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Peer review of options for proposed crossings of Leongatha rail reserve, Clyde Railway Station and associated train stabling
Peer Review Overview Report

Reference: 239201.01
Prepared for: Metropolitan Planning Authority (MPA)
Revision: 1
20 February 2014

Document control record

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Document control							aurecon
Report title		Peer Review Overview Report					
Document ID		239201.01	Project number		239201.01		
File path		P:\Transport\Project Work\239201 - Leongatha Rail Line Peer Review\Report\MPA - Leongatha Rail Line Peer Review - Rev 1 DRAFT.docx					
Client		Metropolitan Planning Authority (MPA)	Client contact		Alexandrea Malishev		
Rev	Date	Revision details/status	Prepared by	Author	Verifier	Approver	
0	24 January 2014	DRAFT for comment	JPW	JPW	JEB	JEB	
1	20 February 2014	FINAL DRAFT for comment. Update to incorporate MPA comments and finding of site survey and gradeline design	JPW	JPW	JEB	JEB	
Current Revision		1					

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Contents

1	Introduction	1
1.1	Purpose of this report	1
2	Methodology	1
2.1	The review process	1
2.2	Information provided	1
2.3	Reference information not reviewed	2
3	Peer review findings	3
3.1	Overview	3
3.2	General comments	3
3.3	MPA comments	3
3.4	Stakeholder Workshop	7

Appendices

Appendix 1

Aurecon Peer Review Comments

Appendix 2

Proposed Clyde Creek PSP

Appendix 3

Clyde Sidings.docx

Appendix 4

Clyde Sidings diagram.pdf

Appendix 5

Conceptual Clyde Station and Stabling Design.docx

Appendix 6

FW: Clyde Vertical Alignment Test

Appendix 7

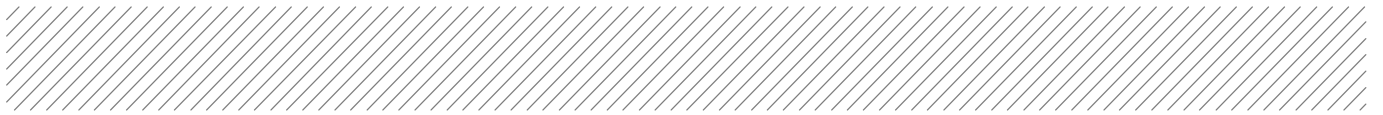
Clyde Five Ways Road

Appendix 8

1650mm watermain sketch

Appendix 9

HERITAGE ASSESSMENTS FOR:130 TUCKERS ROAD, CLYDE; 75 TUCKERS ROAD, CLYDE; CLYDE TOWNSHIP; CLYDE PRIMARY SCHOOL; 10 BALLARTO ROAD, CLYDE; 1755 BALLARTO ROAD, CLYDE; AND 272 HARDYS ROAD, CLYDE NORTH



Appendix 10

Thompsons Road PSP 53 and Clyde Creek PSP 54 – Stormwater Management Strategy (SWMS)

DRAFT

1 Introduction

1.1 Purpose of this report

Aurecon Australia Pty Ltd has been engaged by the Metropolitan Planning Authority (MPA) to complete a peer review of grade separation, train station and stabling concept plans produced by PTV and Vic Roads in order to identify any limitations, implementation or delivery issues associated with the draft concept plans.

The context of the review is that the MPA are currently preparing the Clyde Creek Precinct Structure Plan in partnership with Casey City Council and other key stakeholders. This precinct has been created as a result of the extension of the Urban Growth Boundary through Planning Scheme Amendment V68 passed by the Victorian Government in July 2010.

Following the peer review, Aurecon were subsequently engaged by MPA to complete feature survey of road and rail assets and the preparation of rail and road longitudinal sections. The intent of the works was to provide a more robust assessment of key risks identified by the peer review, and provide greater level of confidence to the MPA project team.

2 Methodology

2.1 The review process

The review process comprised a desktop peer review of the information provided by MPA and commentary on possible areas of non-conformances, areas where further design development may be warranted as well as potential solutions and or mitigation measures.

The review was based upon Aurecon's experience with the planning and development of similar infrastructure.

The review information comprised a range of material including concept design sketches / drawings, written text and reports / documents.

2.2 Information provided

Title	Revision	Format	Source	Received	Appendix
Proposed Clyde Creek PSP	31/05/2013	*.doc	Figure 1 of MPA RFP	As part of RFP	Refer Appendix 2
Clyde Sidings.docx	Unknown / not shown	*.docx	Email	Email from Mark Burton dated 29 Nov 13 @ 11.30am	Refer Appendix 3

Title	Revision	Format	Source	Received	Appendix
Clyde Sidings diagram.pdf	Unknown / not shown	*.pdf	Email	Email from Mark Burton dated 29 Nov 13 @ 11.30am	Refer Appendix 4
Figure 5 - Conceptual Clyde Station and Stabling Design.docx	Unknown / not shown	*.docx	Email	Email from Mark Burton dated 29 Nov 13 @ 11.30am	Refer Appendix 5
FW: Clyde Vertical Alignment Test	Unknown / not shown	*.pdf	Email	Email from Mark Burton dated 11 Nov 13 @ 5.21pm	Refer Appendix 6
Clyde Five Ways Road	Unknown / not shown	*.doc	Figure 6 of MPA RFP	As part of RFP	Refer Appendix 7
1650mm watermain sketch	Unknown / not shown	Embedded	Email	Email from Neil Craigie dated 25 Nov 13 @ 5.25pm	Refer Appendix 8
HERITAGE ASSESSMENTS FOR: 130 TUCKERS ROAD, CLYDE; 75 TUCKERS ROAD, CLYDE; CLYDE TOWNSHIP; CLYDE PRIMARY SCHOOL; 10 BALLARTO ROAD, CLYDE; 1755 BALLARTO ROAD, CLYDE; AND 272 HARDYS ROAD, CLYDE NORTH	Final Draft	*.doc	File transfer from MPA	File transfer for GAA/MPA dated 11 February 2014 @ 10.49am.	Refer Appendix 9
Thompsons Road PSP 53 and Clyde Creek PSP 54 – Stormwater Management Strategy (SWMS)	Version 3	*.pdf	File transfer from MPA	File transfer for GAA/MPA dated 11 February 2014 @ 10.49am.	Refer Appendix 10

2.3 Reference information not reviewed

Following preliminary review, we consider that the following documents are not of relevance to the peer review as the documents provide guidance general in nature only.

Title	Commentary
City of Casey Transport Strategy, August 2008	Provides general guidance. Insufficient specific information to complete peer review.
Growth Areas Authority (2011) The Melbourne South East Growth Corridor Plan, November 2011	Provides general guidance. Insufficient specific information to complete peer review.

3 Peer review findings

3.1 Overview

Based on the information provided, in December 2013 Aurecon completed a review of documents in regard to compliance with rail standards, suitability of design approach and apparent gaps where further review and refinement was required.

3.2 General comments

Generally the peer review identified that only limited engineering concept design had been prepared to date in regard to the location and layout of the proposed station, grade separation and stabling area. The review also highlighted that a number of engineering assumptions that appear to have been made during the development phase need further documentation and/or are not considered compliant with the applicable design standards.

A key concern identified in the review was that proposed vertical realignment options prepared by PTV appeared not to make any allowance for structural thickness of a bridge carrying Ballarto Rd over the railway line. In order to maintain the road level around its existing location, the thickness of the bridge will require the railway line to be locally lowered further than currently shown by PTV. This is potentially compounded by the unknown accuracy of the information used to prepare the base information.

Aurecon was subsequently engaged by PTV to complete a limited feature and level survey of both Ballarto Rd and the existing rail track, and to provide a high level grade design for both road and rail. Please refer to Section 4 for further information.

3.3 MPA comments

Specifically in regard to the questions raised by MPA, we note the following:

- **The suitable location and associated land take of the proposed station and stabling facilities;**

DRAFT Clyde Creek Precinct Structure Plan (54) – Clyde Creek (PSP54), prepared by MPA outlines the proposed location of a future Clyde railway station. The distance between the proposed Clyde railway station and the proposed Cranbourne East railway station is consistent with other stations along the Cranbourne railway line. The station has been located to be within close proximity to the proposed major town centre and development precinct whilst minimising the number of new residential properties abutting the railway line. The location of the proposed station does not preclude the potential for further extension of the rail line in the future and/or the provision of stabling to the south – east beyond the extent of the structure plan. During further design development, consideration could be made for the provision of intermodal public transport interchange within the station precinct.

Similarly, the assumptions made in the PTV documents in regard to overall station land take appear sound however we note that these areas are general in nature and not displayed with the context of the existing VicTrack rail reserve boundary.

- **the proposed road and pedestrian/bicycle network including road hierarchy designation and vertical clearance requirements;**

As noted in PSP54 the proposed future Clyde railway station is easily accessible by private vehicle via the multiple routes included in the proposed road network, pedestrian and cycle network via the adjacent shared use and off-road paths as well as the network of bus capable arterial network.

The Aurecon review assumed that Ballarto Rd and Clyde Five Ways Rd will be grade separated via road over rail grade separation in accordance with the current planning completed to date.

Accordingly, the key vertical clearance requirement is a rail vertical clearance requirement from top of rail to the underside of the bridge structure above.

VRIOG standard VRIOGS 001 – Structure Gauge Envelopes- Minimum Clearances for Infrastructure Adjacent to the Railway, identifies the minimum vertical clearances are as follows:

Rail scenario	Minimum vertical clearance
Where track has been identified to be used for interstate freight and/or double stacked container operations	7.1m
Where track that is or is to be utilised for passenger and/or freight services and has no future interstate freight and/or double stacked containers operation requirements	5.75m

During the meeting held 10 December 2013, the PTV representatives indicated that 5.75m vertical clearance should be adopted for this project.

- **existing heritage bridge and heritage house off Ballarto Road**

The review highlighted that the existing Ballarto Rd bridge achieves a vertical clearance to the existing track of approximately 4.3m. This clearance is significantly less than allowed by VRIOGS 001 for new work and would not be adequate for the electrified network. Aurecon understand that the bridge was originally constructed in 1914-1915 and that in recent years has had major rehabilitation and strengthening works performed to increase allowable road vehicle loading.

The existing bridge opening allows for a single track only, and provides insufficient lateral clearance for a twin track configuration shown in the PTV concept sketches.


Accordingly we consider that a 'do nothing' approach is not feasible and the Ballarto Rd bridge would need to be replaced at the time of or prior to reintroduction of rail services to Clyde Railway Station.

As part of any upgrade it may be possible to optimise both the existing Ballarto Rd horizontal and vertical alignment.

Aurecon understands that a detailed Heritage Assessment has been completed by Mr Ray Tonkin in regard to the works proposed by the Clyde Creek Precinct Structure Plan, and that the Heritage Assessment recommends changes to currently document heritage places and that the existing bridge could be removed as part of the precinct upgrade.

- **existing drainage conditions and assets and any proposed drainage schemes or works;**

The review considered the potential 1650mm stormwater pipe proposed to cross the rail reserve approximately 450m south east of the existing Clyde Rd level crossing as documented in the sketch provided. As noted in the Stormwater Management Strategy (SWMS) included as Appendix 10 of this report we understand that this stormwater pipe is critical to the wider drainage scheme.



We consider that the stormwater pipe would need to meet or exceed the cover (distance from top of pipe to top of rail) as specified in AS4799 – Installation of underground utility services and pipelines within railway boundaries whilst meeting functional requirements. Further feature survey and rail longitudinal design work (refer Section 4) has concluded that the proposed stormwater pipe exceeds the minimum cover stipulated in AS4799.

We recommend that any future design development consider the location of the proposed watermain as a fixed constraint.

- **the location of existing and proposed Melbourne Water/South East Water infrastructure including water mains (pipe track);**

At the time of preparation of this report, MPA advised that no significant existing or proposed Melbourne Water / South East Water water main assets were known to occur at this location.

- **the location of existing and proposed gas infrastructure;**

At the time of preparation of this report, MPA advised that no significant existing or proposed gas infrastructure assets were known to occur at this location.

- **the location and height of any proposed SPI Powernet infrastructure and clearances that are likely to be required for proposed road crossings;**

At the time of this report, MPA advised that no significant existing or proposed electrical infrastructure assets were known to occur at this location.

Aurecon note that the interface between rail infrastructure and transmission infrastructure is well documented with electrical clearance requirements to transmission infrastructure likely governing the height and configuration of overhead transmission lines across the rail reserve. Electricity Safety (Electrical Line Clearance) Regulations 2010, administered by Energy Safe Victoria provides guidance in regard to the interface between major electrical infrastructure with rail and road assets.

Where possible, underground transmission power infrastructure would minimise visual obstruction of the area compared to overhead solutions.


- **if there are issues for heavy rail construction relating to the proposed infrastructure; and**

Given the state of the existing corridor, we consider that any project to upgrade the corridor and reintroduce rail services to Clyde Railway Station would be a major undertaking. Based on the information available to date, we consider the high design solutions developed to date and associated construction would be typical of a major corridor expansion, new station, grade separation and or stabling project and do not present considerable construction issues that cannot be overcome.

- **the structural state of the existing railway formation and the possibility of its re-use in any future works.**

Aurecon has not completed a site inspection of the existing railway formation or track materials as part of this peer review. Given that no rail services have occurred along the line since the early 1990's, it is likely that the existing railway formation is in a significant state of disrepair. Similarly the original rail infrastructure may have been originally constructed to a lower standard than expected for new work today, and that as part of any upgrade project the existing track materials would be removed and replaced with new materials.

- **The construction and cost implications of the proposed road crossings design, the type and standard of construction of works that would best facilitate the possible reintroduction of heavy rail infrastructure and avoid significant public funds being expended, while accommodating existing/proposed infrastructure and the proposed future road crossings;**



During the peer review of the VicRoads design for Clyde – Fiveways Rd we observed that the proposed road level at the crossing of the railway line is 46.550m, and the existing level is around 37.50m equating to a total level difference in the order of 9m. When considering structural thickness (typically in the order of 1.5 to 2m for a road or rail bridge) it appears that the VicRoads design allows for 7.1m vertical clearance (although not specifically stated).

This differs to the discussions held on 10 December 2013, where the PTV representatives indicated that 5.75m rail vertical clearance would likely be sufficient for the Ballarto Rd grade separation.

Aurecon recommend that this assumption is formally confirmed by PTV.

The design and construction requirements for new road and rail infrastructure (including bridges, stations, stabling etc) are well documented by respective road and rail authorities providing a base case expectation of design and construction requirements.

Significant architectural or aesthetic enhancements to road and rail infrastructure, particularly railway stations, have the ability to significantly enhance the amenity and visual appeal of infrastructure however they also have the potential to significantly increase the expenditure whilst achieving the same functional outcomes. At this early stage of development no such enhancements are included in the information reviewed to date.

- **The construction and cost implications of the proposed Clyde Train Station and associated train stabling, the standard of construction of works that would best facilitate the possible reintroduction of heavy rail infrastructure and avoid significant public funds being expended while accommodating existing/proposed infrastructure;**

See above.

- **The possible sequencing of proposed works including the construction of rail infrastructure prior to and after a road crossing being established; and**

It is difficult to comment in detail on the sequencing of the proposed works as it is dependent on many factors well beyond the scope of this study (e.g. speed of land development, political will, cost of living (such as petrol pricing) etc) all of which have potential to impact sequencing.

Indicative sequencing of proposed works involving construction of rail infrastructure prior to and after a road crossing being established are as follows, however at the time of preparation of this report is considered likely than an upgraded road link would be constructed prior to a potential rail upgrade:

Construction of rail infrastructure prior to road crossing

- Existing Ballarto Rd bridge removed to allow construction of rail infrastructure
- Existing rail infrastructure, ground cover and vegetation removed in order to construct the works
- Rail infrastructure constructed to long term design (i.e. at or around existing grade at Clyde Rd, in a deep cutting at Ballarto Rd)
- New road infrastructure established to support the station and connect to wider road network (e.g. station access roads etc)
- Rail services established
- Grade separations at Clyde Rd and Ballarto Rd to be constructed in the future working under constraints imposed by rail operator. This may necessitate critical and high risk activities (such as lifting bridge beams across the rail tracks) to occur during isolated shut downs of the rail line. This requirement may necessitate alternate design and/or construction methodology. In the case of Ballarto Rd, it may be possible to modify or utilise the rail cutting retaining walls to support the future road bridge spanning the rail cutting

Construction of road crossing prior to rail infrastructure

- Grade separations at Clyde Rd and Ballarto Rd to be constructed to cater for future rail provision. The bridges may initially be constructed to cater for the 'medium term' envisaged rail demand (potentially 2 passenger tracks), but designed in such a way that additional tracks could be added in the future. An example of this is initial provision of a 'spill through' type abutment that is later converted to a clear/open span for additional tracks via the provision of a reinforced soil structure wall.
- Existing rail infrastructure, ground cover and vegetation removed in order to construct the works
- Rail infrastructure constructed beneath Clyde Rd and Ballarto Rd under constraints imposed by road authority.
- New road infrastructure established to support the station and connect to wider road network (e.g. station access roads etc)
- Rail services established
- Potential for modification to Clyde Rd and Ballarto Rd grade separations to support long term rail requirements (with modification as noted above)
- **The amenity of adjoining land users in particular Clyde Township.**

We consider that the proposed Ballarto Rd grade separation option assists in maintaining amenity of adjoining land users at Clyde Township by avoiding large elevated structures significantly above the existing surface. However, we note that a submerged station would be in contrast to previous planning and require rethinking of key infrastructure including Clyde Rd grade separation and 1650mm water main design.

A further possible step would be for the entire station could be placed in a deep cutting (similar to recent projects such as Nunawading Railway Station) to further 'hide' railway infrastructure from view, however in doing so construction cost of the project would significantly increase compared to at grade options. Landscaping or aesthetic treatments could further reduce amenity concerns.

3.4 Stakeholder Workshop

Aurecon comments were tabled and discussed during a stakeholder meeting held 10 December 2013. The full spreadsheet of comments are included as Appendix 1 of this report.

The stakeholder workshop was attended by the following stakeholders:

Attendee	Organisation
Alexandrea Malishev	MPA
Gwenda Kullen	MPA
Chris Bright	MPA
Alex Brigo	VicRoads
Anthony Damoularis	VicRoads
Bill Tomkins	VicRoads
Peter Brash	VicRoads
Chris Banger	PTV

Attendee	Organisation
Mark Burton	PTV
Jason Williams	Aurecon

The following individuals were invited to the workshop however were unable to attend.

Attendee	Organisation
John Belcher	Aurecon
Jude Hart	Casey City Council
Luke Connell	Casey City Council
Paul Hamilton	Casey City Council

4 Feature survey and longitudinal design

Following the stakeholder workshop, Aurecon were subsequently engaged by MPA to complete the following:

- Feature survey of existing road levels at the eight locations as advised by MPA
- Feature survey of existing top of rail levels at the four locations indicated by MPA
- Feature survey of existing levels for the current bridge over the rail corridor including finished surface level and clearance level of rail corridor
- Preparation of a longitudinal section along the rail corridor detailing the existing levels and proposed levels for a central platform station based on the master planning already completed by MPA / PTV. Longitudinal Section will be based on Site Survey information and existing MPA Lidar (as infill between survey points) information.
- Preparation of a longitudinal section along the current Ballarto Rd alignment detailing the existing levels and a proposed alignment that will provide for a 5.75m clearance over the rail corridor. The clearance is from the top of the rail to the bottom of the bridge structure. The longitudinal section shall also detail any height differences between the existing side roads and the proposed Ballarto Rd alignment.

The intent of the works was to provide a more robust assessment of key risks identified by the peer review, and provide greater level of confidence to the MPA project team.

4.1 Design Standards

4.1.1 Rail

The following are the principal design standards used as the basis for the rail longitudinal design:

- Victorian Rail Infrastructure and Operator Group Standards (VRIOGS) 001 Structural Gauge Envelopes
- Victorian Rail Infrastructure and Operator Group Standards (VRIOGS) 004.1 Heavy Rail Track Design Manual
- MTM Track Design Standard L1-SDD-STD-007

The table below lists the principal design parameters used for the preliminary rail longitudinal alignment design.

Item	Parameter
Horizontal Track Alignment	Adopt existing
Track Grades	1:50 (2%) maximum 1:250 (0.4%) absolute maximum - station
Structural Clearance	<u>Horizontal</u> Not considered as part of this task <u>Vertical</u> 5.75m
Vertical Geometry	6700m minimum Sag radius 3350m minimum Summit radius 25m minimum length between vertical curves
Platform	Provision for 220m long next generation train (230m total length)
Bridge Structural Depth	2.0m assumed

4.2 Road

The following are the principal design standards used as the basis for the road longitudinal design:

- Austroads - Guide to Road Design Part 3: Geometric Design
- VicRoads Supplement to AGRD Part 3

4.3 Design outputs / findings

Based on the preliminary longitudinal design, the following Table summarises the drawings produced.

Design Parameters	
Drawing	Commentary
239201-SK-TC-0010.pdf	<p>Rail longitudinal</p> <ul style="list-style-type: none"> • New longitudinal alignment to achieve 5.75m min vertical clearance at Ballarto Rd. The design assumes that the road level of Ballarto Rd would remain unchanged, and that in the future a new Ballarto Rd bridge would be constructed with up to 2m structural depth. At the MPA's preferred station location, the revised rail level would be around 1.3m below the existing rail level • New alternate longitudinal alignment to achieve 5.75m min vertical clearance at Ballarto Rd. The design assumes that the Ballarto Rd horizontal and vertical alignment may be optimised and that in the future a new bridge would be constructed with up to 2m structural depth. At the MPA's preferred station location, this would mean that the rail level would be around 2.2m below existing rail level. • For both longitudinal alignments, the proposed 1650mm diam stormwater pipe is not impacted. • This drawing should be read in conjunction with 239201-SK-TC-0020
239201-SK-TC-0020.pdf	<p>Road longitudinal</p> <ul style="list-style-type: none"> • Existing road horizontal and vertical alignment • Potential optimised Ballarto Rd horizontal and vertical alignment. We consider the removal of the existing 'hump' in the road alignment could occur without impact to adjacent road network • Actual clearance from top of rail to underside of bridge at the location shown is 4.48m • This drawing should be read in conjunction with 239201-SK-TC-0010

Following the completion of additional feature survey and design, the peer review comments spreadsheet was updated. Please refer Appendix 1 of this report.



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