

LEVEL CROSSING REMOVAL AUTHORITY FRANKSTON PACKAGE

46 - Station Street/Bondi Road, Bonbeach
Cross Drainage Assessment – Rail Under Road

LXRA-LX31-46-HW-RPT-0002

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Document Control

Release

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Table of contents

Executive summary..... iv

Abbreviations..... v

1. Introduction..... 1

 1.1 Scope 1

 1.2 Background..... 1

 1.3 Project description..... 2

2. Existing conditions 4

3. Relevant legislation and policy..... 5

 3.1 Relevant legislation 5

 3.2 Design requirements 5

4. Preliminary impact assessment 8

5. Management and mitigation..... 9

6. Conclusion..... 10

7. References 11

Table index

Table 1 Relevant legislation 5

Figure index

Figure 1 Bonbeach level crossing removal project area..... 3

Appendices

Appendix A – Site Plan

Executive summary

The AECOM-GHD Joint Venture is engaged by the Level Crossing Removal Authority to provide specialist planning and environmental advice for the Level Crossing Removal Program. A preliminary flood and cross drainage assessment has been undertaken for the Station Street/Bondi Road, Bonbeach level crossing removal.

The purpose of the report is to identify matters relating to cross-drainage that may need to be incorporated into the level crossing removal project design.

The proposed works will not occur within a defined land subject to inundation overlay or special building overlay. Furthermore, available topographical data indicates that the proposed works occur along a local ridge where surface flows will generally discharge away from the rail corridor.

Due to the characteristics of the site, in particular the ridge crest location of the existing rail corridor, it is considered that the project will not have a significant effect on cross flows and consequently flood risk within the surrounding area.

Potential increases in rainfall intensities from climate change and the effect that this may have on the standard of flood protection for the railway, road assets and other properties will be considered for cross-drainage design.

Given that the proposed works will not impede or impact overland flow paths or existing flood areas no further mitigation is required as a result of the project.

As the design progresses, management of the local drainage network and catchments should generally be incorporated into the design and further analysis of major overland flow paths should not be required.

Abbreviations

Term	Definition
ARI	Average Recurrence Interval
BoM	Bureau of Meteorology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EPA	Environment Protection Authority Victoria
IPCC	Intergovernmental Panel on Climate Change
JV	AECOM-GHD Joint Venture
LSIO	Land Subject to Inundation Overlay
LXRA	Level Crossing Removal Authority
mAHD	Metres Australian Height Datum
SBO	Special Building Overlay

1. Introduction

1.1 Scope

The AECOM-GHD Joint Venture (JV) is engaged by the Level Crossing Removal Authority (LXRA) to provide specialist planning and environmental advice for the Level Crossing Removal Program. A preliminary flood and cross drainage assessment has been undertaken for Station Street/Bondi Road, Bonbeach level crossing removal.

The purpose of the report is to identify matters relating to cross-drainage that may need to be incorporated into the level crossing removal project design.

This level crossing removal forms part of the Victorian Government's program to remove 50 level crossings in metropolitan Melbourne.

1.2 Background

Over the next eight years LXRA will oversee the removal of 50 dangerous and congested level crossings across Melbourne.

The Victorian Government allocated \$2.4 billion in its 2015-16 budget to remove at least 20 level crossings by 2018. These sites form the basis of a long-term strategic plan being developed to remove all 50 level crossings by 2022.

Construction has already commenced on several sites, and planning and early consultation is underway for the delivery of the entire program.

Level crossings are a key cause of congestion on Melbourne's roads, and form one of the limitations on the number of train services that can operate on each line. The 50 level crossings planned for removal were chosen on a range of different factors, including safety, congestion and overall network benefits.

Three level crossings on the Frankston railway line have already been removed:

- North Road, Ormond
- McKinnon Road, McKinnon
- Centre Road, Bentleigh.

In November 2015, the Victorian Government announced that work on removing a further eight Frankston line level crossings had commenced. These are:

- Charman Road and Park Road¹, Cheltenham
- Balcombe Road, Mentone
- Edithvale Road, Edithvale
- Station Street/Bondi Road, Bonbeach
- Station Street, Carrum
- Eel Race Road, Carrum²
- Seaford Road, Seaford
- Skye/Overton Road, Frankston.

¹ Park Road has since been included in the Cheltenham package of works

² Station Street, Carrum and Eel Race Road, Carrum are being considered as a single package of works

1.3 Project description

1.3.1 Project area

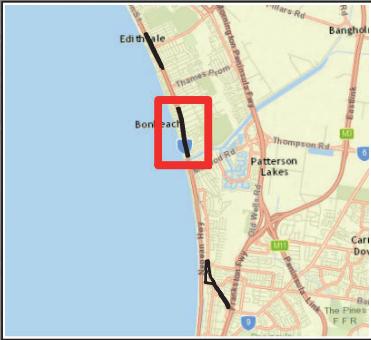
The Station Street/Bondi Road, Bonbeach level crossing removal project area (the project area) extends approximately 730 metres north from Station Street/Bondi Road to Glenola Road and approximately 900 metres south to Mascot Avenue. The project area includes the rail corridor and all of Station Street and Nepean Highway located to the east and west respectfully between Glenola Road and Mascot Avenue.

At its closest point the project area is approximately 125 metres north of Patterson River.

Pedestrian/cyclist rail crossings are located near Station Street/Bondi Road, Golden Avenue, Wellwood Road, and The Glade. Refer to Figure 1.

1.3.2 Project scope

It is proposed to remove the level crossing by lowering the Frankston railway line into a trench under Bondi Road whilst maintaining Bondi Road at the current road level. The trench would be approximately 1,100 metres in length and approximately 12 metres wide. The rail track would be approximately eight metres below ground level at its lowest point at Bonbeach Station and would include underground infrastructure (below the rail track) to collect and divert rain water from the trench. Barriers, fencing and screening would be erected along the trench to prevent access by vehicles or people. Decking above the rail trench would be required to provide for station car parking and new pedestrian bridges would be constructed to maintain pedestrian access across the railway line. A new station building would be provided with access to the below-ground platforms.



Paper Size A3

0 25 50 100
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Figure 1
BONBEACH
Project Area

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Data source: Planning Zones, Vicmap Data, DELWP, 2016. Investigation Area, LXRA, 20/06/2016. Created by:edged

2. Existing conditions

The proposed works will not occur within a defined land subject to inundation overlay (LSIO) or special building overlay (SBO) and there is no indication of surface flows crossing the rail corridor at this location. Furthermore, available topographical data indicates that the proposed works occur along a local ridge where surface flows will generally discharge away from the rail corridor.

A site layout plan with surrounding contours is provided in Appendix A.

3. Relevant legislation and policy

3.1 Relevant legislation

The proposed works will need to be designed to meet the requirements of the legislation indicated in Table 1.

Table 1 Relevant legislation

Legislation/Policy	Description
<i>Water Act 1989</i>	This is the principal Act dealing with the management of water resources in Victoria. Any works which intercept waterways design under the Act must be undertaken in accordance with the requirements of the Act. A licence is required from Melbourne Water for any works on, over or under a designated waterway or within SBO. Approval for the extraction, use or disposal of groundwater for the Project may be required under the <i>Water Act 1989</i> . It is not yet known if this would be required for the project. This would be confirmed during the detailed design phase.
<i>Environment Protection Act 1970</i>	<p>The Act regulates the discharge of emissions to surface water or groundwater by a system of licences and works approvals.</p> <p>Any discharge into a waterway or groundwater during the construction of the project must be in accordance with the requirements of the <i>Environment Protection Act 1970</i>. This requirement would be confirmed by the construction contractors.</p>
State Environment Protection Policy (Waters of Victoria) (2004)	<p>The State Environmental Protection Policy (Waters of Victoria) identifies the beneficial uses of waterways, which must be protected.</p> <p>Works undertaken for the project on or near waterways would need to be managed to protect beneficial uses of the waterway, as defined by the policy</p>

3.2 Design requirements

The following design requirements have been established for the purpose of undertaking a preliminary assessment of the level crossing removal. The design requirements will be further developed as part of the design process.

The works should be designed and constructed:

1. To prevent the underside of the ballast flooding from a 1 in 100-year Average Recurrence Interval (ARI) event (without freeboard) estimated in accordance with Australian Rainfall and Runoff (AR&R, 2016).
2. To meet the requirements stated in the Metro Trains Melbourne drainage guidelines (Metro, 2016).
3. To meet the flooding requirements of the relevant drainage authorities (typically Melbourne Water and the City of Kingston).
4. In accordance with the requirements of the relevant road authority and the relevant drainage authorities.
5. Such that the potential for flooding of any other property is not increased by the project (initial focus on the 100-year ARI event and other events may be considered subject to further direction).
6. To limit the impact of the works on major drainage and overland water flows to the satisfaction of the relevant drainage authority(s). This will typically require assessment of changes (afflux) in velocity, depth, erosion, duration of inundation.

In addition to the above, the following further requirements will be generally adopted:

1. Drainage siphons should only be used where it is considered that no other practical solution is available and then only with the approval of the eventual asset owner.
2. A blockage allowance should be provided for new cross drainage structures, which are not replacing existing structures. The approach should follow the advanced draft blockage guidelines that have been prepared by Australian Rainfall and Runoff on hydraulic structures and which are currently published and subject to industry feedback. These guidelines follow a site specific risk based approach for determining an appropriate assessment of issues to estimate system performance.
3. For all other structures not covered in item 2, for example existing cross drainage, an initial qualitative assessment should be undertaken to consider whether the proposed works would detrimentally affect flood risk in a blockage scenario (e.g. the proposed works fill in a flow path that would otherwise have conveyed flow if an existing culvert is blocked). Based on that initial assessment a decision should be made on whether a blockage assessment as outlined in item 2 should be undertaken.
4. Melbourne Water's waterway crossing guidelines should be referred to in the first instance for guidance on bridge and waterway freeboard.
5. Melbourne Water's velocity depth safety criteria (Melbourne Water, 2007) should be achieved where new overland flow paths are created. This criterion will generally not be relevant where the design is required to match existing conditions.
6. Design flood flows should be based on the standard impervious fractions used for planning schemes. Increases to the standard impervious fractions from potential infill redevelopment and the effect that this has on the standard of flood protection for the railway / road assets and other properties should not be considered at present.
7. Works must be designed and constructed such that the potential for flooding of any other property is not increased by the works for greater than the 100-year ARI event. This should be initially investigated through considering the effect that an arbitrary increase (20 percent adopted) in flood flows has on flood risk. In addition, consideration should also be given to whether flood risk will be affected for smaller flood flows (ARIs less than 100 years). Subject to the outcomes of those assessments, further investigation may be required.
8. Where relevant, the effects of sea level rise from climate change should be included within the design case. This should consider a rise in sea level of 0.8 metres, which is the expected increase in Port Phillip Bay sea levels resulting from climate change by 2100 (Melbourne Water, 2012).
9. Continued increases in global greenhouse gas emissions are projected to lead to increases in the frequency and intensity of extreme weather events and their associated risks to assets and the communities they support (Arblaster *et al.*, 2015). Climate change is also projected to lead to longer term changes in climate including higher average temperatures and sea level rise (Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Bureau of Meteorology (BoM), 2015), which in turn could affect future flood risk at the site (see design requirements).

The potential increase in rainfall intensities from climate change and the effect that this has on the standard of flood protection for the railway/road assets and other properties should be included for all cross-drainage. A 32 percent increase in rainfall intensity should be modelled for the climate change scenario, as has been adopted in the past by the Melbourne Water floodplain mapping. This may be revised in future by Melbourne Water. The 32 percent comes from:

- a. Design rainfall intensities should be factored up by 5 percent per degree increase in temperature (as per Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report)
- b. Maximum predicted increase in temperature by 2099 is 6.4 degrees Celsius and therefore rainfall intensities should be increased by 32 percent. The above temperature increase of 6.4 degrees Celsius represents the upper limit of the likely range for the A1FI scenario (largest temperature increase of the emission scenarios considered in IPCC Fourth Assessment Report).

4. Preliminary impact assessment

The following impact assessment primarily considers the impact of the project on surrounding floodplains or the potential to impede overland flow. Track drainage requirements will be addressed during the design phase.

Due to the characteristics of the site, in particular the elevated ridge of the existing rail corridor, it is considered that the project will not have a significant effect on cross flows and consequently flood risk within the surrounding area.

Barriers will be constructed along the edge of the trench to prevent access by vehicles and people.

Melbourne Water drainage infrastructure will not be impacted. Based on the information available for this assessment, it is not expected that other local pipe drainage networks will be impacted by the cutting. This will need to be confirmed during later stages of design. Smaller local drainage networks may need to be diverted around the cutting trench if necessary.

No impact to Patterson River is expected.

5. Management and mitigation

Given that the proposed works will not impede or impact overland flow paths or existing flood areas no further mitigation is required as a result of the project.

6. Conclusion

Based on the above findings, cross drainage is not be a significant factor.

As the design progresses, management of the local drainage network and catchments should generally be incorporated into the design and further analysis of major overland flow paths should not be required.

7. References

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Appendices

Appendix A – Site Plan

Data source: Data Custodian, Data Set Name/Title, Version/Date, Created by/edged Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NRS, NRCAN, GeBCo, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox India, © OpenStreetMap contributors, and the GIS User Community



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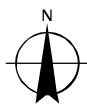
- Rail station
- Project Area
- Council Stormwater Pipes
- Land Subject to Inundation
- Special Building Overlay
- Major Contour 5m
- Minor Contour 1m

Paper Size A4

0 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



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JOINT VENTURE

Bonbeach Project Area
Planning Overlays

Appendix A

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