Over the marker layer, a minimum of 0.5 m of select a fill layer SFL (SFL, such as crushed sandstone or clean fill that has been adequately validated as complying with the RAC (refer to Section 4)) and/or DGB40 (or as specified in the contract) should be placed and compacted as necessary. The validated SFL and/or DGB40 (or as specified

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in the contract) with a combined thickness of 0.5m would form the cap in these areas (Refer Drawing 6, Appendix A).

6.1.7.2 Option 2 – Capping as Landscaped Area with Grass

This option would be similar to cap design for the Landscaped Areas with Topsoil and Grass (Section 6.1.4.1). However, if this option is adopted for the future trackwork areas, the D&C contractor should ensure that the long-term integrity of the cap can be maintained after construction. This will be by means of suitable mechanisms to restrict breaching of the cap, such as fences to restrict access in association with procedures to restrict and authorise excavations or to limit heavy use of the area etc. As discussed in Section 9.5, the details of the mechanisms in place to maintain the long-term integrity of the cap should be included in the EMP which would be subject to approval by the DECCW accredited site auditor (Mr. Mike Hayter). In general, this cap would be installed in the following manner:

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary. The sub-grade should then be prepared as per the contract specifications for the landscaping and a marker layer should be installed over the contaminated fill.
- Imported landscape soils or site soils (modified for landscape purposes as specified) that have been adequately validated as complying with the RAC (refer to Section 4) should be placed over the contaminated fill material and the marker layer to a minimum thickness of 200 millimetres. Over the validated landscaped soils, 100 millimetres of validated topsoil or other materials as specified elsewhere should be placed and subsequently topped with a suitable turf or hydromulch. The imported landscape soil and/or modified site soil that meets the RAC together with the 100 millimetres of topsoil (that also meets the RAC) plus the turf or hydromulch would form the cap (refer Option 1 in Drawing 5, Appendix A).

6.1.8 Dry Detention Basins

Under the proposed ASP design, two dry detention basins will be constructed at the site. In view of this, two cap design options have been provided for the dry detention areas (viz., Option 1 – Capping with 0.5 m SFL and Option 2 – Capping as a landscaped area with grass).

6.1.8.1 Option 1 – Capping with 0.5 m SFL

This cap design option would be similar to the proposed cap in the unpaved areas of the Maintenance storage areas (Section 6.1.6). If this option is adopted by the Design and Construction (D&C) contractor, it would be installed as follows:

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary, ensuring a marker layer is installed over the contaminated fill.
- Over the marker layer, in the base of the basin, a minimum of 0.5m of a select fill layer SFL (SFL, such as crushed sandstone or clean fill that has been adequately validated as complying with the RAC (refer to Section 4)) and/or DGB40 (or as specified in the contract) should be placed and compacted as necessary. The validated SFL and/or DGB40 (or as specified in the contract) with a combined thickness of 0.5 m would form the cap in these areas (Refer Drawing 6, Appendix A).
- On the sidewalls of the basin (to prevent erosion), imported landscape soils or site soils (modified for landscape purposes as specified) that have been adequately validated as complying with the RAC (refer to Section 4) should be placed over the marker layer to a minimum thickness of 200 millimetres. Over the validated landscaped soils, 100 millimetres of validated topsoil or other materials as specified elsewhere should be placed and subsequently topped with a suitable native grass and/or turf (refer Option 1 in Drawing 5, Appendix A). The imported landscape soil and/or modified site soil that meets the RAC together with the 100 millimetres of topsoil (that also meets the RAC) plus the native grass and/or turf would form the cap on the sidewalls.

6.1.8.2 Option 2 – Capping as Landscaped Area

This option would be similar to the cap design for the Landscaped Areas with Topsoil and Grass (Section 6.1.4.1). However, if this option is adopted for the dry detention basins, the D&C contractor should ensure that the long-term integrity of the cap can be maintained after construction by means of suitable mechanisms to restrict breaching of the cap (such as demarcation fences, restricted/authorized excavations, procedures to limit heavy use of the area, maintenance/cleaning procedures that ensure the cap is not breached, etc). As discussed in Section 9.5, the details of the mechanisms in place to maintain the long-term

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integrity of the cap should be included in the EMP which would be subject to approval by the DECCW accredited site auditor (Mr. Mike Hayter). In general, this cap would be installed in the following manner:

- Following establishment of the final contaminated fill levels, service trenches, stormwater lines, footings etc would be excavated and constructed as necessary. The sub-grade should then be prepared as per the contract specifications for the landscaping and a marker layer should be installed over the contaminated fill.
- Imported landscape soils or site soils (modified for landscape purposes as specified) that have been adequately validated as complying with the RAC (refer to Section 4) should be placed over the marker layer to a minimum thickness of 200 millimetres. Over the validated landscaped soils, 100 millimetres of validated topsoil or other materials as specified elsewhere should be placed and subsequently topped with a suitable turf and/or native grass and/or hydromulch (refer Option 1 in Drawing 5, Appendix A). The imported landscape soil and/or modified site soil that meets the RAC together with the 100 millimetres of topsoil (that also meets the RAC) plus the turf and/or hydromulch and/or native grass would form the cap.

7. IMPLEMENTATION OF THE RAP STRATEGY

7.1 Detail and Bulk Excavation Protocols

7.1.1 Early Works - Demolition, Clearing and Detailed Excavations

The following work would be carried out as Early Works. Prior to bulk excavation commencing, the site would be cleared of trees, vegetation and existing buildings would be demolished and removed. Rail tracks and turn-outs would also be removed as necessary and services disconnected and diverted. This would involve the removal and disposal of asbestos-based building materials, if any, by a contractor holding a WorkCover friable asbestos licence (AS-A licence). At the completion of this phase of the Early Works an Occupational hygienist must give written clearance that all surface, asbestos-based materials have been successfully removed.

Once the Early Works have been completed, excavation and compaction of contaminated soils would be undertaken using standard earthwork equipment. Excavation of contaminated soils would include bulk excavation in areas of cut-to-fill, trench excavation for the laying of services (stormwater, electrical conduits, light pole footings etc), tree planting sites and detailed excavation of the pile caps (where required). The following protocols are to be observed during this work and are to be incorporated into the appropriate contractors' plans:

- Site Induction: As part of the site induction process workers are to be advised on:
  - The contamination status of the site including the location, nature, type and concentration of contaminants present.
  - The risks associated with the contaminants.
  - The location and the methods of field identification of contamination hotspots.
  - The occupational health and safety monitoring to be undertaken (as required by site conditions) in areas reported to contain contamination hotspots and areas outside contamination hotspots.
  - The occupational health and safety controls to mitigate the risks (including personal protective equipment (PPE) and, as required, air monitoring) including work in and within 20 metres of contamination hotspots.
- Identified contamination hotspots are to be clearly marked in the field.
- All surface, visible asbestos-based fragments (fibro) are to be removed prior to earthworks commencing:
  - Contractor responsible for clearing the area should have a 'Friable asbestos license' (AS A licence) for asbestos abatement works.
  - Formal, written clearance by an occupational hygienist should be given prior to work starting/resuming within the area.
- Work within hotspots, such as trenching, would disturb the ground and, given the findings of the previous assessment, may result in contaminated soils being temporarily exposed at the surface (before ultimately being capped). In view of the variability of the fill soil, and the relatively short duration of the exposure (in terms of weeks) specific treatment of disturbed soil is not considered warranted. The control measures devised

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to manage the general fill soils would effectively minimise the health risk associated with the contaminants associated with the fill soils (including the hotspots).

- Small scale earthmoving activities (for example, trenching) would not create a significant dust problem, however, dust levels must be kept to a minimum at all times and water carts should be available and used as appropriate (Refer to Section 7.1.3, below).

  All plant operators should:

  - Clean cabs daily to remove accumulated dust and dirt.
  - Have appropriate PPE available within the cab at all times for use as required (refer to Section 8 for details).

- Work is to cease immediately when odours, unusual discolouration or fibro (or other asbestos-based materials) is found within the fill (in the case of asbestos, refer to Section 7.3.3, Asbestos Finds Protocol). When asbestos, odours or other indicators of environmental concern are noted, the project Environmental Manager must be informed immediately. They would assess the situation and make a determination on the steps to be taken to make the situation safe and to resolve the issue. This would include seeking advice from an experienced environmental consultant and/or occupational hygienist as necessary.

- No asbestos-based materials are to be left exposed for an extended period or compacted when exposed. (For dealing with asbestos-based materials in fill refer to Section 7.3.3).

- Barricading and signage is to be used at all locations which are subject to isolation and not to be worked in until clearance is given by an Occupational Hygienist (refer to Section 7.3.3).

7.1.2 Bulk Earthworks

Workers involved in this phase of the project would need to be inducted as described above in Section 7.1.1. It would involve the major earthmoving phase of the project which would use large plant and equipment such as dozers, scrapers, graders and compactors. In view of the scale and nature of the works and the heterogeneity of the fill soils, it is important that the contractor remains vigilant with dust suppression at all times. Adequate, OH&S controls for workers are critical for high-risk activities.

- All bulk earthworks plant should incorporate air-conditioned cabs and:
  - Cabs should be enclosed at all times during operation.
  - Cabs should be cleaned daily to remove accumulated dust and dirt.
  - Cabs should be monitored for dust and asbestos (refer to Section 8.4).
  - Appropriate personal PPE to be available within the cab (refer to Section 8).
- Work is to cease immediately when odours, unusual discolouration or fibro (or other asbestos-based materials) found within the fill (for details, refer to Section 7.3.3, Asbestos Finds Protocol).
- No material containing asbestos-based materials is to be left exposed for an extended period (>3 days) or compacted when exposed. (For dealing with asbestos-based materials in fill refer to Section 7.3.3).
- Barricading and signage should be used at all locations which are subject to isolation and should not be worked upon until clearance has been given (refer to Section 7.3.3)
- Water carts are to be available and to be used at all times (Refer to Section 7.1.3).
- Environmental dust monitoring stations would be operated as discussed in Section 8.4.
- Occupational health dust monitoring would be operated as required under Section 8.4.

7.1.3 Dust and Odour Management and Suppression

The use of water carts is the primary mechanism for the control of dust and it is therefore important that sufficient resources are available to control fugitive dust emissions. A secondary mechanism would be the deployment of sprinklers to dampen stockpiles. Water used by the water carts may have proprietary binding agents added to assist in dust control, if required. The intensity of dust suppression application is to be increased in areas containing asbestos. Consideration should also be given to working areas (i.e. excavation face/stockpile areas) and temporary storage areas (i.e. stockpiles awaiting validation/ relocation).

Particular attention should be given to works that are being undertaken in and around contamination hotspots. Therefore, water carts should be used to dampen the exposed soil surfaces and particularly used when fugitive dust emissions are observed. Fugitive dust may be caused by plant operation, elevated wind speed or by vehicle tracking (truck wheels

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or plant tracks). In this regard, where appropriate, other administrative control measures such as cessation of works under windy conditions, covering exposed surfaces with jute mesh/plastic sheeting etc, establishment and use of sprinkler systems and the implementation of speed limits to vehicles should also be applied.

The monitoring of environmental dust at site boundaries or other appropriate locations should also be carried out (refer Section 8.4).

Investigations performed to date have not identified any volatile contaminants in the soil that could generate odours and, therefore, odours are not anticipated or expected to be significant. If, however, odours are detected during the works the following protocol would be applied:

- Odour source and type of odour to be investigated. This could include air monitoring or sampling of any suspect media in addition to observations of physical conditions.
- Temporary covering of the source to mitigate odours whilst waiting for monitoring/analytical results. This could include the temporary reinstatement of ground conditions.
- Assessing more permanent ways of dealing with the issue. This could include disposal of odorous material off site, the use of masking agents or controlled progressive excavation etc.
- The re-use of odorous soils for construction purposes would not be undertaken unless the material has been aerated and the odorous material has been chemically assessed to be suitable and the odours have been adequately attenuated.

7.1.4 Spoil Management and Waste Classification

Excavations in fill soils should be regarded as being contaminated for the purposes of the management of the soil. Therefore, it is very important that any progressive placement of marker, SFL and formation layer should not be impacted by the stockpiling of contaminated fill soil on the SFL or formation layers, even though the stockpiling may be temporary, as this may result in the SFL and formation layer itself becoming contaminated. As progressive construction of the cap is completed, access to the completed sections should be minimised to preclude undue access and cross-contamination of the cap.

Inspections of the excavated and filled surfaces would be made from time to time to assess for the presence of visible asbestos.

Excavated fill would be placed as part of a cut and fill bulk earthworks and would not require controls other than those noted in this RAP (PPE, monitoring etc). Where trenches are excavated, the resultant excavated spoil should be treated as contaminated soils and should either be placed as fill material below the marker layer or disposed off site after being suitably classified (refer Section 7.1.4.1 for waste classification sampling requirements). Trench excavation should be completed after establishment of final site levels as described in Section 6.1.5. Linear trench stockpiles should be used as backfill or excess material placed as fill under the marker layer as soon as practicable and should not be left for extended periods.

Excess excavated spoil to be disposed off site would be classified, managed and disposed in accordance with the *Protection of the Environment Operations (POEO) Act* 1997. With respect to classification this requires materials to be classified in accordance with the NSW DECCW *Waste Classification Guidelines 2008 (Revised July 2009)*. The results of the provisional waste classification assessment undertaken during the DP assessment (2010a) showed that the filling at the site was provisionally classified as Restricted Solid Waste and Special Waste (asbestos contaminated waste). However, the DP report also noted that during the proposed development, if materials were to be disposed off site, then *ex situ* sampling should be undertaken and the waste classification should be reassessed. However, in view of the random pockets of asbestos contamination in the fill, the filling to be disposed off-site would at a minimum be classified as Special waste (Asbestos Waste). The protocols for off-site disposal of materials and spoil management are provided below.

7.1.4.1 Materials Requiring Off-site Disposal (Contaminated Soils and Filling)

Excess filling material that is to be disposed off site would be classified in accordance with the *NSW EPA Waste Classification Guidelines 2008 (Revised July 2009)* for disposal purposes. If required, disposal consent would be obtained from DECCW prior to the off-site disposal of the spoil. The waste classification assessment report must take into account previous testing results when providing final waste classification.

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For stockpiled contaminated material that is to be removed off site, the nominal sampling density should be 1 sample per 250 cubic metres. As a minimum at least 3 samples must be collected per material type.

For *in situ* filling material, that may require off-site disposal, the nominal sampling density would be 1 sample of filling material per 400 tonnes (nominally 250 cubic metres).

Spoil/filling material which is assessed to have exceeded the threshold criteria for disposal would be held on site pending the determination of alternative disposal arrangements. A contingency plan to handle and manage the disposal of soil material which fails to meet landfill threshold criteria is provided in Section 7.1.4.3.

The waste classification would target a common suite of contaminants (heavy metals, TRH, BTEX, PAH, phenol, PCB, OCP and asbestos).

Threshold concentrations for the disposal of contaminated soils at landfills without performing a TCLP (leaching) test are provided by the NSW DECCW in the *Waste Classification Guidelines*) and are given in Table 4 of this RAP. Spoil materials that exceed maximum concentration thresholds would be tested for leachability. Disposal concentrations when maximum concentrations and TCLP values are used together are shown in Table 5. Disposal methods would depend on the results obtained and sample analysis would be conducted as per Section 9.2.

7.1.4.2 VENM Requiring Off-site Disposal

If excess *in situ* natural clays are to be disposed off site, the material would be sampled at a sampling density of 1 sample per 1000 cubic metres. The samples would be assessed against background ranges given in Table 6 (for inorganic analytes). Organic analytes would be assessed against their respective laboratory detection limits.

An *ex situ* sampling density for VENM of 1 per 1000 cubic metres or at least 3 samples per stockpile should be adopted. Sample analysis would be conducted as per Section 9.1.1. Note that the *in situ* validation data may be used for this purpose.

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7.1.4.3 Spoil Contingency Plan

A contingency plan to cater for the storage, treatment and disposal of excavated spoil which fails to meet landfill criteria has been developed. Materials that fail to meet the DECCW disposal criteria following initial validation testing would be segregated and separately stockpiled, pending further testing and treatment.

Contaminated spoil materials that fail to meet the DECCW criteria would be handled as follows:

1. Materials of the same spoil category would be carefully excavated and placed as separate stockpiles at demarcated and contained locations. The categorisation would be done on the basis of on-site observations and the contaminant exceedances detected.
2. Stockpiles of excavated materials would be appropriately bunded with hay bales/sandbags and if required, covered and/or lined with impermeable plastic sheeting, or alternatively placed in an appropriate container e.g. waste skip, with appropriate cover.
3. Sampling and analysis of segregated stockpiles would be conducted to determine the concentrations of the target contaminant parametres in the excavated materials.
4. Disposal arrangements would be determined based on sampling results as follows:
   - Material that falls below the disposal guideline for General Solid or Restricted Solid Waste as outlined in Table 4 shall be collected and disposed direct to a suitably licensed landfill.
   - Material that exceeds the total contaminant concentration (screening) disposal guideline levels for Restricted Solid Waste outlined in Table 4 shall be tested for TCLP, if possible, and if the results meet the relevant disposal requirements of General Solid or Restricted Solid Waste would be dispatched off-site for disposal.
   - Material that exceeds the total and leachability criteria for landfill disposal, as outlined in Table 5, shall be further segregated into separate stockpiles for alternate treatment and disposal arrangements.
5. Stockpiled materials that cannot be landfilled directly i.e. those that are awaiting TCLP results or that fail the combined specific contaminant concentrations and TCLP

thresholds, or require to be stored pending treatment, would be covered by anchored geotextile to prevent erosion and wind blow of contaminated materials. Materials considered to have the potential to produce contaminated leachate would be stockpiled in an area with an appropriate leachate collection system.

6. Materials that fail the waste classification criteria due to the presence of volatile contaminants (i.e. TPH and BTEX) would be subjected to landfarming to reduce the concentration of contaminants and re-tested for the contaminant of concern after a period of 1 week (and then every subsequent week until levels have reduced sufficiently).

7. If the materials fail the waste classification criteria due to the presence of non-volatile or environmentally persistent contaminants the materials that require treatment would be suitably tested for the feasibility of micro-encapsulation according to EPA's guidance note entitled '*Specification for Micro-Encapsulation of Hazardous Wastes*'. Materials treated in this manner must be TCLP tested to ensure they meet the appropriate leaching criteria prior to disposal.

8. Agreement as to the appropriateness of the treatment and disposal method for materials exceeding the leaching guidelines must be obtained from the relevant landfill and the NSW DECCW, and a disposal consent must be sought from the Hazardous Material Advice Unit of the DECCW prior to the removal of such wastes from the site.

7.1.4.4 Stockpiling of Contaminated Material

Surplus soil/filling materials with contaminant levels in excess of the RAC requiring temporary stockpiling on site shall be placed in a suitable location(s) on impermeable materials. All stockpiles of contaminated material shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries. Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust blow and other air quality impacts. Should the stockpile remain *in situ* for over 48 hours, suitable control measures such as silt fences or hay bales should be erected around each stockpile to prevent losses by surface erosion. Any stockpile to remain on site overnight should be adequately secured in order to reduce the risk of sediment run-off. Stockpiles may be protected against wind-blow or erosion by the following means:

- Sediment control fencing or hay bales at the toe of the embankment;

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- Regular spraying by water carts to keep the surface damp.
- Dedicated water sprinkler systems may be installed *in lieu* of the use of water carts. Care would need to be undertaken not to over-water in this case, causing water run-off, given that the system inherently requires no manual control during its operation.
- Stockpiles containing asbestos-based materials are to be kept separate from all other types of materials.
- Individual stockpiles shall not exceed 300 cubic metres in volume which are formed for the purposes of waste classification in order to limit the amount of affected material in the event that cross-contamination occurs.

7.1.4.5 Loading and Transport of Contaminated Material

Transport of all material to and from the site shall be via a clearly delineated, pre-defined haul route.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licences, consents or approvals as required by the Protection of the Environment Operations (POEO) Act 1997 and with the appropriate approvals obtained from the NSW DECCW, if required.

Details of all contaminated and spoil materials removed from the site (including VENM) shall be documented by the contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and the Principal's Representative (PR). A site log shall be maintained by the PR to track disposed loads against on-site origin, location of the materials and sample numbers.

The proposed waste transport route would be notified to the local Council and truck dispatch shall be logged and recorded by the contractor for each load leaving the site. A record of the truck dispatch would be provided to the PR and the Environmental Consultant.

7.1.4.6 Disposal of Material

All materials removed from the site shall be disposed to a location legally licensed to receive them in accordance with the *Protection of the Environment Operations (POEO) Act*

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1997. Copies of all necessary approvals from the necessary landfills shall be given to the PR and the Environmental Consultant prior to any contaminated material being removed from the site.

Copies of all consignment notes for the transport, receipt and disposal of all materials (including VENM) would also be maintained as part of the site log and made available to the Environmental Consultant for inspection and reporting purposes upon request. This information would include the on-site source of the materials, the disposal location and tonnages (weigh bridge dockets).

All relevant analysis results shall be made available to the contractor and receiving site/ waste facility to enable selection of a suitable disposal location. Holding arrangements, treatment and disposal requirements for excavated materials which fail to meet the landfill disposal guideline levels for moderately contaminated fill are discussed in Section 7.1.4.3.

7.2 Sedimentation and Erosion Controls

Sedimentation and erosion controls would need to be undertaken because of the extent of contaminated soils that would be disturbed during bulk and detailed earthworks and because of the relative proximity of Duck River to some parts of the site. The RAP does not address the implementation of the necessary controls or the monitoring programmes to be undertaken to monitor the efficacy of the controls.

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7.3 Unexpected Finds Protocols

7.3.1 Underground Storage Tanks and Other Buried Structures

In the unlikely event that buried structures such as Underground Storage Tanks (USTs) are encountered during site works, the structure(s) and any associated pipe-work should be managed / removed as follows:

a. Upon discovery of structure, the site foreman is to be notified and the area barricaded.

b. Visual identification of the tank and associated pipe-work.

c. Remove and dispose of the structure and associated pipe-work by a qualified contractor. In the case of an UST, the tank must be removed in accordance with Australian Institute of Petroleum (AIP) Code of Practice.

d. Excavate and stockpile impacted materials (based on field observations) for classification.

e. Validation of the remedial pit by a qualified environmental consultant for the contaminants of concern at the following sampling density:
   - Base of tank pit excavation - 1 sample per 25 square metres i.e. 5 metre x 5 metre grid.
   - Side of tank pit excavation - 1 sample per 10 linear metre (minimum of 1 sample per side) and 1 sample per 2 – 3 metre depth interval.
   - Fuel feed lines/pipe-work - 1 sample per 10 linear metre and 2-3 metre depth interval.
   - QA/QC sampling and analysis in accordance with Section 9.3.

f. 'Chase out' as required of materials in the remediation pit identified to be impacted by petroleum hydrocarbons, and further validation sampling and analysis as required to assess appropriate removal of impacted materials.

g. Waste classification and off-site disposal of impacted materials in accordance with Section 9.2.

h. Inclusion of validation, waste classification and disposal documents (including landfill dockets and, in the case of USTs, tank and pipe work destruction certificates) in the validation report.

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7.3.2 Unexpected Finds Protocol – Volatile Contaminants

Based on the findings of the DP assessment (2010a), the potential for the site being impacted by volatile contaminants would be very low. In the highly unlikely event that significant quantities of volatile compounds are detected, then appropriate gas mitigation strategies may be required as per ANZECC (1999) *Guidelines for the Assessment of On-site Containment of Contaminated Soil.*

If impacts due to volatile contaminants are detected in the area to be capped, the nature and extent of the impacts of the volatile contaminants should be established as a first step before an appropriate remedial strategy is to be established. If feasible the source material should be removed for off-site disposal.

If complete removal of the source of volatile contaminants is not feasible, then the quantum of the impact should be clarified. This would involve the completion of a soil vapour analysis followed by a risk assessment for the volatile contaminants of concern.

Depending on the investigation findings, the capping strategy may be appropriately modified to include a system of subsurface gas vapour drains and a passive extraction system. The details would be incorporated in an addendum to the current RAP.

7.3.3 Unexpected Asbestos Finds Protocol

Based on the results of the DP July 2010 assessment, the general fill soils at the site are considered to be asbestos contaminated soils. Further, it is anticipated that the majority of the asbestos contaminated fill at the site would be managed by means of the proposed 'cap and contain' strategy that is detailed in this RAP. However, if asbestos is detected in unexpected areas prior to, or during, bulk excavation works the following 'Unexpected Finds Protocol' would apply:

a. Upon discovery of suspected asbestos containing material, the site manager is to be notified and the affected area closed off by the use of barrier tape and warning signs. Warning signs shall be specific to Asbestos Hazards and shall comply with the Australian Standard 1319-1994 – Safety Signs for the Occupational Environment.

b. An Occupational Hygienist is to be notified to inspect the area and confirm the presence of asbestos and to determine the extent of remediation works to be undertaken. A report detailing this information would be compiled by the Occupational Hygienist and provided to the Principal (or their representative) and the site manager.

c. The location of the identified asbestos material would be surveyed using sub-meter Differential Global Positioning System (DGPS).

d. If the impacted soil is to be disposed off site, it should be classified in accordance with the DECCW's *Waste Classification Guidelines* (2008) and disposed of, as a minimum, as asbestos contaminated waste to a suitably licensed landfill. In dry and windy conditions the stockpile would be lightly wetted and covered with plastic sheet whilst awaiting disposal.

e. All work associated with asbestos in soil would be undertaken by a contractor holding a class AS-A Licence. WorkCover must be notified 7 days in advance of any asbestos works.

f. Monitoring for airborne asbestos fibres is to be carried out during the soil excavation in asbestos contaminated materials.

g. Documentary evidence (weighbridge dockets) of correct disposal is to be provided to the Principal (or their representative).

h. At the completion of the excavation, a clearance inspection is to be carried out and written certification is to be provided by an Occupational Hygienist that the area is safe to be accessed and worked. If required, the filling material remaining in the inspected area can be covered/ sealed by an appropriate physical barrier layer of non-asbestos containing material prior to sign–off.

i. Validation samples would be collected from the remedial excavation to confirm the complete removal of the asbestos containing materials. If the asbestos pipes/conduits are uncovered, then sampling density would typically comprise one sample per 10-20 linear meter (depending on the length of the pipe). If asbestos debris are found, then the sampling density would typically comprise 1 sample per 5 metre x 5 metre grid.

j. The sampling locations should be surveyed using a sub-meter DGPS.

k. Details are to be recorded in the site record system.

l. Following clearance by an Occupational Hygienist, the area may be reopened for further excavation or construction work.

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7.4 Contingency - Excavation after Cap Placement

Excavation of the site after the placement of the cap may be required in the construction phase and this would need to be controlled to maintain the integrity of the cap and prevent significant cross-contamination of materials above the cap.

The cap would be deemed to be breached when the excavation proceeds below the marker layer and all material below the marker layer should be treated as potentially contaminated unless a specific testing programme shows otherwise.

Excavated, contaminated soil should not be placed on the cap where the cap comprises a soil type surface unless the volume is small and the excavated soil can be laid on a plastic surface to prevent cross-contamination. Contaminated soil from re-excavation can be placed directly on hard cap surfaces such as concrete slabs or bitumen road pavements provided that all material is subsequently thoroughly removed. Excavated soil would be replaced below the marker layer, taken away for re-use elsewhere on the site below the marker layer or taken to a temporary stockpile area for characterisation for off-site disposal. Following re-instatement of the excavation, the cap would be re-instated to match the surrounding cap construction.

7.5 Groundwater Management

No remediation of groundwater is envisaged for the proposed remediation works. However, in the unexpected event that dewatering is required for site development works, then water requiring off-site discharge should be disposed of in accordance with relevant guidelines, approvals and licences. Regular monitoring should be conducted to ensure water quality meets disposal guideline criteria. If groundwater does not meet the consent conditions for disposal into the stormwater system, then arrangements may need to be made for the appropriate treatment of the water prior to discharge, or obtain a permit for discharge into the sewerage system (including consent of the appropriate authorities).

The management of dewatering is the responsibility of the Department of Water and Energy (which is now managed by the DECCW) under the *Water Management Act* 2000. Advice should be sought from the DECCW in regards to licensing requirements. All regulatory requirements relating to dewatering must be met prior to commencement of any dewatering works. It may be necessary to obtain a temporary dewatering license and as necessary an approval from Council for the duration of construction activities.

8. OH&S CONTROLS

8.1 Base Level Personal Protective Equipment (PPE)

All personnel working in areas where contact can be made with contaminated soil (dust or direct contact) would comply with a minimum level of PPE. The minimum level is in addition or complementary to PPE required for the project generally and would include the following:

- As necessary, meeting RailCorp OH&S requirements such as undergoing Rail Industry Safety Induction (RISI) trainings, wearing specific high visibility vests complying with AS 462 and 1906.4, etc.
- Hard hat complying with AS 1801 (type 1).
- Steel-capped safety boots.
- Leather or nitrile gloves or similar when working directly in contaminated soil such as trench excavations and laying services.
- Long sleeved shirt and long trousers (may be combined with safety vest as per above).

All staff would be provided with safety goggles and a P2 disposable dust masks with a valve complying with AS 1716, for use as conditions dictate (e.g. dusty conditions).

In addition to PPE there are also management measures which should be observed. These would include observing a no smoking, eating or drinking rule when outside of site sheds, washing hands and face before eating, etc.

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8.2 PPE in Contamination Hot Spots

All workers working within 20 metre of a known contamination hot spot must wear the base level PPE including a P2 disposable dust mask. Wearing a dust mask is mandatory for work in this area. Hot spot locations are shown in Drawing 2.

8.3 PPE in Asbestos Affected Areas

WorkCover classifies the presence of fragments of asbestos-cement sheet (fibro) in soil as friable asbestos and soil containing fibro needs to be removed by a contractor with a class AS-A licence. The PPE for this work also needs to conform to the requirements of the Code of Practice for the Safe Removal of Asbestos, National Occupational Health and Safety Commission (NOHSC), 2005 but is generally as follows:

- Masks suitable for asbestos removal work would be worn at all times during removal work by those involved and should be a P2 disposable dust mask or a particulate half-face mask with a P3 filter as determined for the asbestos removal task to be undertaken.
- Disposable coveralls, preferably orange in colour should be worn while working in asbestos contaminated areas. Coveralls shall not be used more than once. A reflective orange vest needs to be worn if coveralls are not coloured orange.
- Suitable gloves.
- Steel capped boots.

8.4 Air Monitoring

8.4.1 Dust

Occupational health workplace dust monitoring would be carried out for the earthworks phase of the project including excavation of trenches and laying of service lines. Monitoring would be undertaken using a staged approach and variations to the monitoring plan would depend on the results obtained. As a minimum, the following dust sampling would be undertaken daily in the first two weeks:

- 50% of plant operators operating equipment that is not air-conditioned.
- 20% of operators in air-conditioned cabs.
- 50% of workers 'on the ground' involved in working directly with contaminated soil.

Sample filters would be analysed for total dust and compared to WorkSafe Standard, Exposure Standards for Atmospheric Contaminants in the Occupational Environment (NOSCH 1995 and as updated) and an additional 5% of samples for benzo(a)pyrene. The monitoring would be carried out by a qualified occupational hygienist. The analysis would be undertaken by a NATA accredited laboratory for the relevant test method and should be accelerated so that the results are reported within a maximum 5 working days of the sample date. All results would be assessed by a qualified occupational hygienist and appropriate actions taken in consultation with TCA based on the hygienist's report. If there are exceedances of 50% of the time weighted average values (TWA) in the WorkSafe Standard as assessed by the hygienist then work practices would be reviewed.

Subsequent monitoring may be reduced based on the recommendations of the occupational hygienist, the results obtained and the work schedule; however, check monitoring should be undertaken on at least one day per month as determined by the occupational hygienist.

8.4.2 Asbestos

Air monitoring for asbestos fibres would be carried out in the workplace and surrounding areas during asbestos-contaminated soil removal and would include monitors placed in the cabins of selected plant, the perimeter of the asbestos work zone, change room and, if required, the decontamination unit. The monitoring for asbestos fibres in air in two cabins which are not air-conditioned would be undertaken during the bulk earthworks phase at a frequency as determined by the occupational hygienist irrespective of the removal of any asbestos-contaminated soil.

Boundary monitoring would also be carried out at a minimum of six boundary locations during the early monitoring programme of the earthworks phase. The sampling locations would be determined by the extent of the potential source of airborne fibres (area of disturbed fill), the nature of down-gradient receptors (sensitive receptors such as residential areas and the Main Train site) and potential fibre generating activities taking place (plant movement).

Air monitoring would be carried out by an Occupational Hygienist. Filter analysis (fibre counting) would be carried out by a NATA accredited laboratory. Monitoring results must be available the day after sampling. The action level of asbestos air monitoring would be as shown below:

- < 0.01 fibres per millilitre – Continue with control measures.
- > or = 0.01 fibres per millilitre – Review control measures.
- > or = 0.02 fibres per millilitre – Stop removal work and find the cause.

Concentrations exceeding the action level would require that operations are temporarily ceased and an Occupational Hygienist is consulted to investigate the exceedance and to provide a specific protocol or management plan for continued safe work.

9. VALIDATION AND MATERIAL ASSESSMENT

The validation strategy has been devised broadly on the basis of the following documents:

- NSW DEC Contaminated Sites *Guidelines for the NSW Site Auditor Scheme 2nd edition* (2006).
- NSW EPA (1995), *Contaminated Sites: Sampling Design Guidelines* (with respect to the sampling density).
- NSW EPA (1994), *Contaminated Sites: Guidelines for Assessing Service Station Sites* (with respect to TPH contamination).

The validation assessment would be conducted broadly in accordance with the 7 step data quality objective process, as defined in Australian Standard *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds* (AS 4482.1 – 2005). The DQO process is outlined as follows:

(a) State the Problem

The site would be used as a train stabling yard (industrial purposes). Previous assessments have identified the presence of asbestos, TPH and PAH contamination at the site. Therefore, appropriate remediation would be required before the site can be rendered suitable for the proposed development. Given the low leachability of the contaminants and, hence, their relative immobility, the potential for contaminant migration is not considered to be an issue of concern. Implementation of a permanent capping over this material would further reduce the potential environmental impacts due to these materials.

The isolation or capping of the soil contamination to create a physical barrier system is considered to be the preferred, practical remedial strategy for the project. A capping strategy is considered to be a more robust strategy than the removal of identified 'hotspots' which, given the heterogeneous nature of the fill and the strong likelihood of residual, unidentified 'hot-spots', is considered to be a more conservative approach and, under the proposed development scenario, this remedial strategy is considered to pose a lesser environmental risk than other remedial options. The strategy would also result in the minimisation of waste and in the disposal of soil to landfill. In addition to reducing the quantities of waste to be disposed to landfill, this would also reduce the associated traffic movements.

(b) Identify the Decision

Analytical results of validation samples taken from the capping material should comply with the RAC (Table 1, Section 4.1).

(c) Identify Inputs to the Decision

The inputs into the decision include the following:

- The results of laboratory analysis of validation samples and additional waste classification samples would form the basis of the remediation and validation.

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- The validation results would be compared against the RAC as provided in Table 1, Section 4.1 of this report.
- Completion of remediation in general compliance this RAP.

(d) Define the Boundary of the Assessment

The boundary of the assessment is defined by the boundary of the ASP site, as provided in Drawing 1 of the RAP.

(e) Develop a Decision Rule

The assessment is deemed to be complete when all samples collected from the site demonstrate that the site has been rendered suitable for industrial landuse via the placement of an adequate capping over the site and the implementation of an Environmental Management Plan for the long term management of the capping layer.

(f) Specify Acceptable Limits on Decision Errors

In order to ensure that the results obtained are accurate and reproducible, appropriate and adequate quality assurance and quality control (QA/QC) measures and evaluations would be incorporated and data statistically analysed as set out in Section 9.3 of this report.

(g) Optimise the Design for Obtaining Data

Sampling procedures and sample densities would be in accordance with NSW EPA guidelines and current industry practice. The environmental consultant should employ NATA-accredited analytical laboratories to conduct sample analysis.

9.1 Validation/ Characterisation Sampling and Analysis

9.1.1 Capping layer characterisation/validation Sampling (i.e., Testing for Cap Requirement and Imported VENM)

Only virgin excavated natural material (VENM) or validated, engineered/ quarried materials would be used as capping material at the ASP site. All VENM materials that are used as the cap would require a report from a qualified consultant stating that the material is VENM and discussing the history of the source site and including sample analysis (minimum of up to 3 samples per source site). Further, all source sites should inspected by TCA's qualified environmental consultant to confirm the source site's general suitability from a contamination standpoint.

After transportation to the ASP site, VENM would be sampled at a rate of 1 sample per 1000-2000 cubic metres to confirm the VENM status of the imported materials. QA/QC sampling and analysis would be in accordance with Section 9.3.

The analytical suite for imported materials would depend on the contaminants of concern for the source site. Samples would be analysed for the following:

- Every sample would be analysed for the contaminants of prime concern (heavy metals, TPH, PAH).
- Every third sample would be analysed for other contaminants of potential concern (BTEX, phenol, PCB, OCP, asbestos).

Analysis of specific samples for any identified additional contaminants of concern. Potential for concern would be based on visual and olfactory observations, PID results and proximity to potential sources.

9.2 Waste Classification

Materials requiring waste classification would be analysed as follows:

9.2.1 *Ex situ* Stockpiled Filling Materials for off-site disposal

If *ex situ* material is to be disposed off-site, samples from the material would be collected and analysed at the following frequency:

- One sample per distinct type/source (if there are distinct sources) or 1 sample per 250 cubic metres , subject to a minimum of 3 samples.
- QA/QC sampling and analysis in accordance with Section 9.3.

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Samples would be analysed for the following:

- Every sample would be analysed for heavy metals, TPH/BTEX, PAH, phenols, PCB, OCP, and asbestos.
- Analysis of specific samples for any identified additional contaminants of concern. Potential for concern would be based on visual and olfactory observations, PID results and proximity to potential sources.
- Analysis of selected samples for TCLP analysis based on total concentration results, including a range of levels elevated above the screening (CT) criteria and targeting the most elevated results. In particular, TCLP analysis for PAH would be undertaken given that elevated levels of PAHs were detected in the filling during the DP assessment (2010a).

9.2.2 *In situ* Filling Material for Off-site Disposal

If *in situ* filling material is to be sampled and analysed for off-site disposal, samples would be collected at the following frequency for waste classification purposes:

- At least 1 sample from the *in situ* filling material per 400 tonnes, subject to a minimum of 3 samples.
- QA/QC sampling and analysis in accordance with Section 9.3.

Samples would be analysed for the following analytes:

- Every sample would be analysed for heavy metals, TPH/BTEX, PAH, phenols, PCB, OCP, and asbestos.
- Analysis of specific samples for any identified additional contaminants of concern. Potential for concern would be based on visual and olfactory observations, PID results and proximity to potential sources.
- Analysis of selected samples for TCLP analysis based on total concentration results, including a range of levels elevated above the screening (CT) criteria and targeting the most elevated results. In particular, TCLP analysis for PAH would be undertaken given that elevated levels of PAHs were detected in the filling during the DP 2010 assessment.

9.3 Field Quality Assurance

All sampling data would be recorded on chain of custody sheets. The soil sampling procedure would be as outlined below:

- Sampling from surface or from the excavator bucket and using disposable sampling equipment or stainless steel hand tools.
- Decontaminating all re-usable sampling equipment prior to collecting each sample using a 3% solution of phosphate free detergent (Decon 90) and distilled water.
- Transferring samples into laboratory-prepared glass jars with Teflon-lined lid, and capping immediately.
- Labelling sample containers with individual and unique identification, including project number and sample number.
- Collecting an additional replicate set of samples in sealed plastic bags for visual identification and records purposes, and for PID headspace screening if required.
- Analysis of 5% intra and 5% inter-laboratory replicates (tested for heavy metals and TPH or if a lesser suite of analysis is being conducted on the primary sample, the replicates would be tested for the full suite of the primary sample).
- 1 field rinsate blank sample per day of validation sampling (tested for heavy metals, TPH, PAH, or if a lesser suite of analysis is being conducted in the primary samples, the replicates would be tested for the full suite in the primary samples).
- 1 trip blank per day of validation sampling (TPH and BTEX).
- 1 trip spike per day of validation sampling (BTEX).
- Placing the glass jars into a cooled, insulated and sealed container for transport to the laboratory.
- Transporting the replicate bag samples to the DP laboratory under ambient conditions for storage.

Appropriate quality assurance (QA) and quality control (QC) procedures would be adopted throughout the field sampling programme to ensure sampling precision and accuracy and prevent cross contamination.

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9.4 Quality Control

The quality controls of documentation completeness, data completeness, data comparability, data representativeness, precision and accuracy for sampling and analysis are described in Table 8.

Table 8 – Objectives of Quality Control of Data

Quality Control	Achievement Evaluation Procedure
Documentation completeness	Completion of field and laboratory chain of custody documentation, Sample Receipt Notices, completion of validation sample plans.
Data completeness	Sampling density according to provisions in the approved RAP, and analysis of appropriate determinants based on site history and on-site observation.
Data comparability and representativeness	Use of NATA certified laboratories, use of consistent sampling technique.
Precision and accuracy for sampling and analysis	Achievement of 30% RPD for replicate analysis, acceptable levels for laboratory QC criteria.

9.5 Validation Reporting

A validation assessment report would be prepared by a suitably qualified environmental consultant in accordance with NSW EPA *Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites* (1997) at the completion of the remediation works programme. The validation report would comment on the suitability of the site for the proposed continued industrial land use.

A long-term Environmental Management Plan (EMP) would be prepared to detail the ongoing management requirements for the long term maintenance of the capping structures. In this regard, the EMP must take into account that the ASP will be provided in two stages and should therefore provide details of the relevant mechanisms that are in place for the management of both the interim caps (such as at future trackwork areas) as well as the permanent caps. It would also include the maintenance and inspection requirements for the various cap designs that will be installed (such as at the detention basins), strategies for ensuring that the caps are not breached due to erosion or unplanned excavations, and requirements for prompt restoration incase of cap breaches. Further, prior

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to finalisation, the EMP will be subject to approval by the DECCW accredited site auditor (Mr. Mike Hayter).

10. SITE PERSONNEL AND RESPONSIBILITIES

A project Construction Environmental Management Plan (CEMP) should be developed which outlines the relevant personnel and environmental responsibilities for the Project Manager, Project Environmental Manager, Site Manager and Foremen. The environmental responsibilities and authorities for the implementation of this RAP must comply with the CEMP requirements. The OH&S responsibilities and authorities should be detailed in a Site Specific Occupational Health and Safety Management Plan.

Figure 2, below, shows a typical organisational structure and responsibility that could be utlised for the remedial works.

The objective of this section is to define a clear line of responsibility among responsible TCA, sub-contractors and consultants and to ensure that the function of the role of each of the personnel is identified in order to maximise the safety of all site users and occupants with respect to environmental and OH&S issues.

All designated personnel and contractors working on the site must be made aware of the line of responsibility for implementing the RAP and must follow environmental management and health and safety procedures. Each of the designated individuals must be aware of their own responsibilities on the site and who to contact in the event of an incident, or for advice on procedures and protocols to maximise:

- OH&S to all site users, occupants and surrounding community.
- Environmental protection for the site and surrounding areas including Duck River.

All designated personnel must have read and/or understood the provisions of the RAP prior to entry to the site, commencement of site works or monitoring works which may have health and safety or environmental implications. All personnel would have to undergo a site induction, and would have to sign a statement to that effect.

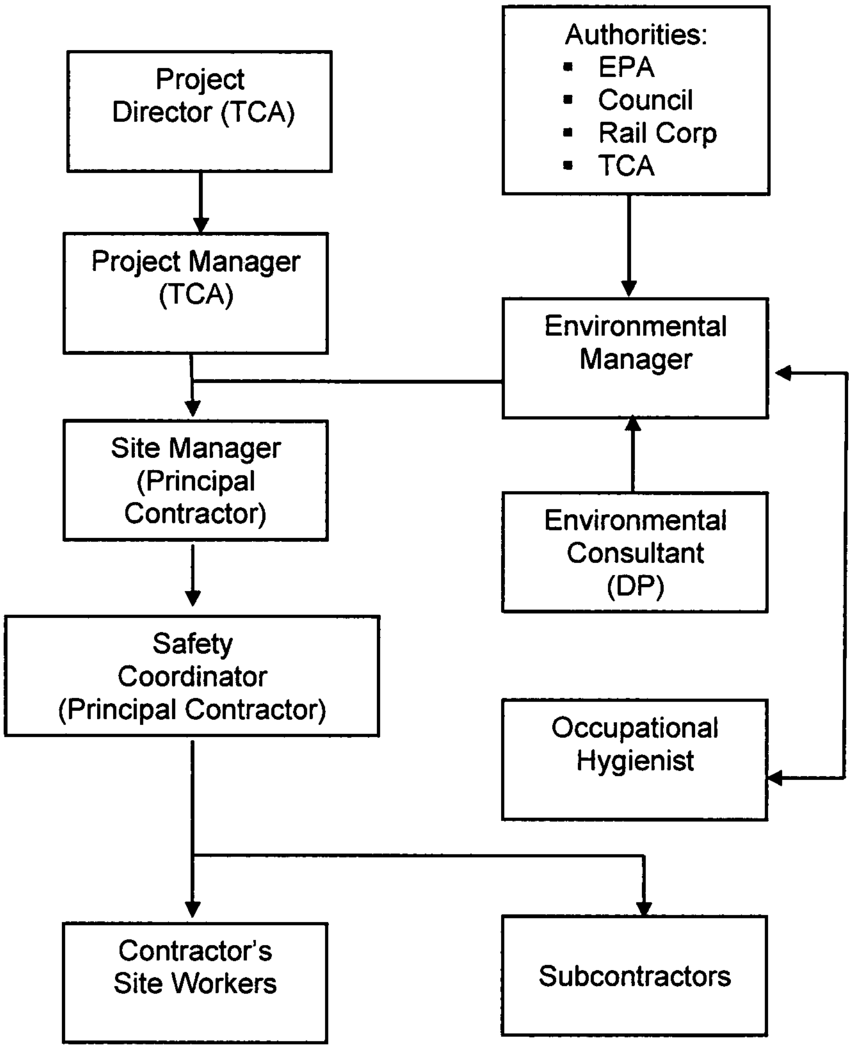
Similarly, all contractors employed to carry out the works on or near contaminated spoil at the site would be responsible for ensuring that their employees are aware of, and comply with, the requirements of TCA site documentation, the CEMP and the RAP.

The above provisions clearly do not pertain to casual users and visitors of the facility once it is operational.

The personnel involved in implementing the CEMP during remedial works are:

- TCA Construction Manager.
- TCA Project Manager.
- Site Manager – Principal Contractor.
- Environment Manager – Principal Contractor.
- Site Safety Coordinator – Principal Contractor.
- Individual sub-contractors.

Figure 2: Typical Organisational Structure for Implementation of the RAP



11. CONCLUSION

It is considered that conformance with this RAP would minimise the potential for environmental impacts during the remedial and construction works at the ASP site.

By following the RAP and demonstrating compliance with the requirements of the 'Planning Guidelines SEPP 55 – Remediation of Land', a validation assessment report would be prepared by a qualified environmental consultant in general accordance with the NSW EPA

Contaminated Sites *Guidelines for Consultants Reporting on Contaminated Sites* (1997) and other appropriate guidance documentation.

Subsequent to the implementation of the RAP, a validation report would be prepared which would confirm whether the site has been remediated to a suitable standard for the proposed development as a train stabling facility (industrial landuse) and occupation, and that no related adverse human health and environmental effects have occurred as a result of the temporary works. Further, a long term Environmental Management Plan (EMP) would also be prepared to detail the ongoing management requirements for the long term maintenance of the capping structures.

Therefore, subject to proper implementation of the RAP it is considered that the site can be rendered suitable for the proposed industrial landuse.

DOUGLAS PARTNERS PTY LTD

Reviewed by:

Nizam Ahamed
Associate

Lindsay Rockett
Principal

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APPENDIX A
Drawings

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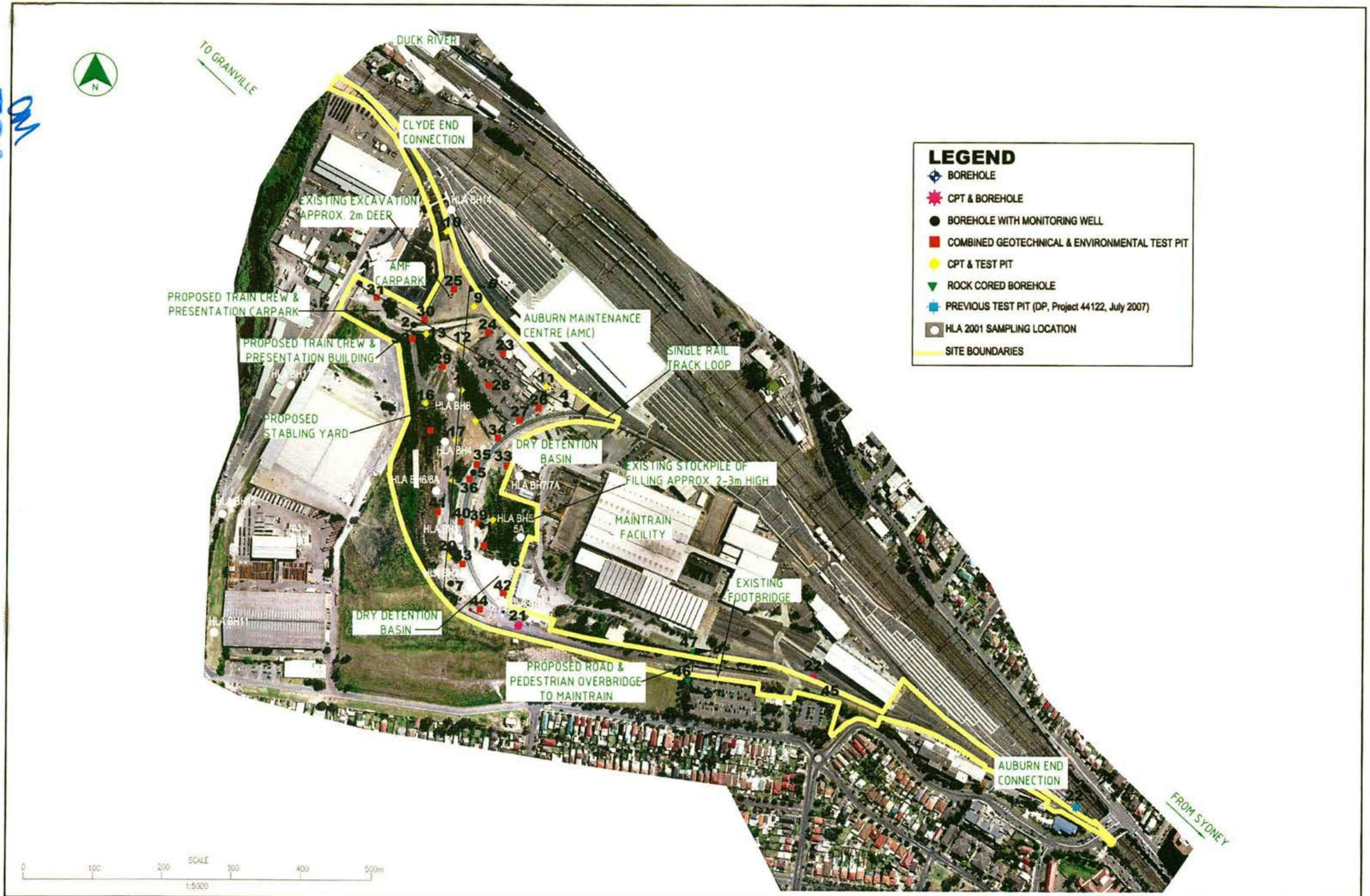

Douglas Partners *Geotechnics · Environment · Groundwater*	CLIENT: Transport Infrastructure Development Corporation		
	DRAWN BY: PSCH	SCALE: As shown	OFFICE: Sydney
	APPROVED BY:		DATE: 23.2.2011

TITLE: **Site Boundaries, Location of Tests & Previous HLA 2001 Well Locations, Remediation Action Plan- VER 02 Aubu Stabling Project,Clyde Marshalling Yards AUBU**

PROJECT No:	71654.02
DRAWING No:	1
REVISION:	C

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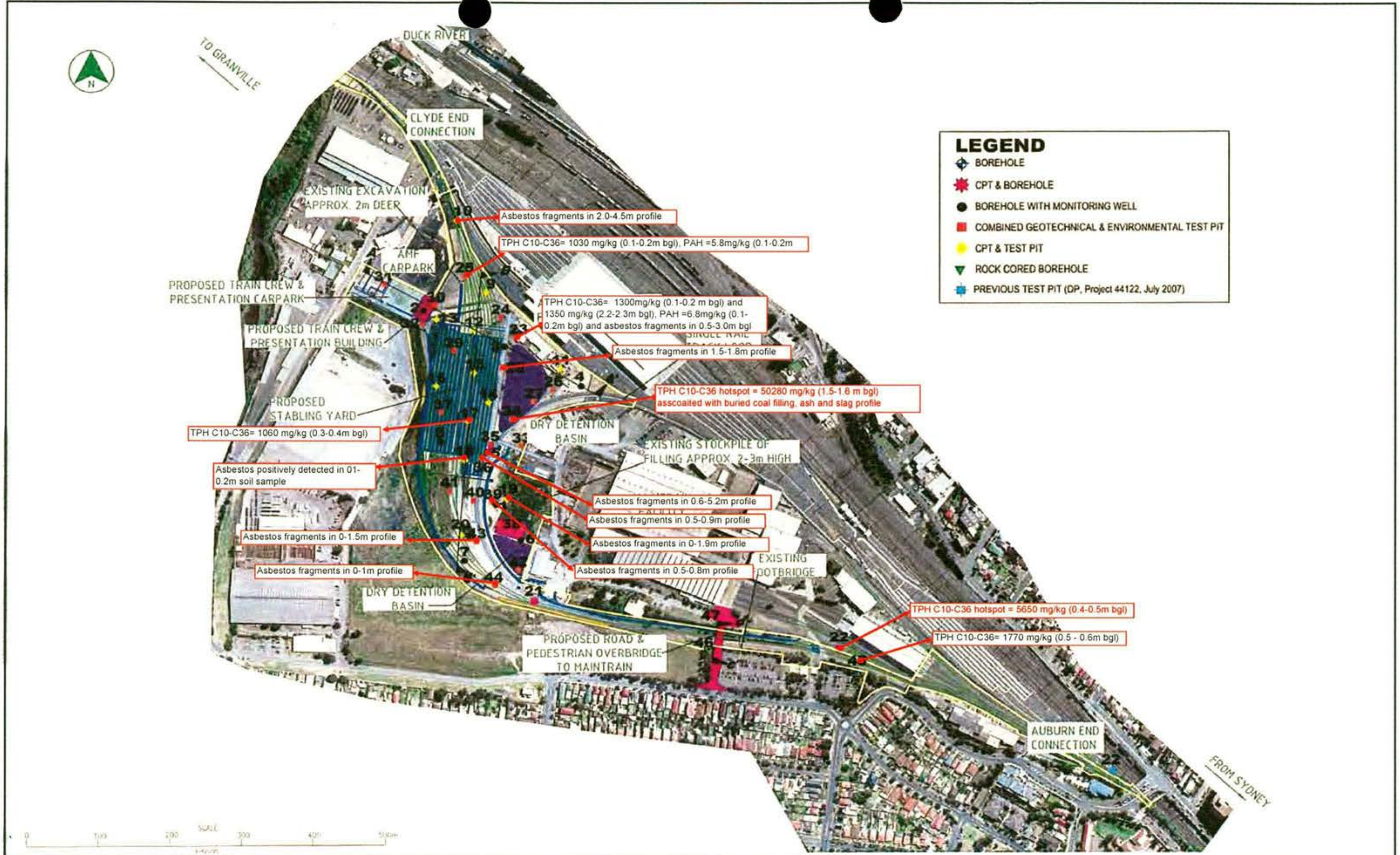

Douglas Partners *Geotechnics · Environment · Groundwater*	Transport Infrastructre Development Corporation		TITLE:	**TPH Exceedances and Asbestos Detections**	Project 71654.02
	DRAWN BY: NSA	SCALE: As shown	OFFICE: Sydney	**Remediation Action Plan - Ver 02**	Drawing No: 2
	APPROVED BY		DATE: 28/02/2011	**Auburn Stabling Project, Auburn**	Revision: B

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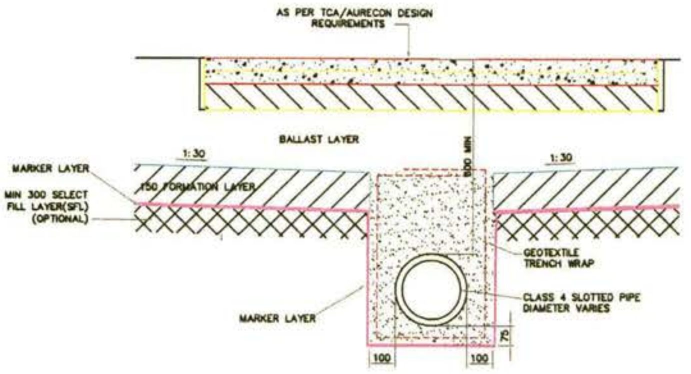

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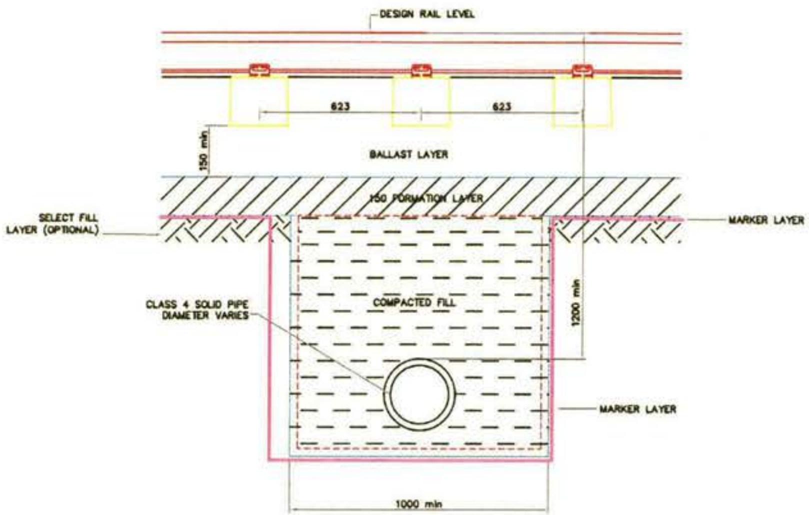
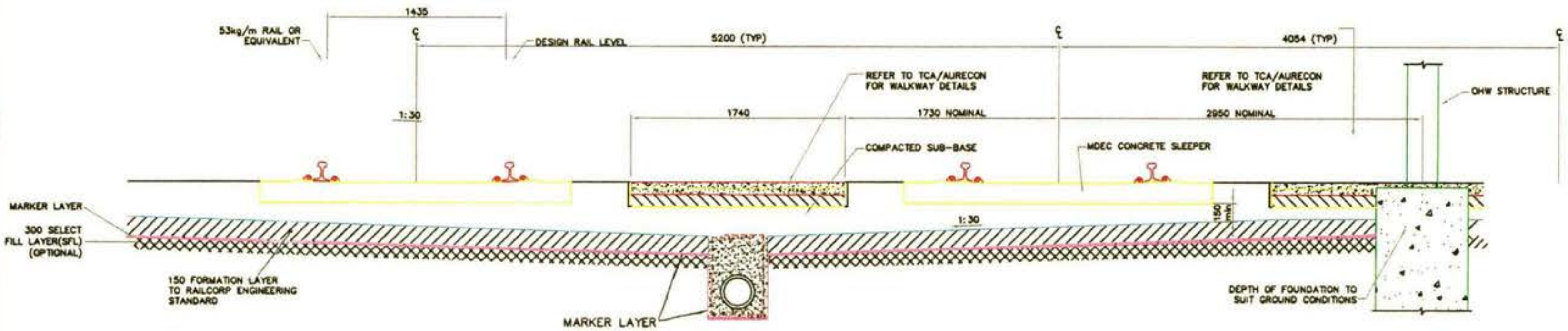
NOTE

1. INSTALLATION OF TRACK DRAINAGE TO BE CARRIED OUT IN ACCORDANCE WITH RAILCORP ENGINEERING STANDARD RTS3433



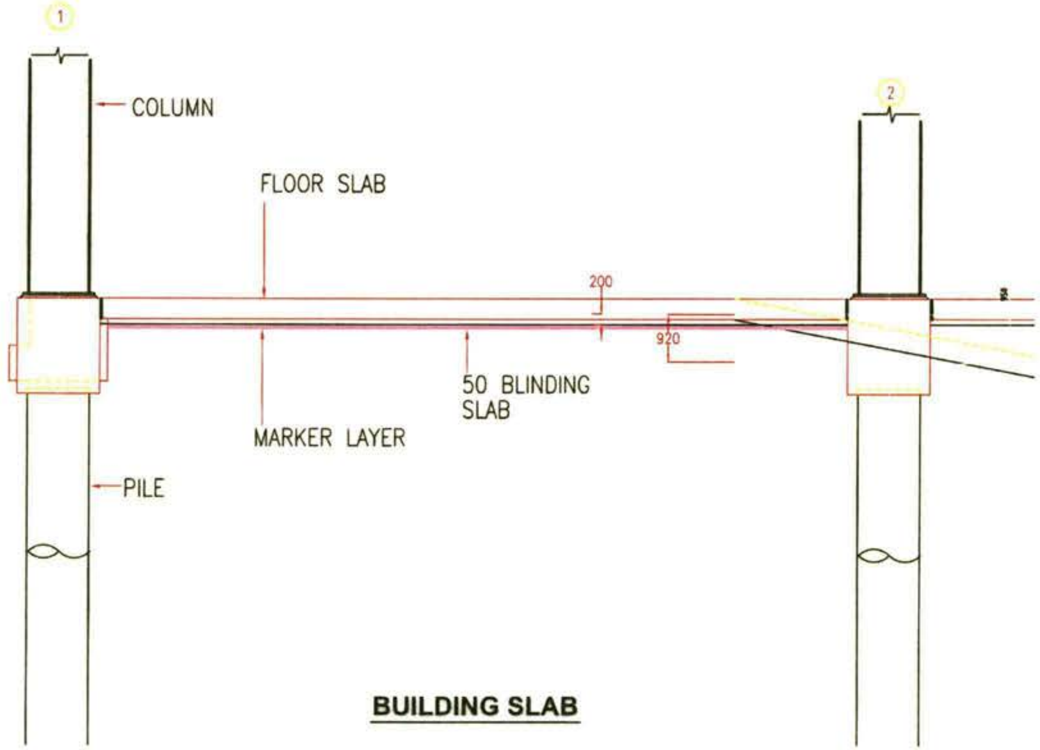
UNDER LINE DRAINAGE CROSSING DETAIL
1:10



TYPICAL BALLAST TRACK DETAIL THROUGH STORAGE ROADS
1:25

NOTE: TCA/AURECON-REFER TO TCA/AURECON DESIGN SPECIFICATIONS FOR PROJECT
SFL - SELECT FILL LAYER (VENM OR AS SPECIFIED FOR PROJECT)

Douglas Partners Geotechnics · Environment · Groundwater	CLIENT: Transport Construction Authority			TITLE: **Capping Details-Rail Track Service Trenches**	PROJECT No: 71654.02
	DRAWN BY: PSCH	SCALE: As shown	OFFICE: Sydney	**Remediation Action Plan, Auburn Stabling Project-VER 02**	DRAWING No: 3
	APPROVED BY: [redacted]		DATE: 9.3.2011	**Marsha[redacted]g Yards, AUBURN**	REVISION: B



BUILDING SLAB

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NOTE: TCA/AURECON-REFER TO TCA/AURECON DESIGN SPECIFICATIONS FOR PROJECT

Douglas Partners Geotechnics · Environment · Groundwater	CLIENT: Transport Construction Authority			TITLE: **Capping Details-Building Slab**	PROJECT No: 71654.02
	DRAWN BY: PSCH	SCALE: As shown	OFFICE: Sydney	**Remediation Action Plan, Auburn Stabling Project-VER 02**	DRAWING No: 4
	APPROVED BY:		DATE: 9.3.2011	**Clyde Marshalling Yards, AUBURN**	REVISION: B

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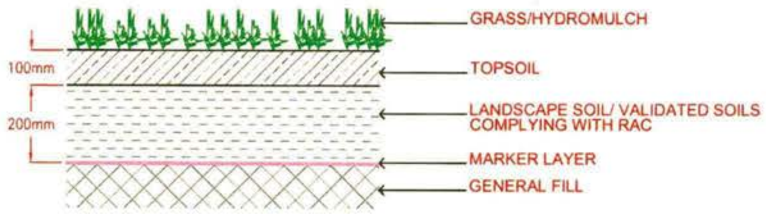
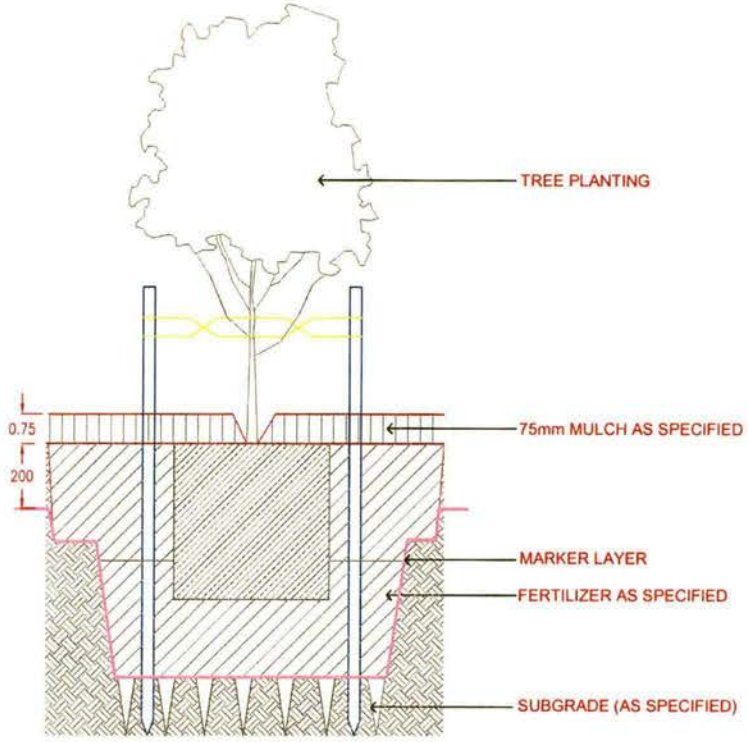
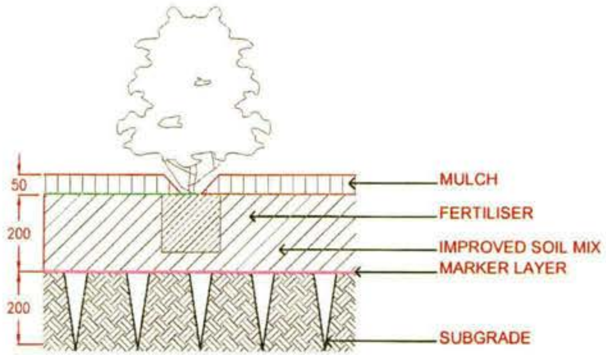


OPTION 1- LANDSCAPED AREA WITH TOPSOIL AND GRASS



OPTION 2- LANDSCAPED AREA WITH MULCH



OPTION 2- LANDSCAPED AREA WITH MULCH

NOTE: TCA/AURECON-REFER TO TCA/AURECON DESIGN SPECIFICATIONS FOR PROJECT

Douglas Partners Geotechnics · Environment · Groundwater	CLIENT: Transport Construction Authority			TITLE: Capping Details-Option 1 & Option 2 For Landscaped	PROJECT No: 71654.02
	DRAWN BY: PSCH	SCALE: As shown	OFFICE: Sydney	Areas, Remediation Action Plan, Auburn Stabling Project	DRAWING No: 5
	APPROVED BY: [redacted]		DATE: 9.3.2011	Clyde [redacted] rshalling Yards, AUBURN	REVISION: B

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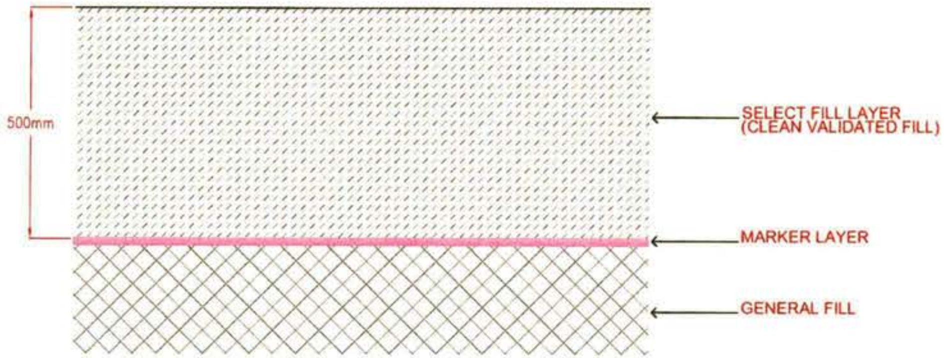

UNPAVED MAINTENANCE STORAGE AREAS

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NOTE: TCA/AURECON-REFER TO TCA/AURECON DESIGN SPECIFICATIONS FOR PROJECT

Douglas Partners Geotechnics · Environment · Groundwater	CLIENT: Transport Construction Authority		
	DRAWN BY: PSCH	SCALE: As shown	OFFICE: Sydney
	APPROVED BY:		DATE: 9.3.2011

TITLE: **Capping Details-Maintenance Storage Area**
Remediation Action Plan, Auburn Stabling Project-VER 02
Clyde Marshalling Yards, AUBURN

PROJECT No:	71654.02
DRAWING No:	6
REVISION:	B

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Transport Construction Authority

Appendix D

Changes to mitigation measures

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The below table includes a summary of the mitigation measures which have been changed since the REF along with the reasoning for the change. These changes include the measures in the REF which have changed in relation to each stage of the ASP. Deleted text is in red, while new text is in blue. There have also been a number of additional measures which have been subject to minor wording changes, which have not been included below.

ID Number	Measure	Reason for change
Stage One - Construction		
B.4	A range of possible approaches for minimising the impact of construction noise would be considered during the detailed design phase and could include: • Stockpile shielding – Localised shielding could be implemented for contained work areas such as the stockpile area. This could be achieved through purpose built temporary barriers or by managing the stockpile such that a mound is maintained on the Manchester Road boundary. • ...	Relocation of stockpile for Stage One moves the stockpile away from nearby sensitive receivers.
B.7	Additional mitigation measures outlined in Section 6 of TCA's *Construction Noise Strategy (Rail projects)* would be implemented when relevant noise goals are exceeded.	Duplication in the REF measures removed.
B.8	The contractor should encourage car pooling or a mini bus to local stations in an attempt to limit private vehicle trips to the site	Measure has been incorporated into mitigation measure D.1 which refers to the preparation of a Traffic Management Plan.
B.9	Providing direct access to the proposed stockpile site would minimise the number of heavy vehicle movements along the western section of Manchester Road at the rear of Sheffield Street during the construction phase.	The proposed stockpile site on neighbouring land would not be required during Stage One with all vehicles to access the ASP site via Private Road.
C.2	Erosion and sedimentation from disturbed areas and stockpiles during construction would be controlled in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Auburn Development Control Plan 2010*. *Auburn Council Development Control Plan 2000 - Guidelines for Erosion and Sediment Control* (2003).	The previous DCP has been repealed by the Auburn Development Control Plan 2010.
C.8	Inspections by a suitably qualified person of excavated and filled surfaces would be made during construction to determine the presence of visible asbestos.	TCA internal review to ensure better environmental outcomes

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ID Number	Measure	Reason for change
D.1	A Traffic Management Plan would be prepared and implemented that seeks to: ▸ ... ▸ determine the need to offset the loss of parking within the existing MainTrain car park during the construction period ▸ minimise impacts to the movement of vehicles to, from and around the MainTrain site. ▸ ...	Measures removed as they are not applicable to Stage One. Final measure added in line with change to mitigation measure B.8
D.4	Road surfaces would be surveyed prior to works commencing and once again surveyed post construction. If it is deemed works have resulted in damage, TCA/contractor would repair the roads to their pre-existing condition.	In response to submission during public display of the REF.
F.1	If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are deemed to have heritage significance, the advice of the Heritage Branch of the Office of Environment and Heritage would be sought regarding appropriate management of the items. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery. approval under section 139 and 140 of the *NSW Heritage Act 1977* would be obtained to allow their recording prior to removal.	In response to Heritage Branch submission during public display of the REF.
F.4	A five-metre curtilage would be maintained around the Auburn Signal Box.	Measures removed as they are not applicable to Stage One.
H.3	Soil management systems would be implemented to ensure that topsoils are maintained in a form that would maintain their viability for use in landscaped portions of the final site layout and minimise the risks of erosion, sedimentation or the spread of environmental weeds, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and the RAP.	TCA internal review to ensure better environmental outcomes.
H.6	All vegetation planted on site during Stage One would generally consist of local native species and would aim to provide screening of the facility, where required.	TCA internal review to ensure better environmental outcomes.

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ID Number	Measure	Reason for change
H.7	Should any trimming, cutting, pruning or removal of trees or vegetation beyond that assessed as part of this PAR and REF be required, approval from TCA in accordance with the *Application for Removal of vegetation* would be required to be obtained.	TCA internal review to ensure better environmental outcomes.
H.8	Preclearance surveys for resident fauna would be undertaken by a qualified ecologist and any fauna sheltering within the construction footprint would be relocated to the nearest area of 'safe' habitat.	TCA internal review to ensure better environmental outcomes.
I.1	An Urban Design and Landscape Plan would be prepared for the ASP during the detailed design stage. This plan would aim to: • minimise the visual impact of any noise mitigation barrier and 'enclosure' • minimise the visual impact of new driveway entrances (e.g. MainTrain and ASP) • address the requirements for landscaping on site • minimise the impacts of lighting from the site, particularly in relation to the new MainTrain overbridge The plan would detail how consultation regarding visual and urban design issues would be undertaken with stakeholders.	Removal of text not relevant to Stage One of the ASP.
I.2	Loss or damage to vegetation would be avoided where practicable, particularly vegetation located on the ASP site's boundaries that provides a screening function. Alternatives to clearing such as trimming are to be considered in consultation with TCA to avoid the total removal of vegetation.	TCA internal review to ensure better environmental outcomes.
I.6	Design would consider appropriate materials and colours for any noise mitigation barrier in order to blend in with the existing visual landscape.	Moved from Stage One operational mitigation measures to Stage One construction mitigation measures
J.1	A Community Involvement Plan would be developed and implemented to engage with government agencies, relevant councils Auburn City Council, landowners, community members and other stakeholders, as relevant, as part of ongoing design development and construction. This plan would identify all potential stakeholders and the best practice methods for consulting and informing these groups as appropriate consultation with these groups. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the ASP where possible.	Clarification of relevant council included.
J.2	Contact details for a 24-hour Construction Response Line (1800 775 465), Project Infoline (1800 684 490), website at	Inclusion of contact details.

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ID Number	Measure	Reason for change
	www.tca.nsw.gov.au and email address (mail@tca.nsw.gov.au) would be provided for ongoing stakeholder contact throughout the construction phase.	
L.7	Detailed design of the fire hydrant system is to be undertaken in accordance with all relevant standards and is to be reviewed by NSW Fire and Rescue.	In response to NSW Fire and Rescue submission during public display of the REF.
Stage One - Operation		
O.2	Approximately 3 A three metre high noise mitigation barriers would be provided along the southern edge of in strategic locations around the stabling yard. The exact location and length of the noise mitigation barrier would be determined confirmed during detailed design. To achieve maximum noise attenuation benefit, the noise mitigation barrier would be constructed as close to the noise source as possible.	Updated in light of confirmation of noise mitigation barrier
O.3	Train horn testing for trains exiting the ASP at the Clyde end would be undertaken within the stabling yard and would only involve the use of be undertaken on the leading (forward facing) town horn of the train prior to departure. A single train would also be required to test its horn at Clyde Station after the driver has changed ends of the train to head back into the city. • Testing of the town horn at the Clyde end would be undertaken within the stabling yard. • Testing of the town horn at the Auburn end would be undertaken outside the stabling yard, either on the main line or along the Auburn neck. Should horn testing be carried out along the Auburn neck a purpose built 'enclosure' within which to test the train horns would be provided. Acoustic treatment of individual buildings at the affected residences along The Crescent may be required.	Removal of aspects forming part of Stage Two and rework of measure due to removal of bullet point.
	The implementation of the above measures is subject to the required assessment of safety and operational aspects and obtaining all necessary approvals	TCA internal review to ensure better environmental outcomes.

ID Number	Measure	Reason for change
O.4	An Operational Noise and Vibration Management Plan would be prepared in consultation with relevant stakeholders during the detailed design phase of the project. The Plan would: • Identify the specific mitigation measures for controlling operational noise from the ASP, including the location, type and timing for the erection of permanent operational noise mitigation barriers and/or other noise mitigation measures. This would also include confirmation, following an operational review by RailCorp, as to whether testing of the train horn at the Auburn end would occur within the 'enclosure' along the Auburn neck or on the main line. • ... • Predict the operational noise impacts at sensitive receivers based on the final design of the Stage One of the ASP. • ...	Alternate testing location confirmed by RailCorp and therefore referencing to confirmation removed.
Q.1	Parking within the MainTrain car park would be reinstated to ensure that there is no net loss in parking at the MainTrain Facility.	Removal of aspects forming part of Stage Two
Q.2	The Operational Traffic Management Plan should include measures to minimise car based trips by operation workers given accessibility of the site to public transport	TCA internal review to ensure better environmental outcomes.
Q.3	An Emergency Response Plan would be developed for the ASP to outline the procedures to be put in place in the event of an emergency.	TCA internal review to ensure better environmental outcomes.
R.4	The use of rainwater tanks to supply water for use in toilets and landscaping is included in the design as part of TCA's Sustainability Guidelines.	TCA internal review to ensure better environmental outcomes.
S.1	Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist. Monitoring would be undertaken fortnightly during the first three months of operation of the Clyde Junction in 2017 and then monthly for the next nine months. In the event that the monitoring demonstrates an impact, further investigation to identify the cause would be undertaken. A management plan would then be developed to address the impact through the implementation of mitigation measures. Where major impacts to the roost are identified, operations (or the identified source of impact) would be halted until a time in which the impacts are reduced through appropriate mitigation.	Adjustment following discussions with RailCorp

ID Number	Measure	Reason for change
S.2	A Weed Management Plan would be developed to manage the issue of weeds during operation and be integrated with RailCorp's existing maintenance procedures.	TCA internal review to ensure better environmental outcomes.
T.2	Landscaping on site would be maintained during operation in line with RailCorp's existing maintenance procedures to ensure that the visual environment is maintained. Where vegetation would be required to be replaced (due to damage or for health reasons), replacement vegetation is to be planted as soon as possible and be of a similar type and size to ensure screening is provided.	Updated to fit with RailCorp's procedures.
T.3	Design would consider appropriate materials and colours for any noise mitigation barrier in order to blend in with the existing visual landscape.	Moved to construction measures
X.1	Existing environmental practices would be implemented, which would include procedures for the management of on site waste including waste from stabled train sets. Operational waste management would be managed through RailCorp's standard procedures.	Updated to fit with RailCorp's procedures.
Stage Two - Construction		
A.2	Consultation with Auburn City Council would be undertaken under the requirements of ISEPP. This consultation would be in relation to council infrastructure services, local heritage items and works on flood liable land.	Removed as would be undertaken prior to Stage One
B.5	The standard mitigation measures outlined in Section 3.1 of TCA's *Construction Noise Strategy (Rail Projects)* would be implemented and additional mitigation measures outlined in Section 6 of the strategy would be implemented when relevant noise goals are exceeded. These measures would be integrated into the Construction Noise and Vibration Management Plan for Stage Two by those constructing Stage Two of the ASP.	
B.7	Additional mitigation measures outlined in Section 6 of TCA's *Construction Noise Strategy (Rail projects)* would be implemented when relevant noise goals are exceeded.	Duplication in the REF measures removed.
B.8	The contractor should encourage car pooling or a mini bus to local stations in an attempt to limit private vehicle trips to the site.	Measure has been incorporated into mitigation measure D.1 which refers to the preparation of a Traffic Management Plan.

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ID Number	Measure	Reason for change
B.9	Providing direct access to the proposed stockpile site would minimise the number of heavy vehicle movements along the western section of Manchester Road at the rear of Sheffield Street during the construction phase.	The use of this stockpile location is not confirmed for Stage Two and the amount of stockpiling required has been reduced for Stage Two and therefore truck numbers are lower.
C.8	Inspections of excavated and filled surfaces would be made during construction by a suitably qualified person to determine the presence of visible asbestos.	TCA internal review to ensure better environmental outcomes.
D.1	A Traffic Management Plan would be prepared and implemented that seeks to: • ... • Investigate methods to minimise the use of private vehicles (e.g. car pooling)	Measure added due to integration of mitigation measure B.8 into traffic management plan
D.4	Road surfaces would be surveyed prior to works commencing and once again surveyed post construction. If it is deemed works have resulted in damage, TCA/contractor would repair the roads to their pre-existing condition.	In response to submission during public display of the REF.
D.5	Further investigation would be undertaken during Stage Two detailed design to consider access impacts and safety in relation to the overbridge.	Included as a result of community consultation undertaken as part of the PAR.
D.6	A parking survey would be undertaken prior to the commencement of Stage Two and monitoring during construction of Stage Two. In the event an increase on-street parking occurs, as a result of the temporary loss of parking within the MainTrain car park, investigations would be undertaken to determine an alternative off-street location for temporary parking. Details of the alternate location would be located in the Traffic Management Plan.	In response to submission during public display of the REF.

ID Number	Measure	Reason for change
F.1	If substantial intact subsurface elements are uncovered during the works, works would cease in the vicinity of the item, and an experienced industrial archaeological consultant would be engaged to assess the level of significance of the remains. If the remains are deemed to have no heritage significance (on grounds of lack of integrity, research potential etc), no further action would be required. If the remains are deemed to have heritage significance, the advice of the Heritage Branch of the Office of Environment and Heritage would be sought regarding appropriate management of the items. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery. approval under section 139 and 140 of the *NSW Heritage Act 1977* would be obtained to allow their recording prior to removal.	In response to Heritage Branch submission during public display of the REF.
F.2	A heritage interpretation plan would be developed and implemented including the provision of interpretive signage that provides information on the heritage significance of the site.	Removed as it would be developed during Stage One for whole project.
H.3	Soil management systems would be implemented to ensure that topsoils are maintained in a form that would maintain their viability for use in landscaped portions of the final site layout and minimise the risks of erosion, sedimentation or the spread of environmental weeds, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and the RAP.	TCA internal review to ensure better environmental outcomes.
H.6	All vegetation planted on site during Stage Two would generally consist of local native species and would aim to provide screening of the facility, where required. Mature vegetation would be planted where feasible.	TCA internal review to ensure better environmental outcomes.
H.7	Should any trimming, cutting, pruning or removal of trees or vegetation beyond that assessed as part of this PAR and REF be required, approval from TCA in accordance with the *Application for Removal of Vegetation* would be required to be obtained.	TCA internal review to ensure better environmental outcomes.
H.8	Preclearance surveys for resident fauna would be undertaken by a qualified ecologist and any fauna sheltering within the construction footprint would be relocated to the nearest area of 'safe' habitat.	TCA internal review to ensure better environmental outcomes.

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ID Number	Measure	Reason for change
I.1	An Urban Design and Landscape Plan would be prepared for the ASP during the detailed design stage. This plan would aim to: • minimise the visual impact of any noise mitigation barrier and 'enclosure' • minimise the visual impact of new MainTrain driveway entrances (e.g. MainTrain and ASP) • ... The plan would detail how consultation regarding visual and urban design issues would be undertaken with stakeholders.	Adjusted to remove reference to 'enclosure' TCA internal review to ensure better environmental outcomes.
I.2	Loss or damage to vegetation would be avoided where practicable, particularly vegetation located on the ASP site's boundaries that provide a screening function. Alternatives to clearing such as trimming are to be considered in consultation with TCA to avoid the total removal of vegetation.	TCA internal review to ensure better environmental outcomes.
J.1	A Community Involvement Plan would be developed and implemented to engage with government agencies, Auburn City Council, landowners, community members and other stakeholders, as relevant, as part of ongoing design development and construction. This plan would identify all potential stakeholders and the best practice methods for consulting and informing ion with these groups where appropriate. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the ASP where possible.	Clarification of relevant council included.
J.2	Should TCA deliver Stage Two, contact details for a 24-hour Construction Response Line (1800 775 465), Project Infoline (1800 684 490), project website (www.tca.nsw.gov.au) and email address (mail@tca.nsw.gov.au) would be provided for ongoing stakeholder contact throughout the construction phase. If TCA is not delivering Stage Two of the ASP, alternatively details would be provided by those responsible for delivering Stage Two.	Inclusion of contact details and text regarding details for Stage Two which may be undertaken by someone other than TCA.
Stage Two - Operation		
O.2	Approximately 3 three metre high noise mitigation barriers would be provided in strategic locations around the stabling yard. The exact location and length of the noise mitigation barrier would be determined during detailed design. To achieve maximum noise attenuation benefit, the noise mitigation barrier would be constructed as close to the noise source as possible.	Noise mitigation barrier to be constructed and positioned during Stage One.

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NSW GOVERNMENT | Transport Construction Authority

ID Number	Measure	Reason for change
O.4	An Operational Noise and Vibration Management Plan would be prepared during the detailed design phase of the project in consultation with relevant stakeholders. The Plan would: • Identify the specific mitigation measures for controlling operational noise from the ASP, including the location, type and timing for the erection of operational noise mitigation barriers and/or other noise mitigation measures. • ... • Predict the operational noise impacts at sensitive receivers based on the final design of the ~~ultimate~~ Stage Two ASP. • ... • Consider any noise impacts associated with the construction of the overbridge.	Updated to include measures in regard to the noise impacts associated with the overbridge due to community consultation.
Q.2	The Operational Traffic Management Plan should include options to minimise car based trips by operation workers given accessibility of the site to public transport	TCA internal review to ensure better environmental outcomes.
Q.3	An Emergency Response Plan would be developed for the ASP to outline the procedures to be put in place in the event of an emergency.	TCA internal review to ensure better environmental outcomes.
S.1	Monitoring of the Duck River roost camp of the Grey-headed Flying-fox would be undertaken by a qualified ecologist. Monitoring would be undertaken fortnightly during the first three months of operation of the Clyde Junction in 2017 and then monthly for the next nine months. In the event that the monitoring demonstrates an impact, further investigation to identify the cause would be undertaken. A management plan would then be developed to address the impact through the implementation of mitigation measures. Where major impacts to the roost are identified, operations (or the identified source of impact) would be halted until a time in which the impacts are reduced through appropriate mitigation.	Adjustment following discussions with RailCorp
S.2	A Weed Management Plan would be developed to manage the issue of weeds during operation and be integrated with RailCorp's existing maintenance procedures.	TCA internal review to ensure better environmental outcomes.

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ID Number	Measure	Reason for change
T.2	Landscaping on site would be maintained during operation in line with RailCorp's existing maintenance procedures to ensure that the visual environment is maintained. Where vegetation would be required to be replaced (due to damage or for health reasons), replacement vegetation is to be planted as soon as possible and be of a similar type and size to ensure screening is provided.	TCA internal review to ensure better environmental outcomes.
T.3	Design would consider appropriate materials and colours for any noise mitigation barrier in order to blend in with the existing visual landscape.	Noise barrier to be constructed as part of Stage One.
X.1	Existing environmental practices would be implemented, which would include procedures for the management of on site waste including waste from stabled train sets. Operational waste management would be managed through RailCorp's standard procedures.	Updated to fit with RailCorp's procedures

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Final	B James K Smallwood	S Fermio A Raleigh	A Raleigh	A Raleigh	A Raleigh	27 April 2011

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Attachment C

CONDITIONS OF APPROVAL

for the Auburn Stabling Project

Schedule of Acronyms and Definitions used:

CBF	Community Based Forum
CECR	Construction Environmental Compliance Report
CEMP	Construction Environmental Management Plan
CLP	Community Liaison Plan
DE	Director Environment (TCA)
DECCW	NSW Department of Environment, Climate Change and Water (formerly Department of Environment and Climate Change) – now Office of Environment and Heritage
DoT	Department of Transport
DPA	Director Planning and Assessments (TCA)
DS	Director Sustainability (TCA)
ECM	Environmental Controls Map
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EPA	NSW Environment Protection Authority (as part of DECCW) - now Office of Environment and Heritage
EPL	Environment Protection Licence
GME	General Manager Engineering (TCA)
GMPCA	General Manager Public and Corporate Affairs (TCA)
NSWII	NSW Industry and Investment (Primary Industries)
ISO	International Standards Organisation
OEH	Office of Environment and Heritage
OTMP	Operational Traffic Management Plan
PECR	Pre-Construction Environmental Compliance Report
POCR	Pre-Operational Compliance Report
RAP	Remediation Action Plan
RBL	Rating Background Level
REF	Review of Environmental Factors
TCA	Transport Construction Authority
TMP	Traffic Management Plan
UDLP	Urban Design and Landscaping Plan
UMP	Utilities Management Plan
WMP	Waste Management Plan

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WRAPP	Waste Reduction and Purchasing Policy
Construction	Includes all work in respect of the Project other than survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys or other activities determined by the Environmental Management Representative to have minimal environmental impact such as minor access roads, minor adjustments to services/utilities, establishing temporary construction sites (in accordance with this approval), or minor clearing (except where threatened species, populations or ecological communities would be affected).
Contamination	The presence in, on or under land or any other aspect of the environment of a substance at a concentration above the concentration at which the substance is normally present in, on or under land or any other aspect of the environment in the same locality.
Critical Construction Activity	Activities with the potential to have a significant negative impact including but not limited to, noise sensitive receivers, heritage (indigenous or non-indigenous) items, threatened or endangered species or communities, critical habitat and traffic or with the potential to pollute waters, contaminate land or damage property.
Designated Works	Includes tunnelling, blasting, piling, excavation or bulk fill or any vibratory impact works including jack hammering and compaction, for construction.
Director Environment	The Director of Environment, TCA
Director Planning and Assessments	The Director of Planning and Assessments, TCA
Director Sustainability	The Director of Sustainability, TCA
Emergency Work	Includes works to avoid loss of life, damage to external property, utilities and infrastructure, prevent immediate harm to the environment, contamination of land or damage to a heritage (indigenous or non-indigenous) item.
Environmental Impact Assessment	The documents listed in Condition 1 of this approval.
Environmental Management Representative (EMR)	An independent environmental representative or TCA Environment and Planning Manager appointed to the project.
General Manager Engineering	The General Manager of Engineering, TCA
General Manager Public and Corporate Affairs	The General Manager of Public and Corporate Affairs, TCA
Impulsive or Tonal Noise	As defined by the NSW Industrial Noise Policy (EPA, January 2000).

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Noise Sensitive Receiver	In addition to residential dwellings, noise sensitive receivers include, but are not limited to, pre-schools and day care facilities, educational institutions (e.g. school, TAFE college), health care facilities (e.g. nursing home, hospital), recording studios and places of worship/religious facilities (e.g. church).
Project	The construction and operation of the Auburn Stabling Project as described in the environmental impact assessment.
Proponent	A person or body proposing to carry out an activity under Part 5 of the EP&A Act - in this instance, TCA.
Reasonable and Feasible	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the New South Wales and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.

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<table>
<tr><th></th><th>TYPE</th></tr>
<tr><td></td><td>General</td></tr>
<tr><td>1</td><td>Terms of Approval
The Project shall be carried out generally in accordance with the:
a) Environmental Impact Assessment.
b) Conditions of Approval.
In the event of an inconsistency between the Conditions of Approval and the Environmental Impact Assessment, the Conditions of Approval will prevail to the extent of the inconsistency.
The Environmental Impact Assessment for this Project comprises the following documents:
<table>
<tr><th>DOCUMENT</th><th>AUTHOR</th><th>DATE</th></tr>
<tr><td>Review of Environmental Factors, Volume 1</td><td>GHD</td><td>November 2010</td></tr>
<tr><td>Review of Environmental Factors, Volume 2 – Technical Papers</td><td>Wilkinson Murray
Douglas Partners
GHD
Casey & Lowe</td><td>November 2010</td></tr>
<tr><td>Preferred Activity Report</td><td>GHD</td><td>April 2011</td></tr>
<tr><td>Preferred Activity Report - Technical Reports
- Addendum Noise and Vibration Assessment – Stage One; and
- Revised Remediation Action Plan.</td><td>Wilkinson Murray
Douglas Partners</td><td>April 2011
March 2011</td></tr>
</table></td></tr>
<tr><td>2</td><td>Project Staging
These Conditions of Approval are to be complied with separately for Stage One and Stage Two as relevant.
The Proponent must undertake a review of the environmental impacts, mitigation measures and Conditions of Approval should the Stage Two works commence five years or more after the date of the determination of the Auburn Stabling Project. The review would need to be approved by DPA.</td></tr>
<tr><td>3</td><td>Statutory Requirements</td></tr>
</table>

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	These Conditions of Approval do not relieve the Proponent of the obligation to obtain all other licences, permits, approvals and landowner permissions from all relevant authorities or landowners as required under any other Act for the Project. The Proponent shall comply with the terms and conditions of such licences, permits, approvals and permissions.
4	**Pre-Construction Environmental Compliance Report** A Pre-Construction Environmental Compliance Report (PECR) for the Project (or such stages of the Project as agreed to by the EMR) shall be prepared detailing compliance with all relevant Conditions of Approval that must be complied with prior to commencement of construction. The PECR shall also include details of approvals and licences required to be obtained under any other Act for the Project. The Proponent shall: a) submit a copy of the PECR to the EMR for review. The EMR is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the PECR; and b) upon completion of the EMR review period submit a copy of the PECR to the DE for approval, at least 14 days (or within such time as otherwise agreed to by the DE) prior to commencement of construction of the Project.
5	**Construction Environmental Compliance Report** The Proponent shall prepare a Construction Environmental Compliance Report (CECR) which addresses the following matters: a) compliance with the CEMP and these conditions of approval; b) compliance with any approvals or licences issued by relevant authorities for construction of the Project; c) implementation and effectiveness of environmental controls. The assessment of effectiveness should be based on a comparison of actual impacts against performance criteria identified in the CEMP; d) environmental monitoring results, presented as a results summary and analysis; e) number and details of any complaints, including summary of main areas of complaint, action taken, response given and intended strategies to reduce recurring complaints (subject to privacy protection); f) details of any review and amendments to the CEMP resulting from construction during the reporting period; and g) any other matter as requested by the DPA and DE. The Proponent shall: a) submit a copy of the CECR to the EMR for review. The EMR is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the CECR; b) upon completion of the EMR review period submit a copy of the CECR to the DE for approval; and c) within 7 days of approval of the CECR by the DE provide a copy of the CECR to Auburn City Council and relevant government agencies as nominated by the DE and make publicly available a copy of the CECR by posting the CECR on the TCA website. The first CECR shall report on the first six months of construction and be submitted within six weeks after expiry of that period (or at any other time interval agreed to by the DE). CECR's shall be submitted within six months after the date of submission of the preceding CECR (or at other such periods as requested by the DE) for the duration

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	of construction.
6	**Pre-Operation Compliance Report** A Pre-Operation Compliance Report (POCR) for the Project (or such stages of the Project as agreed to by the EMR) shall be prepared detailing compliance with all Conditions of Approval prior to commencement of operation of the Project. The Proponent shall: a) submit a copy of the POCR to the EMR for review. The EMR is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the POCR; and b) upon completion of the EMR review period submit a copy of the POCR to the DE for approval. The POCR is to be provided to the DE at least one month prior to the scheduled operation of the Project (or such time as otherwise agreed to by the DE).
	Communications
7	**Community Liaison Plan** The Proponent shall develop and implement a Community Liaison Plan (CLP) to engage with government agencies, relevant Councils, landowners, community members and other stakeholders (such as utility and service providers, bus companies and businesses), as relevant, as part of ongoing design development and construction. The CLP shall aim to provide a single, consistent consultation framework, for proactive communications management for the duration of the construction period. The CLP shall comply with the obligations of these conditions and should include, but not necessarily be limited to: (a) details of the protocols and procedures for disseminating information and liaising with the community and key stakeholders about construction activities (including timing and staging) and any associated impacts during the construction period; (b) details of the community liaison team appointed to manage and implement the plan; (c) procedures for identifying the local community likely to be affected by the Project, including identification of residences, businesses and other sensitive land uses and the specific communication needs of this community; (d) procedures for dealing with complaints or disputes and response requirements, including advertising the 24 hour construction response line number; and (e) the provision of training for all employees, contractors and sub-contractors on the requirements of the CLP. The CLP shall be prepared to the satisfaction of the General Manager Public and Corporate Affairs (GMPCA) at least 15 days prior to the commencement of site mobilisation or commencement of construction or investigations and implemented during construction of the Project.
8	**Community Notification and Liaison** The local community shall be advised of any activities related to the Project with the potential to impact upon them. Prior to any site activities commencing and throughout the project duration, the community is to be notified of works to be undertaken, the estimated hours of construction and details of how further information can be obtained (i.e. contact telephone number, website, newsletters etc) including the 24 hour construction

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	response line number. Construction-specific impacts including information on traffic changes, access changes, detours, services disruptions, public transport changes, high noise generating work activities and work required outside the nominated working hours must be advised to the local community at least 7 days prior to such works being undertaken or other period as agreed to by the GMPCA or as required by OEH (where relevant to the issuing of an EPL).
9	**Website** The Proponent shall provide electronic information (or details of where hard copies of this information may be accessed by members of the public) related to the Project, on dedicated pages within it's existing website, including: (a) a copy of the documents referred to under Condition 1 of this approval and any documentation supporting modifications to the Approval or related approvals that may be granted in the future; (b) a copy of each relevant licence or permit required and obtained in relation to the Project; (c) a list of environmental management reports; (d) details of construction information; and (e) 24 hour contact telephone number for information and complaints. Detailed updates of work progress and construction activities shall be regularly provided on the website.
10	**Complaints Management** The Proponent shall set up a 24 hour construction response line number. Details of all complaints received during construction are to be recorded on a complaints register. For complaints received via phone or in person, a verbal response is to be provided to the complainant within 2 hours during construction times and within 24 hours during non-construction times (unless the complainant agrees otherwise). A detailed written response is to be provided within seven (7) calendar days. For complaints received via letter, a detailed written response is to be provided within seven (7) calendar days. For complaints received via email, an acknowledgement email should be sent as soon as possible but within 48 hours of receipt. A detailed email response is to be provided within seven (7) calendar days. Information on all complaints received during the previous 24 hours and response times shall be forwarded to the EMR each working day.
11	**Community Based Forums** Community Based Forums (CBFs) shall be held during construction of the Project to address issues raised by the community in relation to construction works and to inform the community of progress on the project and upcoming construction work. The CBFs will be convened by TCA's DE/DPA/GMPCA as appropriate, or as required under an EPL.

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	Environmental Management
12	**Environmental Induction** Prior to the commencement of construction, all contractors shall be inducted by the Proponent on the key project interfaces and associated environmental risks and procedures.
13	**Environmental Management System** Construction works shall be undertaken in accordance with the Proponent's Environmental Management System(s) (EMS) which has been accredited as ISO14001 compliant.
14	**Environmental Management Representative** Prior to the commencement of construction, the DE shall appoint an Environmental Representative (EMR) independent of the design and construction personnel of the Project, for the duration of the construction period for the Project. The EMR shall provide advice to the DE in relation to the environmental compliance and performance of the Project. The EMR shall have responsibility for: (a) considering and advising the Proponent on matters specified in these conditions and compliance with such; (b) reviewing and where required by the DE, providing advice on the Project's induction and training program for all persons involved in the construction activities and monitoring implementation; (c) periodically auditing the Project's environmental activities to evaluate the implementation, effectiveness and level of compliance of on-site construction activities with authority approvals and licences, the CEMP and associated plans and procedures, including carrying out site inspections weekly, or as required by the DE; (d) reporting weekly to the Proponent; (e) issuing a recommendation to the Proponent for work to stop immediately, if in the view of the EMR circumstances so require. The stop work recommendation may be limited to specific activities if the EMR can easily identify those activities; (f) require reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts; (g) reviewing corrective and preventative actions to ensure the implementation of recommendations made from the audits and site inspections; (h) providing reports to the Proponent on matters relevant to the carrying out of the EMR role as necessary; (i) where required by the DE, providing advice on the content and implementation of the CEMP and ECM in accordance with the conditions in this approval; and (j) review and approve updates to the CEMP and other applicable management plans identified in the conditions of this approval. The EMR shall be available during construction activities to inspect the site(s) and be present on-site as required during any critical construction activities as defined in the CEMP and ECM.
15	**Construction Environmental Management Plan** The Proponent shall prepare and implement a CEMP prior to commencement of construction which addresses the following matters:

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	a) traffic and pedestrian management; b) noise and vibration management, including TCA's *Construction Noise Strategy (Rail Projects) 2010* and DECCW's *Interim Construction Noise Guideline July 2009*; c) air quality management (including dust suppression); d) landscape and rehabilitation plan (for work sites); e) Indigenous and non-Indigenous heritage management; f) water and soil management including TCA's *Water Discharge and Reuse Guidelines* (2011); g) storage and use of hazardous materials; h) contaminated land; i) flora and fauna management; j) weed management; k) waste management; and l) sustainability. The CEMP shall: a) comply with the conditions of this approval, conditions of any licences, permits or other approvals issued by government authorities for the Project, all relevant Acts and Regulations and accepted best practice management; b) be prepared in accordance with the *Guideline for Preparation of Environmental Management Plans* (Department of Infrastructure, Planning and Natural Resources, 2004); and c) include a site-specific Environmental Policy. The Proponent shall: a) where required by the DE, consult with government agencies and relevant service/utility providers as part of the preparation of the CEMP; b) submit a copy of the CEMP to the EMR for review. The EMR is to be given a minimum period of 7 days to review and endorse the CEMP; c) following receipt of the EMR's endorsement, the CEMP shall be submitted to the DE for approval, at least 14 days prior to commencement of construction (or such time as is otherwise agreed to by the DE); d) review and update the CEMP at minimum 3-monthly intervals, and in response to any actions identified as part of the EMR's audit of the document (as required by Condition 15(c)); and e) updates to the CEMP shall be made within 7 days of the completion of the review or receipt of actions identified by any EMR audit of the document, and be submitted to the EMR for approval. The CEMP must be approved by the DE prior to the commencement of any construction work associated with the Project (or stage as relevant).
16	**Operational Environmental Management** Prior to the commencement of operation, the Proponent shall advise the operator (RailCorp) of relevant conditions of approval for the Project to be incorporated into its environmental management systems and operating procedures as relevant.
	Property
17	**Building Condition Surveys** Subject to landowner agreement, building condition surveys shall be completed on the following buildings/structures prior to proximate piling, excavation or bulk fill or

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	any vibratory impact works including jack hammering and compaction ("Designated Works"): a) all buildings/structures/roads within a plan distance of 50 metres from the edge of the Designated Works; and b) all heritage listed buildings and other sensitive structures within 150 metres from the edge of the Designated Works unless otherwise determined following geotechnical and vibration assessment as endorsed by a qualified geotechnical engineer and as approved by the General Manager, Engineering (TCA) as not likely to be adversely affected. Property condition surveys need not be undertaken if a risk assessment indicates buildings/structures/roads will not be affected as determined by a qualified geotechnical and construction engineering expert with appropriate registration on the National Professional Engineers Register and endorsed by the General Manager, Engineering (TCA) prior to commencement of Designated Works. Selected potentially sensitive buildings and/or structures shall first be surveyed prior to the commencement of the Designated Works and again immediately upon completion of the Designated Works. All property owners of assets to be surveyed, as defined above, are to be advised within a reasonable time prior to commencement of the surveys of the scope and methodology of the survey and the process for making a claim regarding property damage within a reasonable time (not less than 14 days) prior to commencement of the survey(s). A copy of the survey(s) shall be given to each affected owner. A register of all properties surveyed shall be maintained. The Proponent will only be responsible for undertaking rectification works and/or paying compensation for damage to buildings and structures as a result of construction activities direct and indirect (i.e. including vibration and groundwater changes) for which the Proponent is responsible. In such instances, damage shall be rectified at no cost to the owner(s).
	Hours of Work
18	**Standard Construction Hours** Construction activities shall be restricted to the hours of 7:00 am to 6:00 pm (Monday to Friday); 8:00 am to 1:00 pm (Saturday) and at no time on Sundays and public holidays except for the following works which are permitted outside these standard hours: (a) any works which do not cause noise emissions to be more than 5dBA higher than Rating Background Level (RBL) (background) noise levels at any nearby residential property and/or other noise sensitive receivers; (b) the delivery of plant, equipment and materials which is required outside these hours as requested by police or other authorities for safety reasons and with suitable notification to the community as agreed by the DE; (c) emergency work to avoid the loss of lives, property and/or to prevent environmental harm; and (d) any other work in accordance with TCA's *Out of Hours Work Procedure* and considered essential to the Project. Alternative hours of construction may be approved through an EPL.

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19	**High Noise Generating Activities** Rock breaking or hammering, jack hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel and any other activities which result in Impulsive or Tonal Noise generation shall only be scheduled between the following hours unless otherwise agreed to by the DE or OEH (where relevant to the issue of an EPL), unless inaudible at nearby residential properties and/or other noise sensitive receivers: (a) 8 am to 12 noon, Monday to Saturday; and (b) 2 pm to 5 pm Monday to Friday.
	Construction
20	**Environmental Controls Map (ECM)** The Proponent shall prepare an Environmental Controls Map (ECM) in accordance with TCA's *Guide to Environmental Control Map 2010* prior to the commencement of construction for implementation for the duration of construction. The ECM may be prepared in stages as set out in the CEMP. The Proponent shall submit a copy of the ECM to the EMR for review and endorsement. The EMR is to be given a minimum period of 7 days to review and endorse the ECM. Following receipt of the EMR's endorsement, the ECM shall be submitted to the DE for approval, at least 14 days prior to commencement of construction (or such time as is otherwise agreed to by the DE). The ECM shall be prepared as a map – suitably enlarged (e.g. A0 size) for mounting on the wall of a site office and included in site inductions, supported by relevant written information. The ECM shall address the following information: a) the worksite layout and boundary, including site offices; b) location of the nearest noise sensitive receivers and noise monitoring locations; c) sediment and erosion control measures; d) temporary and permanent noise barriers; e) designated car parking areas for the workforce; f) construction traffic routes within and adjacent to the worksite; g) dust control measures and monitoring locations; h) location of environmentally or heritage sensitive areas (e.g. threatened species, critical habitat) within 50 metres of the Project works; i) vegetation and trees to be protected within and outside the Project boundary; j) location of heritage (indigenous and non-indigenous) items; k) location of spill containment and clean-up equipment; l) stormwater drainage and watercourses; and m) location of worksite waste management facilities. The ECM shall also include the following information where relevant: a) key construction stages and timeframes for the work; b) hours of work applicable to the worksite (including deliveries); c) restrictions on certain activities (e.g. rock breaking and driven piling); d) contact details (including after hours) for key staff (including Environment Manager and EMR); e) OEH's Environment Line number (131 555); f) key control and mitigation measures and responsibilities for managing issues identified in the CEMP;

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	g) reference to, and location of, operating procedures for pollution control equipment and other environmental control measures (e.g. water treatment plants, wheel wash facilities); h) monitoring and inspection requirements; i) document control and approval details; j) approvals, licences, permits etc applicable to the works; and k) appearance of threatened species and/or Endangered Ecological Communities (e.g. photograph, sketch). Updates to the ECM shall be made within 7 days of the completion of the review or receipt of actions identified by any EMR audit of the document, and shall be submitted to the EMR for approval.
	Noise and Vibration
21	**Construction Noise and Vibration** Construction noise and vibration mitigation measures shall be implemented through the CEMP, in accordance with TCA's *Construction Noise Strategy (Rail Project)* 2010 and DECCW's *Interim Construction Noise Guideline July 2009.* The mitigation measures shall include, but not necessarily be limited to: a) details of construction activities and an indicative schedule for construction works; b) identification of construction activities that have the potential to generate noise and/or vibration impacts on surrounding land uses, particularly sensitive noise receivers; c) detail what reasonable and feasible actions and measures shall be implemented to minimise noise impacts (including those identified in the Environmental Impact Assessment); d) procedures for notifying sensitive receivers of construction activities that are likely to affect their noise and vibration amenity, as well as procedures for dealing with and responding to noise complaints; e) where not otherwise subject to an EPL, an out of hours work protocol (OOHWP) for the assessment, management and approval of works outside the standard construction hours identified in Condition 18 of this approval, including a risk assessment process under which the EMR may approve out of hours activities deemed to be of low or to medium environmental risk. All high risk out of hours works are subject to approval by DE. The OOHWP should be developed consistent with TCA's *Construction Noise Strategy (Rail Projects) 2010* and *Out of Hours Work Assessment Procedure (2010);* and f) a description of how the effectiveness of actions and measures shall be monitored during the proposed works, clearly indicating the frequency of monitoring, the locations at which monitoring shall take place, recording and reporting of monitoring results and if any exceedance is detected, the manner in which any non-compliance shall be rectified.
22	**Vibration Criteria** Vibration (other than from blasting) resulting from construction and received at any structure outside of the Project shall be limited to: (a) For structural damage vibration - the acceptable vibration values set out in the German Standard DIN 4150: Part 3 - 1999 "Structural Vibration in Buildings: Effects on Structures"; and

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	(b) For human exposure to vibration - the acceptable vibration values set out in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (DEC 2006). These limits apply unless otherwise approved by the DE through the CEMP or by OEH (where relevant to the issuing of an EPL).
23	**Public Address Systems** Use of public address systems at any construction sites outside the standard construction hours is prohibited except in emergency situations. Use of public address systems during the operational phase would be undertaken in accordance with RailCorp's operating procedures, consistent with details provided in the Environmental Impact Assessment (i.e. for security/emergency situations only).
24	**Non-tonal reversing beepers** Non-tonal reversing beepers (or an equivalent mechanism) shall be fitted and used on all construction vehicles and mobile plant regularly used on-site and for any out of hours work.
25	**Noise Impact on Educational Facilities** Potentially affected pre-schools, schools, universities and any other affected permanent educational institutions shall be consulted in relation to noise mitigation measures to identify any noise sensitive periods, e.g. exam periods. As much as reasonably possible noise intensive construction works in the vicinity of affected educational buildings are to be minimised.
26	**Piling** Wherever practical, piling activities shall be completed using non-percussive piles. If percussive piles are proposed to be used, approval of the EMR or DE shall be obtained following consultation with OEH (where the works are subject to an EPL).
27	**Operational Noise and Vibration** Prior to the commencement of the laying of rail track or the construction of physical noise mitigation structures an Operational Noise and Vibration Management Plan shall be prepared to identify noise (air- and ground-borne) and vibration control measures to be implemented for the Project (or stage as relevant). The Operational Noise and Vibration Management Plan shall be prepared in consultation with RailCorp and relevant stakeholders. The Operational Noise and Vibration Management Plan shall: a) identify the appropriate operational noise and vibration objectives and levels for sensitive receivers, which are consistent with the *Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects* (DECCW 2007), the *Industrial Noise Policy* (EPA 2000), the relevant DECCW sleep disturbance criteria (as identified in the noise and vibration assessment) the *Environmental Criteria for Road Traffic Noise* (EPA, 1999) and the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (DEC 2006); b) predict the operational noise and vibration impacts at sensitive receivers based on the final design of the Project (or stage as relevant); c) examine all reasonable and feasible noise and vibration mitigation measures consistent with the *Interim Guidelines for the Assessment of Noise from Rail*

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	Infrastructure Projects (DECCW 2007) and *Industrial Noise Policy* (EPA 2000); d) identify specific physical and other mitigation measures for controlling noise and vibration at the source, along the propagation path, and at the receiver (if relevant) including location, type and timing for the erection of permanent noise barriers and/or other noise mitigation measures. e) Incorporate the details of the noise barrier to be constructed as part of Stage One works, together with other mitigation measures identified in the environmental impact assessment and Noise and Vibration Reports to manage impacts within the Auburn Stabling Project, including - yard horn or short toot of town horn to warn of impeding train movement within the stabling yard; - construction of 3 metre high noise barrier; - train horn testing using the leading (forward facing) town horn of the train prior to departure; and - testing of the train horn at the Auburn (southern) end of the stabling yard along the main line, between Auburn and Lidcombe Stations as agreed by RailCorp. f) include a consultation strategy to seek feedback from directly affected property owners (including educational institutions) on the noise and vibration mitigation measures; and g) have consideration of: - setback of buildings from the proposed structures; - overshadowing for north facing sites in residential, educational and/or open space areas; - the provision of absorptive surfaces on noise barriers at locations where reflective noise impacts would occur; - stormwater drainage requirements and flooding; and - risk and prevention of graffiti and other forms of vandalism.
28	**Operational Noise Compliance Monitoring** Compliance monitoring shall be undertaken within 3 months of the commencement of the operations of the Project (or stage as relevant) to evaluate the effectiveness of the operational noise and vibration mitigation measures to determine if any additional reasonable and feasible mitigation measures are needed that are consistent with the requirements of the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (DECCW 2007) and *Industrial Noise Policy* (EPA 2000). In the event that the compliance monitoring indicates that the operation of the Project (or stage as relevant), will lead to greater noise impacts than previously modelled, additional noise mitigation measures would be developed in consultation with relevant stakeholders and the affected residents/receivers.
	Contamination/Spoil
29	**Site Remediation** The site shall be remediated in accordance with the Remediation Action Plan (RAP) prepared by Douglas Partners (refer Preferred Activity Report Appendix C), Where unsuitable filling material is to be disposed off-site, samples from the material shall be collected, analysed and classified prior to being transported to an appropriately licensed waste facility in accordance with DECCW's *Waste Classification Guidelines 2008*. Prior to the commencement of remediation works, all contractors shall be inducted by

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	the Proponent outlining the location, nature, type and concentration of contaminants on site, as well as potential risks and mitigation measures. Following remediation, the Proponent shall undertake Stage 4 Validation and Site Monitoring in accordance with DECCW's *Guidelines for Consultants Reporting on Contaminated Sites* and other guidelines as applicable. The Validation and Site Monitoring is to confirm that there is no off-site migration of contaminants from the site, or if there is off-site migration, the contamination within the site is managed or monitored so that it does not present an unacceptable risk to the on-site or off-site environment. The Proponent shall also prepare the following: a. a site Environmental Management Plan (EMP), detailing the procedures for the long-term management of the capping layer. b. appropriate notification of any restrictions applying to the land as a result of contamination to ensure that potential purchasers or other interested parties are aware of the restrictions (Section 149 Certificate under the EP&A Act or covenant under the *Conveyancing Act 1919*). The work required under this condition will be undertaken to the satisfaction of a site auditor engaged by the Proponent.
30	**Asbestos** Asbestos at the site shall be managed in accordance with the Remediation Action Plan (RAP) prepared by Douglas Partners (refer Preferred Activity Report Appendix C), which include measures for previously unidentified asbestos discovered during works. Prior to earthworks commencing all visible asbestos-based fragments shall be removed by an appropriately licensed contractor as required by the *Working with Asbestos: Guide* (WorkCover NSW, 2008). Asbestos shall be disposed of at a suitably licensed waste facility. During earthworks, excavated and filled surfaces shall be inspected by a suitably qualified person to determine the presence and need for removal of additional visible asbestos. If asbestos impacted soil is to be disposed off-site, it shall be classified in accordance with DECCW's *Waste Classification Guidelines 2008* and disposed of, as a minimum, as asbestos contaminated waste to a suitably licensed waste facility. Air monitoring for asbestos fibres shall be carried out in work areas (i.e. cabins of selected plant etc) by an occupational hygienist during asbestos-contaminated soil removal. Site boundary monitoring shall also be carried out at a minimum of six boundary locations during the earthworks phase.
31	**Unidentified Contamination (Other than Asbestos)** If previously unidentified contamination (excluding asbestos) is discovered during construction, work in the affected area shall cease immediately and an investigation shall be undertaken and report prepared to determine the nature, extent and degree of the contamination. The level of reporting must be appropriate for the identified contamination in accordance with DECCW *Guidelines for Consultants Reporting on Contaminated Sites*.. The Proponent shall: a) submit a copy of any contamination report to the Site Auditor for review. The Site Auditor is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the report; and

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	b) upon completion of the Site Auditor review period submit a copy of the report to the DE for consideration. The DE is to determine whether consultation with Auburn City Council and/or DECCW is required prior to continuation of construction works within the study area.
32	**Storage and Use of Hazardous Materials** Construction hazard and risk issues associated with the use and storage of hazardous materials shall be addressed through risk management measures, which shall be developed by the construction contractor prior to construction as part of the overall CEMP, in accordance with relevant DECCW guidelines and Australian and ISO standards. These measures shall include: a) the storage of hazardous materials, and refuelling/maintenance of construction plant and equipment to be undertaken in clearly marked designated areas that are designed to contain spills and leaks; b) spill kits, appropriate for the type and volume of hazardous materials stored or in use, to be readily available and accessible to construction workers. Kits to be kept at hazardous materials storage locations, in site compounds and on specific construction vehicles. Where a spill to a watercourse is identified as a risk, spill kits to be kept in close proximity to potential discharge points in support of preventative controls; c) all hazardous materials spills and leaks to be reported to site managers and actions to be immediately taken to remedy spills and leaks; and d) training in the use of spill kits to be given to all personnel involved in the storage, distribution or use of hazardous materials.
	Traffic
33	**Traffic Management Plan** The Proponent shall prepare, implement and update (as required) a construction Traffic Management Plan (TMP) as part of the CEMP which addresses, as a minimum, the following: a) nomination of heavy vehicle access routes; b) adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption is minimised; c) how impacts on adjacent operating commercial premises will be minimised; d) maximisation of safety and access for pedestrians and cyclists; e) adequate sight lines to allow for safe entry and exit from the site; f) address the access and safety impacts on Manchester Road associated with the design of the overbridge (Stage Two); g) impacts and changes to on and off street parking and requirements for any temporary replacement provision; h) parking for construction staff and site offices to occur within construction site compounds and a consideration of methods to minimise the use of private vehicles (e.g. car-pooling); i) construction-related deliveries which shall be minimised during school start and finish times; j) the movement of tracked excavators to and from the site would be minimised; k) any closures of footpaths would clearly show the alternative route (which may be

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	on the edge of the roadway) with appropriate directional signage and pedestrian protection; and l) other matters identified as part of the mitigation measures in the Environmental Impact Assessment. The Proponent shall consult with the relevant roads authority during preparation of the TMP as required. The performance of all Project traffic arrangements shall be monitored during construction. The Proponent shall: a) submit a copy of the TMP to the EMR for review. The EMR is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the TMP; and b) upon completion of the EMR review period submit a copy of the TMP to the DE for approval, at least 14 days prior to commencement of construction works which may effect traffic movements.
34	**Parking Survey** A parking survey of local roads shall be undertaken prior to the commencement of construction of Stage Two of the Project. The results of the survey shall be monitored during the works. In the event that available parking on local roads is reduced due to parking of vehicles related to construction of the works, an alternative off-street location for temporary parking would be investigated and the TMP updated.
35	**Road Condition Reports** Road Condition Reports shall be prepared for all local roads likely to be used by construction traffic in the vicinity of the Project. These reports shall be prepared prior to commencement of construction and after construction is complete. A copy of the relevant report shall be forwarded to the relevant roads authority.. Any damage resulting from the construction of the Project, aside from that resulting from normal wear and tear must be repaired. An alternative arrangement for road damage repair may be negotiated with the relevant roads authority.
36	**Operational Traffic Management Plan** The Proponent shall prepare an Operational Traffic Management Plan (OTMP) in consultation with relevant stakeholders (e.g. Maintrain, RailCorp, Council(s), (and their local traffic committee), the RTA (and their regional traffic committee)). The OTMP shall address the following matters (where applicable): a) final traffic flow and parking arrangements (including no net loss in parking at the Maintrain Facility - Stage Two); b) options to minimise car based trips by operational workers; c) an Emergency Response Plan for the ASP to outline access procedures in the event of an emergency; d) any long term changes to intersection/access layouts, kerb locations and traffic signage. The OTMP shall be approved by the DE prior to undertaking the final traffic/access and parking layouts for the Project (or stage as relevant).
	Air Quality

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37	**Dust Emissions** All construction activities shall be carried out in a manner that minimises or prevents the emission of dust including: (a) trucks entering and leaving all construction sites are fully covered and tailgates are effectively sealed; (b) any vehicles which leave construction sites do not track materials on public roads. Wheel wash facilities or equivalent shall be constructed and maintained, to be utilised by all departing trucks and machinery which have been used in unsealed areas; and (c) when conditions are excessively dusty and the dust emissions criteria from operations cannot be maintained, then all dust generating activities must cease until dust suppression can be adequately carried out. A weather station shall be installed on-site for the duration of construction works to assist in monitoring and managing the impacts from dust emissions.
	Erosion and Sediment Control
38	**Soil and Water Management Measures** Soil and water management measures shall be prepared as part of the CEMP for the mitigation of water quality and hydrology impacts during construction of the Project. The management measures shall be prepared in accordance with *Managing Urban Stormwater: Soils and Construction 4th Edn* (Landcom, 2004), the Remediation Action Plan (RAP) prepared by Douglas Partners (refer Preferred Activity Report Appendix C), and as a minimum, address the following matters: (a) preparation of a relevant catchment analysis to determine the capacity of existing drainage systems and capacity, changes resulting from the construction of the Project and implications of pumping load and detention requirements; (b) details of management measures to minimise soil erosion and discharge of sediment or water pollutants from the site including a strategy to minimise the area of bare surfaces during construction; (c) describe the location and capacity of erosion and sediment control measures through area-specific Erosion and Sediment Control Plans (ESCPs); (d) measures to handle and dispose of stormwater, effluent and contaminated water and soil; (e) details of the location and management measures of stockpiles; (f) measures to direct seepage, spillage, contaminated water, fire fighting or other water which contains pollutant levels above the background concentrations of natural discharge points into sumps with pump out facilities; (g) measures for the use of water reclaimed or recycled on-site; (h) detailed erosion and sedimentation controls, sufficient to address the technical requirements for obtaining any relevant EPL, as relevant; (i) detailed description of water quality monitoring to be undertaken including base line monitoring, identification of locations where monitoring would be carried out and procedures for analysing the degree of contamination of potentially contaminated water; (j) contingency plans to be implemented in the event of fuel spills or turbid water discharge from the site; (k) program for inspecting, reporting on and responding to the effectiveness of the sediment and erosion control system to ensure controls are being implemented efficiently; and

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	(l) details on the preparation and implementation of progressive management measures as activities change.
	Drainage and Stormwater
39	Stormwater Management A site Stormwater Management Plan shall be developed for the operation of the Project consistent with other existing site Stormwater Management Plans. The plan would include protocols for the maintenance of water quality structures and the treatment requirements of stormwater runoff in accordance with the targets identified in Landcom's *Water Sensitive Urban Design Strategy* (2009). The design of stormwater drainage structures shall be in accordance with *Australian Runoff Quality* (IEAust, 2006).

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	Waste
40	**Waste Management Plan** Prior to the commencement of construction a Waste Management Plan (WMP) shall be prepared which addresses the following matters: a) management of wastes during construction in accordance with the NSW Government's *Waste Reduction and Purchasing Policy* (WRAPP); b) application of the waste minimisation hierarchy principles of avoid/reduce/re-use/recycle/dispose; c) waste handling and storage; d) disposal of wastes including cleared vegetation, contaminated materials, glass, metals and plastics, hydrocarbons (lubricants and fuels) and sanitary wastes; e) disposal of any waste material that is unable to be re-used, re-processed or recycled at a facility approved to receive that type of waste; f) need for environmental safeguards and the adoption of environmentally sensitive work practices to minimise waste and advance the values of ecologically sustainable development; g) procedures for classifying waste in accordance with DECCW's *Waste Classification Guidelines*; h) procedures for the recovery of resources from waste where this is beneficial and does not harm the environment or human health, in accordance with the 'resource recovery exemptions' under clause 51 of the *Protection of the Environment Operations (Waste) Regulation 2005*; i) installation of segregated bins for recyclable materials and provision for material to be reused or recycled wherever possible; j) the disposal of chemical, fuel and lubricant containers and solid and liquid wastes in accordance with applicable DECCW guidelines; k) appropriate induction and training of all employees and contractors in the waste hierarchy and the requirements of the WMP; and l) six monthly reporting to the Proponent on the amount of material generated, the amount recycled and the amount purchased with recycled content as part of the Project using the format and tables contained in Part C and Part D of the NSW Government *WRAPP Reporting Guidelines 2009*. The Proponent shall: a) submit a copy of the WMP to the EMR for review. The EMR is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the WMP; and b) submit a copy of the WMP to the DE for approval, at least 14 days prior to the commencement of construction. The WMP is to demonstrate the manner in which a target of at least 90 percent of construction waste generated during site preparation and construction of projects is to be diverted from landfill and either recovered, recycled or reused. In addition, the WMP is to address how 100 percent of usable spoil material will be recovered for beneficial use.
	Lighting
41	**Lighting Control** All permanent lighting for the Project shall be designed, installed and operated in

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	accordance with the requirements of AS 1158 "Road Lighting", AS 4282 "Control of the Obtrusive Effects of Outdoor Lighting" and RailCorp's operational requirements. Lighting design shall also take into consideration the potential impacts on the Grey-headed Flying-fox colony.
	Miscellaneous
42	**Graffiti and Advertising Control** Hoardings, site sheds, fencing, acoustic walls around the perimeter of the site and any structures built as part of the Project are to be maintained free of graffiti and advertising not authorised by the Proponent during the construction period. Graffiti and unauthorised advertising will be removed or covered within the following timeframes: a) offensive graffiti will be cleaned or covered within 24 hours; b) highly visible yet non-offensive graffiti will be cleaned or covered within 1 week; c) graffiti that is neither offensive nor highly visible will be cleaned or covered during normal operations within one month; and d) any advertising material will be removed or covered within 24 hours.
43	**Utilities Management Plan** Prior to commencement of construction, a Utilities Management Plan (UMP) shall be prepared which addresses the following matters: (a) the location of existing services potentially affected by the construction of the Project; (b) the relocation of services required as part of construction; (c) measures to minimise and manage hazards or risks associated with working in close proximity to services/utilities; and (d) measures to minimise and manage any unexpected disruption to services/utilities. The UMP shall be: (a) prepared in consultation with service providers; (b) endorsed by the General Manager, Engineering (TCA); and (c) incorporated into the CEMP and applicable ECM(s).
44	**Authorised Water Servicing Co-ordinator** The Proponent shall engage a Sydney Water authorised water servicing coordinator to manage the design and construction of any works to the existing water or sewer mains.
	Flora and Fauna
45	**Flora and Fauna Management** Flora and fauna management measures shall be included in the CEMP for the Project, which include: (a) general impact mitigation; (b) staff/contractor inductions; (c) vegetation clearing protocols; (d) pre-clearing surveys and fauna salvage/translocation; (e) protected/threatened/endangered species/ecological communities awareness;

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	(f) rehabilitation and restitution of adjoining habitat; (g) weed control; (h) pest management; and (i) site monitoring. Construction sites and site accesses shall, where practicable and feasible, be located in areas that minimise the amount of vegetation clearing required for their establishment.
46	**Replanting Program** Any cleared native vegetation shall be subject to a target of 100% offset in accordance with TCA's Sustainability Targets. All vegetation planted on-site during site landscaping or rehabilitation is to consist of locally endemic native species, unless otherwise agreed by the DE following consultation with Auburn City Council, where relevant, and/or the owner of the land upon which the vegetation is to be planted. For landscaping outside the rail corridor, the Proponent shall consult with the Auburn City Council to develop a Replanting Program which addresses opportunities to enhance the quality and connectivity of existing habitats in the area. Landscaping used for the Project inside the rail corridor shall also be consistent with RailCorp's *Revegetation Treatments for RailCorp Lands – Design Guidance and Specification.* Where practicable, new landscape plantings shall occur as early as possible during construction of the Project.
47	**Removal of Trees or Vegetation** Loss or damage to vegetation shall be avoided where practicable, particularly vegetation located on the Project site boundaries that provide a screening function. Separate approval is required for the trimming, cutting, pruning or removal of trees or vegetation where the impact has not already been identified in the Environmental Impact Assessment for the Project. The Proponent is to assess the impact of the trimming, cutting, pruning or removal of trees or vegetation having regard to the following: (a) relevant NSW legislation including the EP&A Act, and *Threatened Species Conservation Act 1995;* (b) relevant Commonwealth legislation including *Environment Protection and Biodiversity Conservation Act 1999*; and (c) TCA's Application for Removal of Trees.
48	**Monitoring of the Duck River Grey-headed Flying Fox Roost Camp** Monitoring of the Grey-headed Flying-fox roost camp shall be undertaken by a qualified ecologist on a fortnightly basis for the first three months of operation of the Clyde Junction and then monthly for the next nine months. In the event that monitoring demonstrates an impact, further investigation to identify the cause should be undertaken. A management plan would then be developed to address the impact through the implementation of mitigation measures.
49	**Weed Management Plan** A site Weed Management Plan shall be developed for the operation of the Project consistent with other existing site management plans.

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	Heritage
50	**Non-Indigenous Heritage Management** Non-Indigenous heritage management measures shall be prepared in consultation with RailCorp, Auburn City Council and the NSW Heritage Branch (as relevant) and incorporated into the CEMP, including: (a) identification of heritage items and archaeological sites and present policy and management options; (b) management measures to be implemented to prevent any impact on works to be undertaken in the vicinity of heritage items and sites; (c) detail of training and induction requirements for contractors and subcontractors on obligations under the NSW Heritage Act including site identification, protection and conservation; and (d) procedures and protocols for engaging specialists to provide 24 hour advice. A heritage interpretation plan (i.e. interpretative signage) will be prepared to provide information on the heritage significance of the Clyde Marshalling Yards. Heritage interpretation would be developed in consultation with RailCorp, Auburn City Council and other interested community groups and implemented prior to the operation of the Project (or stages as relevant).
51	**Non-Indigenous and Indigenous Heritage – During Construction** If previously unidentified non-Indigenous or Indigenous heritage/archaeological items are uncovered during construction works, all works in the vicinity of the find shall cease and appropriate advice shall be sought. Works in the vicinity of the find shall not re-commence until clearance has been received from the relevant heritage agencies. Any significant findings of non-indigenous heritage shall be documented and then reported to RailCorp to update the Section 170 listings.
	Urban Design and Landscaping
52	**Urban Design and Landscaping Plan** Prior to the finalisation of Project detailed design the Proponent shall prepare an Urban Design and Landscaping Plan (UDLP) which addresses the following matters: (a) materials, finishes, colour schemes and maintenance procedures including graffiti control for new buildings, walls, barriers and fences; (b) landscape treatments and street tree planting to integrate with surrounding streetscape and screen the rail corridor; (c) total water management principles to be integrated into the design where considered appropriate; (d) design measures included to meet the Proponent's Sustainable Design Guidelines; (e) any other matters which the conditions of this approval require the UDLP to address; and (f) ongoing maintenance responsibilities. The UDLP shall be prepared in consultation with Auburn City Council, RailCorp, relevant stakeholders (including neighbouring residents) and approved by the TCA Engineering Assurance Manager - Architecture and Urban Design. Any significant changes to the above listed elements, or the façade details of the structure(s), after the determination of the Project will require consideration by the

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	TCA Engineering Assurance Manager Architecture and Urban Design to determine whether the changes are required to be reconsidered by the TCA Design and Sustainability Review Panel.
	Sustainable Development
53	**Greenhouse Gas Emissions** A Carbon Emissions Report shall be developed to identify measures for minimising greenhouse gas emissions during the construction and operation of the Project. As part of the detailed design process, the following is to be undertaken: (a) identify the initial carbon footprint assessment undertaken at concept design stage and presented as part of the Environmental Impact Assessment (including materials and energy usage during the construction phase of the project); (b) provide evidence that outlines how the carbon footprint can be further reduced through the implementation of various energy efficiency measures, sustainability in design features and the specification of lower embodied carbon construction materials where practical (e.g. flyash in concrete etc); and (c) Include a tracking programme for emissions generated during construction to be reported on a 6 monthly basis. The revised carbon footprint assessment prepared as part of the detailed design stage is to be submitted to the DS for endorsement with the UDLP.
54	**Sustainability Role** The Proponent shall appoint a Sustainability Officer who is responsible for implementing sustainability objectives for the Project. Details of the Sustainability Officer, including defined responsibilities consistent with the Proponent's sustainability objectives, are to be submitted to the satisfaction of the DS prior to preparation of the UDLP and Pre-Construction Sustainability Report.
55	**Pre-Construction Sustainability Report** Prior to commencement of construction, a Pre-Construction Sustainability Report shall be prepared to demonstrate how the following sustainability targets are to be met: (a) all buildings to be designed to minimise their embodied carbon during construction and operation; (b) impacts of climate change to be considered as part of the design process; (c) sustainability materials procurement policy to be adopted for design and construction; (d) design measures to be incorporated into new buildings to maximise potential savings in water consumption; (e) management measures to minimise potable water use during construction, and identification and commitment to the use of alternate water sources (e.g. harvested rainwater) where possible; (f) consider opportunities to improve water quality within watercourses/bodies adjacent to construction activities, and details of any implementation; (g) sustainability initiatives to be included on all community and stakeholder management plans, and feedback sought from the community regarding sustainability performance; and (h) any other relevant sustainability targets identified in the Environmental Impact Assessment. Where appropriate additional project-specific sustainability principles and targets

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	shall be identified in the Pre-Construction Sustainability Report. The Proponent shall: (a) submit a copy of the Pre-Construction Sustainability Report to the Sustainability Officer for review. The Sustainability Officer is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the Pre-Construction Sustainability Report; and (b) upon completion of the Sustainability Officer review period, submit a copy of the Pre-Construction Sustainability Report to the DS for approval, at least 14 days (or within such time as otherwise agreed to by the DS) prior to the commencement of construction.
56	**Pre-Operational Sustainability Report** Prior to operation of the Project the Proponent shall prepare a Pre-Operation Sustainability Report which will: (a) demonstrate the manner in which project targets outlined in Condition 55 have been met; and (b) provide a summary of the community feedback received during the Project's construction. The Proponent shall: (a) submit a copy of the Pre-Operation Sustainability Report to the Sustainability Officer for review. The Sustainability Officer is to be given a minimum period of 7 days to review and provide any comments to the Proponent in relation to the Pre-Operation Sustainability Report; and (b) submit a copy of the Pre-Operation Sustainability Report to the DS for approval, at least one month prior to the scheduled operation of the Project (or such time which is otherwise agreed to by the DS).

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