

THE BENEFITS OF ELEVATED RAIL

CASE STUDY ONE: THE UPFIELD LINE

Lessons from the graduate design
research studio 'RailUP!' 2015



msd

Melbourne
School of Design





WELCOME

PREFACE

This design studio is part of our on-going investigations of public transport futures for Melbourne.

Since 2005, we have worked with many students and colleagues at the University of Melbourne and RMIT University to incorporate understanding of the technical and operational requirements for effective public transport networks into contemporary architectural and urban design processes. Much of this work has been supported by a large cohort of industry partners in state and local government, and the private sector. Its directions have been set though research made possible through Australian Research Council grants.

In 2012, we turned our attention to the experiences of passengers in and around stations. We wanted to know how station design could best contribute to greater public transport use by encouraging pedestrians and cyclists, improving bus-train interchanges, and by integrating and creating space for socially useful urban development.

The 'Transit for All' project was supported by the University of Melbourne's Carlton Connect Initiative Fund and 15 industry partners. From this project, student designs for new stations across the Melbourne suburban rail

network were used to stimulate critical debate among the networks of public and private sector professionals responsible for much of Melbourne's recent work on new stations and level-crossing removals.

We began that project with an agnostic position on the relative merits of rail-under or rail-over options for level-crossing removals. However, after reviewing the work produced over three iterations of our design-research process, it became clear that elevated rail had some distinct advantages over the typical 'trenched-rail' designs being constructed around Melbourne.

In 2015, we sought to continue this independent design research. We sought to examine the potential effects of elevated rail in two very different rail corridors in Melbourne, and approached the Level Crossing Removal Authority for support for our work. In the next stage of this research, we wanted to test the proposition that elevated rail has significant benefits. We have done this in several ways. Firstly, we investigated the legacy of historic grade separations in Melbourne, which has included many lines elevated on embankments, lowered in trenches, or crossed by road over and under-passes (Woodcock & Stone 2016, The Benefits of Level Crossing Removals). Secondly, we ran another design research studio.

The students who participated in this intensive 12-week studio undertook a complex analysis of the context for level crossing removals along the Upfield corridor (Case Study One) before producing a series of design proposals. Key elements of these analyses and design propositions are included in this booklet.; analysis and propositions for the southern part of the Frankston Line are Case Study Two, a separate booklet.

As part of this work, we have brought masters students from the Melbourne School of Design into direct contact with the industry professionals who are shaping the delivery of the government's program of level-crossing removals. This booklet outlines the designs and the analytic thinking behind them that were produced by the students through 12 weeks of intense effort. We thank them for the enthusiasm and skill that they brought to the task. We also thank the many professionals who contributed to the process.

We present this work as a contribution to the public debate on level-crossing removals and more widely, on the re-vitalisation of Melbourne's public transport.

Ian Woodcock
John Stone

The Benefits of Elevated Rail. Case Study ONE: The Upfield Line

Lessons from MSD Studio RailUP! July-October 2015

Studio leaders:

Ian Woodcock (RMIT University)
Dr. John Stone (University of Melbourne)

MSD M.Arch Design Studio Program Coordination:

Professor Donald Bates
Dr. Hing-Wah Chau

Graphic design: Nicola Inskip

Acknowledgements:

Upfield team:

Vincenzo Armenia
Amirah Aziz
Leyla Beiglari
Xinye Feng
Kenneth Jimbo
Justine Lenkiewicz
Ye Yang
Group overview: Kenneth Jimbo

Technical background & briefings / advice:

Station precinct design: John O'Connell (PTV)
Station design: Neville Boon (PTV)
Viaduct design: Damian Collopy (VicRoads - Urban Design)
Viaduct design benchmarking: Chris Lamborn (Hassell)
Railway engineering: John Hearsch
Rail alignments and timetabling: David Stosser

Urban design critique:

Shelley Penn
Lorrae Wild (VicRoads / Victorian Design Review Panel)
Saraid Mitten (VicTrack)
Jim Dolkas (VicTrack)
Andrew Ferrington (State Devt. & Business Innovation)
Craig Gillette (DELWP)
Simon Wollan (MGS Architects)
Neil Stonell (Grimshaw)
David Cook (Caldis Cook Group)
Matt Drysdale (Caldis Cook Group / Deakin U)
Neil Hutchinson (DEDJTR)
Mat Bonomi (Kingston City Council - urban design)
Aidan Mullen (Kingston City Council - urban design)
Aditya Andley (Moreland City Council - urban design)

Cover images: Nicola Inskip

Copyright: 2016
ISBN: 978 0 7340 5285 8



msd

**Melbourne
School of Design**



CONTENTS

Page_ 03	PREFACE
07	INTRODUCTION
07	METHOD
09	CASE STUDY: UPFIELD CORRIDOR
21	THE BENEFITS
23	Amenity
29	Connectivity + Accessibility
33	Disruptiveness + Safety
37	Economic Development
41	Future Proofing
45	PROPOSALS
71	CONCLUSION
72	REFERENCES



INTRODUCTION

Building on the process and outcomes of previous Transit for All studios (2013-14), an architectural design studio was offered to masters students through the Melbourne School of Design at the University of Melbourne in Semester 2, 2015. It set out to explore the potential of elevated rail as a method for level-crossing removal in several Melbourne rail corridors.

Previous research (eg. Woodcock, 2016; Woodcock & Stone, 2015; Woodcock & Wollan 2013) had shown that, in principle, elevated rail offered considerable advantages to local communities as well as rail operations compared to typical 'trenched' designs being built in Melbourne. This studio aimed to investigate the validity of this proposition in specific locations: the Upfield and Frankston rail corridors.

Space under elevated viaduct, Vincenzo Armenia 2015.



LEFT: Path under viaduct near Upfield - Leyla Beiglari

We did not confine our attention to the fifty level crossings identified by the Victorian Government for removal, but rather addressed level crossings as part of a larger, interconnected system along Melbourne's train network, which includes the roads, pedestrian and cycle paths and public open spaces in adjacent communities.

This document presents the outcomes of our investigations of the Upfield Line north of Flemington Bridge. The studio produced a series of proposals which each address the following criteria: amenity, connectivity, accessibility, disruptiveness, safety, economic development and future proofing. These benefits are outlined here, alongside an overview of an elevated rail proposal along the Upfield line.

Method

The studio used design-research to explore options for elevated rail along the Upfield line. We analysed existing conditions along the corridor, along with local and international precedents. Key institutional stakeholders including PTV, VicTrack, VicRoads and DEDJTR, and numerous planning, design and construction experts, provided valuable background information.

Our analysis was integrated into a series of design studies to test the potentials of various viaduct and station design possibilities in their local context. These studies explored the effects of different viaduct heights, means of approach, circulation, as well as place-making strategies.

The design proposals addressed a series of essential criteria covering amenity, connectivity, accessibility, disruptiveness, safety, economic development and future proofing. These criteria are explained in detail on p.21.

The main body of this booklet presents the most successful proposals produced in the studio under each category. We also provide an overview of design proposals for elevated rail at each station from Royal Park to Upfield, including a new station at Campbellfield.

CASE STUDY 01: UPFIELD CORRIDOR

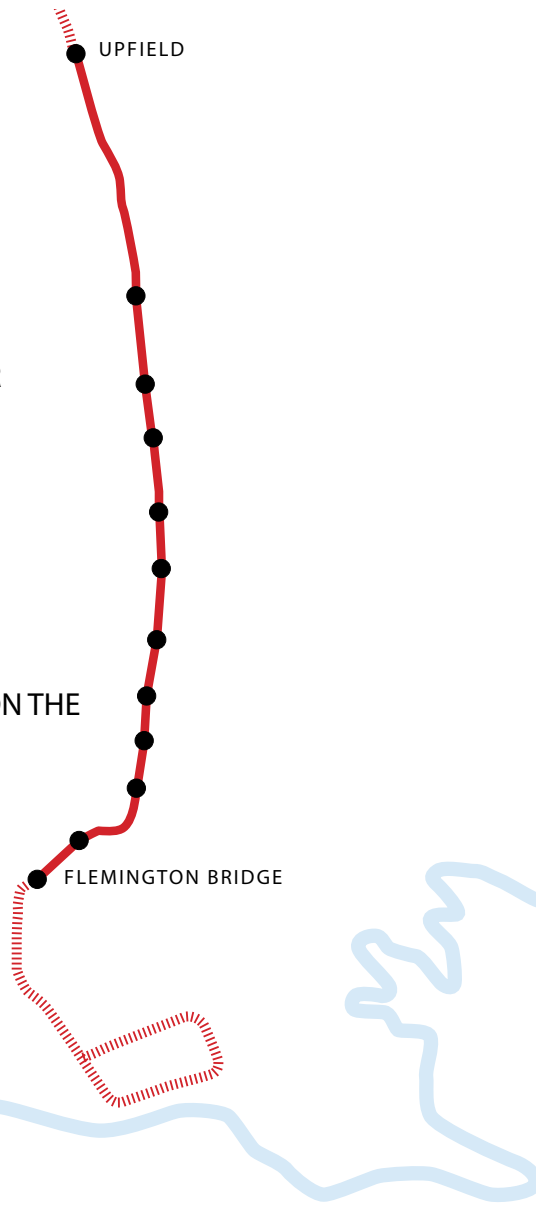
PTV Network Development
Plan 2012:



12 TRAINS PER HOUR



2ND LEAST BUSIEST LINE ON THE
NETWORK



LEFT: Path under viaduct - Leyla Beiglari

Of the 21 level crossings between Flemington Bridge and Upfield, only 3 are earmarked for removal. This leaves an additional 18 level crossings which will either remain at grade, or wait patiently to be removed - along with the numerous other non-mandated level crossings across the Melbourne train network.

11 bus routes currently cross the Upfield Line, and there is potential to add much-needed east-west connectivity to enhance network performance. An elevated rail approach offers the opportunity to remove large numbers of level crossings in a way that maximises urban design benefits and sustainable transport outcomes, while minimizing disruption resulting from multiple series of one-off, narrowly-scoped projects.

On the Upfield line, the removal of additional crossings is particularly prudent as many are very close together. The removal of some crossings in isolation will make it difficult to remove others in the future. This is particularly evident in the southern part of the line where there is the highest concentration of level crossings. In their current arrangement, the tracks act as a barrier impeding accessibility to services and amenities on either side of the tracks. This is due to the limited number of safe crossing points for cars and pedestrians along the length of the line. Though popular, the Upfield Bike Path is narrow and dangerous, its width constrained by the tracks.

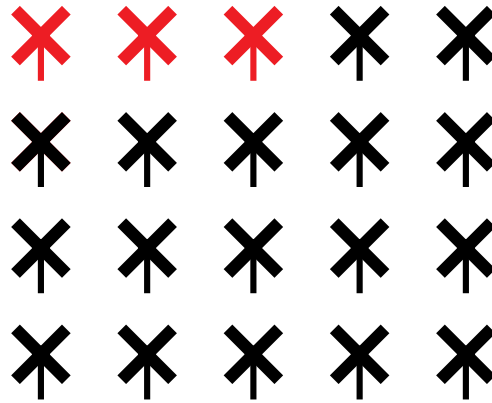
Elevating the tracks creates the opportunity to completely reconceive the relationship between these communities and the amenities within them. New space is opened up to allow commuter cyclists to share with recreational riders, joggers and strollers. In addition, elevated rail creates a new source amenity with a linear park connecting Royal Park to Upfield, a much-needed open space connection for Melbourne's intensifying inner north. Also, as part of this project, we proposed a new station at Campbellfield which we argue should be included in the scope of any crossing removals here.

EXISTING CROSSINGS

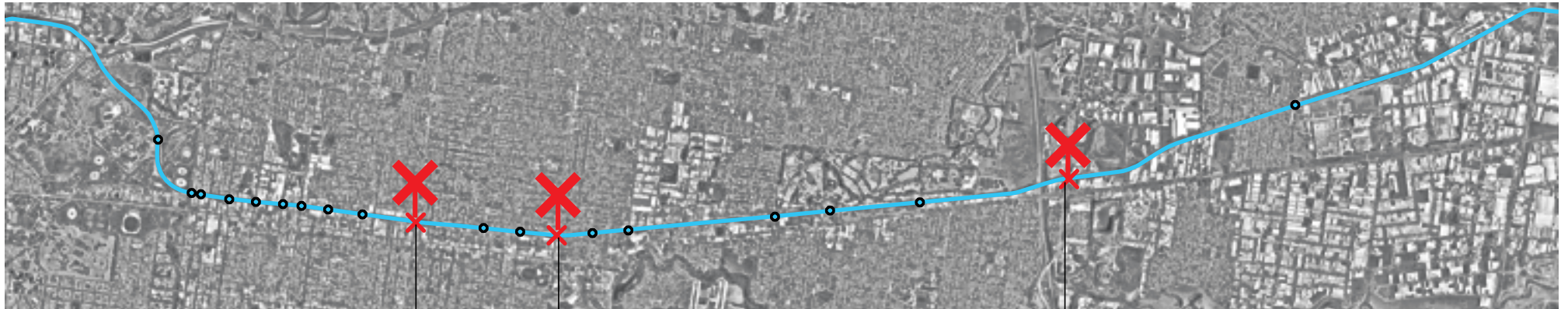
LEVEL CROSSINGS
MOORABBIN - FRANKSTON

POPLAR ROAD
PARK STREET
BRUNSWICK ROAD
UNION STREET
DAWSON STREET
ALBERT STREET
VICTORIA STREET
HOPE STREET
ALBION STREET
MORELAND ROAD

REYNARD STREET
MUNRO STREET
BELL STREET
O'HEA STREET
GAFFNEY STREET
BAKERS ROAD
BOUNDARY ROAD
BOX FOREST ROAD
CAMP ROAD
BARRY ROAD



20 LEVEL CROSSINGS TOTAL
3 MANDATED



MORELAND ROAD

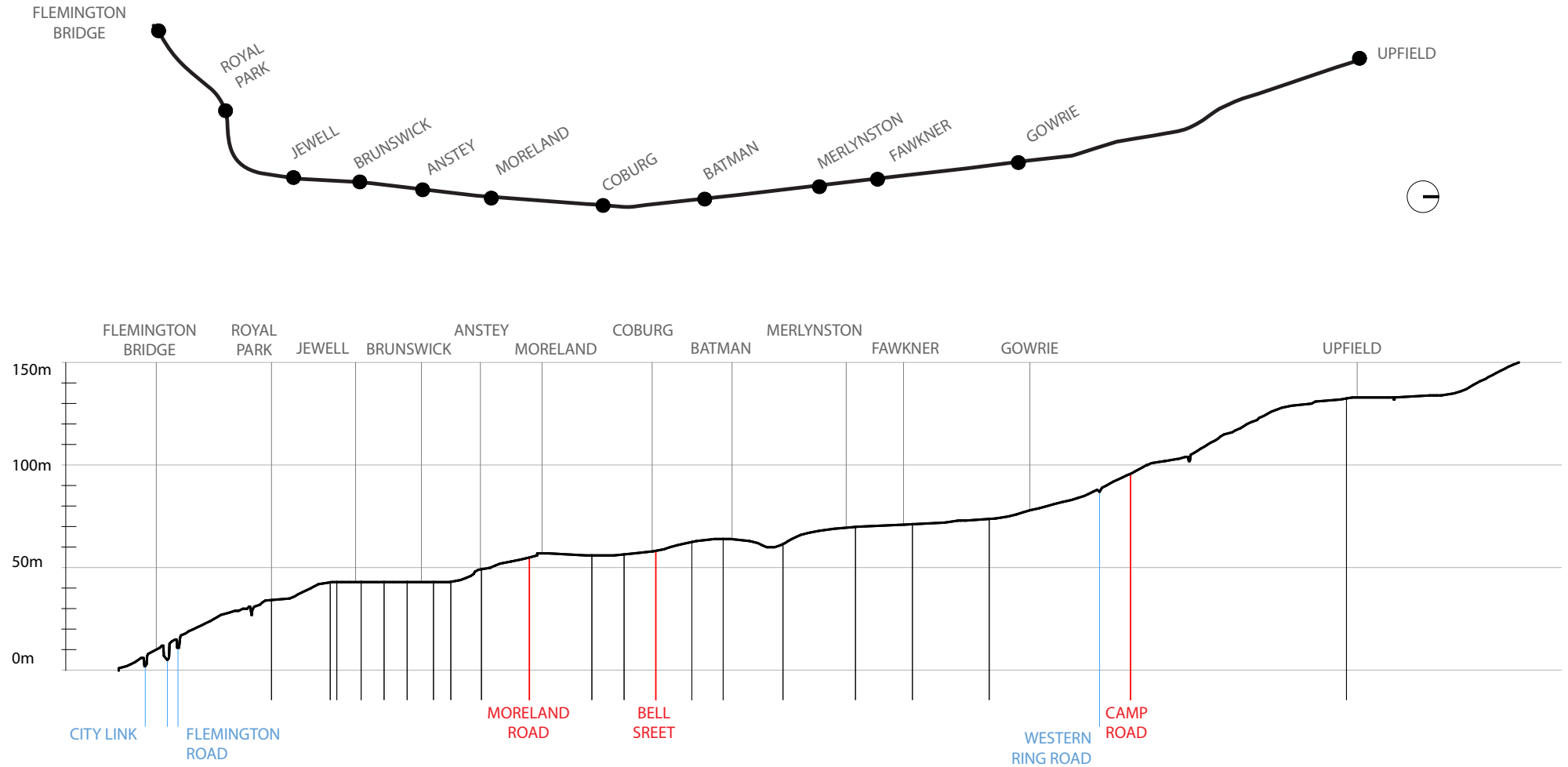


BELL SREET



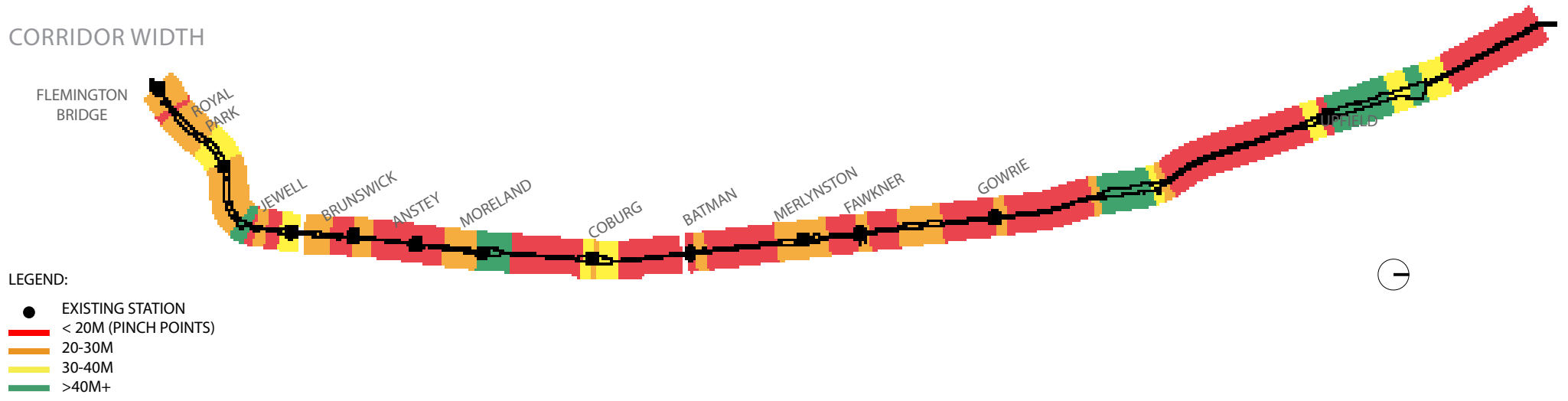
CAMP ROAD

EXISTING ALIGNMENT

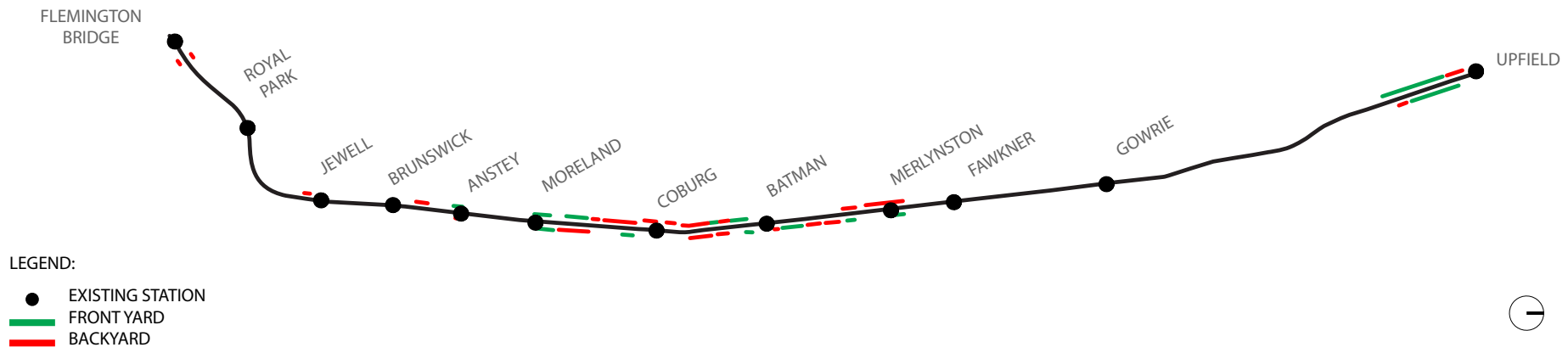


ALIGNMENT ANALYSIS

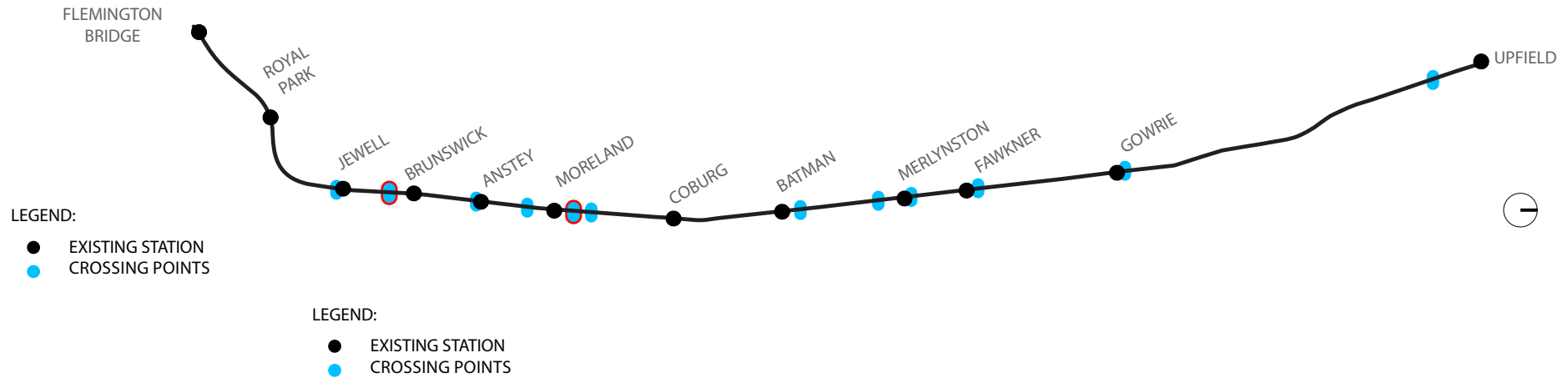
CORRIDOR WIDTH



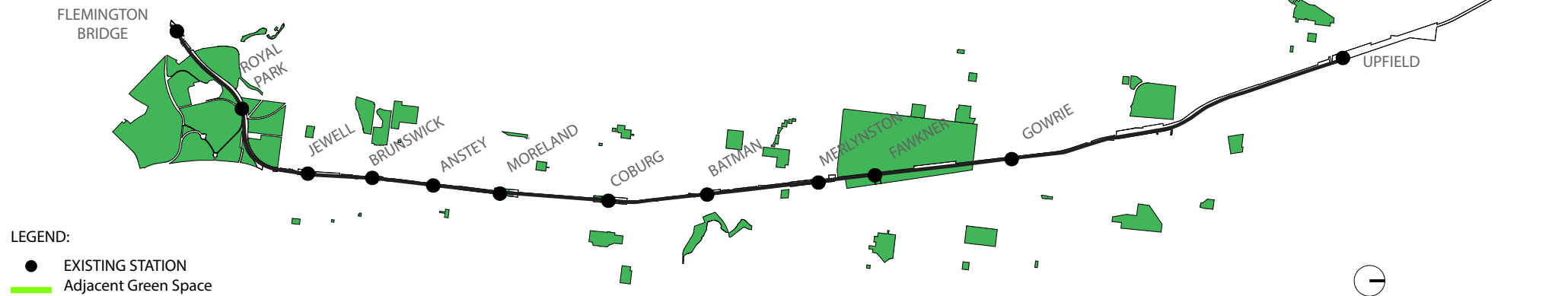
VISUALLY SENSITIVE AREAS



PEDESTRIAN CROSSINGS

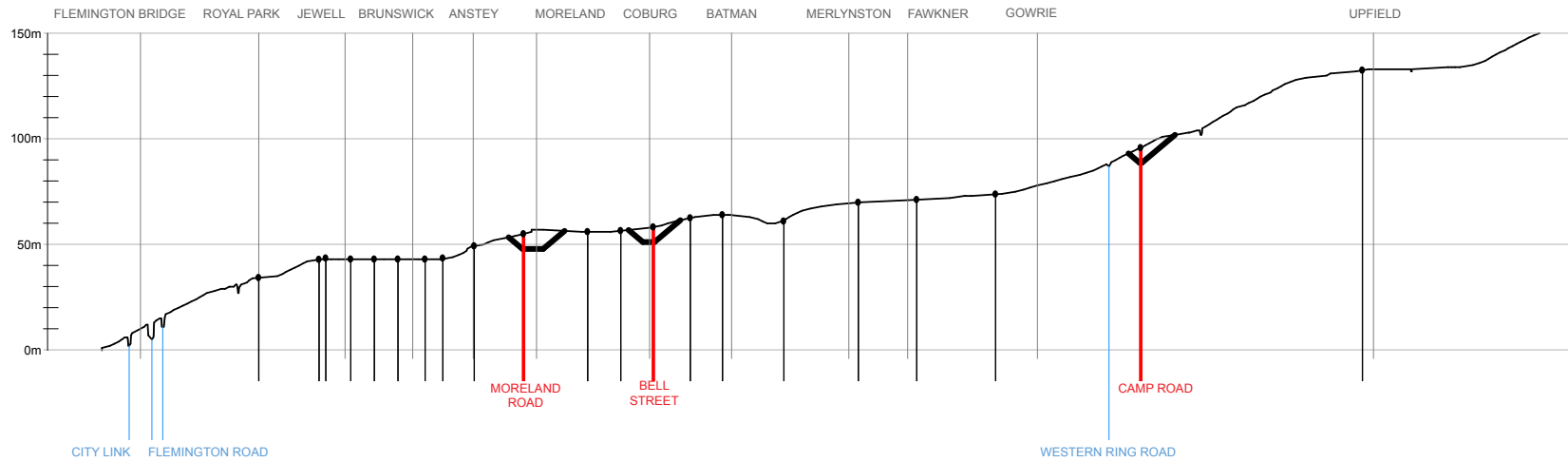


GREEN SPACE

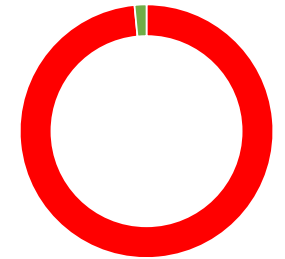


PROPOSED ALIGNMENTS - TRENCH 3 MANDATED ONLY

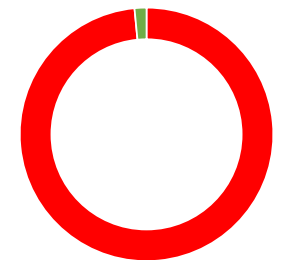
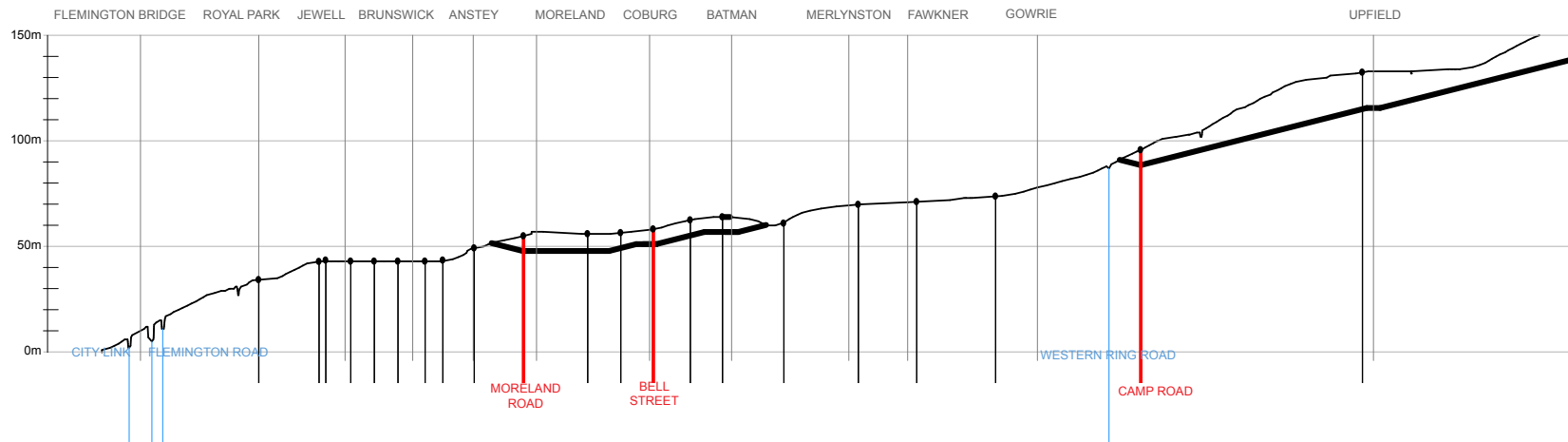
TRENCH OPTION 1 - MANDATED CROSSINGS 1:30 GRADIENT



CONNECTIVITY



TRENCH OPTION 2 - MANDATED CROSSINGS 1:100 GRADIENT

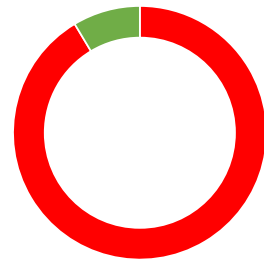


PROPOSED ALIGNMENTS - ELEVATE 3 MANDATED ONLY

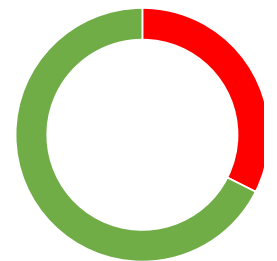
ELEVATED OPTION 1 - MANDATED CROSSINGS 1:30 GRADIENT



CONNECTIVITY

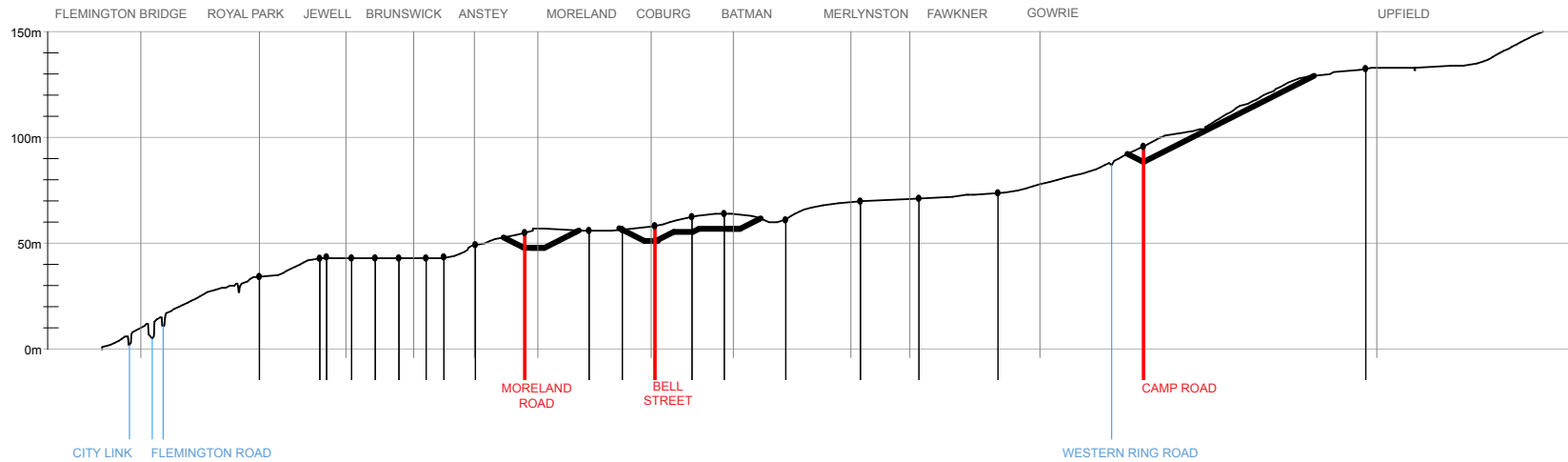


ELEVATED OPTION 2 - MANDATED CROSSINGS 1:100 GRADIENT

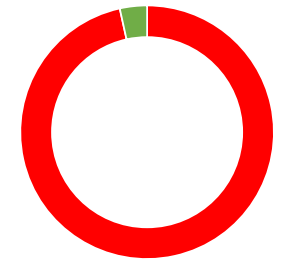


PROPOSED ALIGNMENTS - TRENCH 3 MANDATED ONLY

TRENCH OPTION 3 - MANDATED CROSSINGS 1:50 GRADIENT

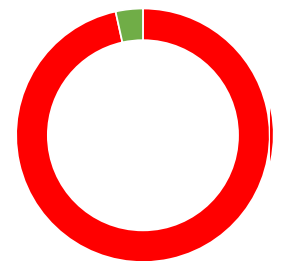
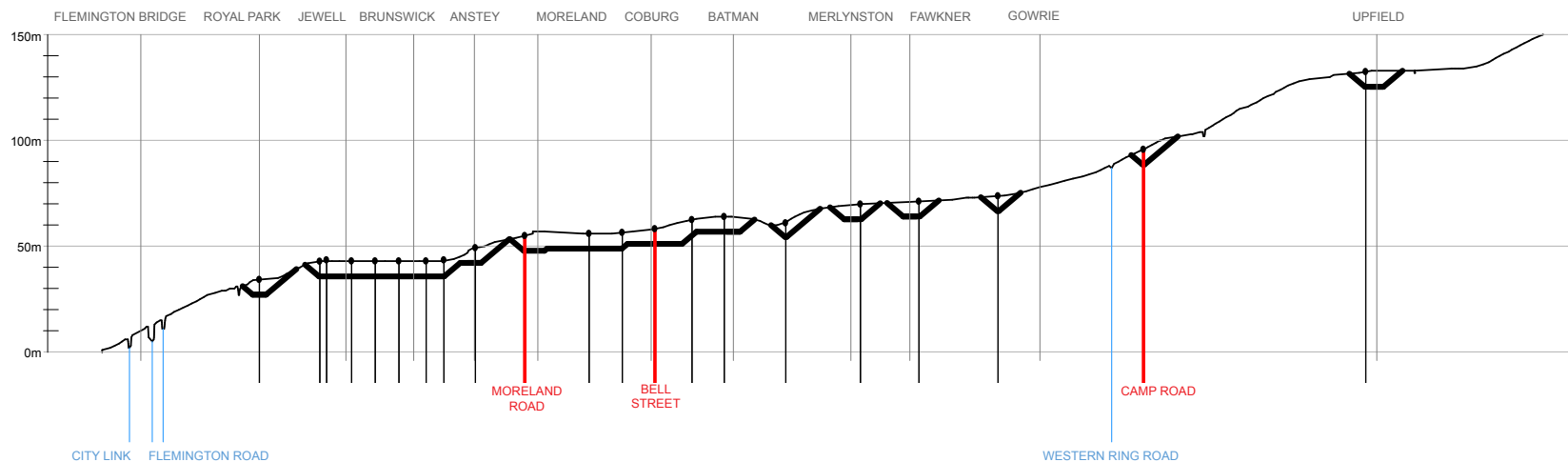


CONNECTIVITY



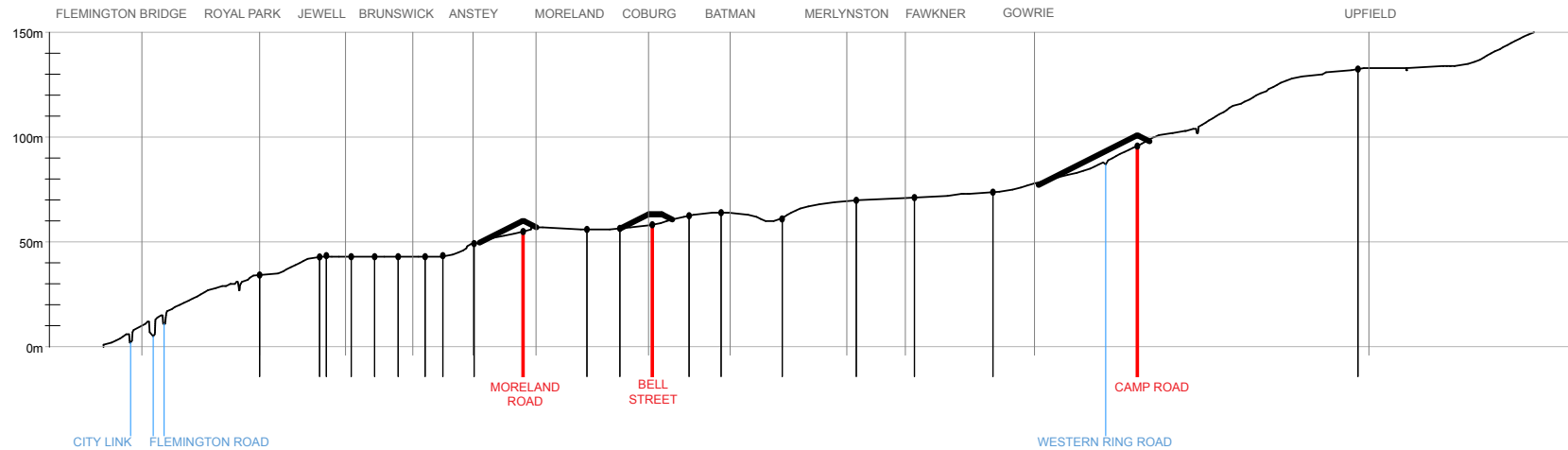
PROPOSED ALIGNMENTS - ALL 21 TRENCH

TRENCH OPTION 4 - ALL TRENCH 1:30 GRADIENT

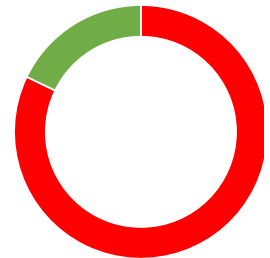


PROPOSED ALIGNMENTS - ELEVATE 3 MANDATED ONLY

ELEVATED OPTION 3 - MANDATED CROSSINGS 1:50 GRADIENT

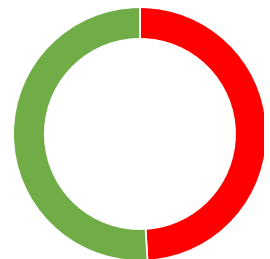


CONNECTIVITY



PROPOSED ALIGNMENTS - ALL 21 ELEVATED

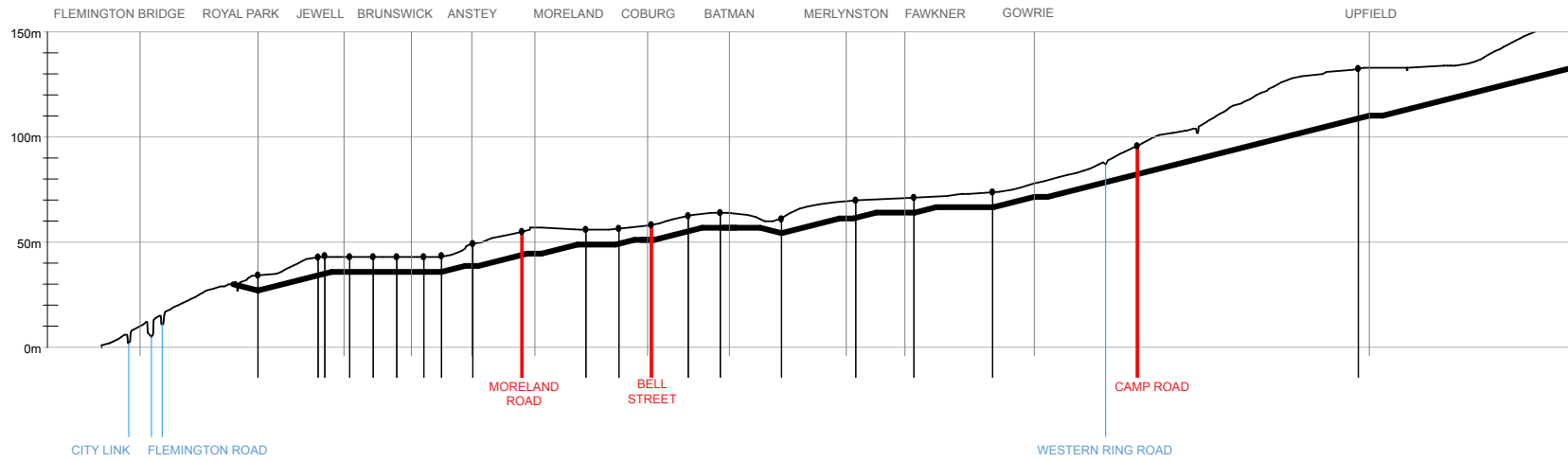
ELEVATED OPTION 4 - ALL ELEVATED 1:30 GRADIENT



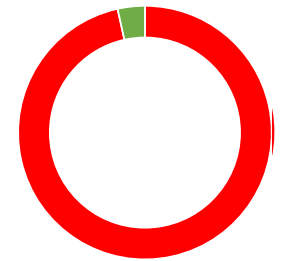
PROPOSED ALIGNMENTS - ALL 21 TRENCH

TRENCH OPTION 1 - MANDATED ONLY 1:50

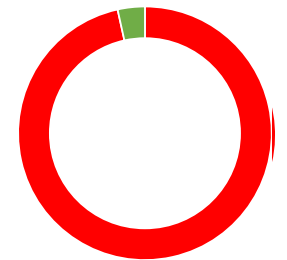
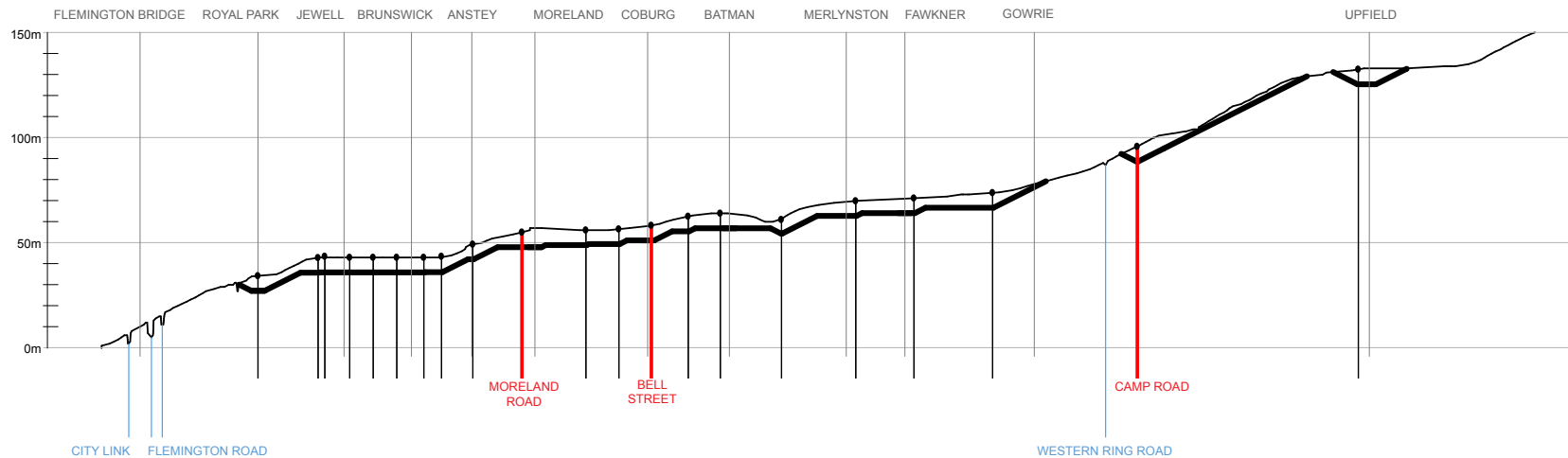
TRENCH OPTION 5 - ALL TRENCH 1:100 GRADIENT



CONNECTIVITY



TRENCH OPTION 6 - ALL TRENCH 1:50 GRADIENT



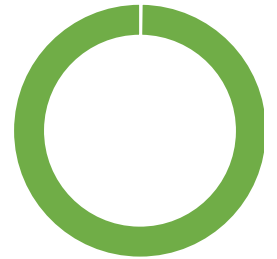
PROPOSED ALIGNMENTS - ALL 21 ELEVATED

ELEVATED OPTION 1 - MANDATED ONLY 1:50

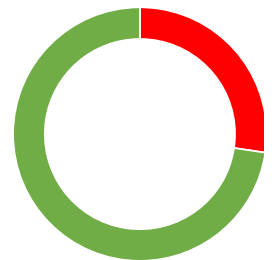
ELEVATED OPTION 5 - ALL ELEVATED 1:100 GRADIENT



CONNECTIVITY



ELEVATED OPTION 6 - ALL ELEVATED 1:50 GRADIENT





THE BENEFITS

Each benefit addresses a number of questions:

01 Amenity

- How easily can new public space be created under and around elevated structure?
- Can it be activated for community and recreational uses, both passive and active?
- How does the elevated structure itself contribute to the character of the local community?

02 Connectivity + Accessibility

- How does the elevated rail impact ground level connectivity after the grade separation?
- How easily can the new space integrate nearby land uses?
- How accessible are the stations themselves
- How well does the design facilitate and encourage inter-modal transfer?
- How direct are the paths between trains, buses and trams?

03 Disruptiveness + Safety

- How much disruption would the design cause during construction: to rail services, private and commercial traffic? Construction dirt and noise?
- How can noise and overlooking be minimised?
- How safe are the spaces created for all users?
- What levels of safety can they provide for pedestrians, cyclists, public transport users and those with mobility issues in particular?
- How much disruption would be caused to major services, utilities, drainage, high water tables, and other difficult ground conditions?

04 Economic Development

- Can land uses such as retailing, hospitality, commercial and other land uses, including community uses that provide employment and contribute to local economic activity and social capital be developed and integrated?
- How feasible would these types of land use be in the short, medium and longer term?

05 Future Proofing

- How well does the design allow for future change? For example: changes in land use, expansion of transfer facilities, upgrades to improve amenity, weather protection, wayfinding?
- To what extent can negative impacts of the design be ameliorated, minimised, remediated?



PARK ST
HOSPITAL →
← ROYAL PARADE

Park Street, Brunswick, looking south to Royal Park - Nicola Inskip

01 AMENITY

Elevated rail creates the opportunity to develop parks and gardens for public use on what is currently underutilised land. These spaces can be active spaces which facilitate specific events and activities, or passive open spaces which can contribute to the local environment.

The viaduct structure itself can contribute to place making and add to the character and identity of the local built environment. This is particularly useful within activity centres where level crossing sites can be transformed into gateways and community markers. Stations are more prominent and public transport has greater visibility, making wayfinding easier and simpler.

Starting the elevated railway at Royal Park links it to the suburbs to the north where new open space is greatly needed and difficult to create.



LEFT: New station at Springvale,

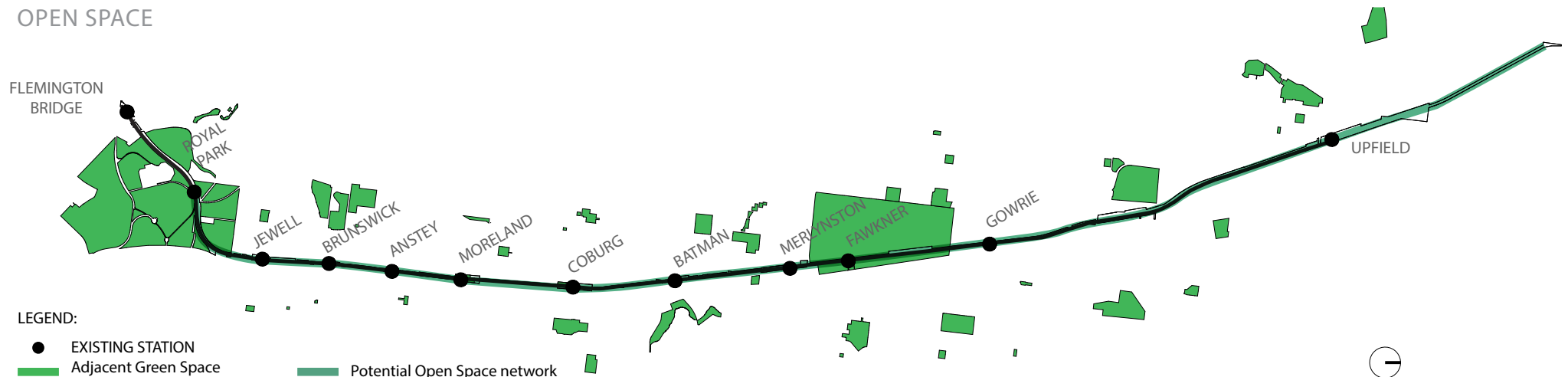


RIGHT: View from platform at Camp Rd - Vincenzo Armenia

Passenger experience is an important consideration. Elevated photography taken along the Upfield line reveals that views of the city skyline and to distant mountain ranges are possible from an elevated vantage point above existing station locations.

If the space beneath the elevated rail structure is converted into public open space, 9-14 km or between 14-15 hectares of new open space could be reclaimed, dramatically contributing to open space strategies outlined by local government.

OPEN SPACE



01 AMENITY

The Structure

It's possible to construct and finish the elevated structure in a variety of materials. Examples explored in the studio included concrete, brick, steel and timber- as well as varying colours, textures and patterns.

For elevated rail in extended corridors, materials and treatments could change along the length of the viaduct, responsive to local character.



Concrete, Brick, steel and plants - Leyla Beiglari.



Textured Concrete- Victor Eric Goh.



Formed concrete - Edward Grutzner.



Concrete, brick and applied details - Nicola Inskip



Concrete- Vincenzo Armenia



Concrete, timber- Amirah Aziz

The Space Below

Elevating the train line 'creates' space below by reclaiming the former railway reserve. This new public space can be repurposed in many ways, depending on adjacent contexts in terms of land use, built form and demographic composition. Building beneath the viaduct is possible also.

Parks, community gardens, bike paths, market spaces, nature reserves, playgrounds and sports grounds are some of the options.



Market- Chee Heng



Community garden- Hamish Collins



Water catchment- Nicola Inskip



Basketball court- Chee Heng



Bike and pedestrian paths- Joshua Stellini



Playground- Xinye Feng



BEFORE



AFTER

ABOVE: Existing line converted to bike path - Xinye Feng.

BELOW: Elevated rail reconnecting neighbourhood - Vincenzo Armenia.



BEFORE



AFTER



BEFORE



AFTER

ABOVE: Gandolfo Gardens connected and extended at Moreland - Nicola Inskip

BELOW: Jewell Station with proposed community garden (and new development beyond).



BEFORE



AFTER



JEWELL STATION



 **RMIT**
UNIVERSITY



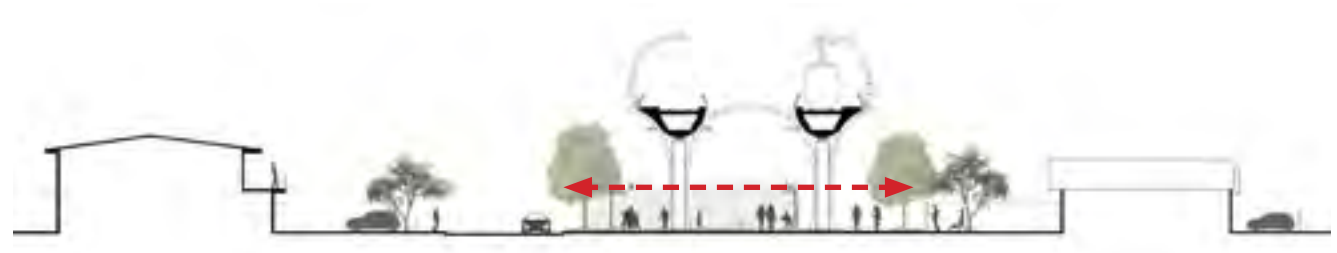
02 CONNECTIVITY + ACCESSIBILITY

Removing level crossings with an elevated structure will relieve congested roads around level crossings as well as create an opportunity to consider new connections for as desired.

Connectivity for walkers and cyclists will be greatly enhanced. Opportunities to safely cross or walk along the corridor will be possible anywhere along the unobstructed ground plane. Elevated rail will benefit the community far beyond the immediate context of the current crossing sites.

This enhanced connectivity will also improve access to the stations, increasing rail patronage, further reducing road congestion.

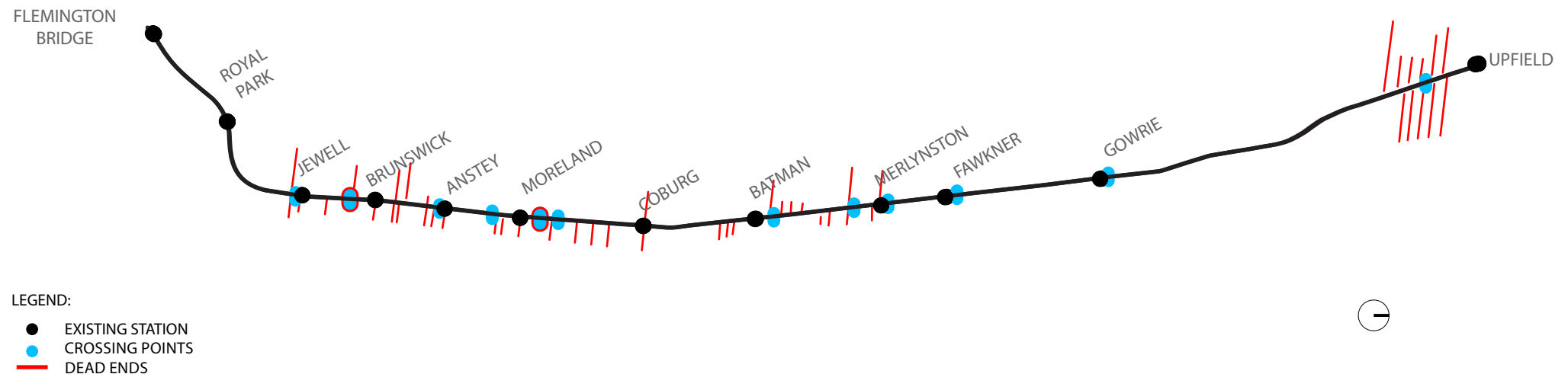
Access to station platforms, especially for members of the public who have mobility issues, is aided by the inclusion of elevators and escalators in the designs, ensuring equitable access for all.



ABOVE: Ground level connectivity under viaduct- Victor Eric Goh

FACING PAGE: new public spaces beneath the viaduct between Jewell and Brunswick stations - Nicola Inskip

EXISTING PEDESTRIAN CROSSINGS AND DEAD ENDS





TOP & MIDDLE: Shared path and linear park below viaduct, south of Upfield - Leyla Beiglari

Bottom: Barkly St Brunswick reconnected - Justine Lenkiewicz

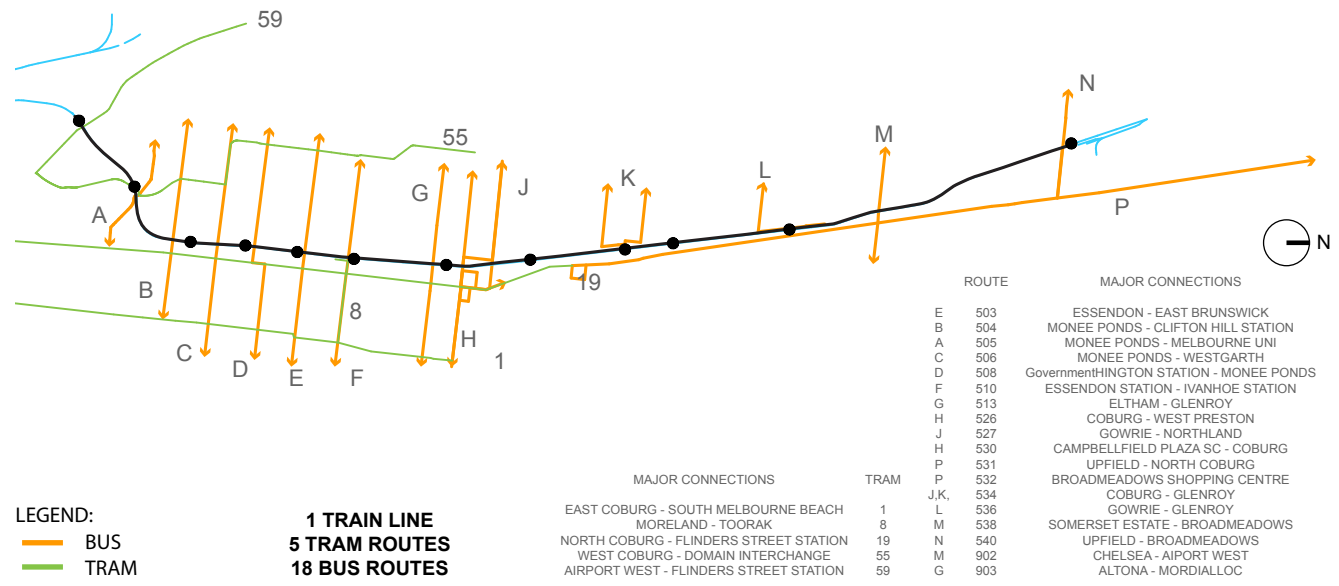
Intermodal Transfers

Removing level crossings creates opportunities for improving transfers between trains and other modes of transport. Elevated rail creates more flexibility in the long run for better transfer facilities. The space reclaimed on public land allows maximum flexibility for designing transfer arrangements. Trenched solutions are less flexible because of the expense of decking over them.

More direct access between trains, buses and trams can be created. For example, bus stops can be created where level crossings once existed or directly below station platforms instead of being located on side streets or inconvenient distances from the station. Careful design can allow access between rail and road-based public transport that minimises the need to cross roads.

Good transfers strengthen the entire public transport network. Improving bus and cycling access to rail stations will reduce the need for parking on land that is better used for retail, commercial, community or residential purposes.

Public transport along the Upfield Line



Bus / rail interchange at Jewell on Brunswick Rd - Nicola Inskip



Bus / Rail interchange at new Campbellfield Station on Camp Rd - Vincenzo Armenia



Path under viaduct, Cambellfield - Vincenzo Arminia

03 DISRUPTIVENESS + SAFETY

A continuous elevated structure can minimise disruption caused both during and after construction. The viaduct can be constructed alongside or above an operational railway, minimising the need to shut down the railway. The process is also far less destructive and doesn't require the heavy earthmoving equipment used in trench scenarios.

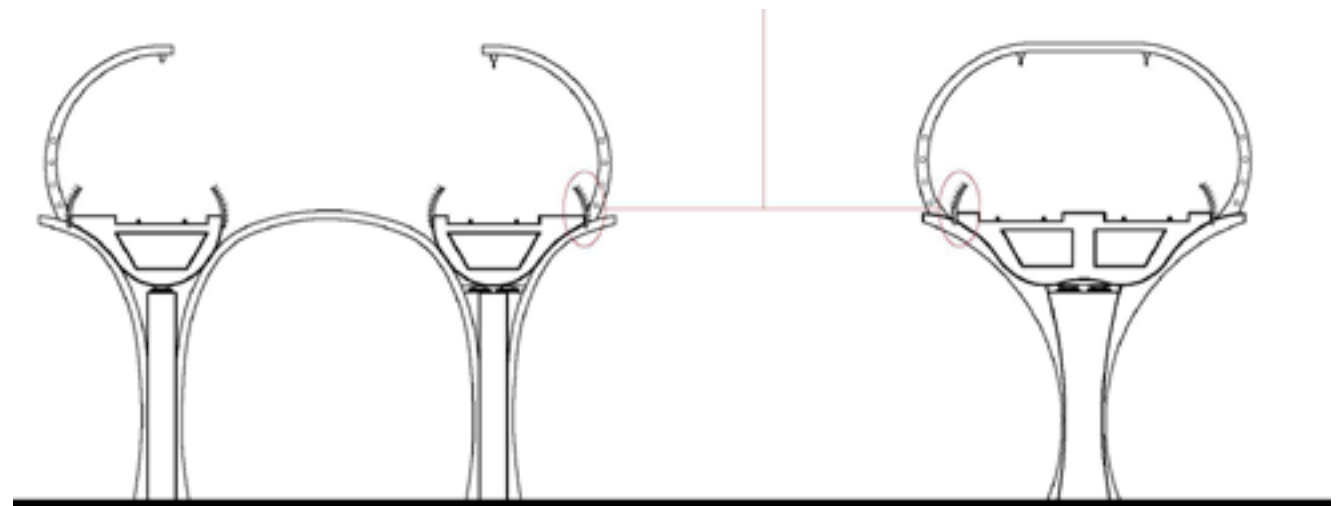
Most of Melbourne's railways are very old and new railway tracks will be much quieter. Once the viaduct is complete, disturbance from the railway, such as noise, lightspill and overlooking, can be mitigated through the use of screens and barriers. The increased safety due to crossing removal will encourage greater usage of the new spaces, increasing passive surveillance under the viaduct.

These benefits are particularly important along the southern section of the Upfield Line, where the corridor is often narrow (<20m) and bordered mainly by the backs of underutilised industrial premises. Elevating the line with turn these many kilometres of backs into frontages with direct access to high-quality public open space, increasing their development potential, with more active frontages.



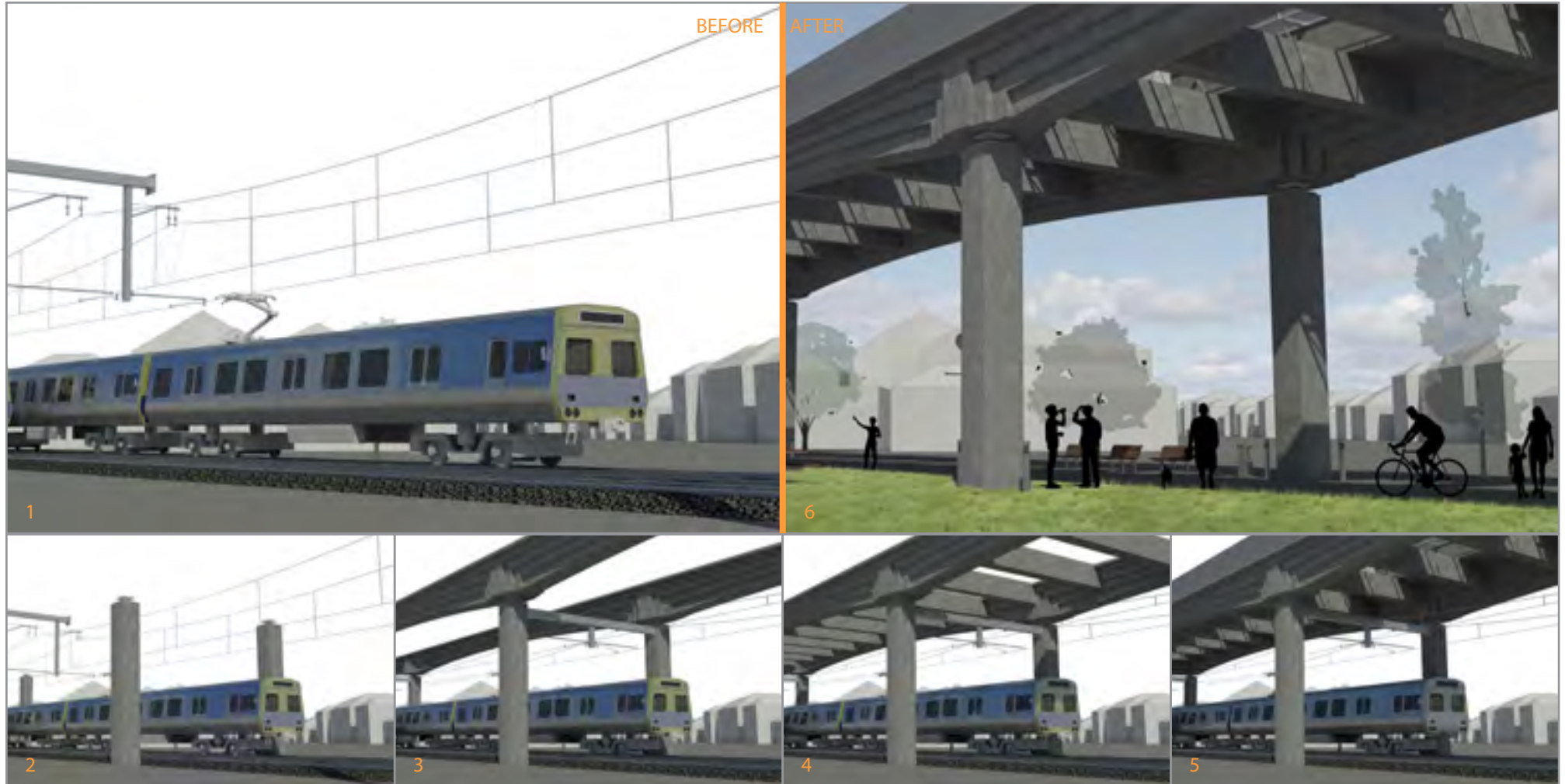
ABOVE: Visual barrier example, before and after- Nicola Inskip.

BELOW: Viaduct Section and sound barrier detail- Victor Eric Goh.



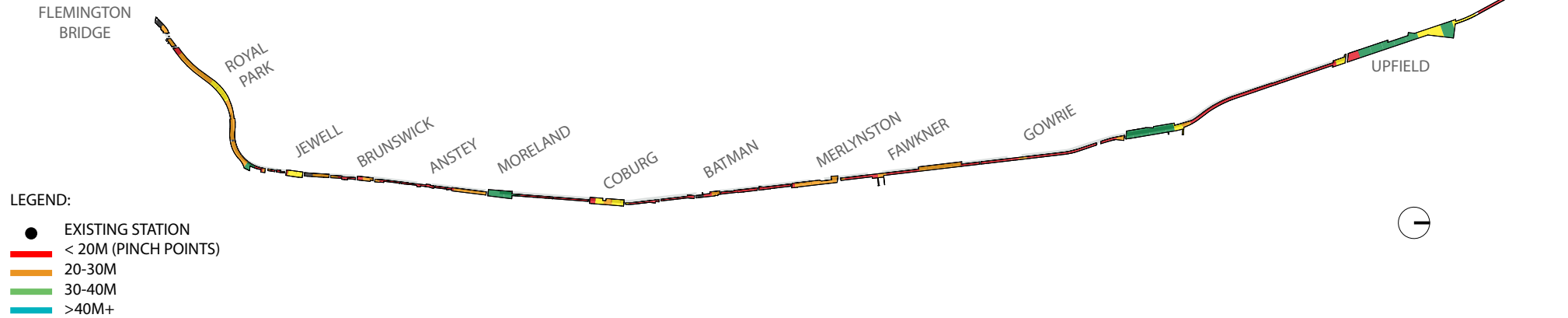
03 DISRUPTIVENESS + SAFETY

CONSTRUCTION SEQUENCE

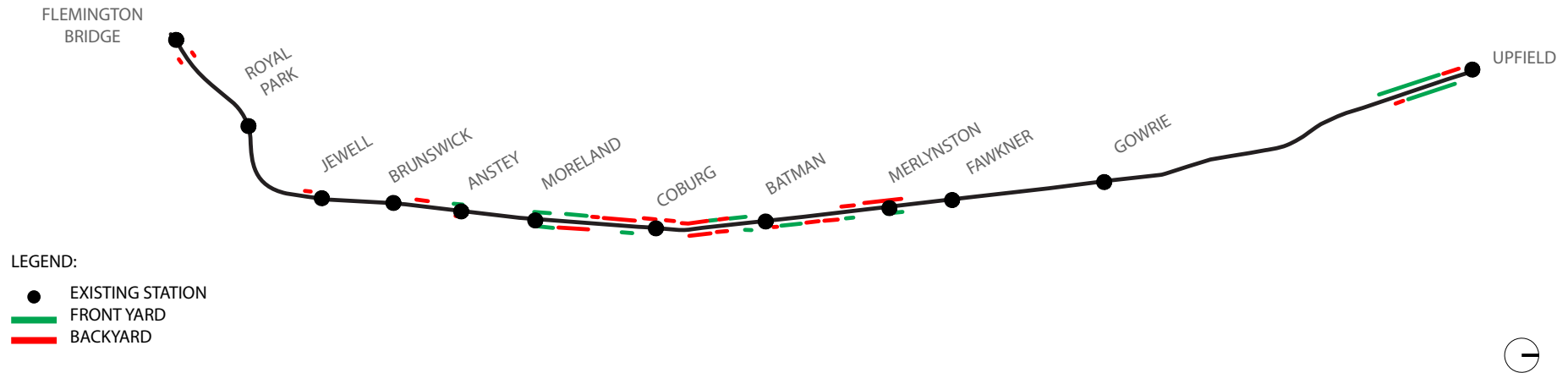


ABOVE: Elevated rail can be constructed over an operational railway if necessary, minimising shutdown disruptions. Construction Sequence - Edward Grutzner

CORRIDOR WIDTH



VISUALLY SENSITIVE AREAS





Retail, commercial, community and recreational development under viaduct south of Coburg Station - Nicola Inskip

04 ECONOMIC DEVELOPMENT

The integration of complementary land uses at street level is aided by the release of land in the rail reserve by using elevated rail. Land uses such as retail, hospitality, commercial and community uses provide employment and contribute to local economic activity. An excellent historic example of this in Melbourne can be seen at Glenferrie station.

Building under a viaduct is easier than building over a submerged railway – especially away from the city centre where land values and building heights are lower. This is in contrast to a railway trench that will need to be decked over to support a new building above.

Furthermore, development can easily be integrated at a later date, with the space under the railway incrementally developed in the future without the need to build decking.

In the studio, examples of this potential that were investigated included supermarkets, office space, retail, hospitality, community and recreational spaces.



ABOVE: Bell St., Coburg looking East with viaduct - Kenneth Jimbo

BELOW: Barry Road, Upfield looking west - Leyla Beiglari





BEFORE

Level Crossing on Bell Street, Coburg looking west



AFTER

Bell St Coburg - bus / rail interchange + re-developed land adjacent

UPFIELD LIBRARY
ENTRY >



05 FUTURE PROOFING

The space created beneath the railway offers flexibility of use essential for adapting to the future. This is evident in the variety of land uses possible, such as many types of open space, recreational, retail or community facilities.

Some examples explored in the studio included a library, light industrial and artists workshops, innovation hubs, re-tailing, entertainment and business centres.

Along the Upfield line many stations, including Brunswick, Coburg and Jewel, are well over a century old and at the end of their service life.

By elevating the line it is possible to build over and preserve and re-purpose these historic buildings while creating transport infrastructure capable of coping with the increased demand for public transport today, and 100 years into the future.



Campbellfield could become a major transport interchange in future, with excellent access to the airport. Incremental development beneath and beside Campbellfield Station - Vincenzo Armenia





BEFORE



AFTER

ABOVE: Camp Road, Campbellfield - station and activity centre - Vincenzo Armenia

BELOW: Connecting across the former rail reserve between Jewell and Brunswick - Nicola Inskip



BEFORE



AFTER



BEFORE



AFTER

ABOVE: Albert Street, Brunswick - new elevated station - Justine Lenkiewicz

BELOW: Barry Rd, Upfield - new elevated station - Leyla Beiglari



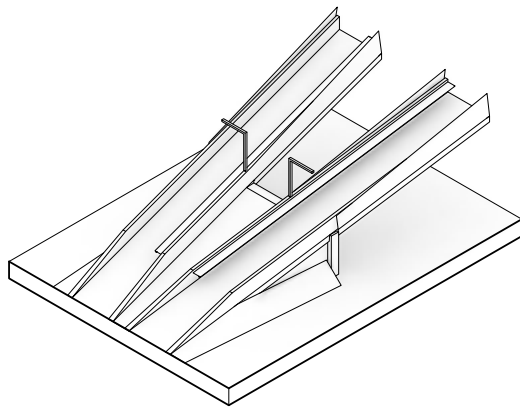
BEFORE



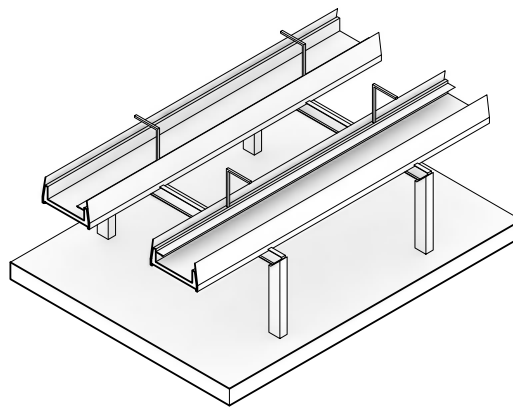
AFTER

UPFIELD DESIGN PROPOSALS

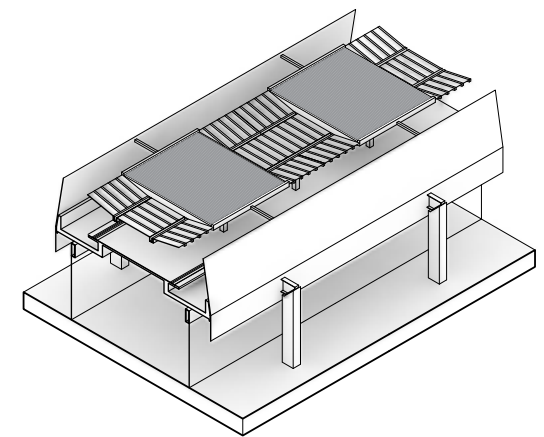
The studio approached the task of exploring elevated rail along the Upfield line by dividing up the case study area and allocating a segment to each student. A unique strategy was developed and applied to each segment, resulting in a continuous elevated proposal. Though each segment varied in size, each student explored how the viaduct could be ramped up, interacted with the adjacent context and integrated with station facilities.



RAMP



VIADUCT



STATION

NEW STATION DESIGNS



ROYAL PARK
Ye Yang



JEWELL
Justine Lenkiewicz



BRUNSWICK
Justine Lenkiewicz



MORELAND
Xinye Feng

FLEMINGTON BRIDGE

ROYAL PARK

JEWELL

BRUNSWICK

ANSTEY

MORELAND

COBURG

BATMAN



COBURG
Kenneth Jimbo



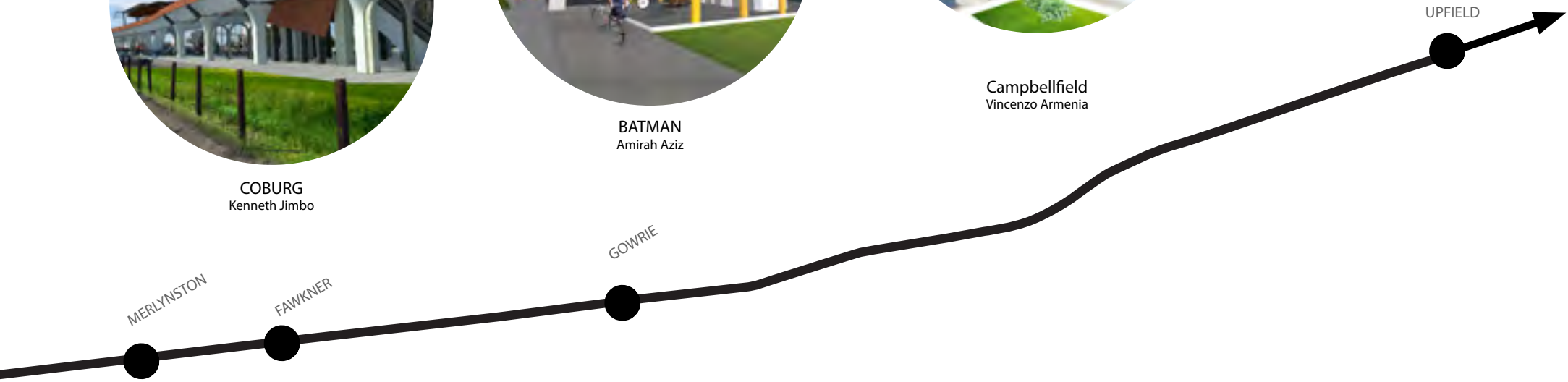
BATMAN
Amirah Aziz



Campbellfield
Vincenzo Armenia



UPFIELD
Leyla Beiglari



MERLYNSTON

FAWKNER

GOWRIE

UPFIELD



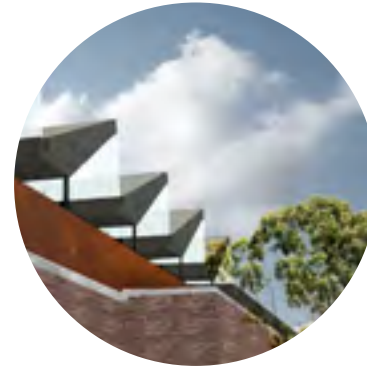
PLATFORMS



ROYAL PARK
Ye Yang



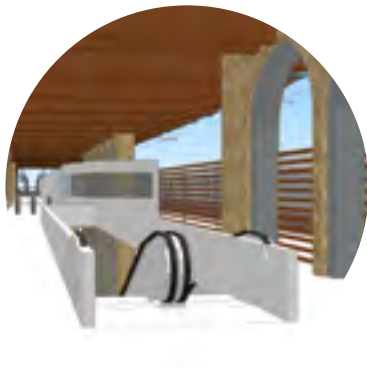
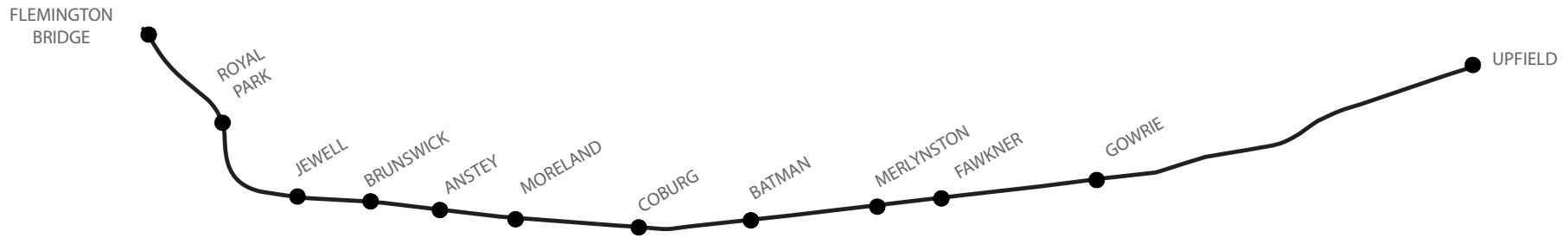
JEWELL
Justine Lenkiewicz



BRUNSWICK
Justine Lenkiewicz



MORELAND
Xinye Feng



COBURG
Kenneth Jimbo



BATMAN
Amirah Aziz



Campbellfield
Vincenzo Armenia



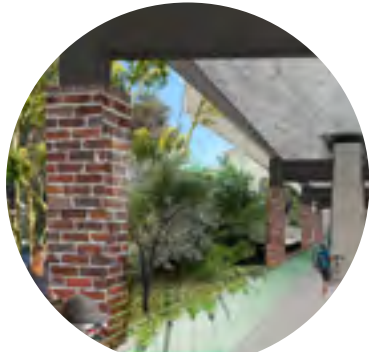
UPFIELD
Leyla Beiglari



PARKS AND OPEN SPACE



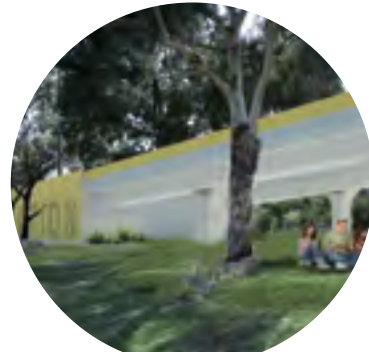
ROYAL PARK
Ye Yang



JEWELL
Justine Lenkiewicz

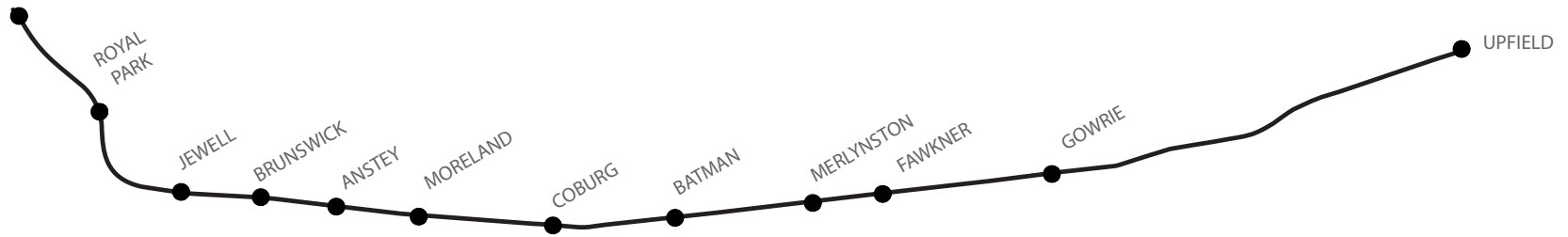


BRUNSWICK
Justine Lenkiewicz



MORELAND
Xinye Feng

FLEMINGTON
BRIDGE



COBURG
Kenneth Jimbo



BATMAN
Amirah Aziz



Campbellfield
Vincenzo Armenia

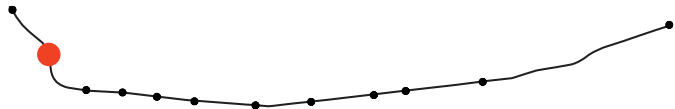


UPFIELD
Leyla Beiglari



ROYAL PARK

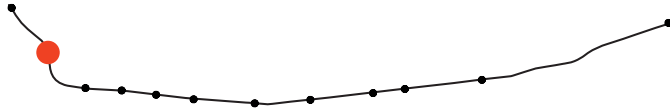
Ye Yang



Elevating the line north of Flemington Bridge allows large areas of Royal Park to be re-connected. At present, the only places to cross the line are at the Poplar Rd Level Crossing.

ROYAL PARK

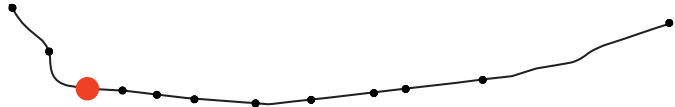
Nicola Inskip



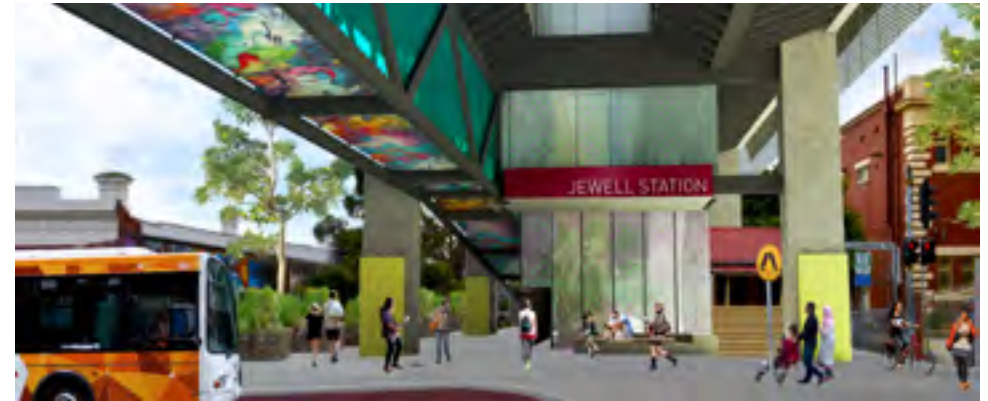
A bike track could be suspended below the viaduct (TOP RIGHT) for commuter cyclists, accessible at station precincts. Elevated rail allows the linear park to connect directly to Royal Park at Park St.

JEWELL

Nicola Inskip



TOP RIGHT: Elevated station enables preservation and re-purposing of heritage listed station buildings; BOTTOM: Elevated station from Watson St (i.e. looking east)



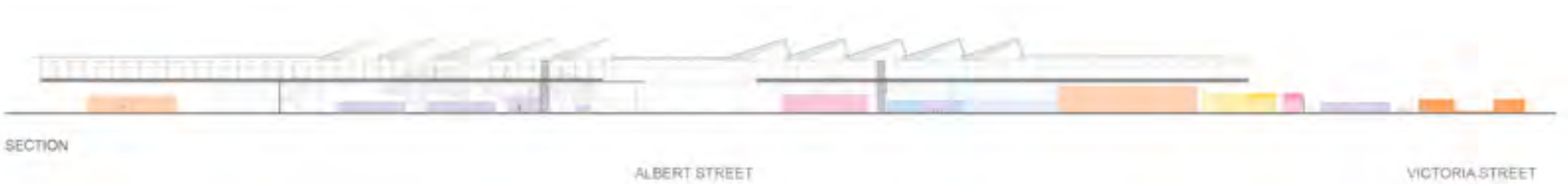
TOP LEFT: New connectivity at ground level

TOP RIGHT: Viaduct with suspended Upfield bike path for un-interrupted high-speed cycling

BOTTOM: Jewell Station precinct

BRUNSWICK

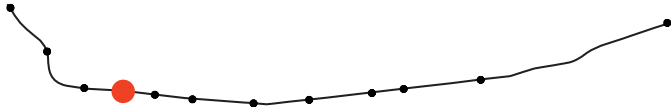
Justine Lenkiewicz





BRUNSWICK

Nicola Inskip



TOP RIGHT: Albert St looking east (with possible new east-west bus connection)

BOTTOM LEFT: View along linear path next to Brunswick Baths

BOTTOM RIGHT: Dawson St, looking west

ANSTEY

Nicola Inskip



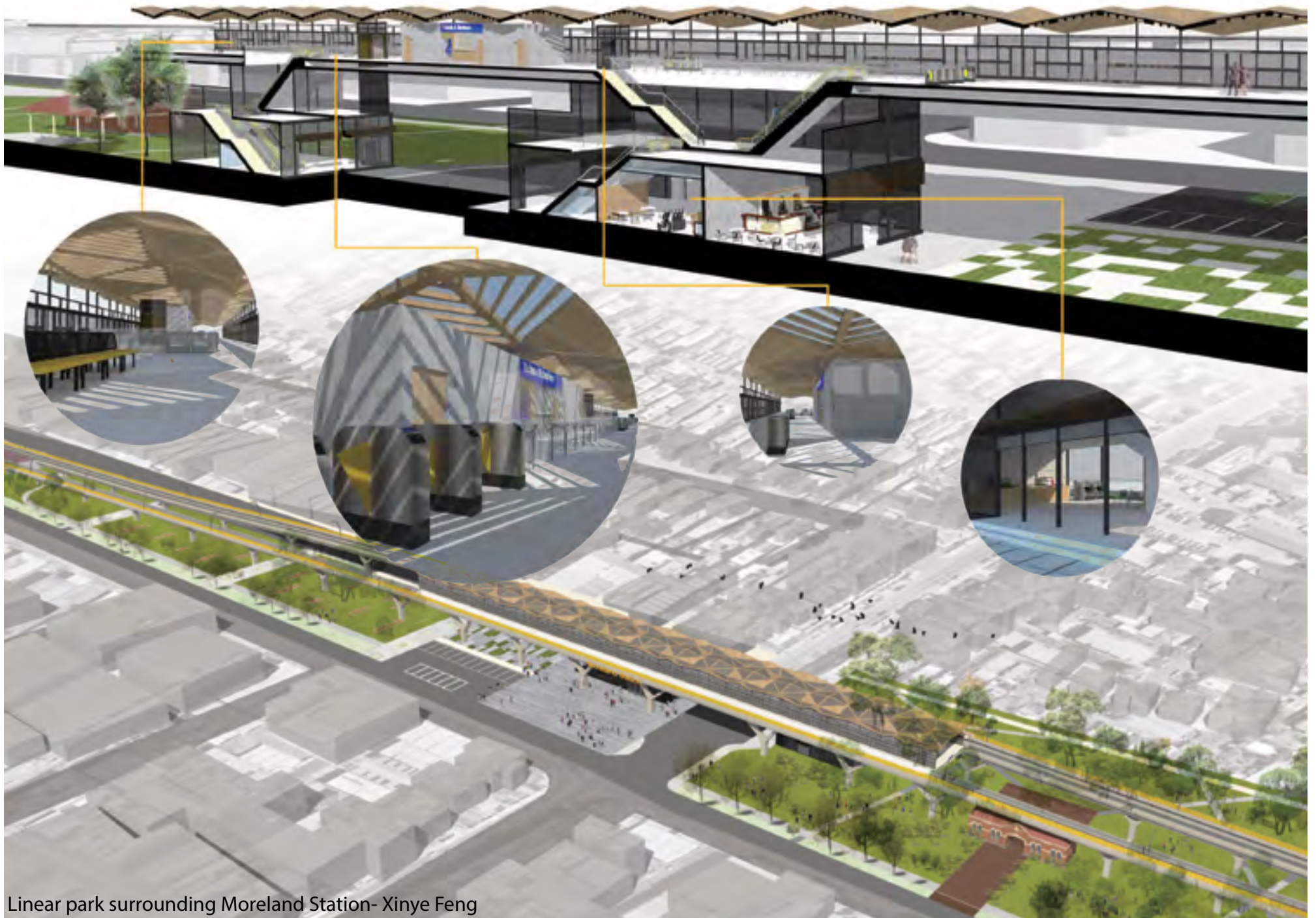
TOP RIGHT and BOTTOM: Pocket park, Upfield trail and Florence St plaza

MORELAND

Xinye Feng



Elevated rail at Moreland allows extension of Gandolfo Gardens, preserving and re-purposing the heritage station building, with a new park south of Moreland Rd on former railway land.

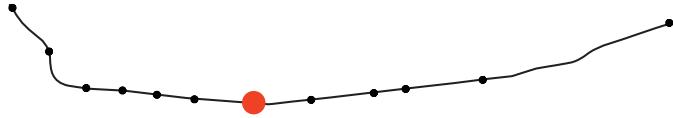


Linear park surrounding Moreland Station- Xinye Feng

Elevated station bridges across Moreland Rd to provide improved access to east-west public transport; new parkland and community facilities enhance amenity and potential of adjacent land.

COBURG

Kenneth Jimbo



These images explore elevating the line from south of Munro St to North of Bell. However, a continuous elevated structure would have more benefits in the long term.

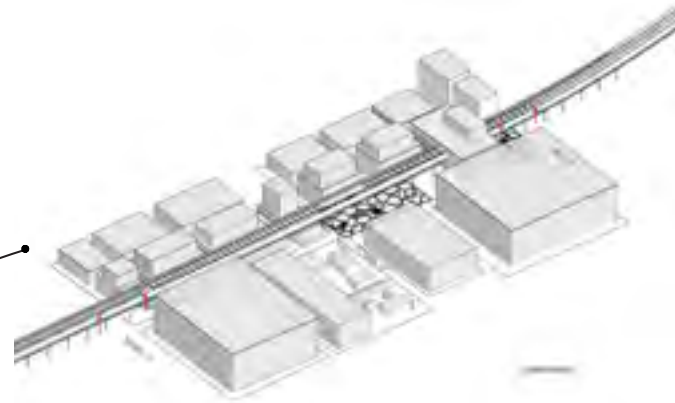
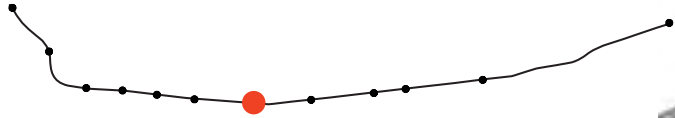


TOP LEFT: Bell St, looking east;

TOP RIGHT and BOTTOM: If only some crossings are removed, more rail ramps would be needed and the benefits of elevated rail would not be fully realised.

COBURG

Nicola Inskip



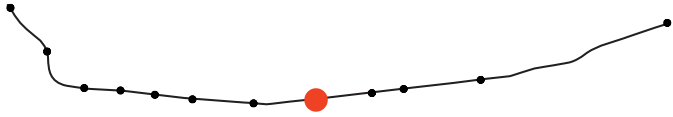
Elevated rail can facilitate the aims of the Coburg Activity Centre Structure Plan to increase development and improve the public realm by making it more pedestrian-friendly.



Elevated rail can allow preservation of the heritage station and enhanced integration of central Coburg by enabling retail, commercial and recreational uses beneath the station and viaduct.

BATMAN

Amirah Aziz



Elevated rail from Coburg to Batman allows new linear parkland for improved cycling, walking and recreational uses, including community gardens and market areas.



Elevated rail at Batman would allow greater east-west connectivity and better urban design outcomes for the emerging activity centre adjacent to the station on Gaffney

CAMPBELLFIELD

Vincenzo Armenia



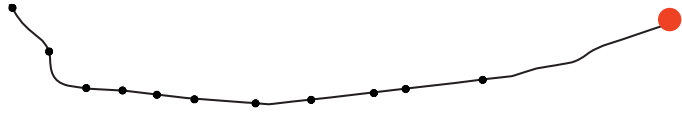
Level Crossing removal at Camp Rd should include a new station (there was one here from 1889 to 1956) to serve nearby retailing, stimulate urban renewal and add public transport connectivity.



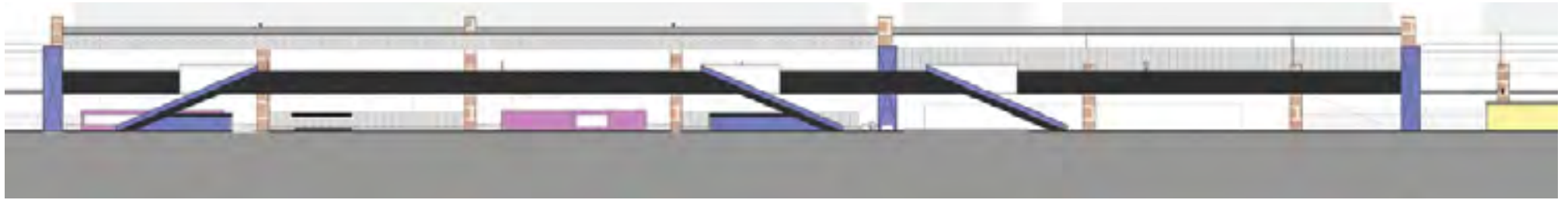
Elevated rail allows incremental development, better integrating the station with urban renewal. Camp Rd is an important route to the airport, this would be a good access point for rapid bus services.

UPFIELD

Leyla Beiglari



New community facilities could be incorporated beneath the station and viaduct at Upfield with elevated rail.



Linear park on public land reclaimed from the rail reserve south of Barry Rd. with diverse facilities for cycling and walking, passive as well as active recreation, connecting communities along the line

CONCLUSION

This booklet has presented an analysis of existing urban conditions and design propositions for elevated rail to remove all level crossings along the Upfield rail corridor north of Flemington Bridge.

The Victorian State Government has committed to removing three crossings from the 21 that currently exist in this rail corridor, leaving 18 that will remain until such time as they are removed in the future. Nine of these 18 crossings are currently used by east-west buses, and a further three could be used to provide improved bus services.

We have argued elsewhere (Woodcock & Stone 2015) that the prioritisation of level crossing removal should not only be about fixing local road congestion, it should be about enabling improvements to Melbourne's public transport, facilitating access for cyclists and pedestrians, and better integration with land use. We have also argued that, if well done, elevated rail is the preferred mode for removal of level crossings unless rail operations would be negatively impacted.

In other work (Woodcock & Stone 2016; Woodcock 2016; Woodcock & Wollan 2013) we have argued that the benefits of elevated rail over the other cost-effective options for suburban level crossing removals go beyond mere differences of construction cost (which are sometimes only modest). These benefits have been further explored in this design investigation of an extended corridor of elevated rail. The benefits of elevated rail are such that the longer the corridor, the greater they become in terms of public open space released and the new public connectivity that is created.

The students' analysis of various scenarios for trenching versus elevating, removing only the three mandated crossings versus all 21 clearly show the significant gains

in community connectivity with elevated rail. Notably, the only gains with trenched rail are at the crossings themselves.

These findings raise questions of scale and scope in relation to future-proofing. To what degree does Melbourne need to act now, to be able adequately to respond to a projected doubling of patronage in future, without the transport network becoming gridlocked?

If the mandated three crossing removals were done as elevated rail, there would be three isolated rail bridges that would require much longer rail shutdowns than a continuous viaduct.

The remainder of the corridor would still be divided. There would still be 18 crossings raising safety risks. The proposed future peak frequencies of up to 12 trains per hour would mean that boom gates would be down for very significant periods of time, playing havoc with east-west movement of cars, buses, cyclists and pedestrians.

Removing the remaining crossings should be a priority to realise the benefits claimed for the Melbourne Metro in terms of increased capacity on the Upfield line.

As has been noted in this booklet, large-scale removal of crossings using elevated rail not only future-proofs the railway for substantial service improvements, it also allows the entire public realm from Royal Park to Upfield to be re-imagined.

For most of the corridor, the rail line is flanked by underutilised industrial land whose potential for urban renewal is constrained as long as the line is at grade. Elevating the line in long segments would turn 14km of 'backs' into new frontage onto a continuous spine of

14-15 Hectares of new public space, reclaimed from underutilised rail reserve, connecting many dead-end streets and small pockets of public open space adjacent to the railway line.

In short, instead of removing just three local traffic and safety problems, the amenity of the inner north could be dramatically transformed. High-frequency, reliable rail services, improved bus access, wider and safer bike paths, walking trails, new landscaping and plantings, and a variety of active and passive recreation spaces would combine to enhance economic activity and substantially increase local land values. More than this, the inner north would gain a vital new connective spine of public open space free of vehicular traffic.

This transformative potential of elevated rail is clearly illustrated in the students' explorations. It is our hope that the imagination of our students can contribute to the important public debate about level crossing removals in Melbourne, and the broader issues of transforming our city into one that is genuinely accessible to all via active and public transport.

Some may find these propositions challenging. After all, it is a long time since elevated rail was built in Melbourne. Yet around the world, from Berlin to Vancouver, cities have been building elevated rail on viaducts with great success. Cities with legacies of elevated rail are seeking to make better use of the spaces beneath their viaducts. Vancouver, Miami, Toronto, New York, Berlin and Singapore (to name a few) are coming to similar conclusions as our students about the variety of things that can be done with the enormous public resource of land beneath elevated rail. Unlike trenched rail, elevated rail opens up connections and creates possibilities.

REFERENCES

- Alford, G and Wild, N (2007) Developing a Strategic Approach for a Station and Modal Inter-change Upgrade Program, Proceedings of the 30th Australasian Transport Research Forum, Melbourne: ATRF
- Charles, P and Galiza R J (2013) Employing Best Practice in Station Access to Bridge the Door-to-Door Divide Proceedings of the 36th Australasian Transport Research Forum, Melbourne: ATRF
- Coxon, S Burns, K and DeBono, A (2008) Can the design of effective public space inform the passenger experience of public transport? Proceedings of the 31st Australasian Transport Research Forum, Gold Coast: ATRF
- Green, C and Hall, P (2009) Better Rail Stations, London, Department of Transport
- Hale, C (2011) Station Access and the Modern Transit System, Proceedings of the 34th Australasian Transport Research Forum, Adelaide: ATRF
- Hale, C (2013) History and prospects of the rail station Journal of Urbanism: International Research on Placemaking and Urban Sustainability 6(1), 72-91
- Hale, C and Miller, M (2012) Amenity and opportunity at rail stations Australian Planner 50(1), 44-54
- Hale, C and Eagleson, S (2014) The station access task in Melbourne, Australian Planner 51(4), 330-339
- Lawrie, I and Stone, J (2015) Missing the Connection? A case study approach to understanding effective public transit transfers in dispersed lower density cities, Proceedings of the 37th Australasian Transport Research Forum, Sydney: ATRF
- Maher, R and Skinner, P (2011) An architect's view of the station user experience, Proceedings of the 34th Australasian Transport Research Forum, Adelaide: ATRF Mayor of London (2002) Interchange Plan – Improving interchange in London, London: Transport for London
- McPherson, C and Daff, M (2005) Pedestrian Behaviour and the Design of Accessible Rail Crossings, Proceedings of the 28th Australasian Transport Research Forum, Sydney: ATRF
- Mees, P (2010) Transport for Suburbia: Beyond the Automobile Age, London: Earthscan
- Near Maps (2015). Various aerial photography Retrieved from <http://au.nearmap.com/>
- Network Rail (2011) Guide to Station Planning and Design Principles for Network Rail, London, Network Rail
- PTV (2012) Network Development Plan: Metropolitan Rail: Overview, Melbourne: Public Transport Victoria
- PTV (2012) Estimated Station Entries at Metropolitan Stations. Retrieved on Feb 29, 2016 from <https://ptv.vic.gov.au/assets/PDFs/.../station-by-station-patronage-data.xls>
- PTV (2013) Station-by-station-fact-sheet-accessible-version, accessed 1 April 2014, <http://ptv.vic.gov.au/assets/PTV/PTV%20docs/research/PTV-Station-by-Station-Fact-Sheet-accessible-version.xls>
- PTV (2014) Annual Report 2013-14, Melbourne: Public Transport Victoria
- Semmler, C and Hale, C (2010) Rail Station Access – an assessment of options, Proceedings of the 33rd Australasian Transport Research Forum, Canberra: ATRF
- Transport For London (2009), Interchange Best Practice Guidelines - Quick Reference Guide, London, Transport for London.
- VRIOGS, (2011) Railway Station Design Standard and Guidelines, Melbourne, Victorian Railway Industry Operators Group Standards
- Woodcock, I (2016) 'The design speculation and action research assemblage: 'transit for all' and the transformation of Melbourne's passenger rail system', Australian Planner, 53 (1), 15-27
- Woodcock, I and Stone, J (2016) The Benefits of Level Crossing Removals: lessons from Melbourne's historical experience, Melbourne, Melbourne School of Design/RMIT University
- Woodcock, I and Stone, J (2015) 'Grade separations and intermodal transfer at railway stations in Melbourne', Proceedings of the 37th Australasian Transport Research Forum, Sydney: ATRF
- Woodcock, I and Wollan, S (2013) Public Use Zone: A new paradigm for suburban rail station design for Australian cities, Proceedings of the State of Australian Cities National Conference, Sydney





msd
Melbourne
School of Design

