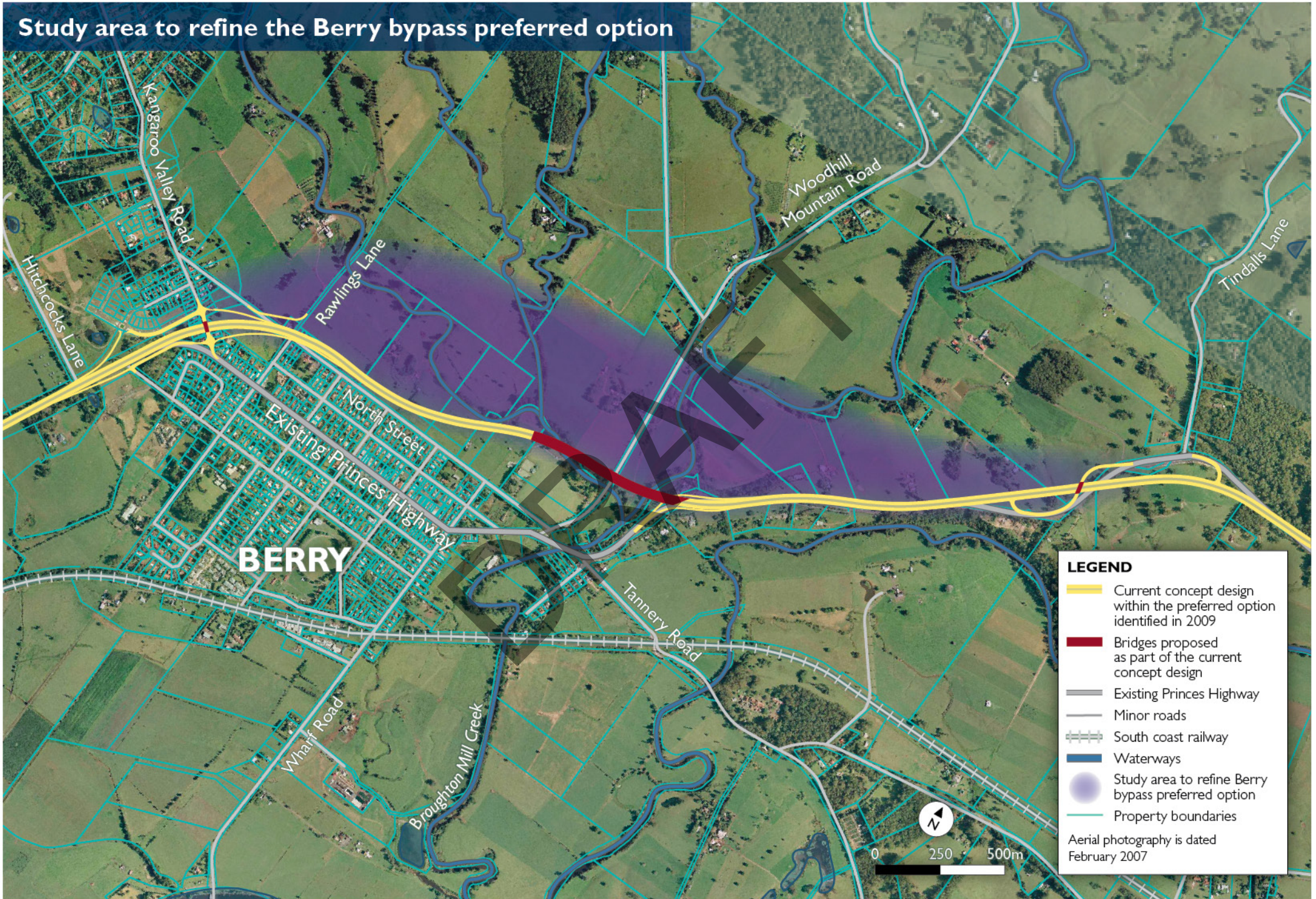

Appendix 1 Berry Bypass Preferred Concept Design

DRAFT



Study area to refine the Berry bypass preferred option



**Appendix 2 Berry Bypass Community Review
Group Update**

DRAFT



Berry bypass

Community review group update

The Berry bypass community review group held its fourth discussion on 13 October 2011.

Member for Kiama Gareth Ward attended the meeting and clarified the goal of the NSW Government and the purpose of the group. He thanked the group for their commitment to making sure the RTA delivers the best Berry bypass possible. He affirmed that he was committed to building the bypass along the preferred route to the north of town. He reminded the group that there would be impacts from the bypass, and this group's aim is to mitigate these as best we can.

It was agreed the group was facing several key project problems:

- the amenity of North Street.
- flooding and management along the alignment north of North Street.
- the visual impact and amenity of the highway at Woodhill Mountain Road.
- the current design and aesthetics of the Berry Bridge.
- noise management and resident impacts, possible shadowing impacts from the noise walls and how to manage noise from bridge deck joints for which we had actions to investigate, an understanding of some consequences and some of the mitigation measures.

The group considered each problem area and the RTA presented on the actions requested from previous discussions.

Problem 1: The amenity of North Street.

The RTA at the suggestion of members of the group, has begun exploring the design of a lowered highway where it runs north of North Street. This would have implications during flood times and a mitigation measure would be to reroute Town Creek. The lowering of the highway would decrease the height of the noise walls on the southern side of the highway.

This was considered a viable option and further investigations will be made.

The RTA investigated moving the alignment further to the north on the other side of Bundewallah Creek. This design would require the construction of bridge or viaduct structures to cross over the Bundewallah Creek floodplain. It would create more property severance issues on rural properties. The rough strategic cost estimate is \$130 million over the current cost of \$170 million (totalling \$300 million). This option around the north of Berry is not considered economically viable.

Problem 2: Flooding and management along the alignment north of North Street.

The RTA confirmed ongoing discussions with Shoalhaven City Council about flood mitigation and management in this area. Council had attended a site visit with group members on 28 September. The rerouting of Town Creek was discussed and the suggestion to move the swale through farming property. This is considered a viable alternative with more investigations needed. Discussions with Council and property owners will be ongoing.

Problem 3: The visual impact and amenity of the highway at Woodhill Mountain Road.

The RTA has been working with members of the group on design alternatives to reduce the visual impact and amenity of the highway at Woodhill Mountain Road.

To date these have examined how to lower the bridge with a deeper cutting into the ridge.

One option could lower the height of the bridge by about 10 metres at the eastern end. The consequences would be a large environmental impact with the cutting into the mountain and managing the 540,000m³ of surplus spoil. How to resolve the excess spoil was debated, with some to be used on the proposed adjacent Bomaderry to Berry upgrade. The RTA agreed more detail was required and this needed to be looked at further. There was also discussion around how to reduce the amount of spoil excavated.

The strategic cost estimate for this option is \$250 million, \$80 million over the current cost of \$170 million. This is mostly due to the expenses associated with the spoil.

Ideas on how to reduce the cost will continue to be discussed and investigated.

The RTA will:

- work closely with community members on further options in this area.
- provide the group with more detail on cost assumptions.
- list and investigate management options for excess spoil.

Problem 4: The current design and aesthetics of the Berry Bridge.

The bridge proportions and how an urban design approach could improve the proposed structures was briefly discussed. It was agreed that the group was not ready for this detail and that urban design in relation to the bridge be parked for a future discussion.

Problem 5, 6 & 7: Noise management and resident impacts, possible shadowing impacts from the noise walls and how to manage noise from bridge deck joints.

The group viewed a 3D animation showing the lowered highway and the shadowing that would be generated over the shortest day in winter. Shadows from the proposed noise wall began to impact some properties on North Street about 15 minutes before the sun dipped below the escarpment.

An action has been to examine the technology behind:

- bridge deck joints, and
- the type of road surface to assess how noise can be reduced.

The RTA committed to addressing these items in the detailed design with the aim of reducing noise.

Study area

The group discussed financial feasibility of options. The group largely accepted the bypass needs to be economically viable and understood that the project competes on a state wide level for funding. Social impacts, environmental impacts and financial feasibility are often a trade off.

The group at large advocated for a focus on the current alignment and the design options available generally along and in the vicinity of this alignment. This was noted by the local member. There will be future meetings to work to improve design/alignment.

This will involve continuing with two discussions:

- a focus on the bridge to improve its aesthetics and design. The aim to lower the bridge and reduce its impacts has not yet been achieved.
- a focus on reducing the impact of the highway on the north Berry precinct and examining appropriate landscape and urban designs for this newly created space.

Meeting notes and the presentations are on the community review group documents page on RTA website www.rta.nsw.gov.au/fbb

For more information:

Project information line (free call) 1800 506 976
foxgroundandberrybypass@rta.nsw.gov.au
www.rta.nsw.gov.au/fbb

Berry project office open 10am – 5pm each Friday, Broughton Court Shop 3/113 Queen Street Berry

Placed by the RTA on behalf of the community review group.

13 October 2011

Appendix 3 RMS Workshop Discussion Paper

DRAFT



BERRY BRIDGE AND INTERCHANGE OPTIONS REVIEW AND BRAINSTORMING WORKSHOPS

This briefing suggests a structured approach to collaborative options generation and review with members of the community and an independent panel who are experts in areas of road design and construction.

1. A panel of independent experts is ready to be part of the collaborative process and these consist of:

Darrel Conybeare, director Conybeare Morrison, architect

Vlad Sofrevski, director Hughes Trueman, road designer

Ken O'Neill, senior design manager Aurecon, bridge designer

Barry Murphy, project director Baulderstone, constructor

2. It is intended the independent panel will be briefed ahead of the workshops to gain an understanding of the issues and this will also include a site visit (members of community can also attend).

3. The workshops will be facilitated by Peter Stewart, an independent engineering professional and workshop facilitator.

4. It is anticipated the structure of the first workshop could follow the agenda below:

- Contextualising Berry Bridge and interchange with Berry and the rest of the Princes Highway Upgrade
- Recapping on physical and design boundaries and assessment criteria
- Recapping and reviewing of previous interchange options generated through the value management workshops of 2009
- Reviewing of latest options
- Brainstorming new options
- Reviewing the value and benefits of the workshop
- Outlining the structure of the follow up workshop
- Setting the time frame for reporting the process and outputs
- Generating a meeting statement for public distribution
- Anything else.

5. The process and outputs will be documented for public distribution by an independent report writer Michael Moore, constructability expert and principal of Evans & Peck, infrastructure management consultants.

Appendix 4 Expert Panel Bios

DRAFT



Peter Stewart

Peter Stewart Consulting Pty Ltd

Position Director

Qualifications & Affiliations Bachelor of Science (Civil Engineering), University of Strathclyde, Glasgow; Fellow, Institution of Engineers Australia; Member, Institution of Civil Engineers, London

Summary

Peter Stewart has 40 years experience in the civil engineering construction industry. Peter holds a Civil Engineering Degree from Strathclyde University, Glasgow, Scotland and is a Member of the Institution of Civil Engineers (London) and a Fellow of the Institution of Engineers, Australia. Peter has worked in the UK, South Africa, Hong Kong and Australia.

Peter provided design coordination for several significant projects in Australia, the most notable being the ACA award winning Woronora Bridge in 2002 and the Lawrence Hargrave Drive or Sea Cliff Bridge, as it is now known which was an ACAA finalist in 2006.

Peter was honoured with the Australian Civil Engineer of the Year Award 2005 by the Board of the College of Civil Engineers of Engineers Australia for the excellence of his contribution to civil engineering across Australia.

Peter established his own consulting practice which commenced operations from 1st July 2006 providing professional services to the civil construction industry. These services cover construction methods, risk analysis, value engineering, option selection and also include Alliance contracting facilitation.. Peter has provided these services all over the Australian continent.

Peter is Chairman of the National Committee for Construction Engineers one of Engineer's Australia support groups that represents over 5000 construction engineers in Australia. The NCCE is the Engineers Australia group which provides support to the ACA Award.

Vladimir Sofrevski

Mott MacDonald Hughes Trueman

Position Divisional Director

Qualifications & Affiliations Bachelor of Science in Civil Engineering, majoring in roads and railways 1989); Member, Institution of Engineers, Australia (1992)

Summary

Vlad heads the civil section in our Sydney office. He has over 20 years experience in road and civil infrastructure projects, with expertise covering design management, masterplanning and design.

His speciality is design of a variety of road types, ranging from private and local council roads through to high profile RTA arterial roads and freeways including intersections, roundabouts and grade separated interchanges.

Vlad has been involved in many major RTA projects over the last 17 years, covering all the design stages from preliminary investigation and concept development, through to detail design and documentation.

Darrel Conybeare

Conybeare Morrison International Pty Ltd

Position Director

Qualifications & Affiliations BArch (Hons 1), University of Sydney, University Medal 1962; MArch, University of Pennsylvania, USA; MCP, University of Pennsylvania, USA; Registered Architect (NSW) No 2252; Registered Architect (VIC); Fellow Planning Institute of Australia; Fellow Australian Institute of Architects

Summary

In 1980 together with William Morrison, Darrel established the office of Conybeare Morrison which practices as a multidisciplinary design consultancy, carrying out masterplanning and design with award winning projects in the fields of architecture, urban design and strategic planning.

Darrel has over 30 years experience in the management and direction of large multidisciplinary project teams and 25 years experience in advising Government Authorities on appropriate urban design initiatives.

In 1996 he was appointed to the masterplan team for the Sydney Olympic Games site at Homebush. He has also been responsible for the major road and infrastructure projects carried out by the practice including the \$1.5 billion Westlink M7 project, the Liverpool to Parramatta Transitway, the Northwest Transitway and several Pacific Highway Upgrade Projects.

His specialist experience on infrastructure projects extends from concept design and establishing 'best fit' of highway infrastructure into the macro landscape, through to refinement of detail on interchanges, bridges, noise walls, and other road furniture.

Ken O'Neill

Aurecon

Position Associate - Transport Services

Qualifications & Affiliations Degree in Structural Engineering, BSc(Eng) – DIT Bolton Street, Dublin CPEng NPER MIEAust

Summary

Ken is a Senior Bridge Engineer and an Associate within the Transport Sector at Aurecon.

He has twelve years experience in the detailed design, documentation and construction of bridge and other infrastructure projects covering a wide range of structures from post-tensioned concrete bridges to major modifications of existing bridges.

He has worked on some of Sydney's most iconic bridges including Sydney Harbour Bridge Infrastructure Upgrade and the ANZAC Bridge Maintenance Project.

Barry Murphy

Baulderstone

Position Project Director

Qualifications & Affiliations BE Civil (Hons) (Civil & Environmental Engineering), University College Cork

Summary

Barry has over 17 years of experience in the construction industry, 11 years of which has seen him involved in major infrastructure projects. In the role of Alliance Manager Barry has just recently completed the ANZAC Bridge Phase 1 and Sydney Harbour Bridge Upgrade project for the RTA. Both extremely complex and challenging projects have been recognised as setting new benchmarks in many key areas such as Safety, Quality, Design and Stakeholder Management.

During his tenure on these projects Barry has demonstrated time and time again his ability to work closely with the client and participants to get best for project and value for money outcomes.

Michael Moore

Evans & Peck

Position Principal

Qualifications & Affiliations BE (Civil), University of NSW

Summary

Michael has more than 25 years experience gained in civil construction, in the delivery & procurement of major tunnel, road, rail, bridge & airport projects.

His capabilities cover project management, design management, and technical management on various BOOT, design & construct, construct only, and alliance contracts. Michael has successfully led project teams in planning, developing and implementing construction solutions to resolve complex technical challenges for major projects, including M5 East viaducts through sensitive wetlands, a bus crossover between Western Distributor viaducts, and modular assembly of the ventilation stack for Sydney's Cross City Tunnel.

With Evans & Peck, Michael has provided construction management and constructability advisory services for road and rail transport infrastructure projects through the development, delivery and operational phases to both government and the private sector.

Gillian Goldsmith

Evans & Peck

Position Associate

Qualifications & Affiliations Bachelor of Planning (Honours), University of New South Wales; Evans & Peck Leadership Training (2010); Committee Member, FutureNet; Associate Member, Planning Institute of Australia (MPIA)

Summary

Gillian has over 8 years experience working with a diverse range of private construction and infrastructure firms and government organisations, both in Australia and abroad. Gillian has successfully managed stakeholder and communication implementation for a range of corporate and public sector projects, required to ensure the delivery of large infrastructure, change management or community engagement projects.

Appendix 5 Workshop #1 and #2 Agendas

DRAFT



AGENDA



Name of meeting: Berry Bridge & Berry Northern Interchange Workshop

Location of meeting: Berry Village Boutique Motel, 72 Queen Street, Berry

Meeting facilitator: Peter Stuart

Date: Thursday 27th October 2011 **Time:** 9am to 4pm

Attendees: Stuart Coughlan, Bruce Ramsay, John Cullity, Will Armitage, Philip Thorniley, Bob Fitzell, Peter Stewart, Vladimir Sofrevski, Darrel Conybeare, Ken O'Neill, Barry Murphy, Michael Moore, Gillian Goldsmith, Carla Brookes, Steve Zhivanovich

Please read:

Please bring:

~Time	Item	Resp	Comments
9.00	Arrive at venue	All	Tea and Coffee
9.15 – 10.00	Site Visit	All	Gain an appreciation of issues
10.00 – 10.30	Introduction and Welcome Purpose of the Meeting Expectations for today	PS	Introductions Understand what each person brings Establish a working agreement Review / confirm objectives & agenda What do we want to achieve for today?
10.30 – 11.00	Setting the scene: ➤ The context surrounding the bridge and interchange at the North end ➤ The physical boundaries ➤ The assessment criteria	SZ /All	Clear understanding regarding the context, constraints and options to date.
11.00 – 12.30	Options Review ➤ Previous bridge & interchange options review ➤ Review the latest options (the current option and Bruce's option) ➤ Brainstorm new ideas	All	Understand the pros and cons of the options. Status of the issues raised. Generate new ideas – capturing both individual and group ideas
12.30 – 1.30	Lunch		

~Time	Item	Resp	Comments
1.30 – 3.00	<ul style="list-style-type: none"> ➤ Review the new ideas generated against the issues raised. ➤ Identify refinements to the options ➤ Prioritise refinements to go forward. 	All	Assess new ideas Alignment on ideas/refinements Clarify & document all ideas/refinements Actions to develop prioritised ideas/refinements for next workshop
3.00 – 3.15	Tea/Coffee		
3.15 – 3.45	Action list going forward: <ol style="list-style-type: none"> 1. Outline structure of the next workshop 2. Set the timeframe for reporting the process and outputs 3. Generate meeting statement for public distribution 	PS/ SZ	Align on next workshop: <ul style="list-style-type: none"> ➤ Review & reporting ➤ Capture further thinking post this workshop ➤ Feedback on actions from this workshop ➤ Align on preferences
3.45 – 4.00	Review the value and benefits of the workshop	PS	Feedback on workshop

DRAFT

AGENDA



Roads and Maritime Services - RMS (formerly Roads and Traffic Authority -RTA)

Name of meeting: Berry Bridge & Berry Northern Interchange Workshop #2

Location of meeting: Venue: Berry Village Boutique Motel 72 Queen Street Berry

Meeting facilitator: Peter Stuart

Date: Monday 7 November
Time: 9.30am to 4pm

Attendees: Peter Stewart, Vladimir Sofrevski, Darrel Conybeare, Ken O'Neill, Barry Murphy, Michael Moore, Gillian Goldsmith, Carla Brookes, Steve Zhivanovich
John Cullity, Bruce Ramsey, Stuart Coughlan, Will Armitage, Philip Thorniley and Bob Fitzell

Time	Item	Who	Comments
9.30-10.00	Arrive at venue	All	Tea and Coffee
10.00 – 10.15	Introduction and Welcome Purpose of the Meeting Review Expectations/objectives	PS	Introductions Confirm our working agreement Review / confirm objectives & agenda
10.15 – 10.45	Actions resulting from our meeting of the 27 th October 2011	SZ/ BR	Confirm key decisions from first workshop Confirm the priorities raised at the last meeting and actions that have ensued
10.45 – 12.00	Priority 1: Alignment refinement to <ul style="list-style-type: none"> ➤ Reduce cut quantities ➤ Achieve balanced cut/fill quantities ➤ Minimise grades (braking noise) ➤ Remove need to source a disposal tip ➤ Optimise batter angles/ treatment ➤ Achieve value for money 	All	Discuss Bruce Ramsay Option 3 and AECOM options and align on community preferences for the RMS to develop further
12.00 – 12.30	Flooding considerations and opportunities	All	
12.30 – 1.30	Lunch		
1.30 – 3.00	Priority 2: Bridge Options to <ul style="list-style-type: none"> ➤ Achieve an aesthetic solution ➤ Maintain amenity/visuals. ➤ Meet cost constraints ➤ Minimise light/shadowing impacts ➤ Achieve value for money 	All	Assess bridge types Alignment on ideas/refinements Discuss options and align on community preferences for the RMS to develop further
3.00 – 3.15	Tea/Coffee		
3.15 – 3.45	Action list going forward: <ol style="list-style-type: none"> 1. Align on community preferences to be taken forward by the RMS 2. Agree reporting requirements. 3. Confirm the timeframe for reporting the process and outputs 4. Generate meeting statement for public distribution 	PS/ SZ	Align on next steps: <ul style="list-style-type: none"> ➤ Agree on review & reporting requirements ➤ Environmental assessment requirements ➤ Align on preferences
3.45 – 4.00	Review the value and benefits of the workshop	PS	Feedback on workshop

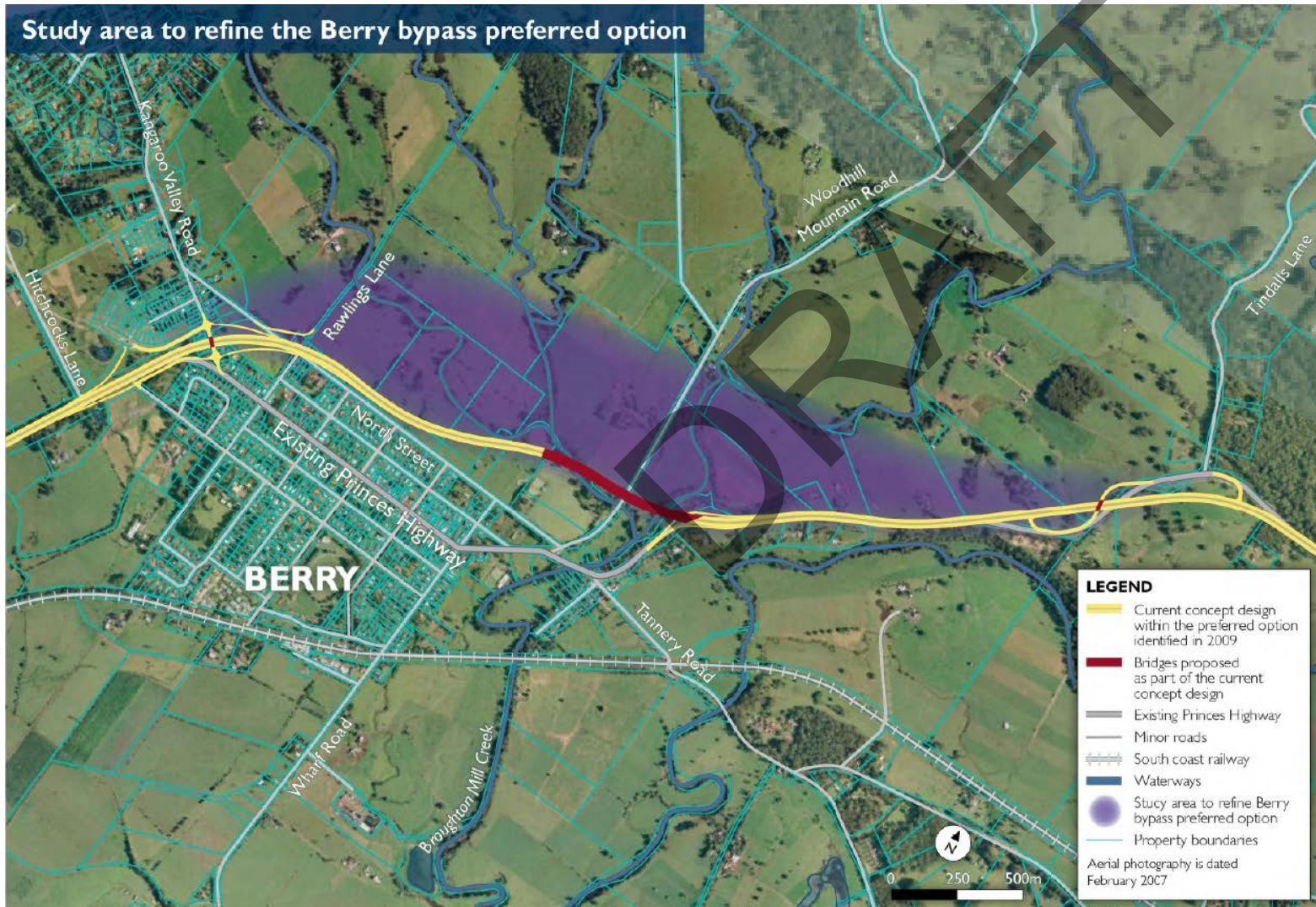
Appendix 6 Workshop #1 Briefing Presentation

DRAFT



BERRY BYPASS OPTIONS REVIEW

Study area to refine the Berry bypass preferred option



Community review
group
meeting 4
12 October 2011

Approaching the problems and how to resolve



Transport
Roads & Traffic
Authority

- 1. Define a problem**
- 2. Consider the actions**
- 3. Understand the consequences**
- 4. Mitigation of impact after that**

DRAFT

1. The amenity of North Street

1.1. Explore the design of a lowered highway in the vicinity of North Street, and examine the width of the cross section and immediate drainage / water storage needs (see below).

In addition a further action was to examine an alignment shift slightly to the

1.2. Examine an alignment further to the north

1.3. Examine a design approach to these spaces

2. Flooding and management along the alignment north of North Street

- 2.1. Consider rerouting Town Creek to Bundewallah Creek. More work on topography needed. Looked at 2 potential cattle bridge sites over Bundewallah Creek to provide access to high ground in times of flooding - replacing the high ground lost to the highway.
- 2.2. Investigate retaining walls within the highway cross section to minimise the cross section.
- 2.3. Consider using pumps in the lowered highway area.

3. The visual impact and amenity of the highway at Woodhill Mountain Road

3.1. Examine Woodhill Mountain overbridge over the highway, the clearance required for flooding and trucks to pass underneath. Examine Council's and Cardno's estimate of heights for 1:20 and 1:100. Look for other circumstances where this design level has been adopted.

3.2. Consider how to reduce the height of the bridge at the eastern end - Bruce's ideas: Examine lowering the highway with a cutting in the ridge

3.3. Examine a cut and cover tunnel in the ridge.

3.4 Examine other construction types (more piers) to reduce costs.

3.5. Examine alignments including the shifting or diverting to the north of the current alignment.

4. The design and aesthetics of the Berry bridge

4.1. Give special attention to the bridge's proportions and aesthetic befitting of its vicinity to Berry. Get urban designers on board.

5. Noise – noise management and resident impacts

5.1. Examine the appearance of a lowered bridge and what that entails

5.2. Examine the noise wall options with the lowering of the highway in the vicinity of North Street

6. (subset of noise) Shadow impact for residents of North Street

6.1. Build a virtual reality to examine potential shadowing issues at various locations.

7. The noise generated from the design of joints on the bridge

7.1. RTA to examine

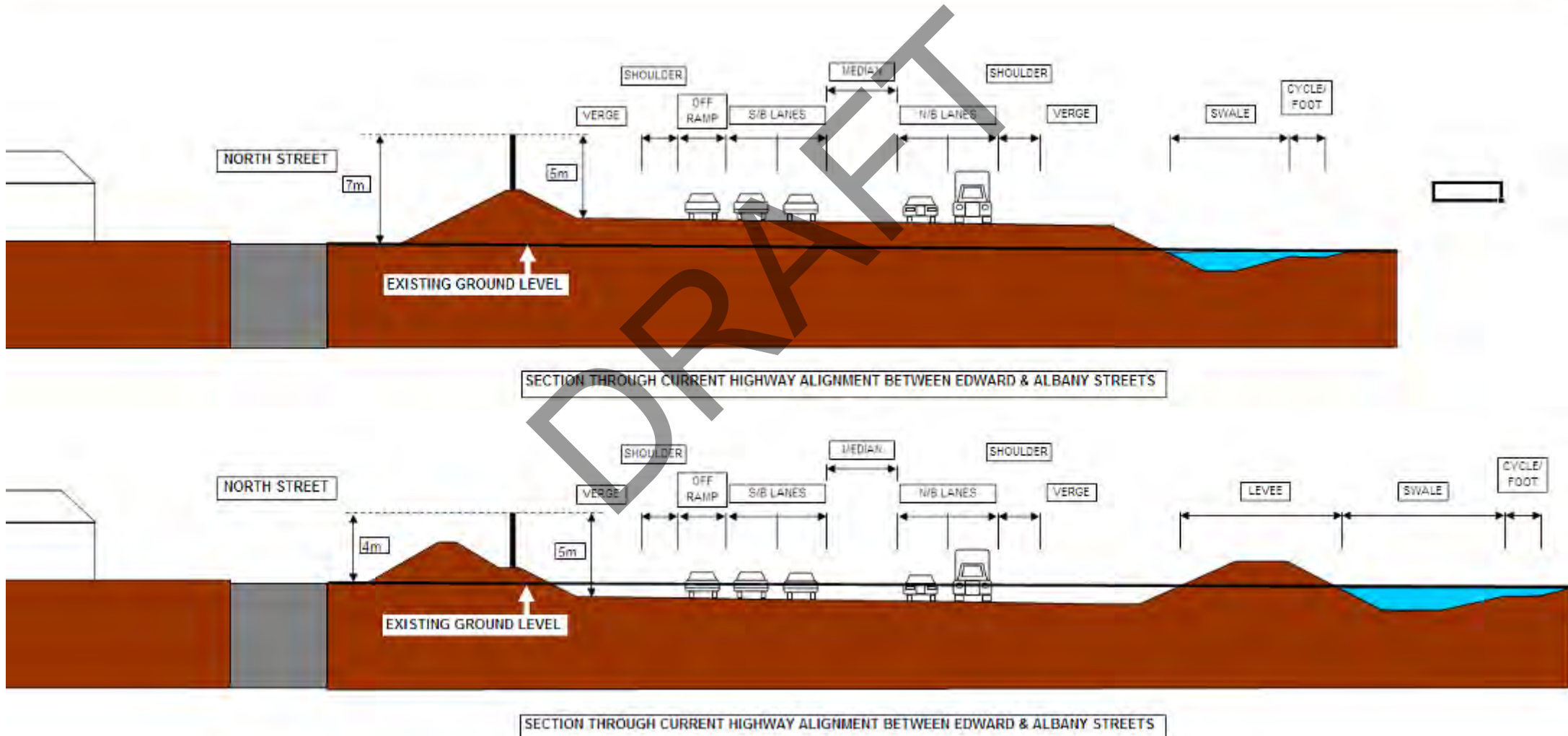
DRAFT

Problem 1

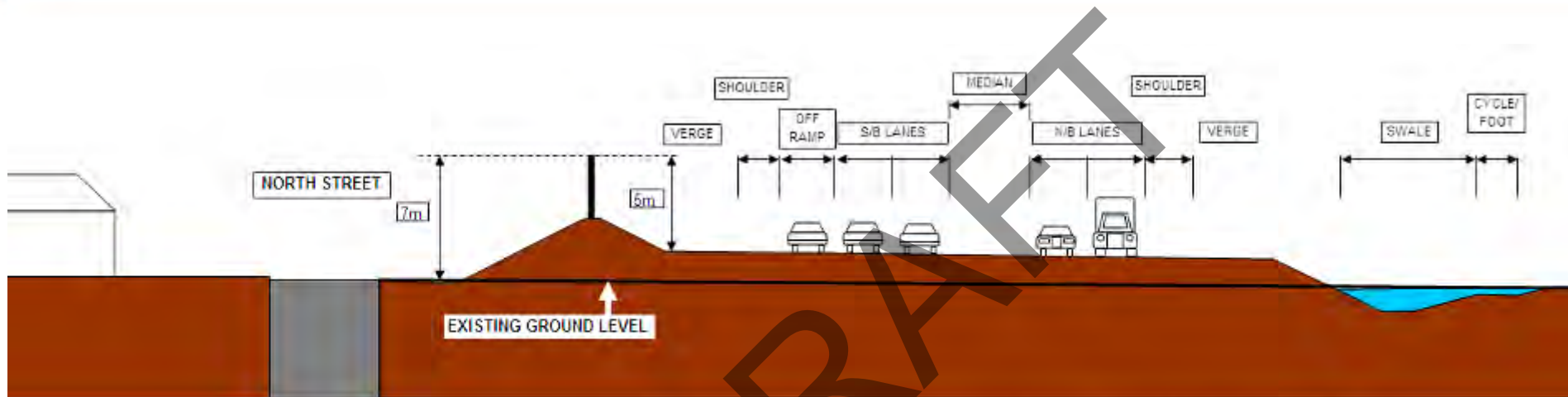
The amenity of North Street

DRAFT

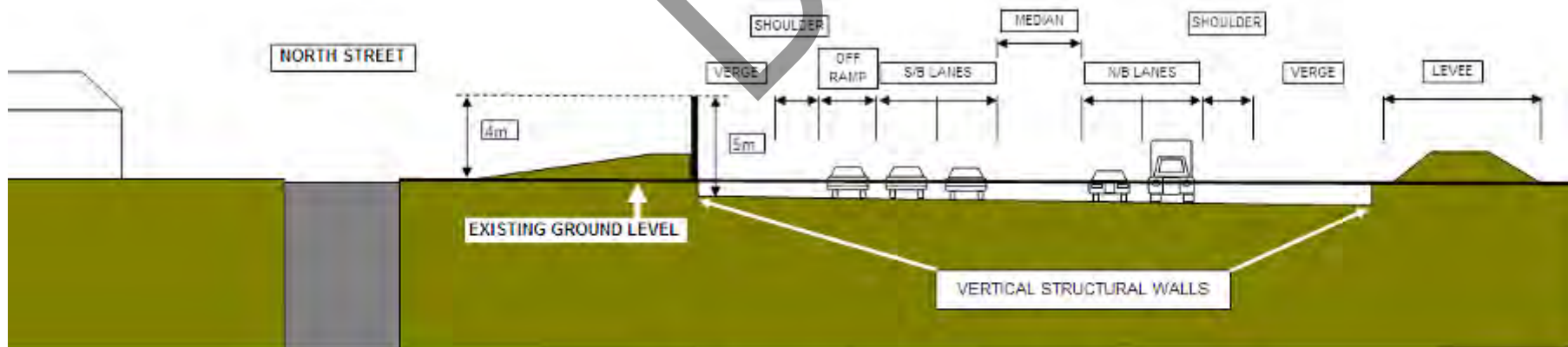
Action: 1. The amenity of North Street - Explore the design of a lowered highway



Action 1. The amenity of North Street - Explore the design of a lowered highway



SECTION THROUGH CURRENT HIGHWAY ALIGNMENT BETWEEN EDWARD & ALBANY STREETS

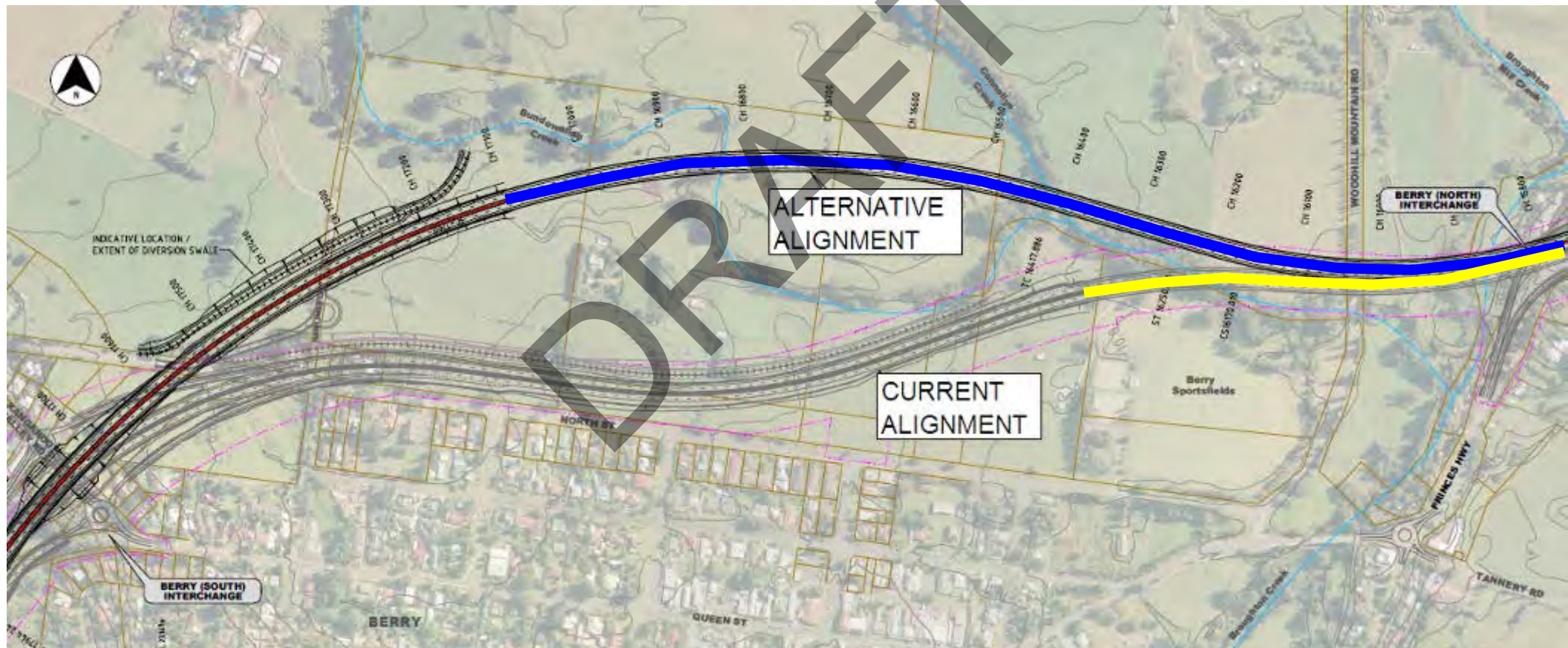


SECTION THROUGH PROPOSED HIGHWAY ALIGNMENT BETWEEN EDWARD & ALBANY STREETS TOWN CREEK DIVERTED ALONG RAWLINGS LANE

Action 2. The amenity of North Street - Examine an alignment further to the north



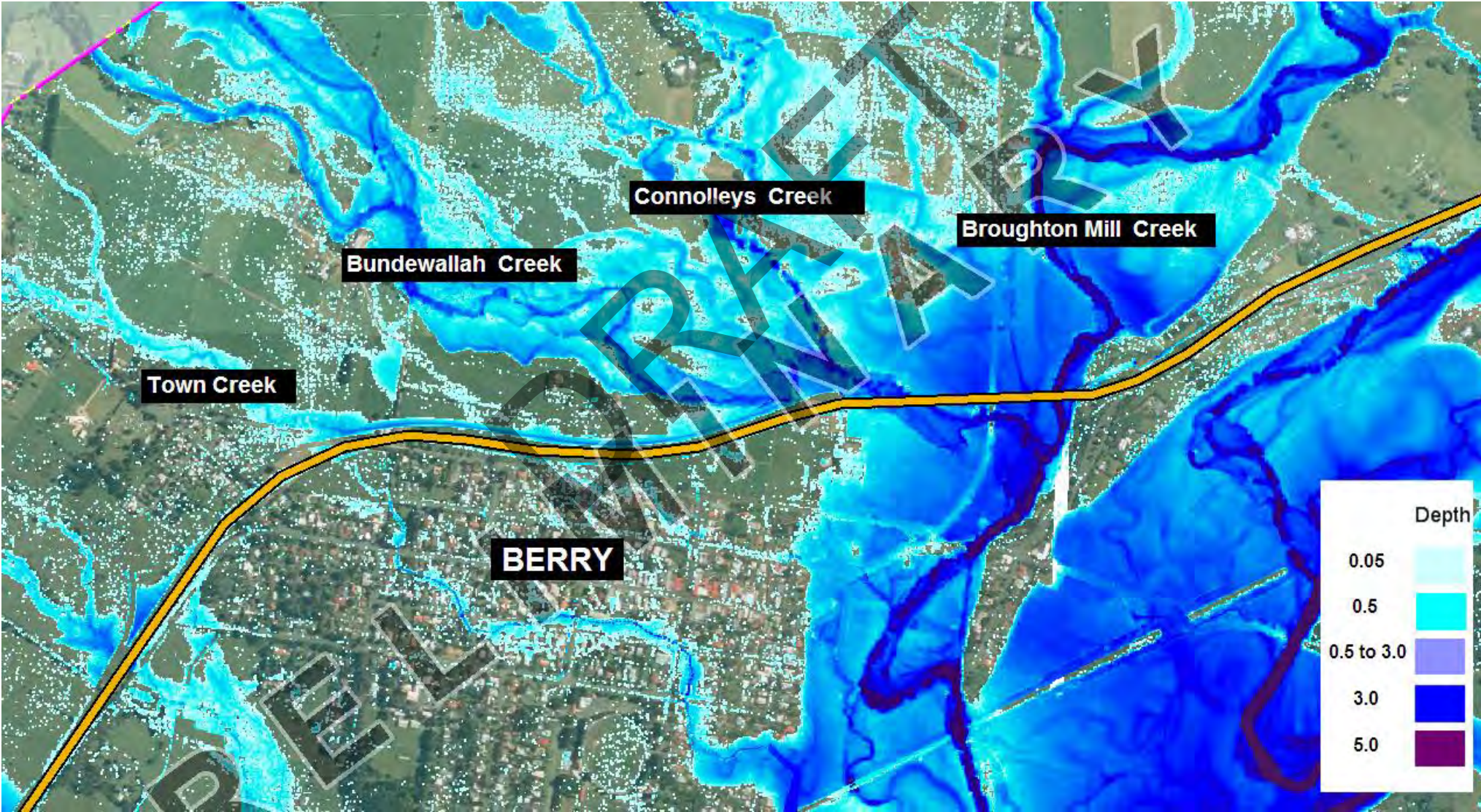
Transport
Roads & Traffic
Authority



Action 2. The amenity of North Street - Examine an alignment further to the north



Transport
Roads & Traffic
Authority



Action 3. The amenity of North Street - Examine an alignment further to the north



Transport
Roads & Traffic
Authority

Consequences

- A bridge of approximately 1200 metres length would be required to cross the flood plain
- Increases the amount of land severance and impact on rural properties
- The strategic cost estimate is \$300 million (over current cost of \$170 million)

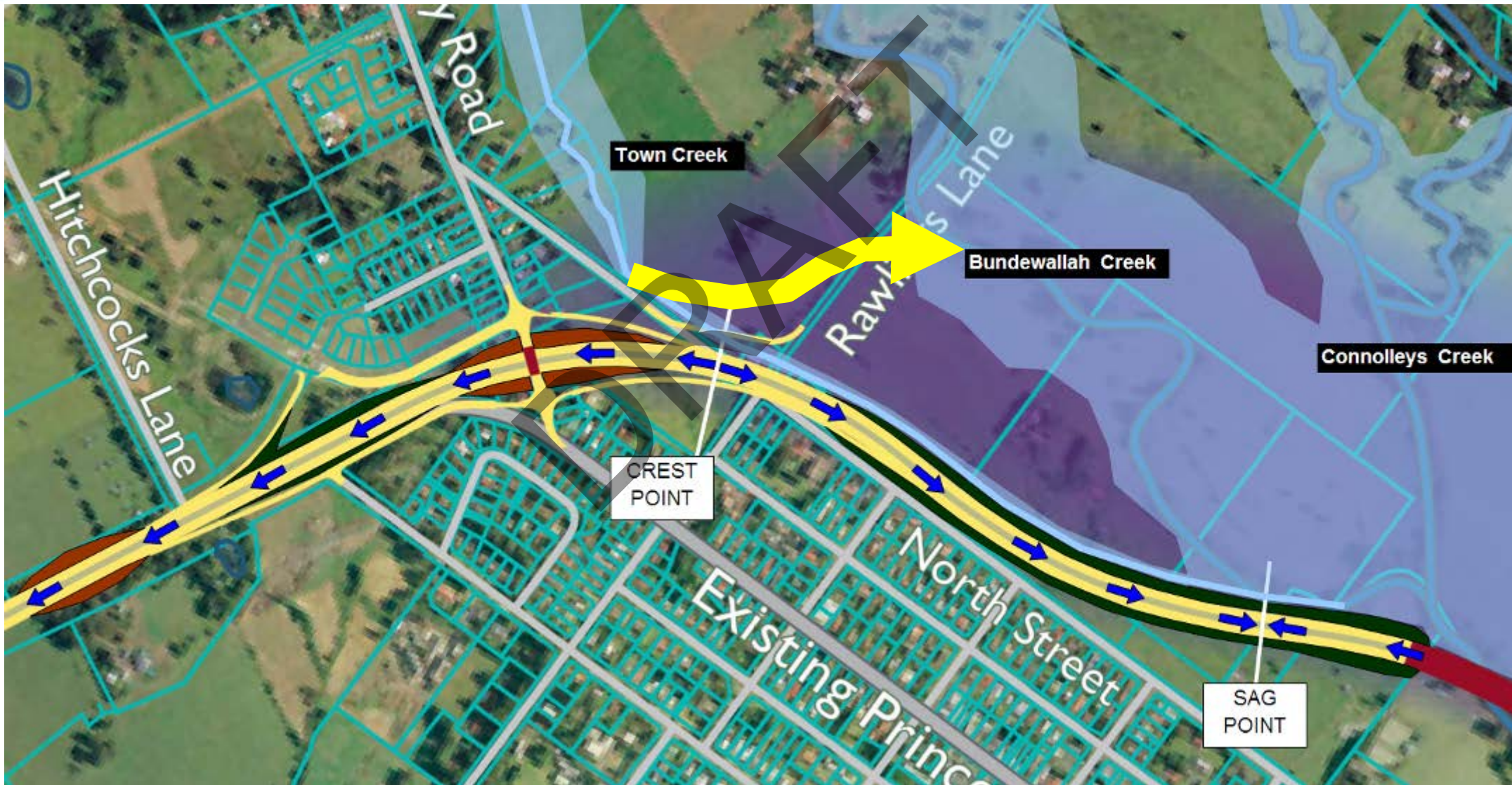
Problem 2 Flooding

DRAFT

Flooding and management along the alignment north of North Street – Action 1. Rerouting Town Creek



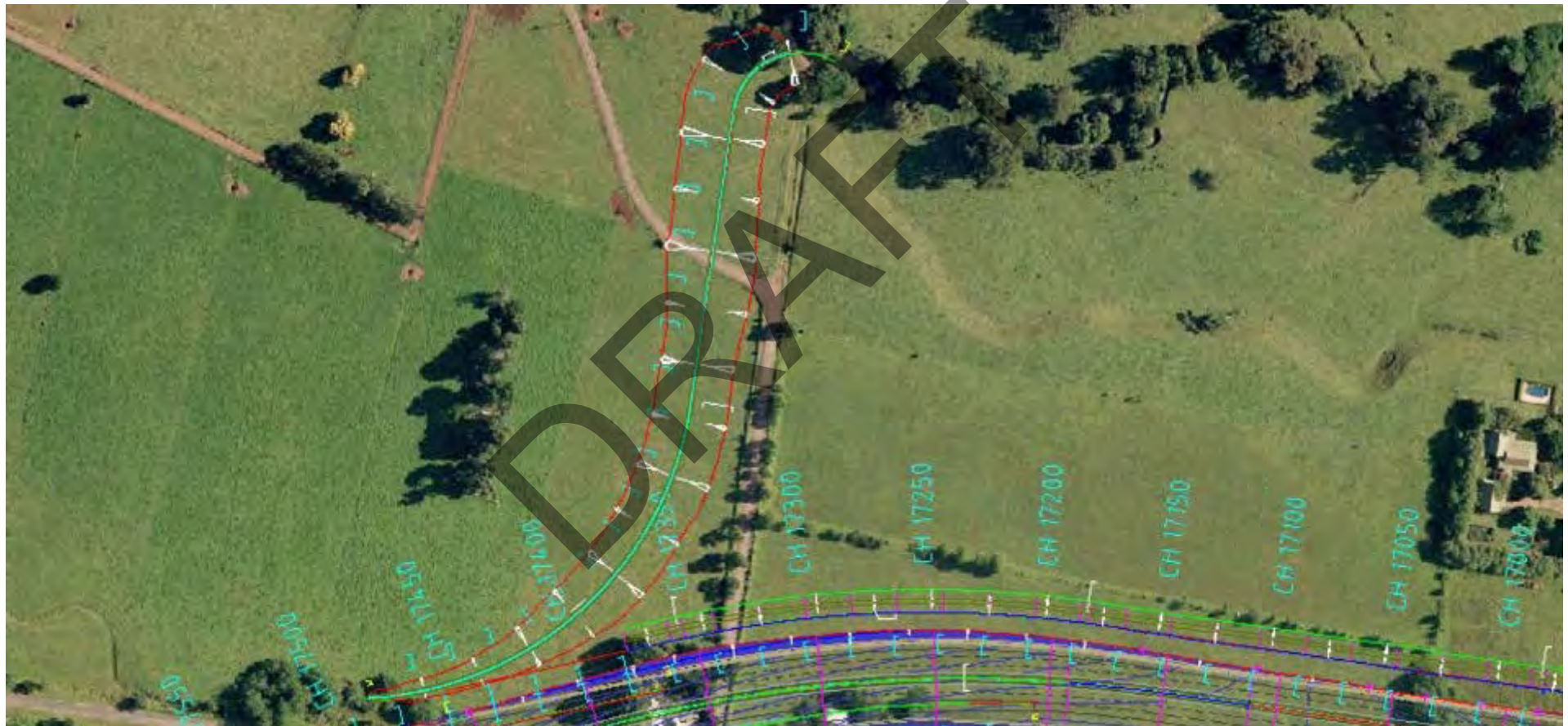
Transport
Roads & Traffic
Authority



Flooding and management along the alignment north of North Street – Action1. Rerouting Town Creek



Transport
Roads & Traffic
Authority



Flooding and management along the alignment north of North Street – Action 1. Rerouting Town Creek



Transport
Roads & Traffic
Authority

Rerouting

Discussions with Council ongoing.

Consequences

Environmental impacts – effects on riparian landscape

Impacts on 2 farms

Improved flood management for the town of Berry.

Mitigation

discussions with Council needed.

Flooding and management along the alignment north of North Street – Action 3. Examine pumps



Transport
Roads & Traffic
Authority

3. Consider using pumps in the lowered highway area.

RTA advice to date as to this practice was that it is preferable we do not use these. Pacific Highway use at Tugan – see comment.

Consequences

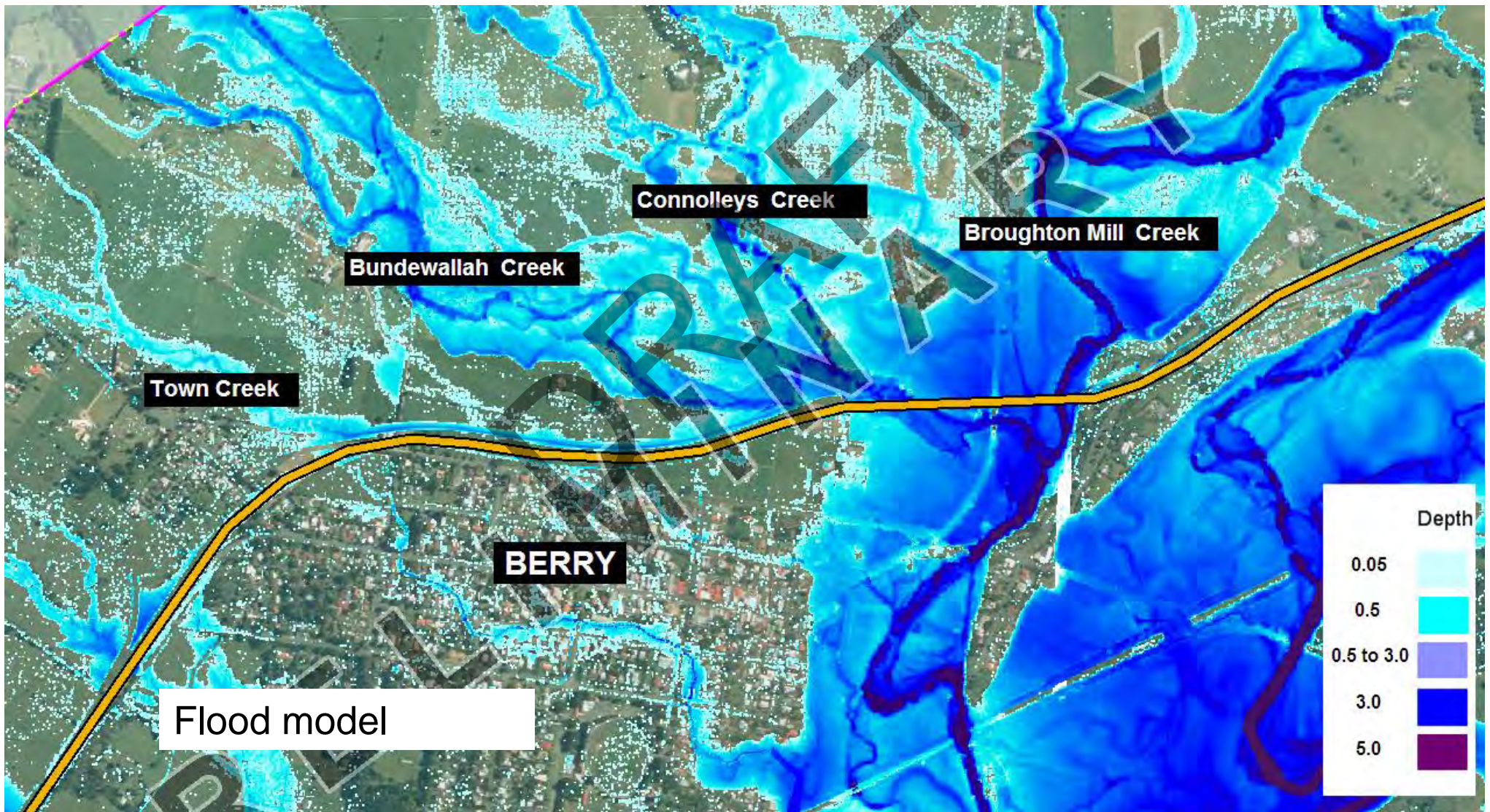
If the pump fails due to blockages or power failures (experience in the Airport Tunnel and Parramatta Road at Granville under the railway, shows they do) the road will flood, rendering it impassable and dangerous.

Problem 3.

The visual impact and amenity of the highway at Woodhill Mountain Road

DRAFT

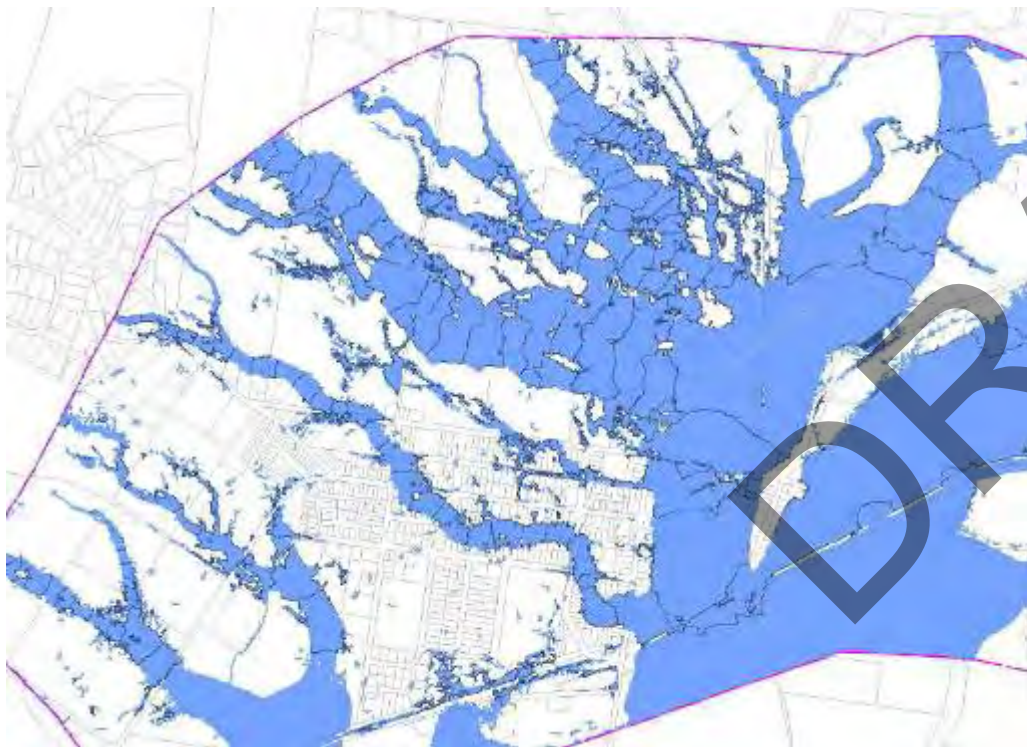
3.1. Action: Examine Council's and Cardno's estimate of heights for 1:20 and 1:100.



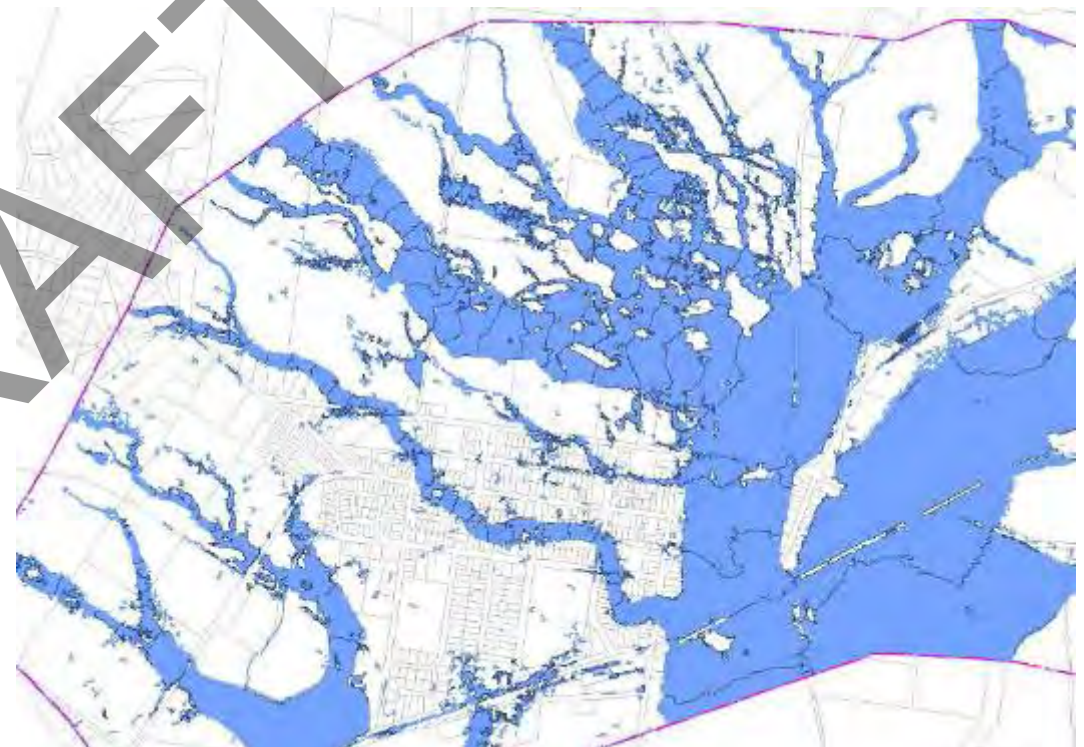
3.1. Action: Examine Council's and Cardno's estimate of heights for 1:20 and 1:100.



Transport
Roads & Traffic
Authority



1:100 year flood model

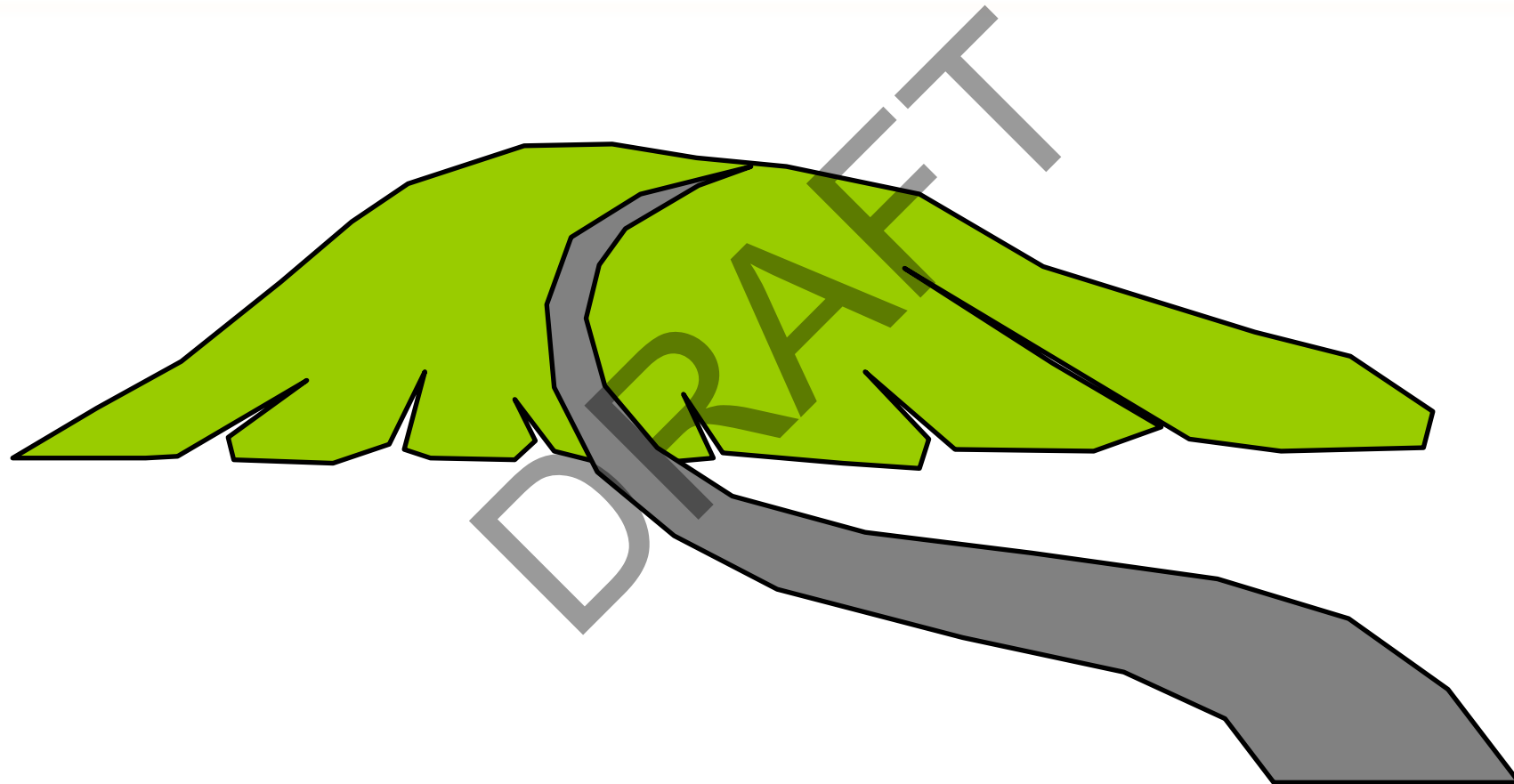


1: 20 year flood model

**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - Bruce's ideas:
Examine lowering the highway cutting in the ridge**



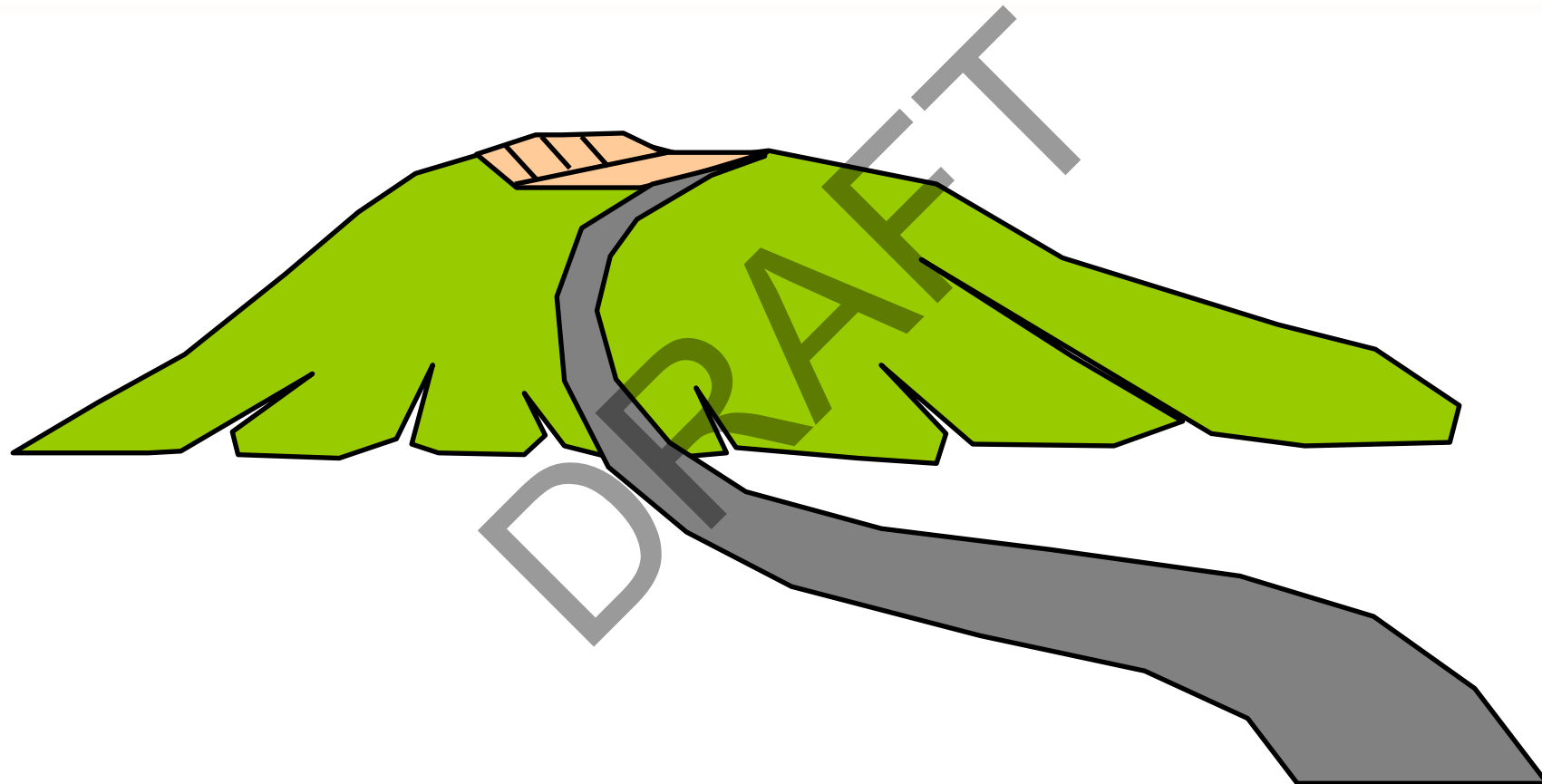
Transport
Roads & Traffic
Authority



**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - Bruce's ideas:
Examine lowering the highway cutting in the ridge**



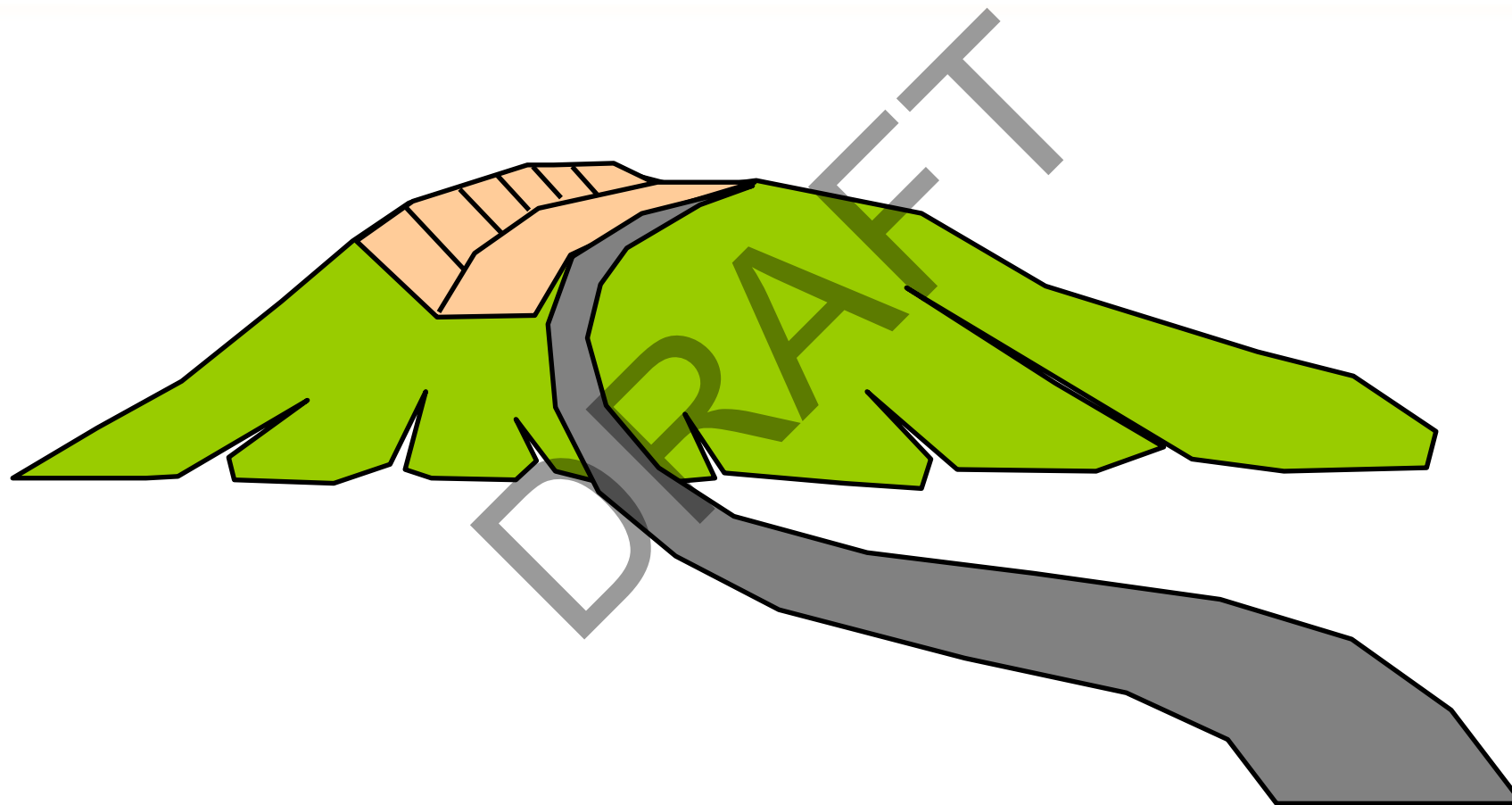
Transport
Roads & Traffic
Authority



**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - Bruce's ideas:
Examine lowering the highway cutting in the ridge**



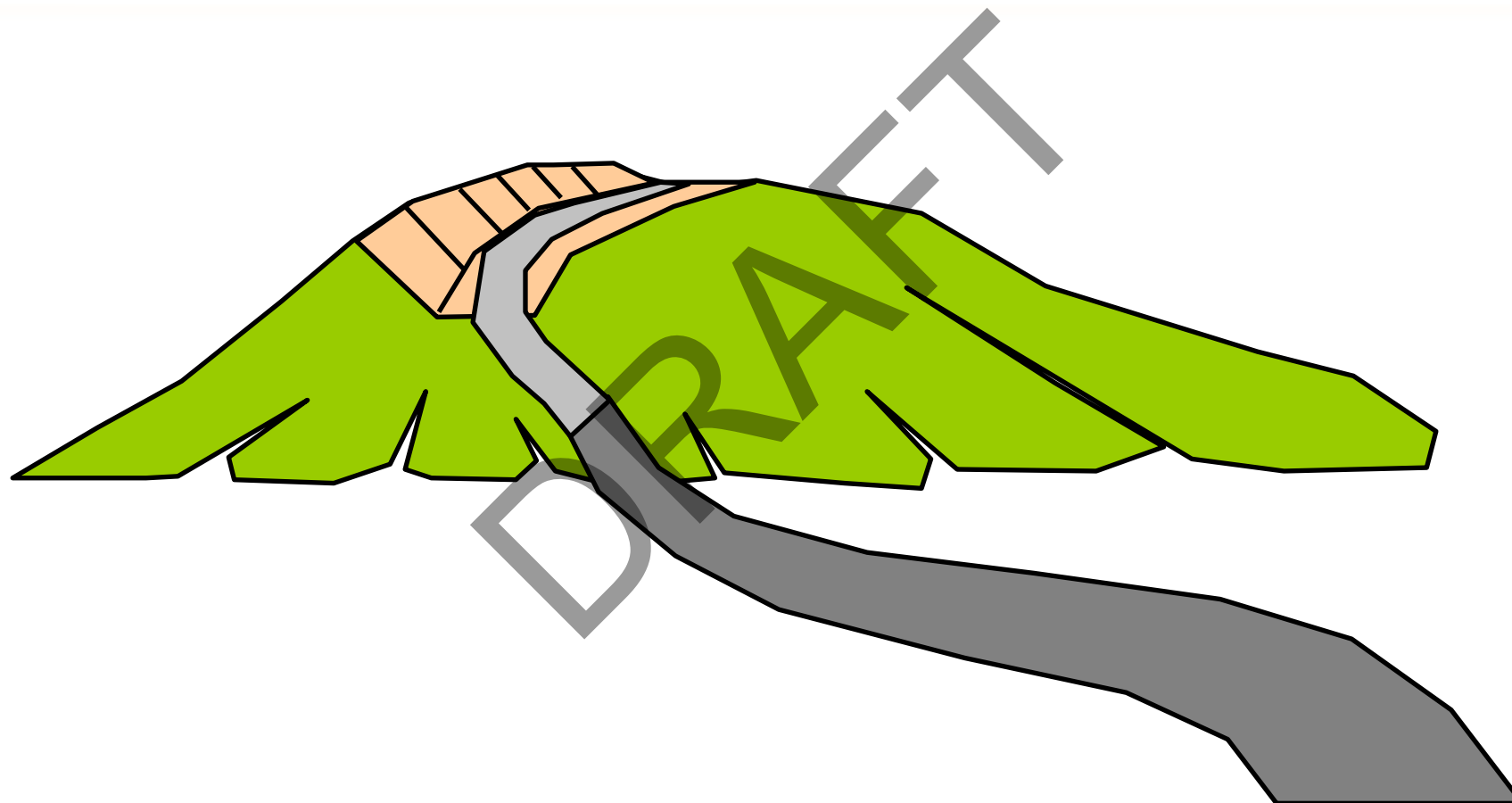
Transport
Roads & Traffic
Authority



**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - Bruce's ideas:
Examine lowering the highway cutting in the ridge**



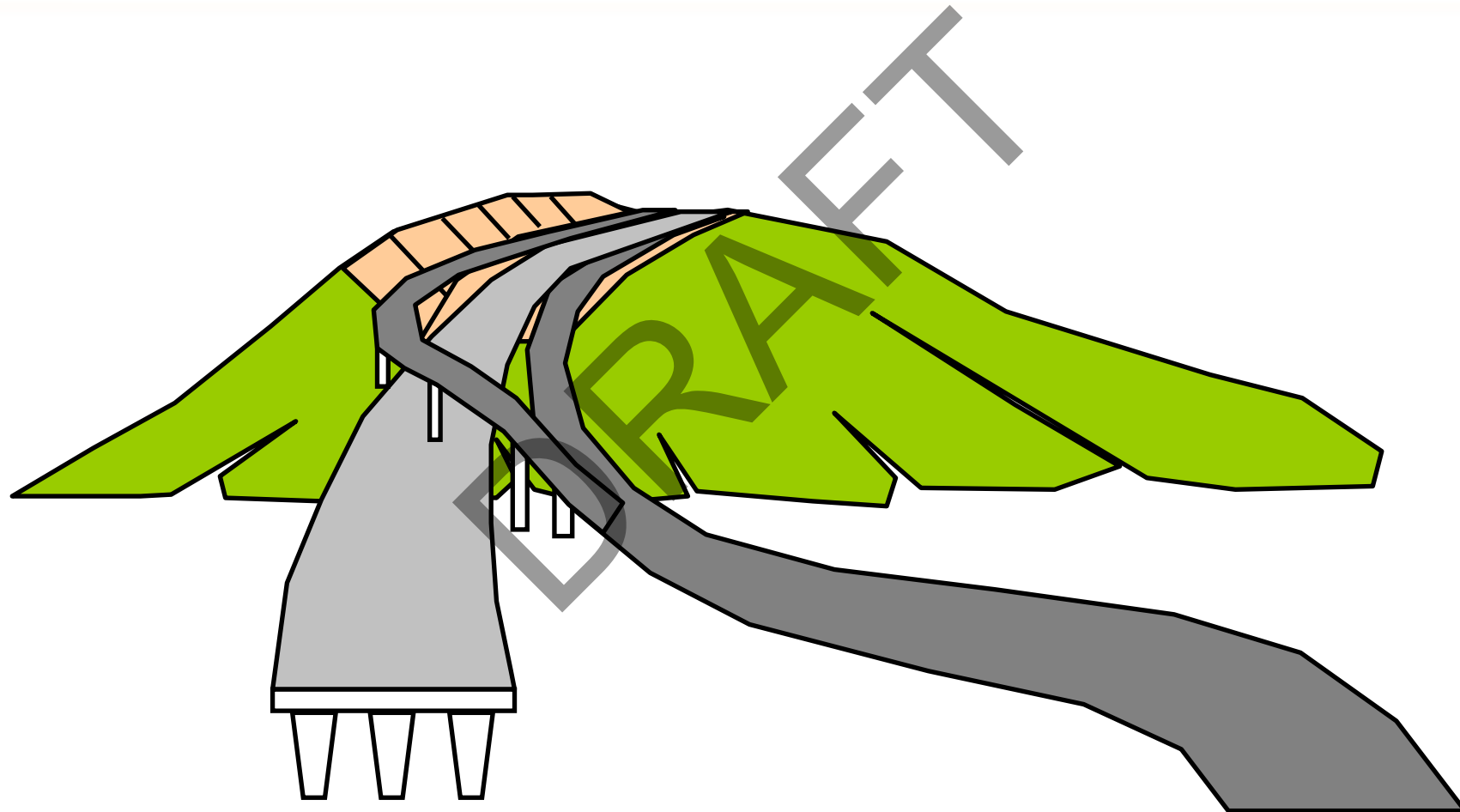
**Transport
Roads & Traffic
Authority**



**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - Bruce's ideas:
Examine lowering the highway cutting in the ridge**



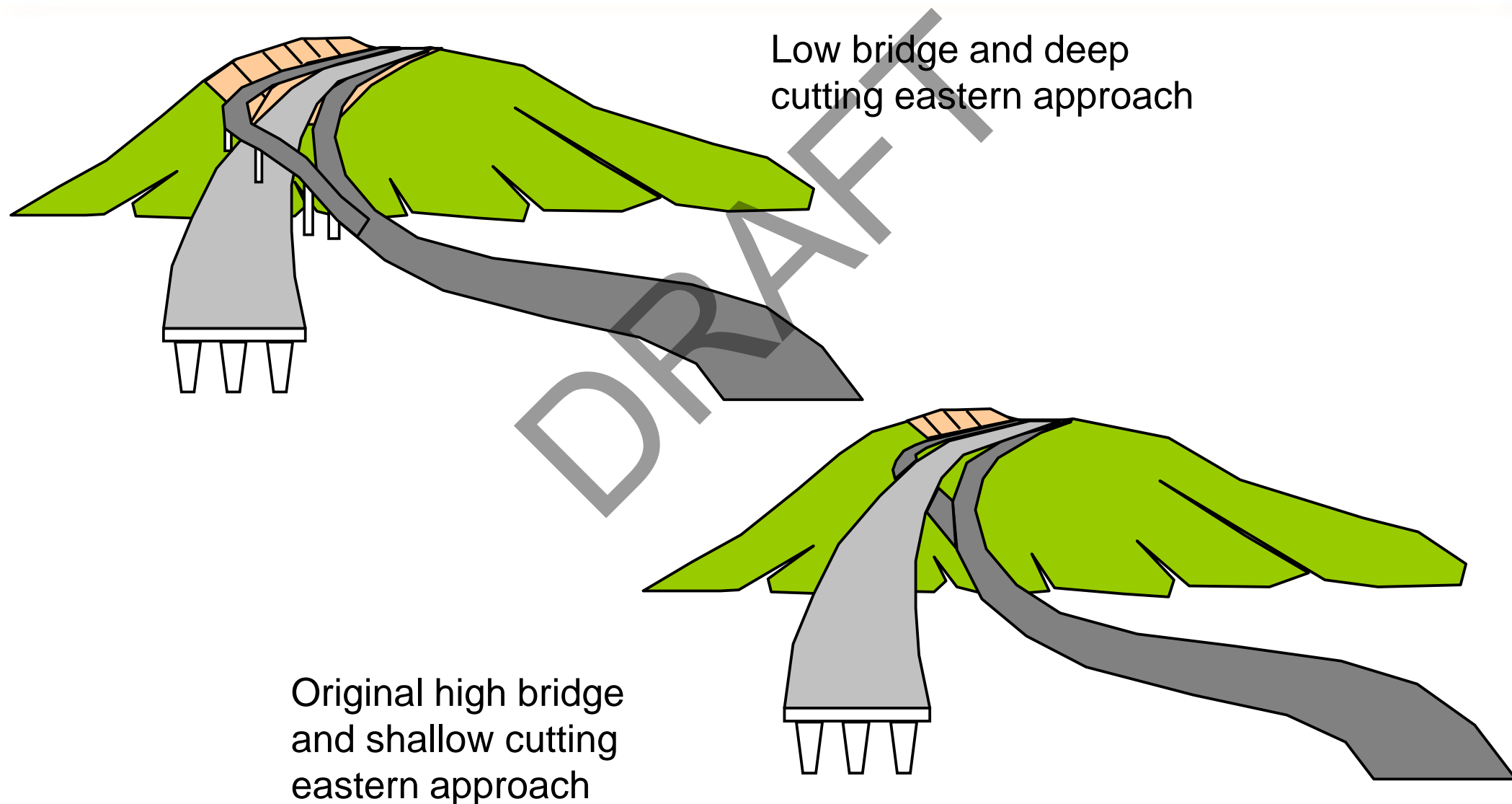
Transport
Roads & Traffic
Authority



**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - Bruce's ideas:
Examine lowering the highway cutting in the ridge**



**Transport
Roads & Traffic
Authority**



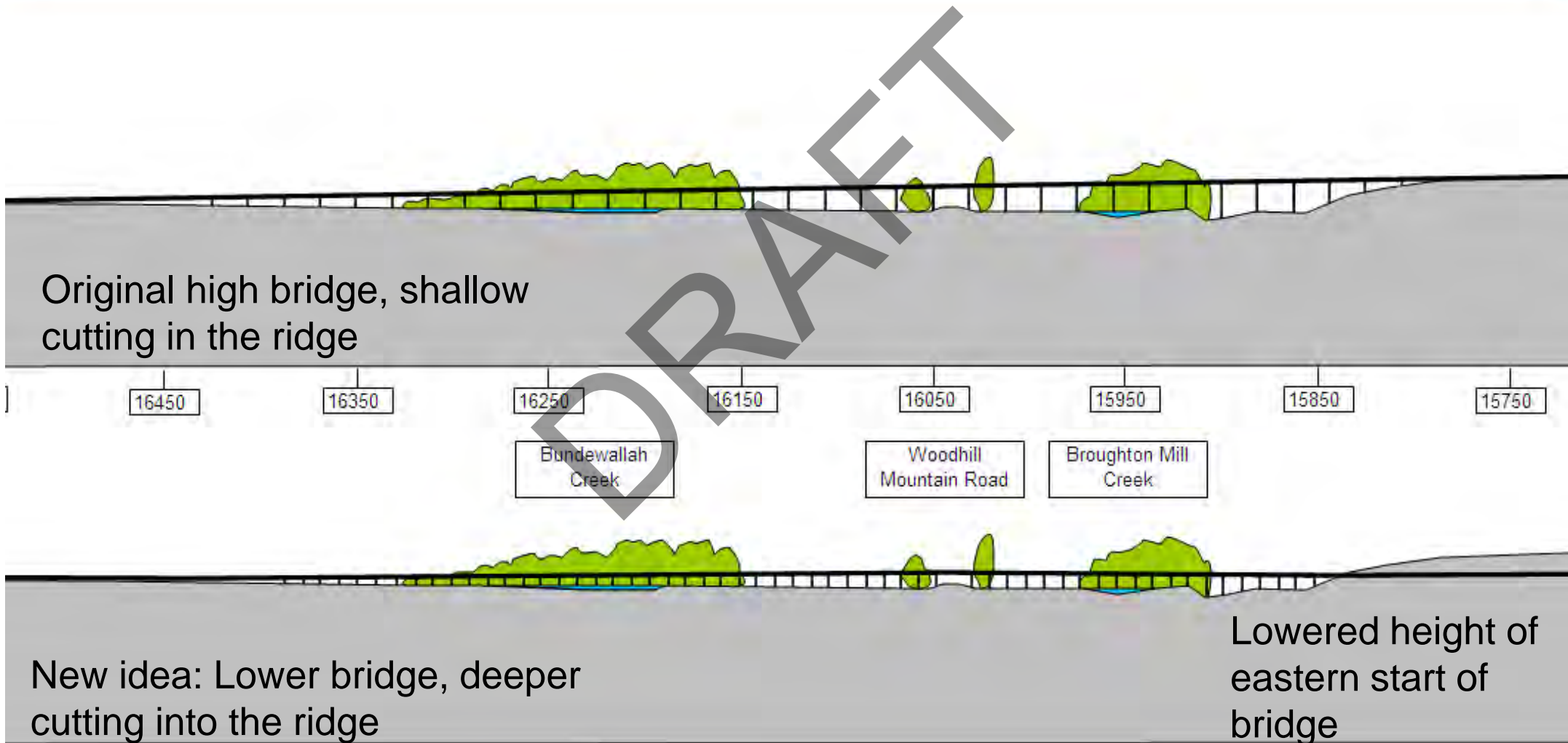
Low bridge and deep
cutting eastern approach

Original high bridge
and shallow cutting
eastern approach

Comparing the original proposal with new ideas



Transport
Roads & Traffic
Authority



3.2. Action: Consider how to reduce the height of the bridge at the eastern end - community ideas: Examine lowering the highway cutting in the ridge



Transport
Roads & Traffic
Authority

Consequences of a deeper cutting:

- The height of the bridge would be lowered.
- Improved visuals at Woodhill Mountain Road.
- Large environmental impact of mountain removal.
- This cutting would excavate 540,000m³ of surplus excavated material.
- This would require approx. 36,000 extra loaded truck trips to transport the soil somewhere.
- Assuming a typical 15m³ capacity truck this would mean 270 truck loads per day for about 7 months.
- Removing soil: hydraulic rock breakers and bursters would be needed as the rock strength increases lower down.
- The strategic cost estimate at this stage is \$250 million (original higher bridge option is \$170 million).

Mitigation

- Currently design estimates are we need soil in Bomaderry, but not this much.
- If the surplus were used on the next section to Bomaderry it would increase the average height of the road by 1metre.
- More thought needed.

3.2. Action: Consider how to reduce the height of the bridge at the eastern end - community ideas: Examine lowering the highway cutting in the ridge



Cut and cover tunnel – includes:

- Would require a lighting system.
- Would require a jet fan based ventilation system and likely require a portal exhaust system. An air outlet may also be needed to disperse the air - depending on proximity to residences and NSW government environmental approvals.
- Would require a dual redundant high voltage electrical system with one or two substations.
- Would require a deluge system, probably with large water storage tanks.

Consequences of cut and cover tunnel (600 metre tunnel):

- The height of the bridge would be lowered.
- Improved visuals at Woodhill Mountain Road.
- Large environmental impact
- Some soil could be replaced back on the tunnel cover.
- Estimated the strategic cost for a cut and cover tunnel would be over \$300 million (original higher bridge option is \$170 million).

Mitigation

- More needed

**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - community ideas:
Examine lowering the highway cutting in the ridge**



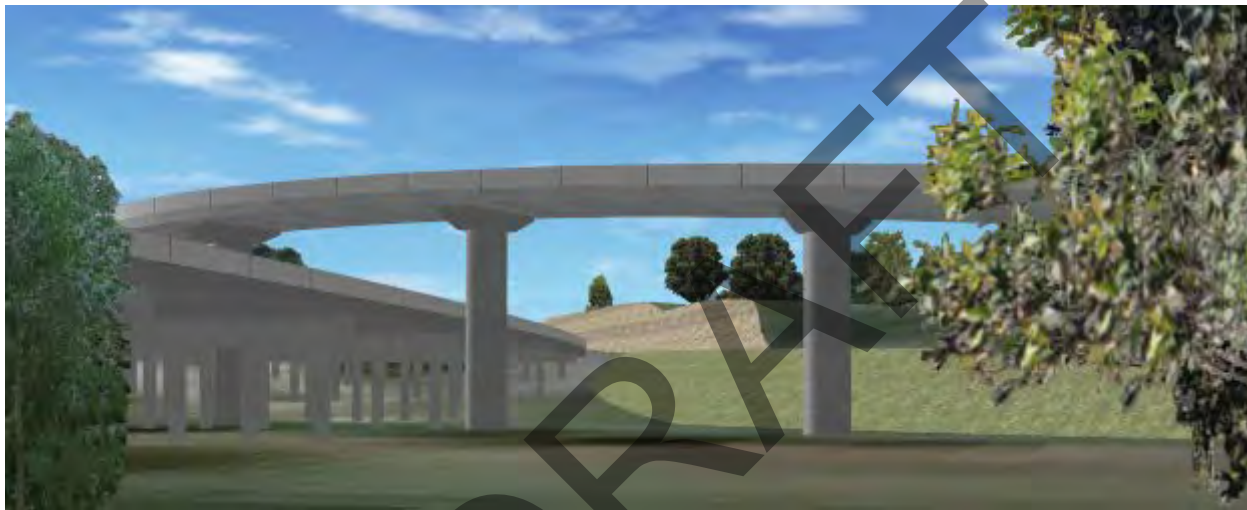
Deep cut, low
bridge idea



**View of Berry
Bridge looking
east**

Original proposal,
shallow cut, high
bridge

**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - community ideas:
Examine lowering the highway cutting in the ridge**



Deep cut, low
bridge idea



**View of Berry
Bridge looking
east**

Original proposal,
shallow cut, high
bridge

3.2. Action: Consider how to reduce the height of the bridge at the eastern end - community ideas: Examine lowering the highway cutting in the ridge



Transport
Roads & Traffic
Authority



Deep cut, low
bridge idea



View looking west
from eastern
approach to Berry
Bridge

Original proposal,
shallow cut, high
bridge

**3.2. Action: Consider how to reduce the height of the bridge at the eastern end - community ideas:
Examine lowering the highway cutting in the ridge**



Deep cut, low
bridge idea



**View looking
south from
Woodhill Mountain
Road**

Original proposal,
shallow cut, high
bridge

3.4. Action: Examine other construction types (more piers) to reduce the costs



Type of bridge investigated is called planked bridge, using 15 metre spans.

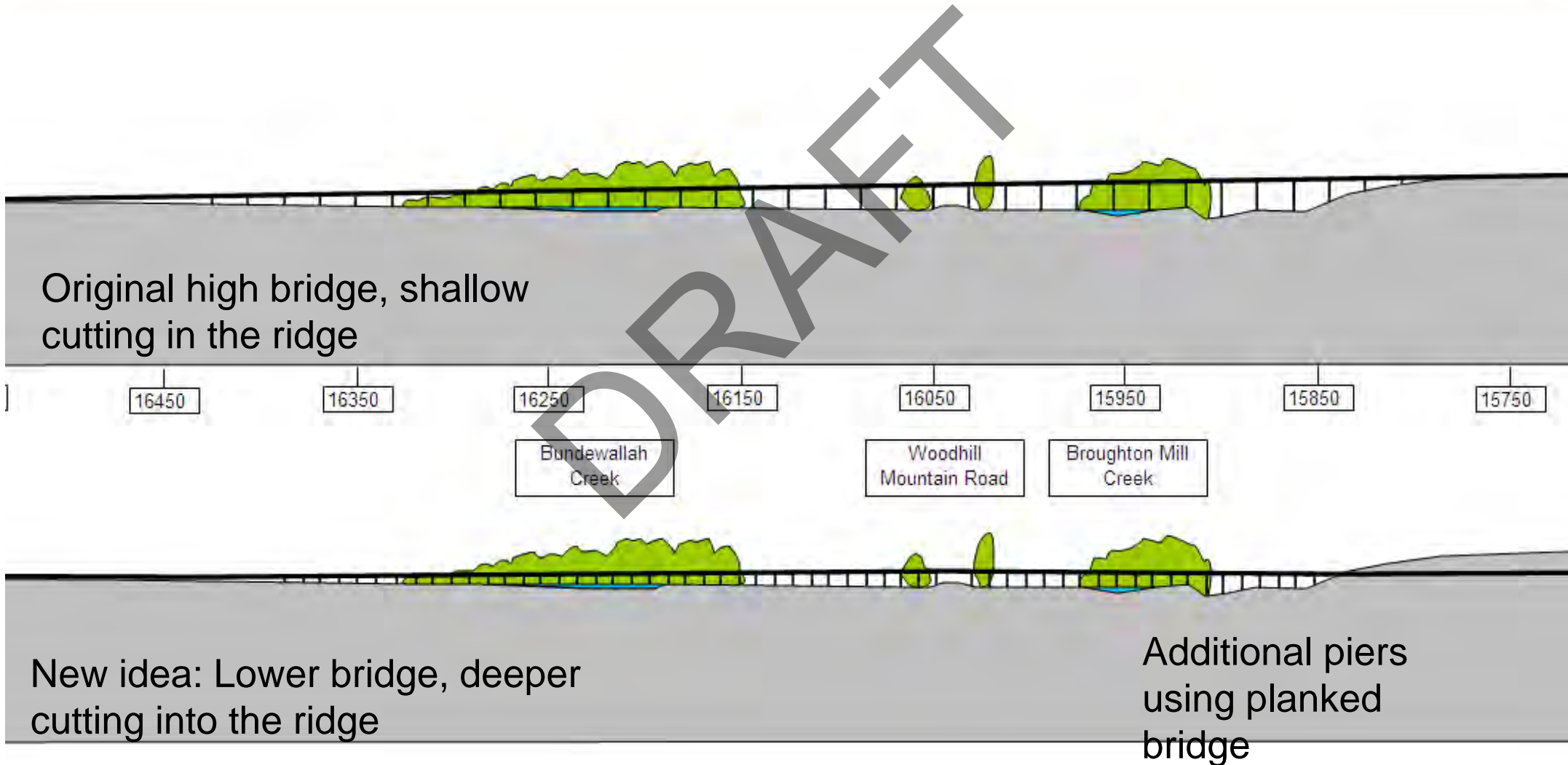
Changing the Berry bridge to 15metre long plank beams from 35 metre long super tee beams increases the number of spans from approximately 16 to 38.

DRAFT

Comparing the original proposal with new ideas



Transport
Roads & Traffic
Authority



3.4. Action: Examine other construction types (more piers) to reduce the costs



Consequences of planked bridge

- Cheaper to construct
- More spans, more piers (16 to 38)
- More piers in floodwater, greater impact in flood
- More impact on riparian areas

Mitigation

- Difficult
- Estimates to date for deeper cutting into the ridge INCLUDE planked bridge.

Our problems

4. The design and aesthetics of the Berry bridge

Actions:

4.1. Give special attention to the bridge's proportions and aesthetic befitting of its vicinity to Berry. Get urban designers on board. **NEXT PRESENTER**

5. Noise – noise management and resident impacts

Actions:

5.1. Examine the appearance of a lowered highway and what that entails VR **NEXT ANIMATION**

5.2. Examine the noise wall options with the lowering of the highway in the vicinity of North Street **NEXT ANIMATION**

6. (subset of noise) Shadow impact for residents

6.1. Action: virtual reality to show potential shadowing issues at various locations. **NEXT ANIMATION**

7. The noise generated from the design of joints on the bridge

Actions: RTA to examine

- different types of bridge expansion joints: modular, fingerplate

Options to improve design

- Bridge design impacts joint number and types
- Tender for design and construct could include environmental performance as a key criteria
- Can be a different design to Minamurra

HYPERLINKS TO ANIMATIONS



- [Fly-pass current option](#)
- [Fly-pass low bridge deep cutting option](#)
- [Drive through – current option](#)
- [Winter solstice shadow tracking](#)
- [North Street area walk](#)



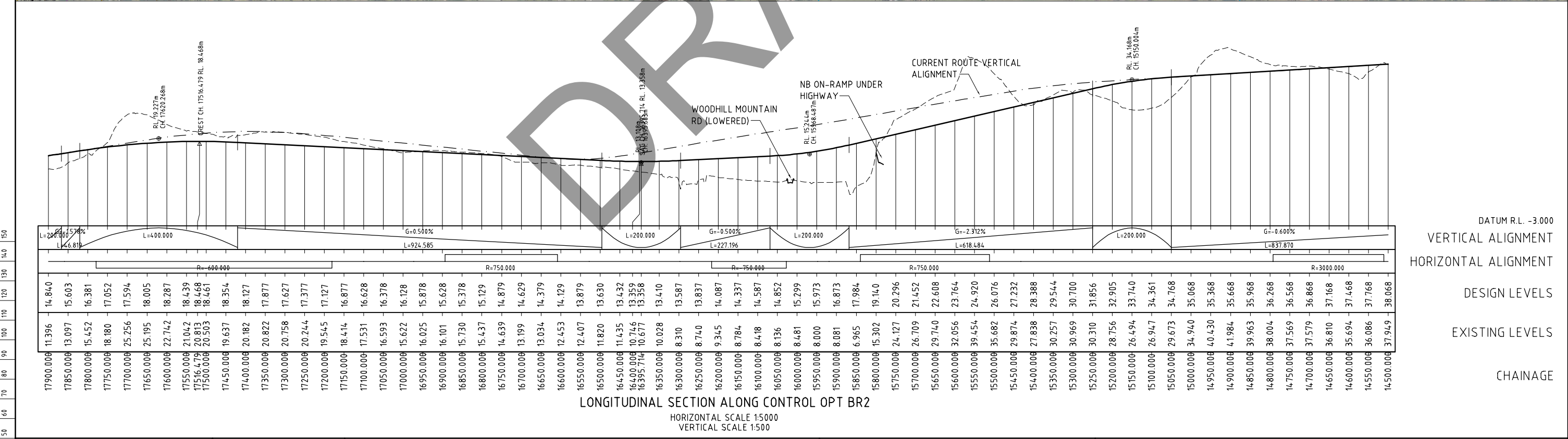
END

DRAFT

Appendix 7 BR2 Option – General Arrangement

DRAFT



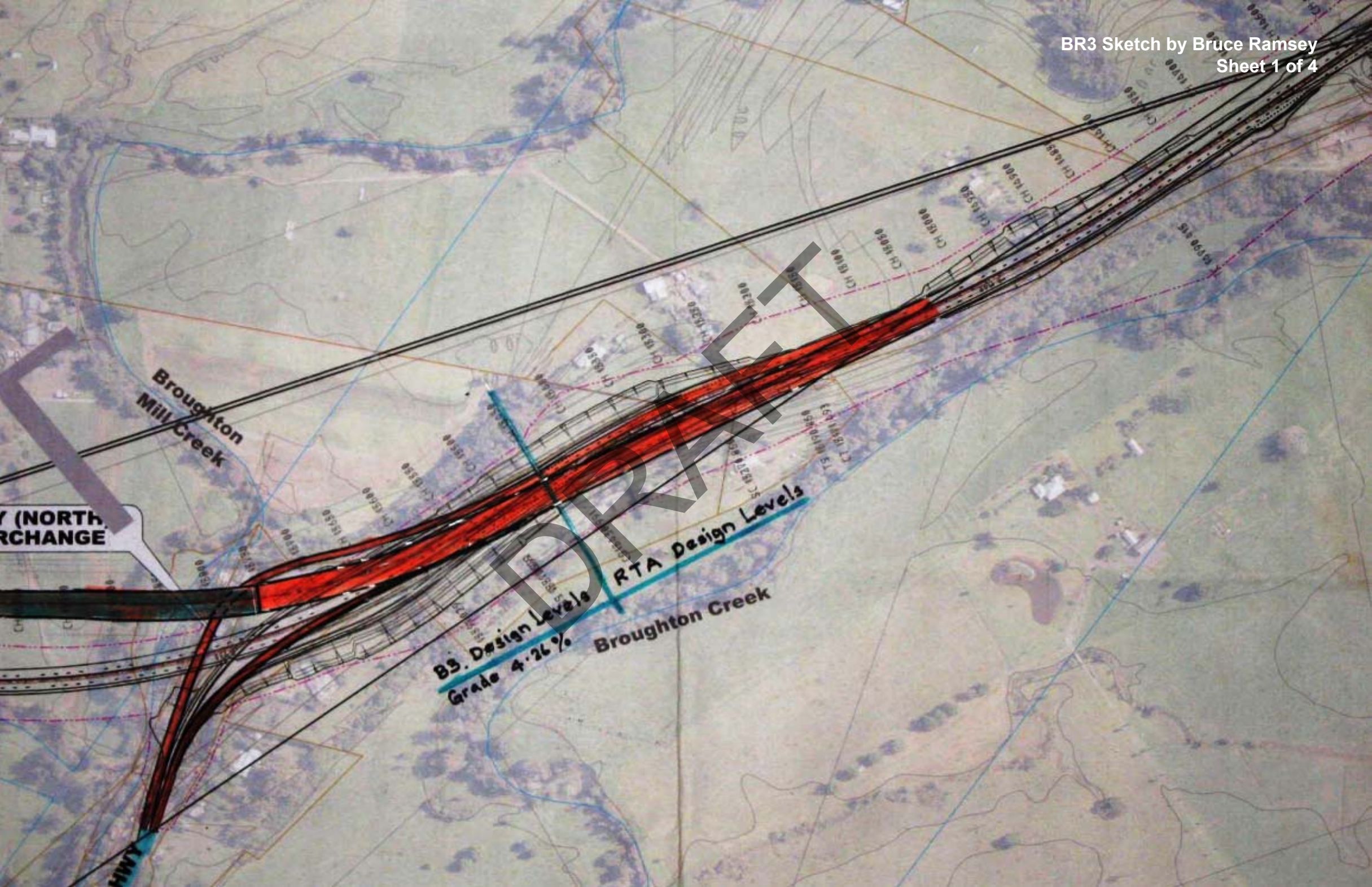


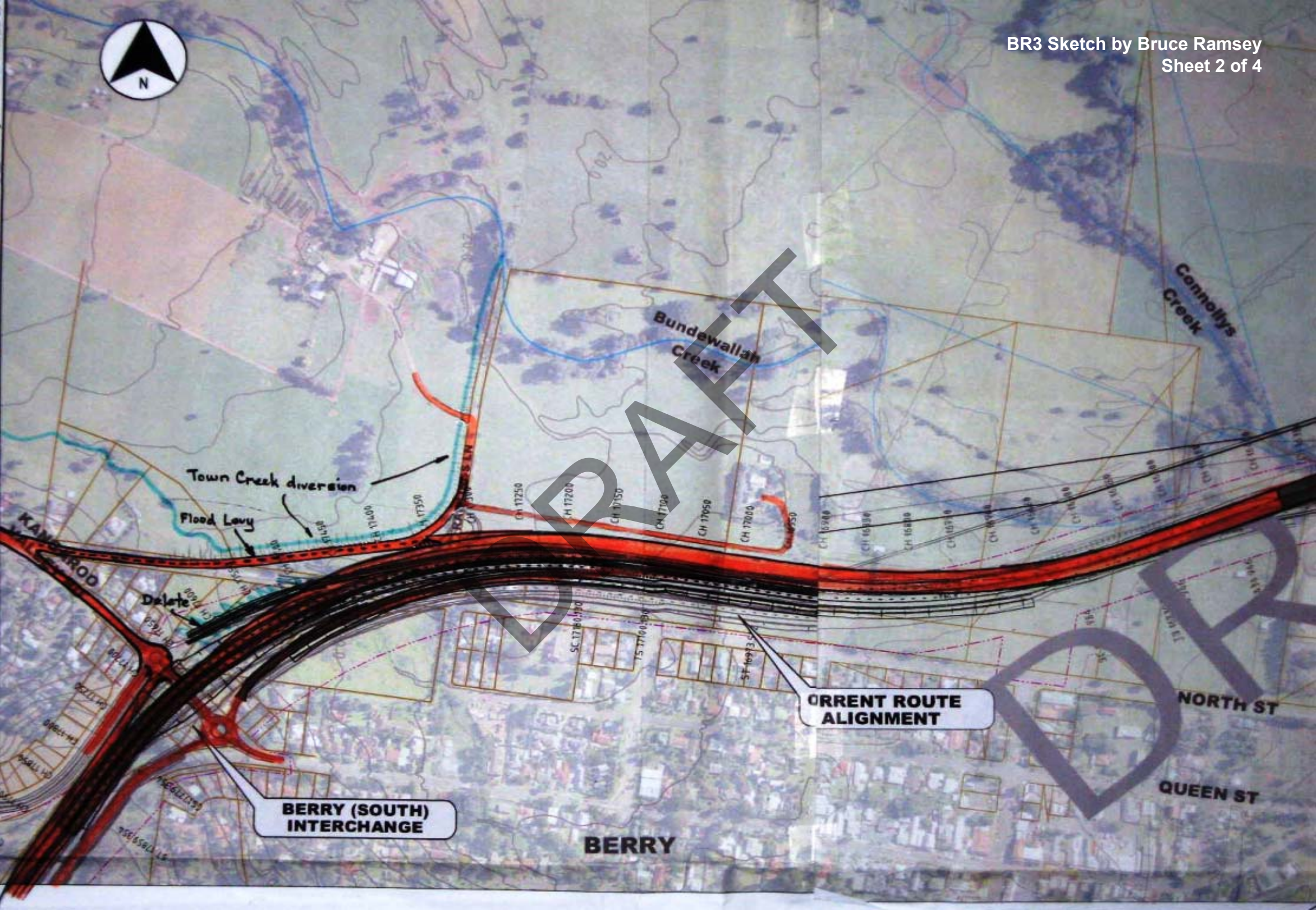
DESIGNER: 	SCALES:	FOXGROUND & BERRY BYPASS CONCEPT DESIGN		INFORMATION DOCUMENT
		GENERAL ARRANGEMENT PLAN BERRY BYPASS OPTIONS LOWERED ALIGNMENT - BR2		
AECOM Australia Pty Ltd A.B.N. 20 093 846 925				

**Appendix 8 BR3 Sketch and Workshop #2
Options Presentation**

DRAFT







Town Creek diversion

Flood Levy

Delete

Bundewallah
Creek

Cannollys
Creek

KAWAROD

ORRENT ROUTE
ALIGNMENT

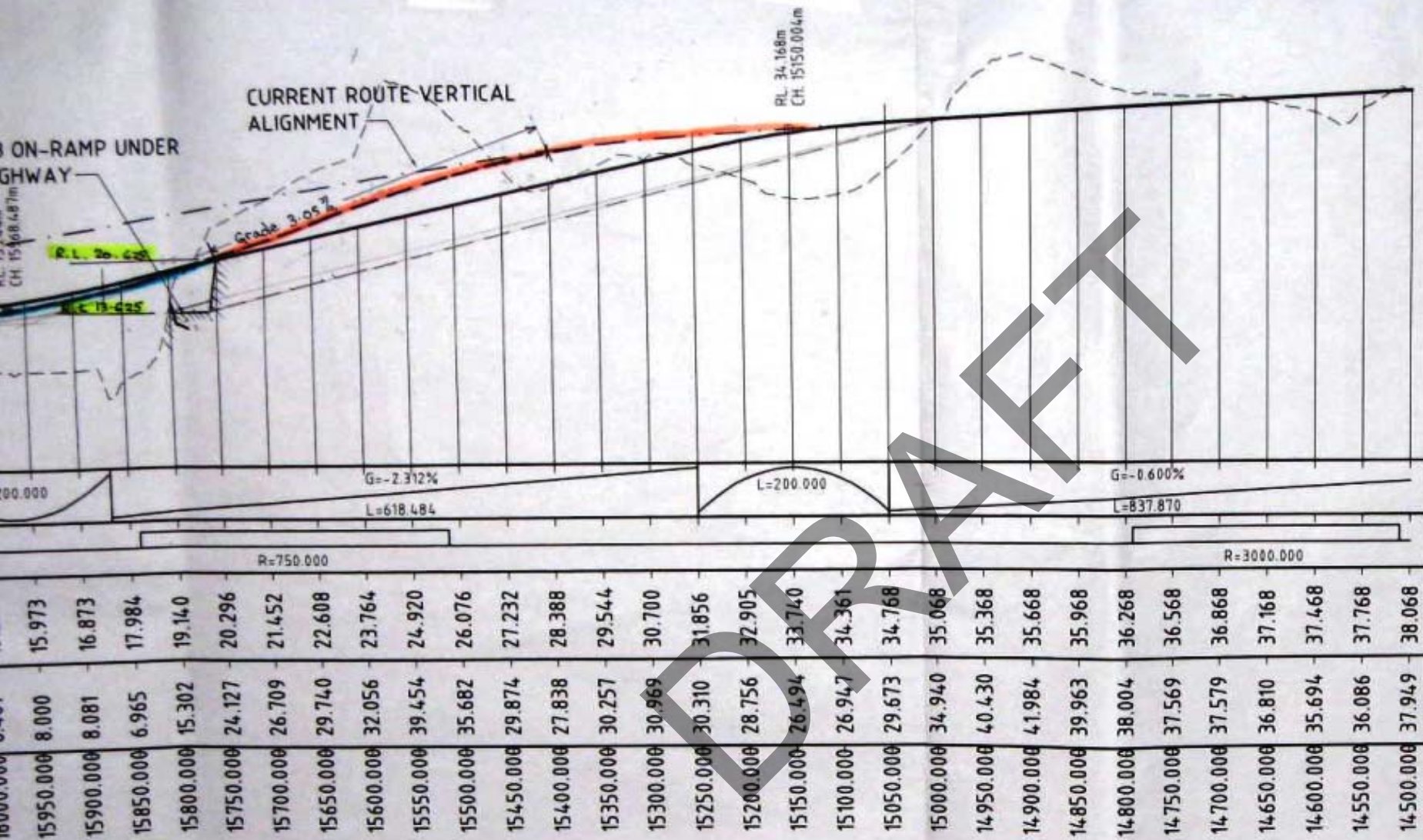
BERRY (SOUTH)
INTERCHANGE

BERRY

NORTH ST

QUEEN ST

DRAFT



DATUM R.L. -3.000
VERTICAL ALIGNMENT
HORIZONTAL ALIGNMENT
DESIGN LEVELS
EXISTING LEVELS
CHAINAGE

ROL OPT BR2

**FOXGROUND & BERRY BYPASS
CONCEPT DESIGN**

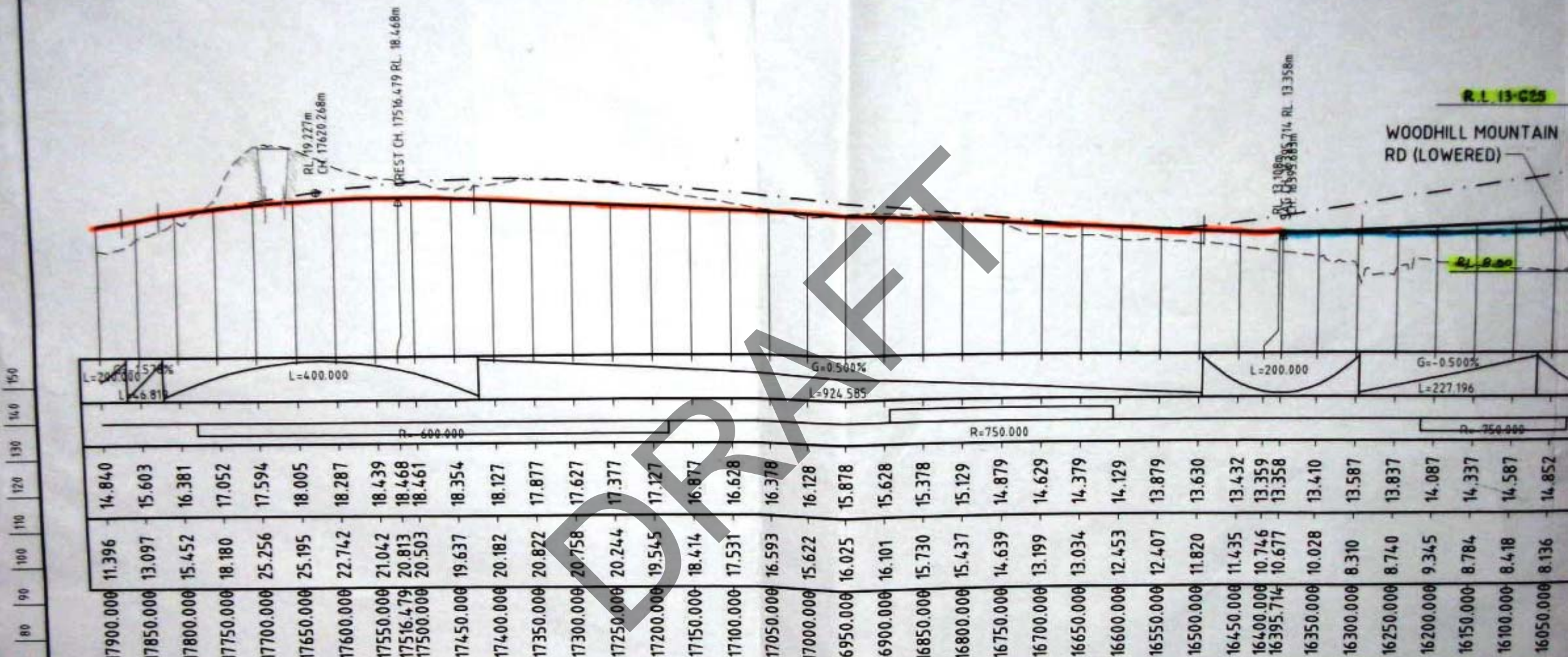
GENERAL ARRANGEMENT PLAN
BERRY BYPASS OPTIONS
LOWERED ALIGNMENT - BR2

INFORMATION DOCUMENT

DOCUMENT NO.

PROJECT NO - DOC. TYPE - PROJECT PHASE - DISCIPLINE - DATE (YYMMDD) - DRAFTER INITIALS - DESCRIPTION

60021933-drg-10-rd-111025-gs_BR2



R.L. 13.025

WOODHILL MOUNTAIN RD (LOWERED)

R.L. 8.00

17900.000	11.396	14.840
17850.000	13.097	15.603
17800.000	15.452	16.381
17750.000	18.180	17.052
17700.000	25.256	17.594
17650.000	25.195	18.005
17600.000	22.742	18.287
17550.000	21.042	18.439
17516.479	20.813	18.468
17500.000	20.503	18.461
17450.000	19.637	18.354
17400.000	20.182	18.127
17350.000	20.822	17.877
17300.000	20.758	17.627
17250.000	20.244	17.377
17200.000	19.545	17.127
17150.000	18.414	16.877
17100.000	17.531	16.628
17050.000	16.593	16.378
17000.000	15.622	16.128
16950.000	16.025	15.878
16900.000	16.101	15.628
16850.000	15.730	15.378
16800.000	15.437	15.129
16750.000	14.639	14.879
16700.000	13.199	14.629
16650.000	13.034	14.379
16600.000	12.453	14.129
16550.000	12.407	13.879
16500.000	11.820	13.630
16450.000	11.435	13.432
16400.000	10.746	13.359
16395.714	10.677	13.358
16350.000	10.028	13.410
16300.000	8.310	13.587
16250.000	8.740	13.837
16200.000	9.345	14.087
16150.000	8.784	14.337
16100.000	8.418	14.587
16050.000	8.136	14.852

LONGITUDINAL SECTION ALONG CONT

HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:500

DESIGNER



AECOM Australia Pty Ltd A.B.N. 20 093 846 925

SCALES:

Review by Vlad Sofrevski, Divisional Director, Mott MacDonald HughesTrueman

Preliminary concept design process for analysing and assessing the road geometry aspect of the BR3 option:

1. Horizontal Geometry

- Location of the highway crossing over Woodhill Mountain Road. The suggested positioning of the crossing in the Bruce sketch was reviewed and was considered to be feasible as it may give opportunity to locally lower Woodhill Mountain Road and therefore lower the highway in the vicinity. To this, it was noted that the land impact (property ownership) will need to be further investigated.
- Highway curve between the hill and Woodhill Mountain Road. The suggested R=600m horizontal curve was reviewed and was found to be not feasible due to the need for a substantial extra pavement to satisfy the sight distance. Also, the westbound carriageway would have safety concerns due to implementation of minimum radius crest vertical curve followed by the minimum horizontal curve of R=600m. To this, the R=750m curve was assessed to be more appropriate as it eliminates/minimises the above concerns.
- The overall horizontal alignment, incorporating the above analysis, was considered to be feasible for further development.

2. Vertical Geometry

- The Highway grading through the flood area and over Woodhill Mountain Road. The suggested lowering of the highway, together with the local lowering of WMR was reviewed and was assessed to be feasible to the extent of lowering the WMR by some 0.5m (to keep the road sub-grade higher than the adjacent drainage swales) and keep the low (sag) on the highway outside the bridge structure. To keep the highway as low as practicable, the 0.5% longitudinal grade (being the minimum acceptable) was put forward for implementation.
- Highway grade between WMR and the hill. The suggested grade increase from 1% up to 3% was reviewed and considered to be feasible due to its length of no more than 350-400m. The noise impact from this grade increase, in terms of uphill grade noise (E/B traffic) and downhill breaking noise (W/B traffic) will need to be further investigated.
- The overall synchronisation of the horizontal and vertical alignment in the vicinity of the hill is not ideal.

3. Further refinements in order to minimise the cut earthworks and impact on properties

- Application of retaining walls along sections of the highway off-load and on-load ramps.
- Identifying areas where cut excavation can be avoided, such as near the gore area of the offload ramp

Parameters considered:

- 650m length examined for comparative purposes: CH15150 to CH15800
- Vertical 3% main line approach grade from the west
- Horizontal main line alignment adjustments to north and/or south
- Minimising use of reinforced earth walls
- Steeper vertical grades to on and off ramps
- Earlier / later start of ramps to utilise existing topography

Development of BR refinements



Transport
Roads & Maritime
Services



BR3-A

- Vertical alignment re-graded to 3%
- RE walls at Kelly Karpentry and NB on-ramp
- Maximum height of N/B on ramp RE wall = 6.5m
- Maximum height of Kelly Karpentry RE wall = 11.0m
- East abutment to western limit
- Excess cut over fill 104,000m³

Development of BR refinements



Transport
Roads & Maritime
Services



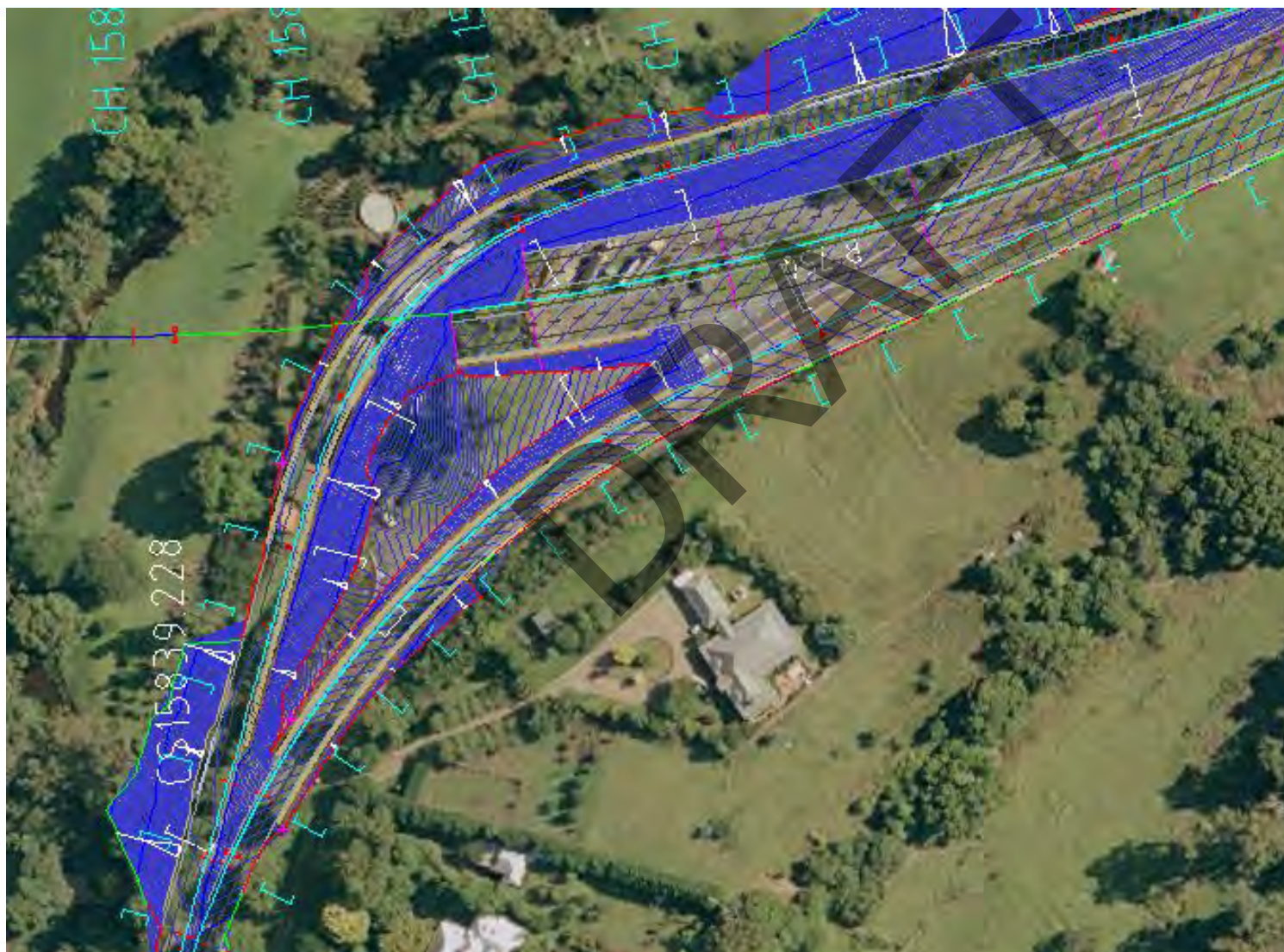
BR3-B

- Vertical alignment regraded to 3%
- Fill batters at Kelly Karpentry and NB on-ramp
- Excess cut over fill 79,000m³
- Introduce mohawk between S/B off ramp and main line

Development of BR refinements



Transport
Roads & Maritime
Services



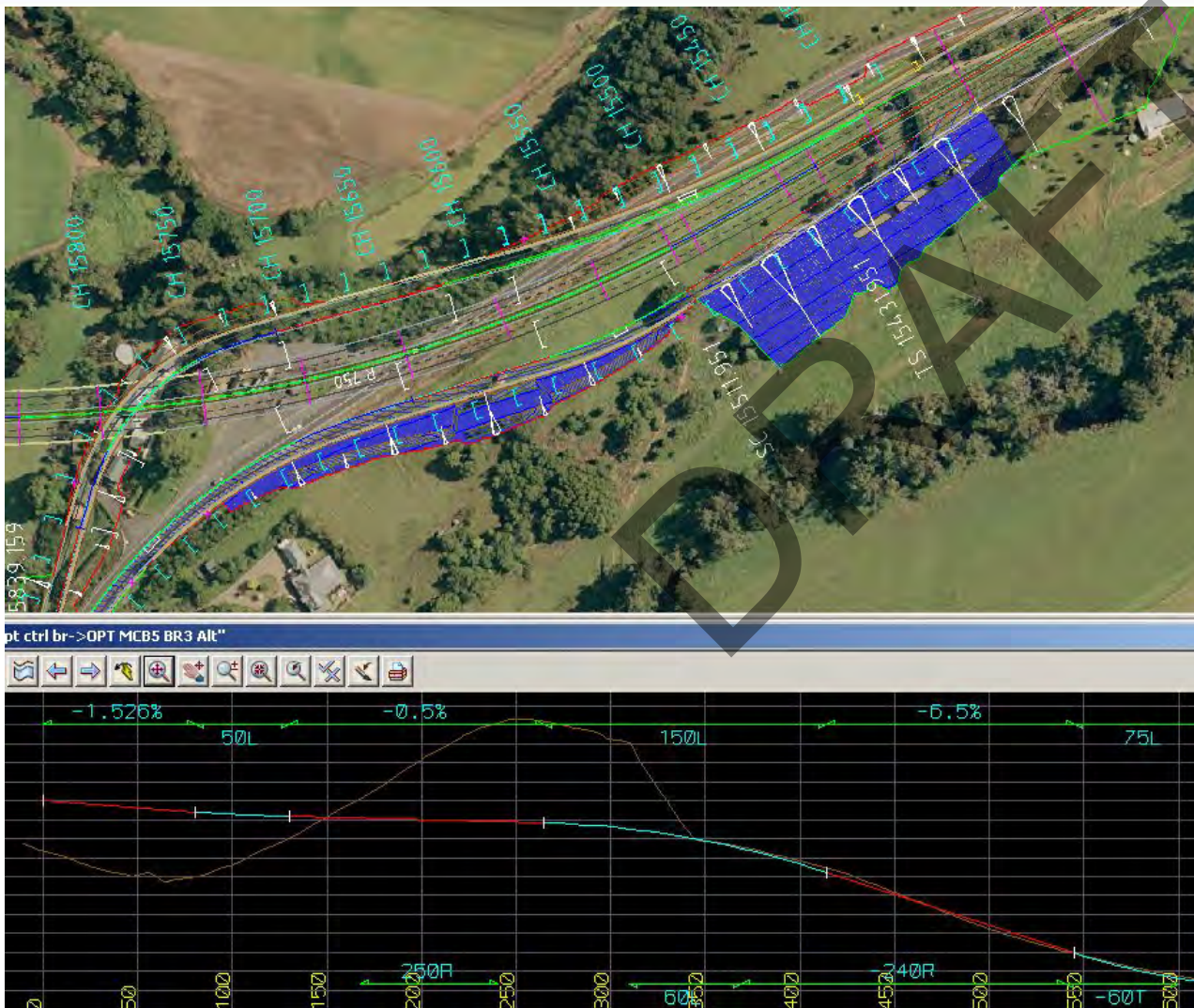
BR3-B

- Introduce mohawk between S/B off ramp and main line

Development of BR refinements



Transport
Roads & Maritime
Services



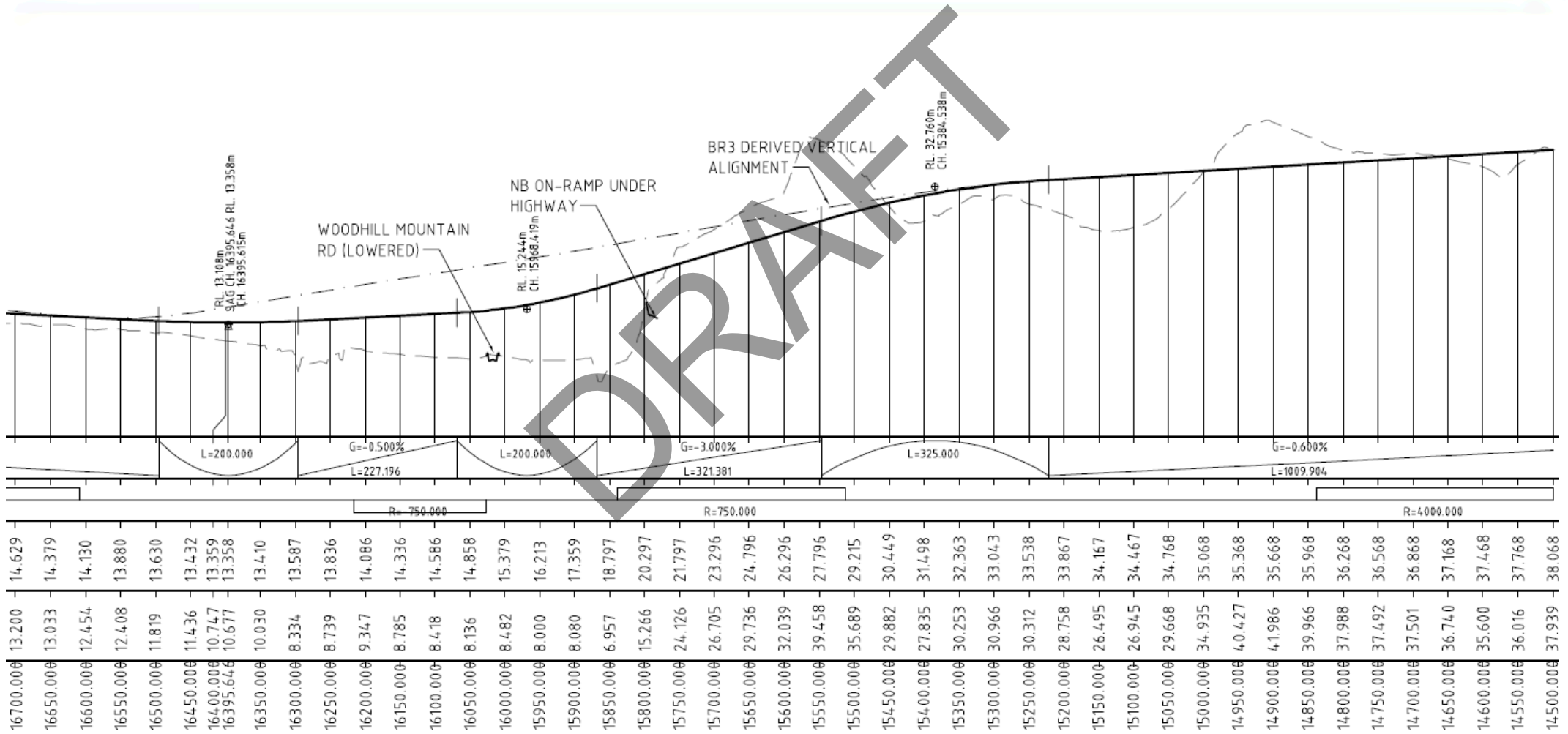
BR3-C

- Vertical alignment re-graded to 3%
- S/B off ramp starts earlier in area of high fill
- Not possible to follow existing terrain
- No cut to fill benefit unless grades of vicinity of +10% and -10%

BR3 Long section



Transport
Roads & Maritime
Services



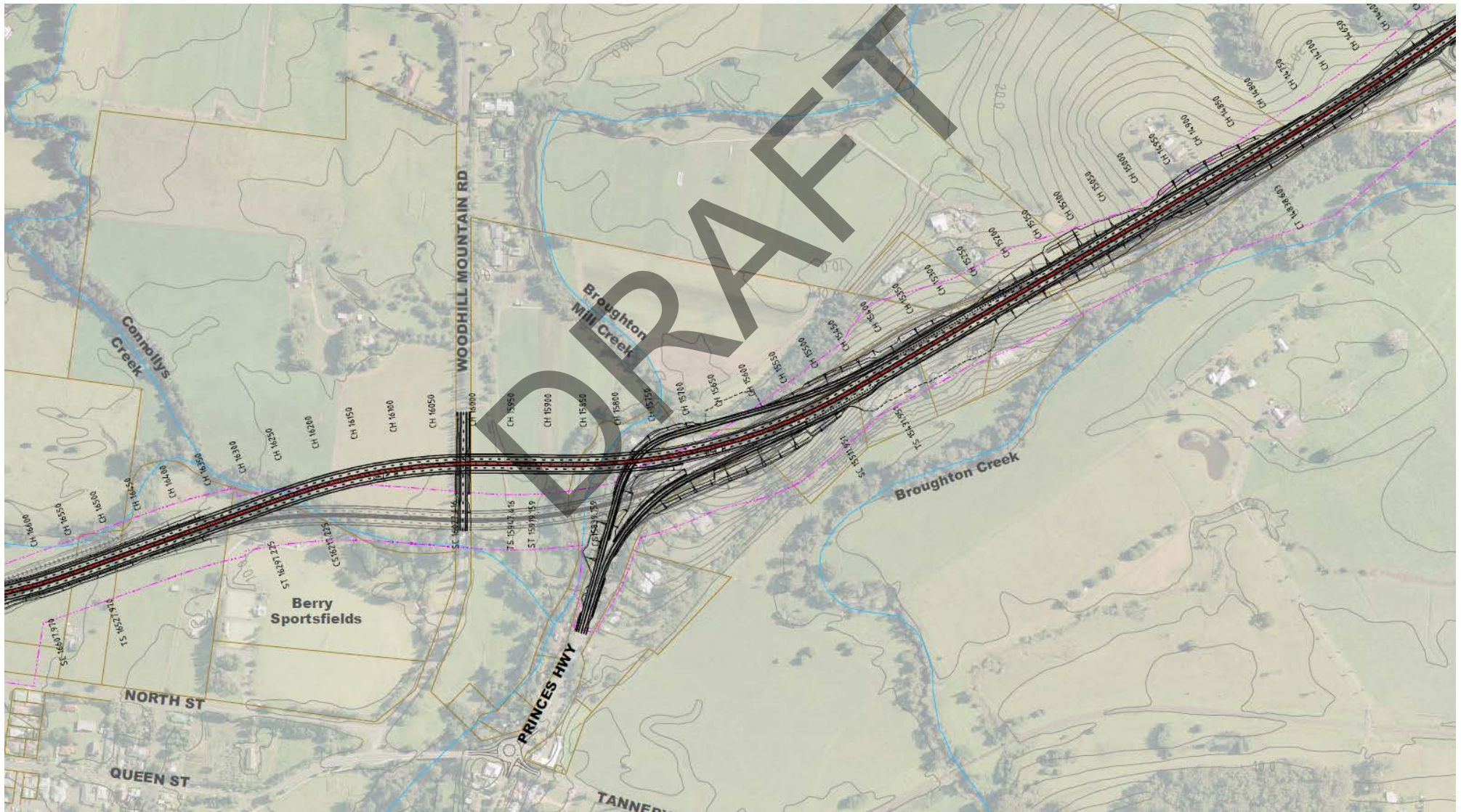
LONGITUDINAL SECTION ALONG CONTROL OPT BR3

HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:500

Berry Bridge



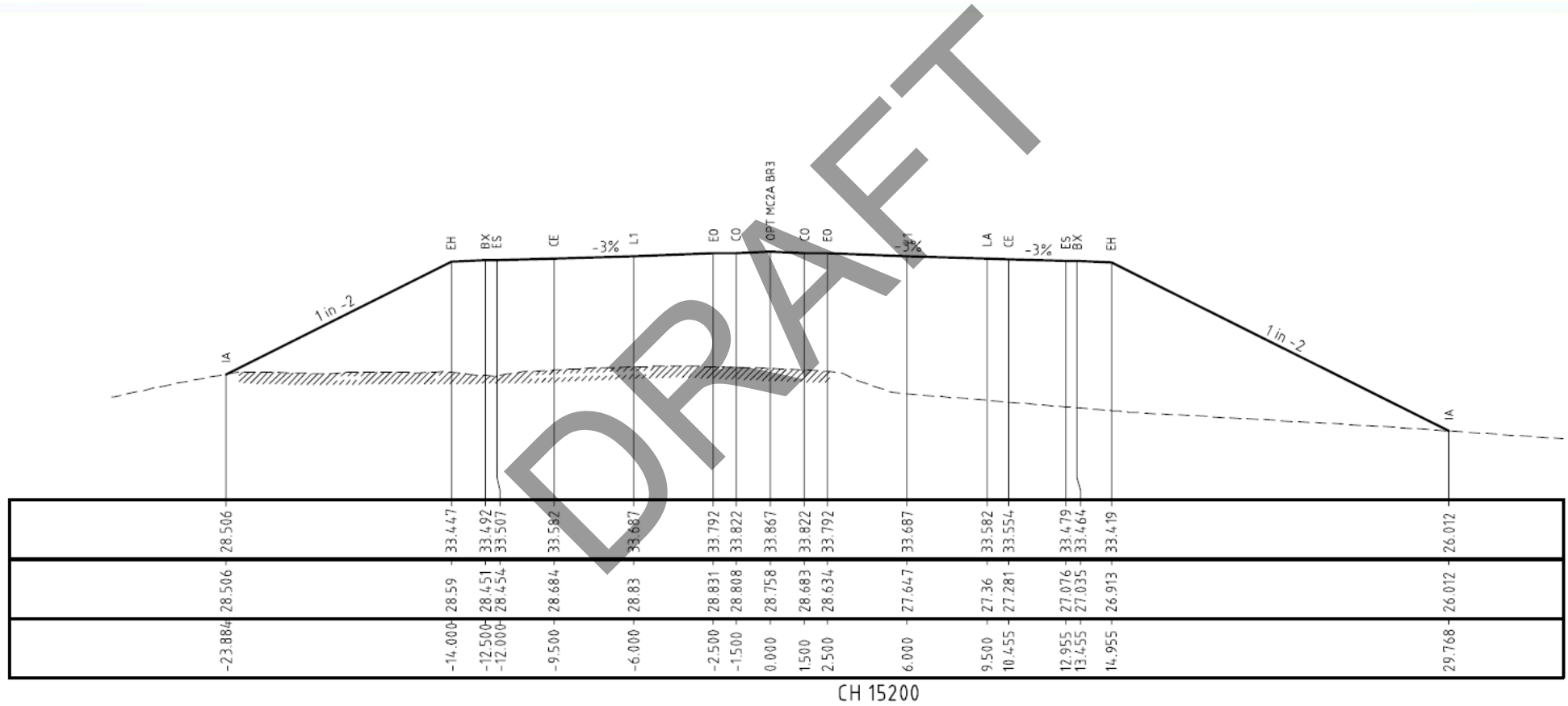
Transport
Roads & Maritime
Services



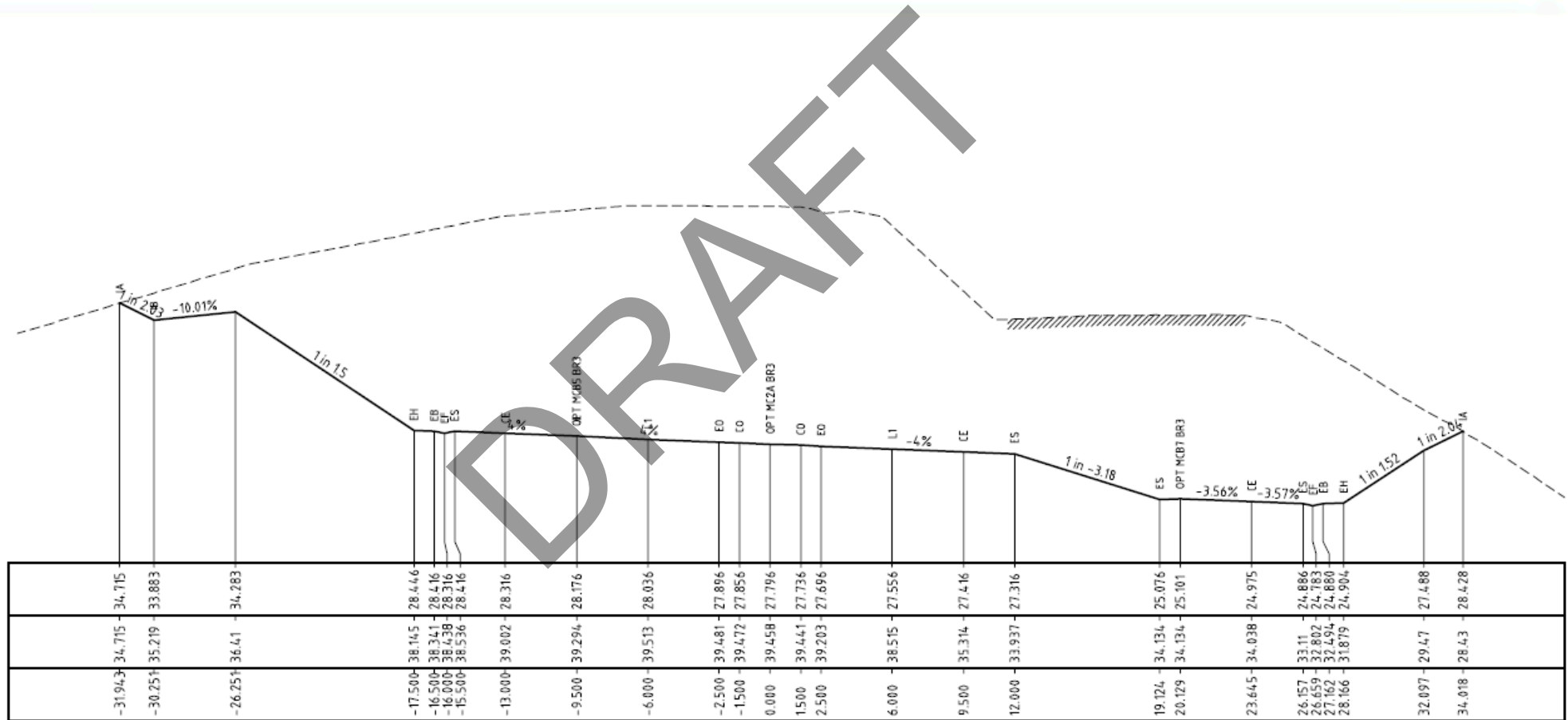
BR 3 Sections



Transport
Roads & Maritime
Services

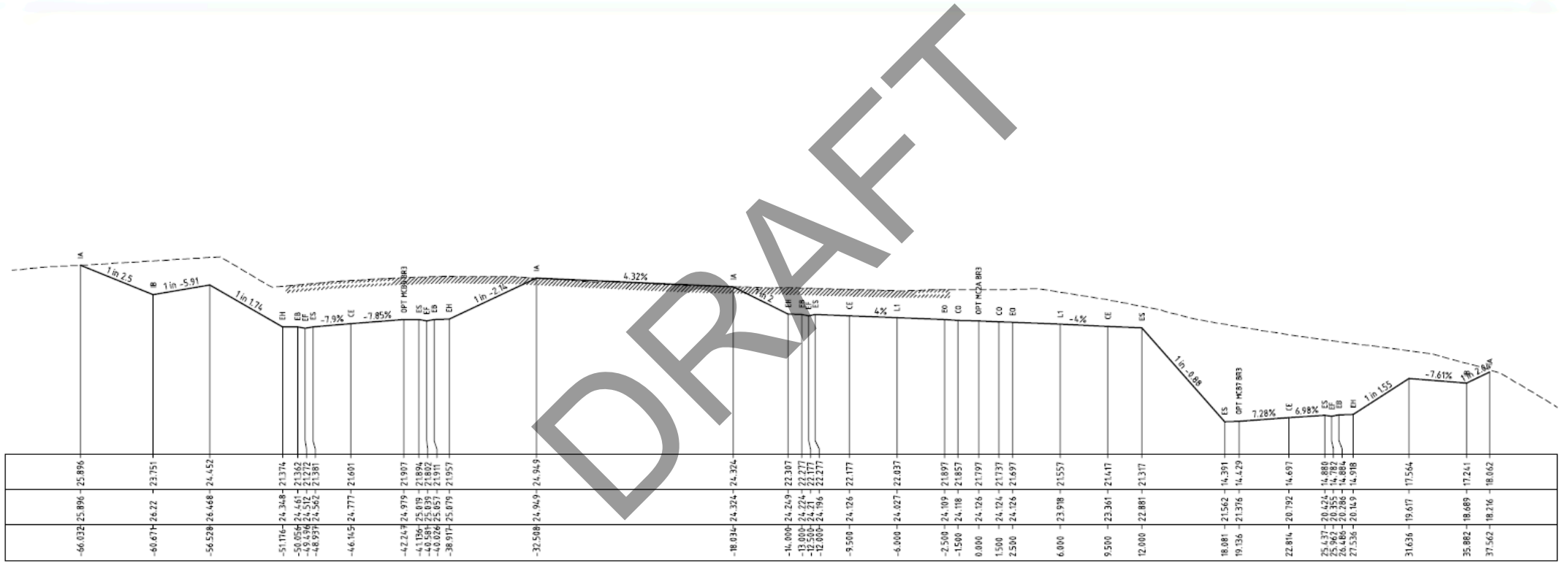


BR 3 Sections



CH 15550

BR 3 Sections

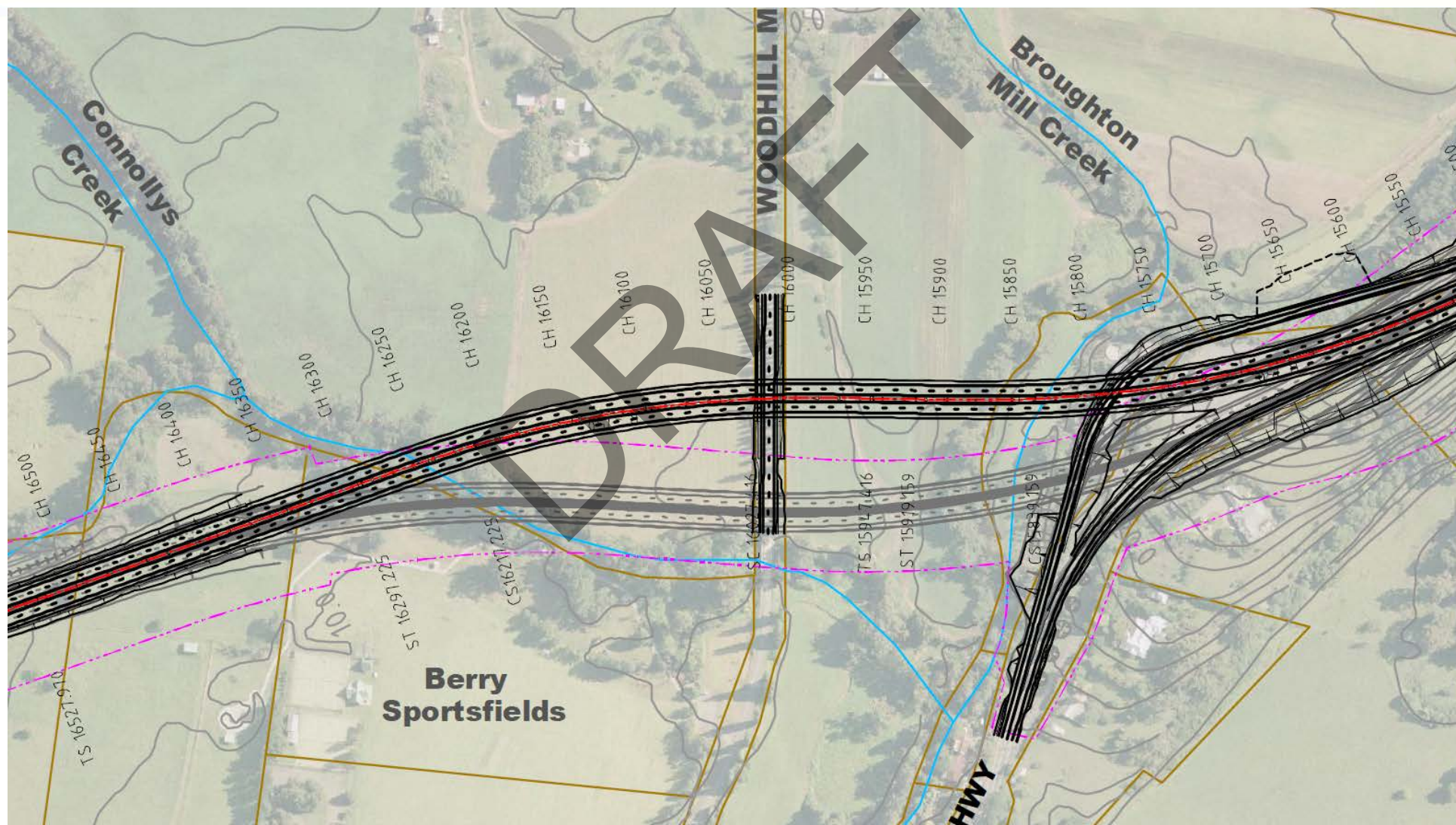


CH 15750

Woodhill Mountain Road



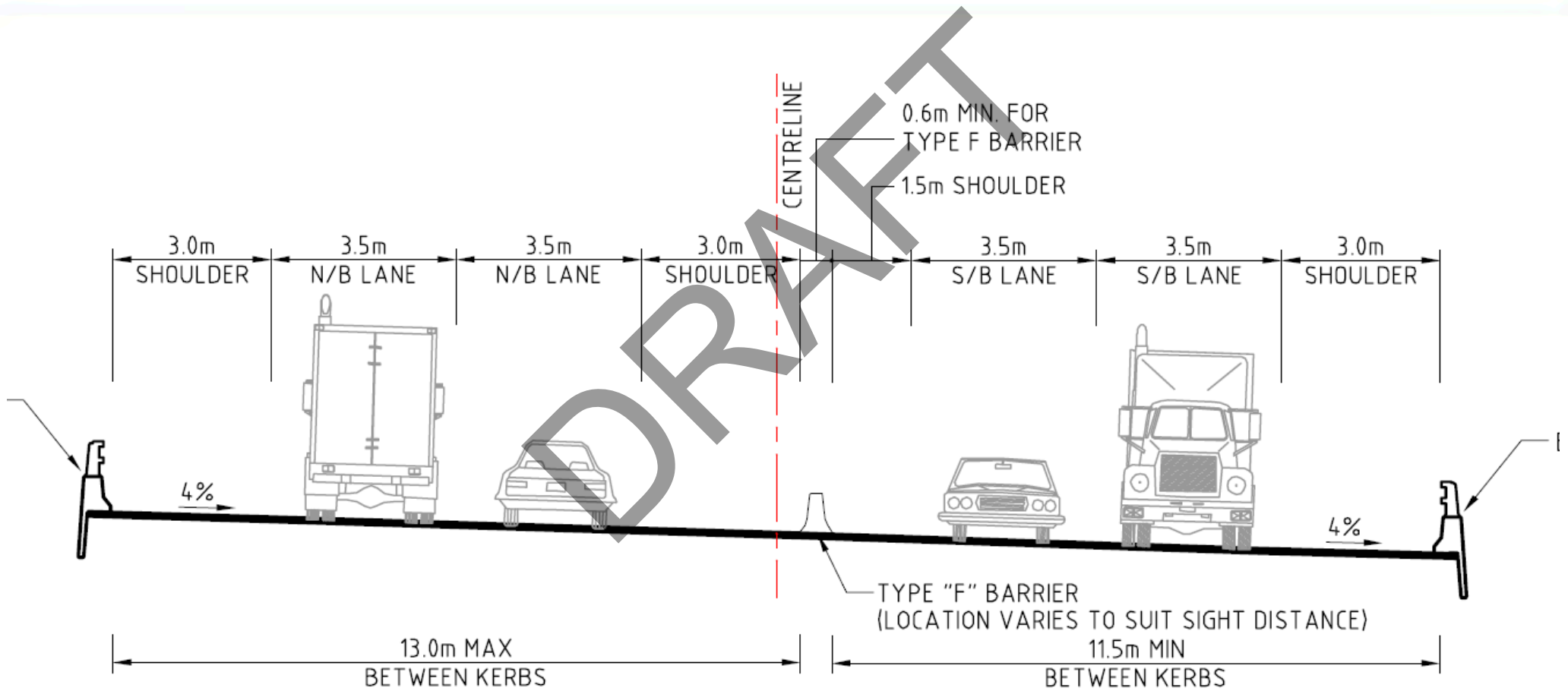
Transport
Roads & Maritime
Services



Berry Bridge Section



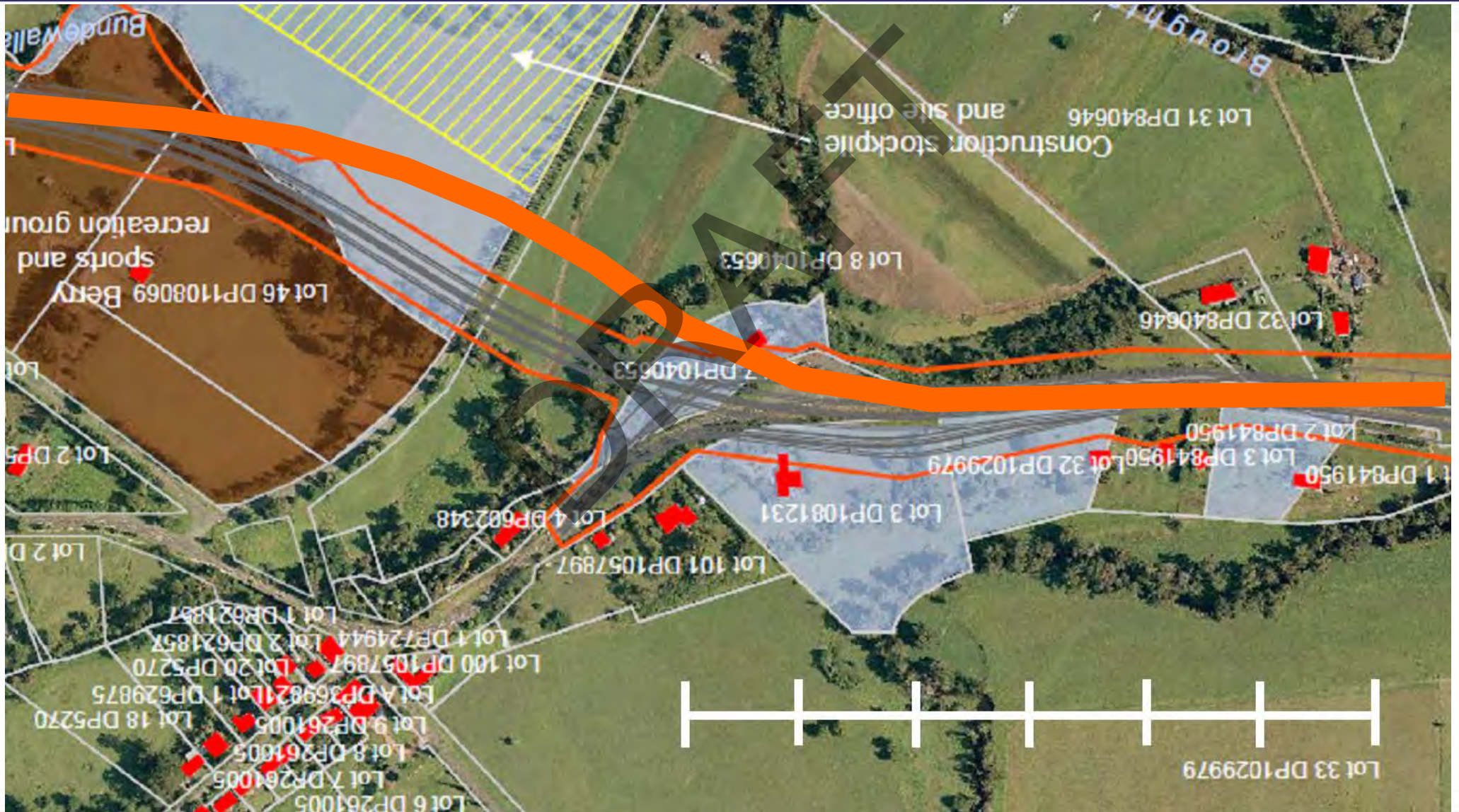
Transport
Roads & Maritime
Services



Acquired properties



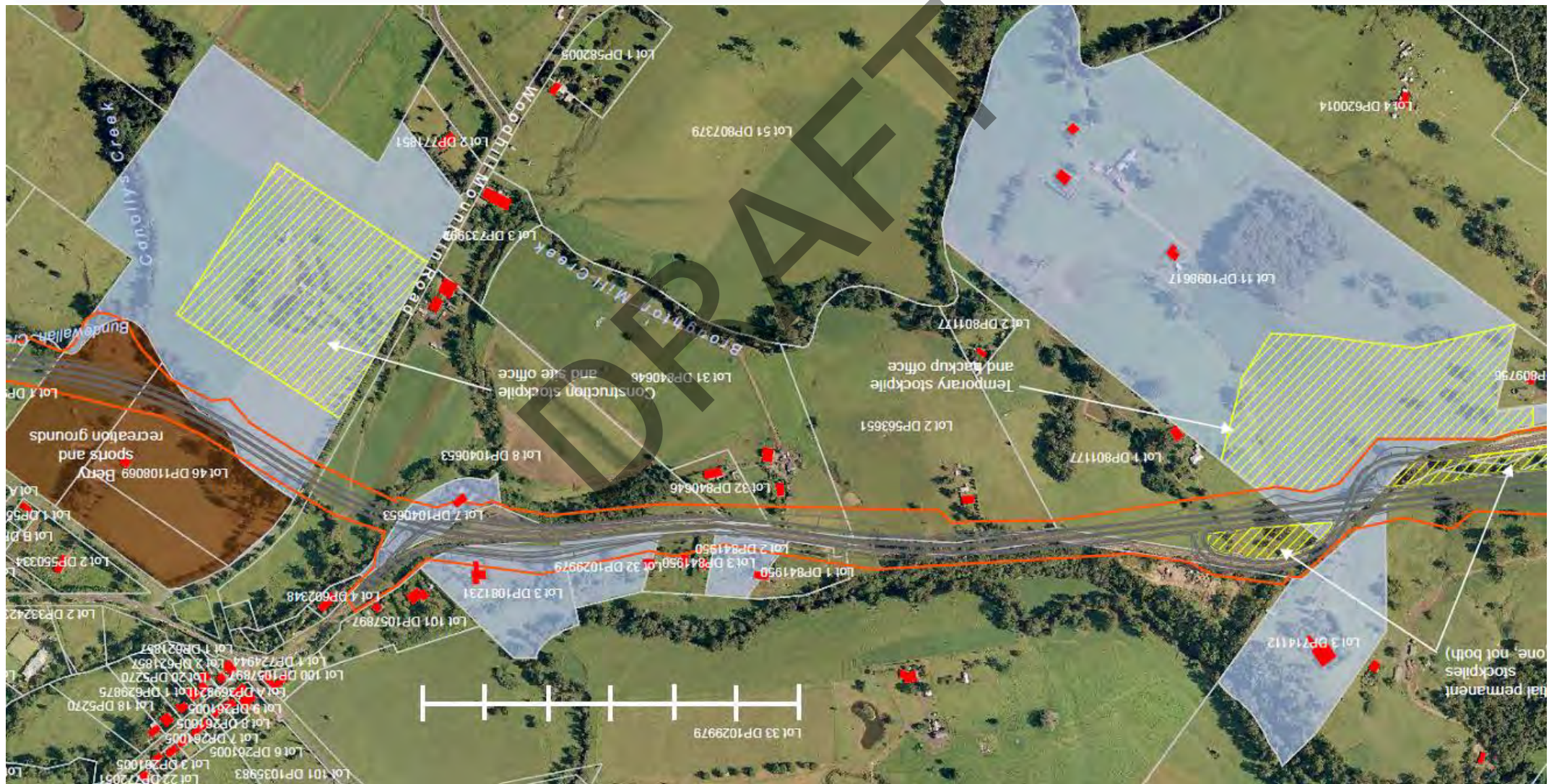
Transport
Roads & Maritime
Services



Acquired properties



Transport
Roads & Maritime
Services



Appendix 9 BR3-D Option – Sketch

DRAFT





B.R. 3. Conceptual Horizontal Alignment.

**Appendix 10 Workshop #2 Bridge Presentation –
Urban Design Models and Bridge
Examples**

DRAFT



Google Street View from Woodhill Mountain Road Looking North



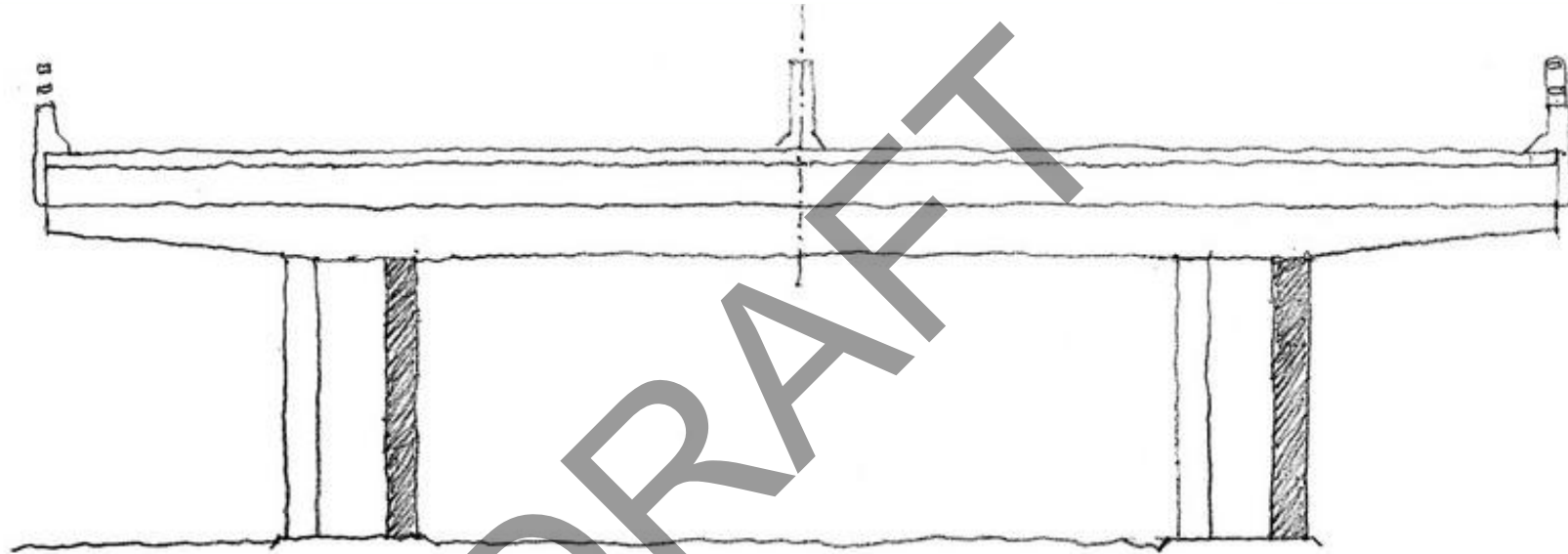
Transport
Roads & Maritime
Services



Two Pier Option *15m Span*



Transport
Roads & Maritime
Services



DRAFT

2 PIER OPTION

Option 01 - Bridge Planks with Two Pier 15m Span 3D View from South



Transport
Roads & Maritime
Services



3D VIEW FROM SOUTH
OPTION 01 - SUPER T WITH 2 PIER (15M SPAN)
BERRY BYPASS

November 2011 / Proj No. 11048-04-01
Issued 03 April 2011

CM+
Corybeak Morrison International Pty Ltd
Infrastructure & Transport
1000 George Street, Suite 1000, Sydney, NSW 2000
T: +61 (0)2 9230 4000 F: +61 (0)2 9230 4001
www.corybeakmorrison.com.au

Option 01 - Bridge planks with Two Pier 15m Span Span 3D View from South East



Transport
Roads & Maritime
Services



3D VIEW FROM SOUTH EAST
OPTION 01 - SUPER T WITH 2 PIER (15M SPAN)
BERRY BYPASS

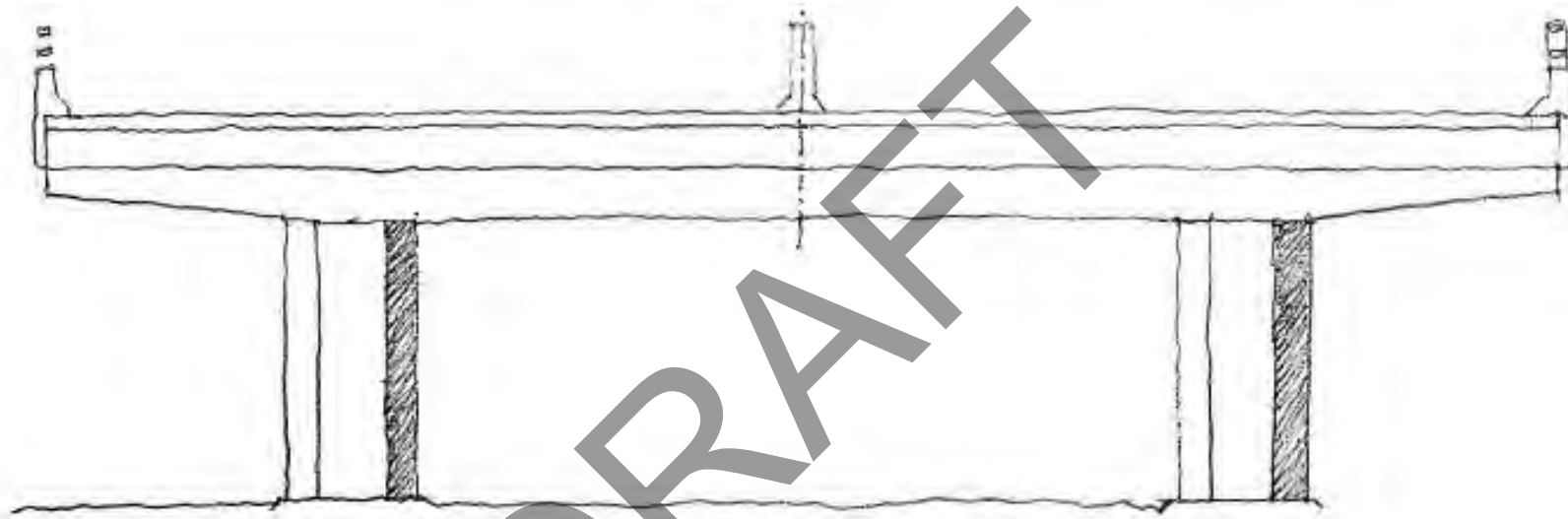
November 2011 - OLV No 1085-5004
Issued 05 Nov 2011

CM+ Company & Maroon International Pty Ltd
Level 11, 100 Pitt Street, Sydney NSW 2000
Tel: 61 61 2311 2311 Fax: 61 61 2311 2311
www.cmplus.com.au

Two Pier Option 30m Span



Transport
Roads & Maritime
Services



DRAFT

2 PIER OPTION

Option 02 - Super T with Two Pier 30m Span 3D View from South



Transport
Roads & Maritime
Services



3D VIEW FROM SOUTH
OPTION 02 - SUPER T WITH 2 PIER (30M SPAN)
BERRY BYPASS

November 2011 / Draw No. T/CSS-3K-02
Issued 03 Nov 2011

CM+ Corrybeare Moniston International Pty Ltd
Corrybeare Moniston International Pty Ltd
11/111 Macquarie Street, Sydney, NSW 2000
T: 61 2 924 9444 F: 61 2 924 9445 E: info@cmplus.com.au

Option 02 - Super T with Two Pier 30m Span 3D View from South East



Transport
Roads & Maritime
Services



3D VIEW FROM SOUTH EAST
OPTION 02 - SUPER T WITH 2 PIER (30M SPAN)
BERRY BYPASS

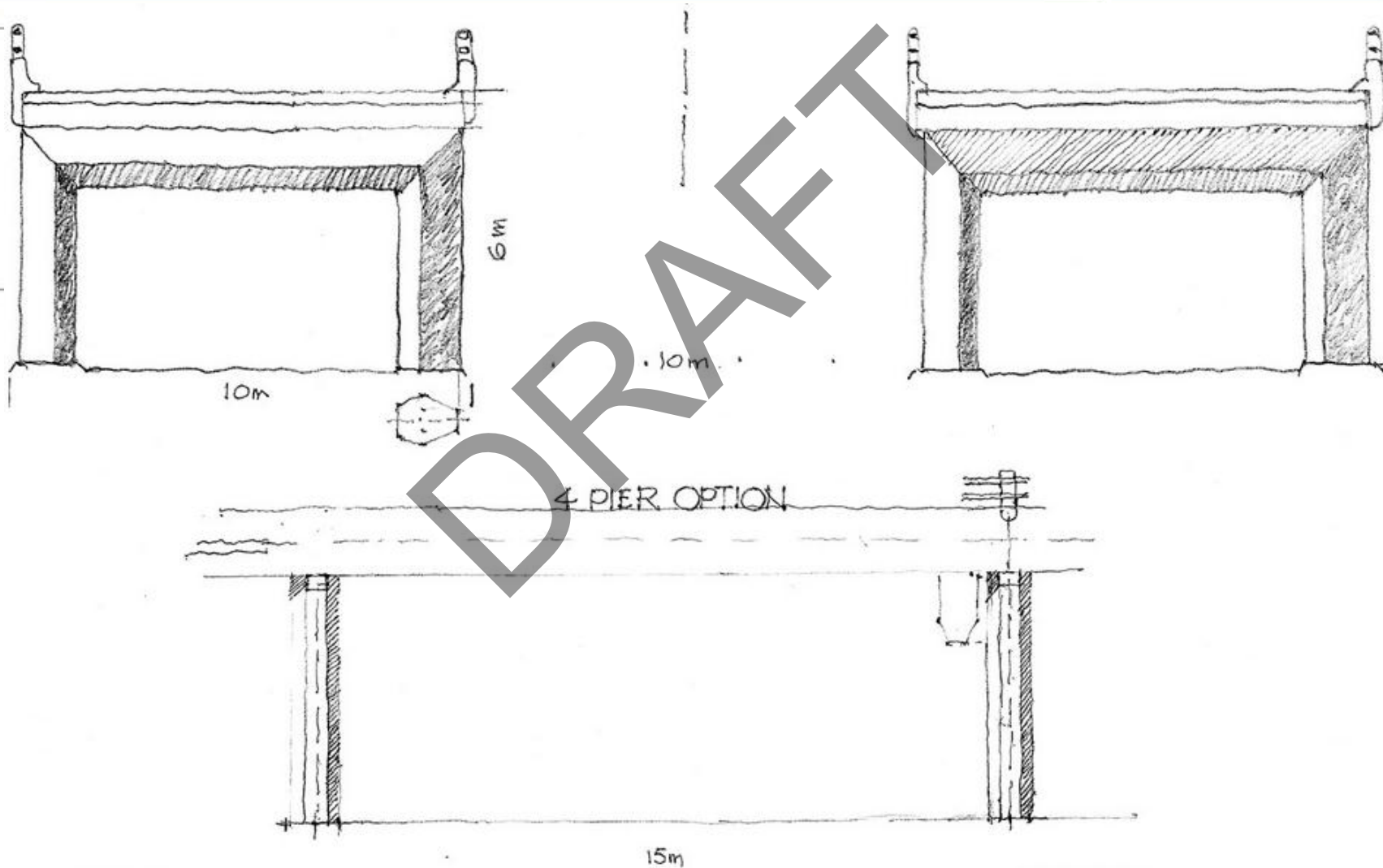
November 2011 - Draw No 11000-0400
Revised 05 Nov 2011

CM+ Christybank Morrison International Pty Ltd
Austlian and New Zealand entities of CM+ Group
100 Victoria Road, Suite 100, North Sydney, NSW 1585
Tel: +61 (0)2 9372 2000 Fax: +61 (0)2 9372 2001

Four Pier Option 15m Span



Transport
Roads & Maritime
Services



Option 03 - Bridge planks with Four Pier 15m Span 3D View from South



Transport
Roads & Maritime
Services



3D VIEW FROM SOUTH
OPTION 03 - SUPER T WITH 4 PIER (15M SPAN)
BERRY BYPASS

November 2011 / Dep No. 11095-9K-03
(Issue 03 Rev 2011)

CM⁺ Conybeare, Morrison International Pty Ltd
150-152 William Street, Sydney NSW 2000
T: 61 2 9230 4000 F: 61 2 9230 4001
www.conybeare.com.au

Option 03 - Bridge planks with Four Pier 15m Span Span 3D View from South East



Transport
Roads & Maritime
Services



3D VIEW FROM SOUTH EAST
OPTION 03 - SUPER T WITH 4 PIER (15M SPAN)
BERRY BYPASS

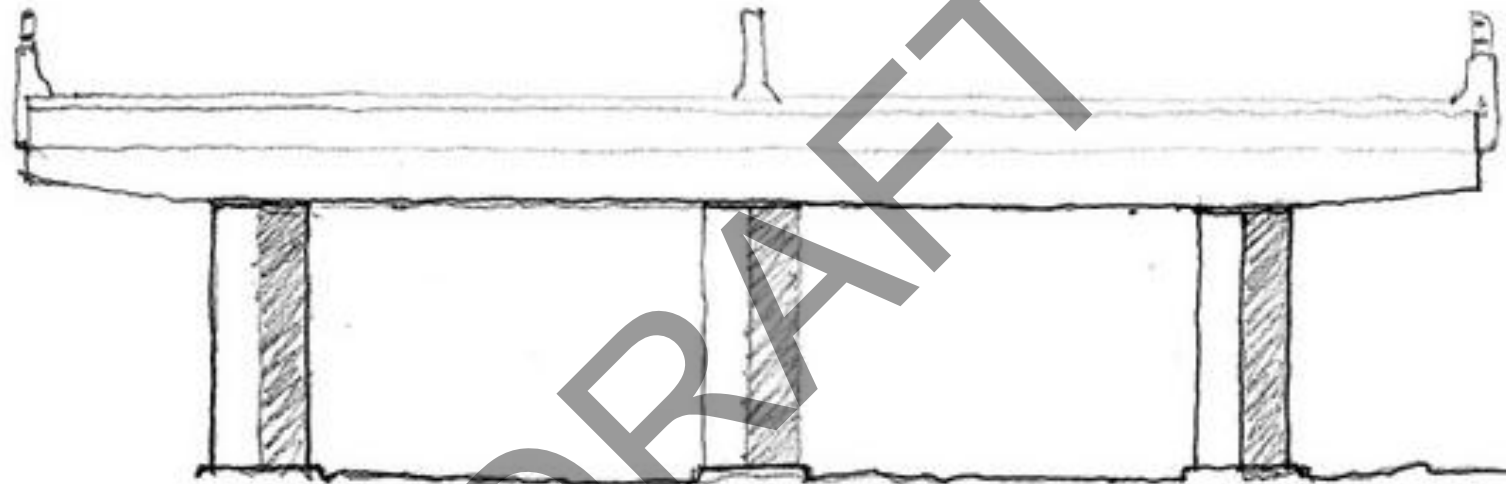
November 2011 - Draw No 4 1080-5000
Revised 03 MAY 2011

CM+ Corybear & Morrison International Pty Ltd
Level 10, 100 Market Street, Sydney, NSW 2000
100 Market Street, Sydney, NSW 2000
Tel: +61 (0)2 9232 8000 Fax: +61 (0)2 9232 8001
www.corybear.com.au

Three Pier Option



Transport
Roads & Maritime
Services



3 PIER OPTION

Four Pier Option



Transport
Roads & Maritime
Services



DRAFT

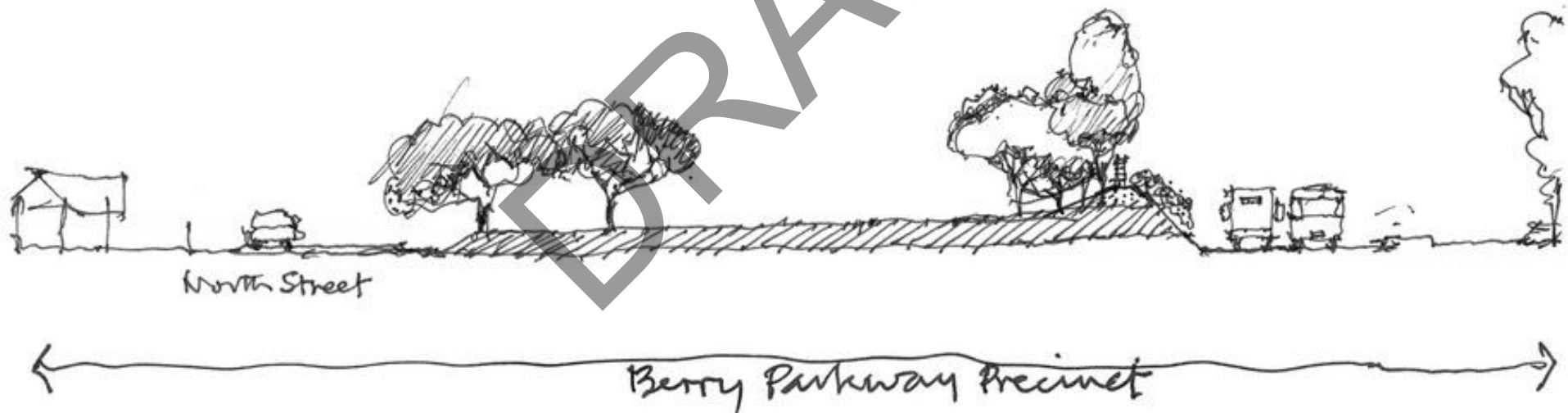
4 PIER OPTION

Berry Embankment North Terrace



Transport
Roads & Maritime
Services

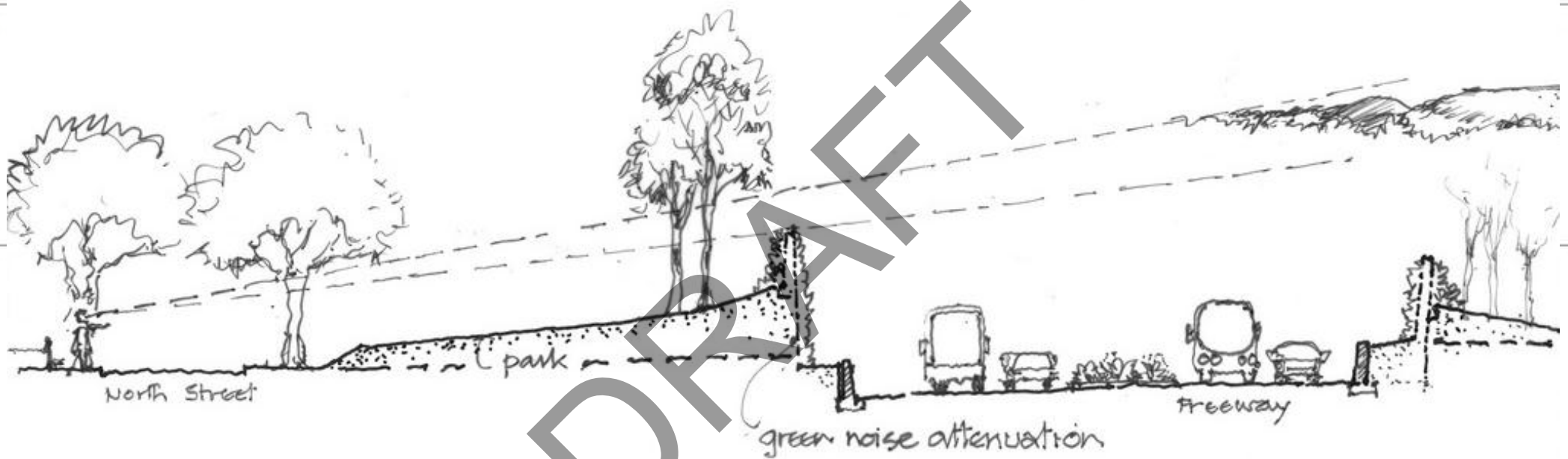
Berry Embankment - "North Terrace"



North Street Section



Transport
Roads & Maritime
Services



North Street SECTION ~ Typical

NORTH STREET SECTION
BERRY BYPASS

November 2011 - Dwg No 11080-SK-14
Issued 03 Nov 2011

CM⁺ Conybeare Morrison International Pty Ltd
Architecture • Interiors • Heritage • Urban Design • Masterplanning
50 All Saints Street East Sydney NSW 2011 Australia
T: 61 2 9244 8000 • F: 61 2 9244 8077 • E: cm@conybear.com.au

3D View Floodplain



Transport
Roads & Maritime
Services



Noisewall View 01



Transport
Roads & Maritime
Services



Noisewall View 02



Transport
Roads & Maritime
Services



NOISEWALL VIEW 02
BERRY BYPASS

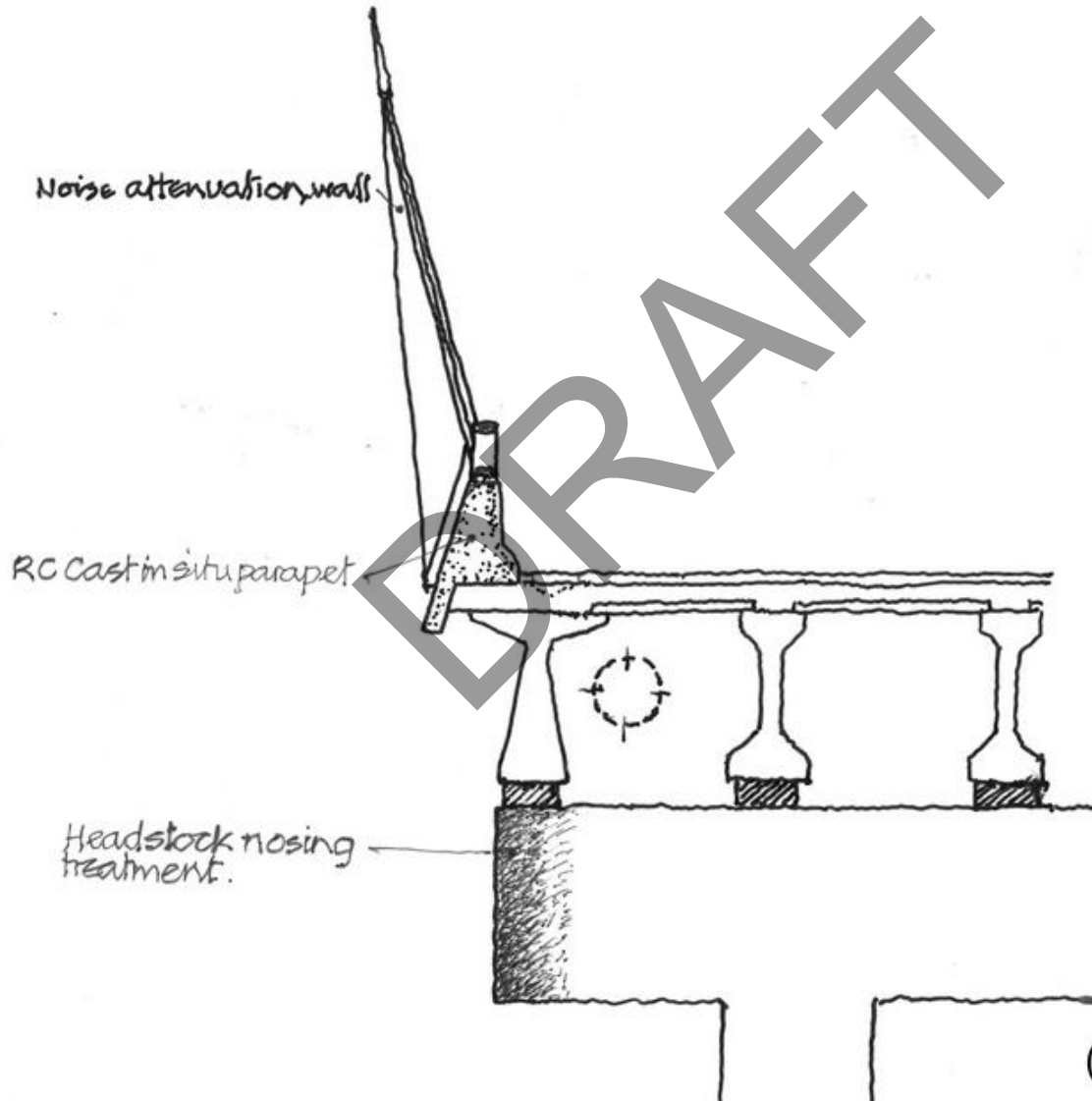
November 2011 - DWG No. 11080-SK.12
Issued 03 Nov 2011

CM+
Coyne & Bellenden
2000-2008 - Sydney's Heritage - Urban Design & Architecture
12000 Maitland Street, 1st Floor Sydney NSW 2011 Australia
T: 61 2 9248 6008 F: 61 2 9244 9977 E: cm@coynebell.com.au

Noisewall Detail Sketch



Transport
Roads & Maritime
Services



NOISEWALL DETAIL SKETCH
BERRY BYPASS

November 2011 - Dwg No 11080-SK-13
Issued 03 Nov 2011

CM⁺ Corybear Morrison International Pty Ltd
Architecture • Interior • Heritage • Urban Design • Interiors
100 Pitt Street Level 14 Sydney NSW 2000 Australia
T 61 2 9244 8888 F 61 2 9244 8277 E cm@cmintl.com.au
© 2011 CM⁺

Bridge Examples



Transport
Roads & Maritime
Services

DRAFT

Buckley Bridge Queensland



Transport
Roads & Maritime
Services



Moorabool Twin Bridges Victoria



Transport
Roads & Maritime
Services



Sheahan Bridge NSW



Transport
Roads & Maritime
Services



Sheahan Bridge NSW



Transport
Roads & Maritime
Services



Sheahan Bridge NSW



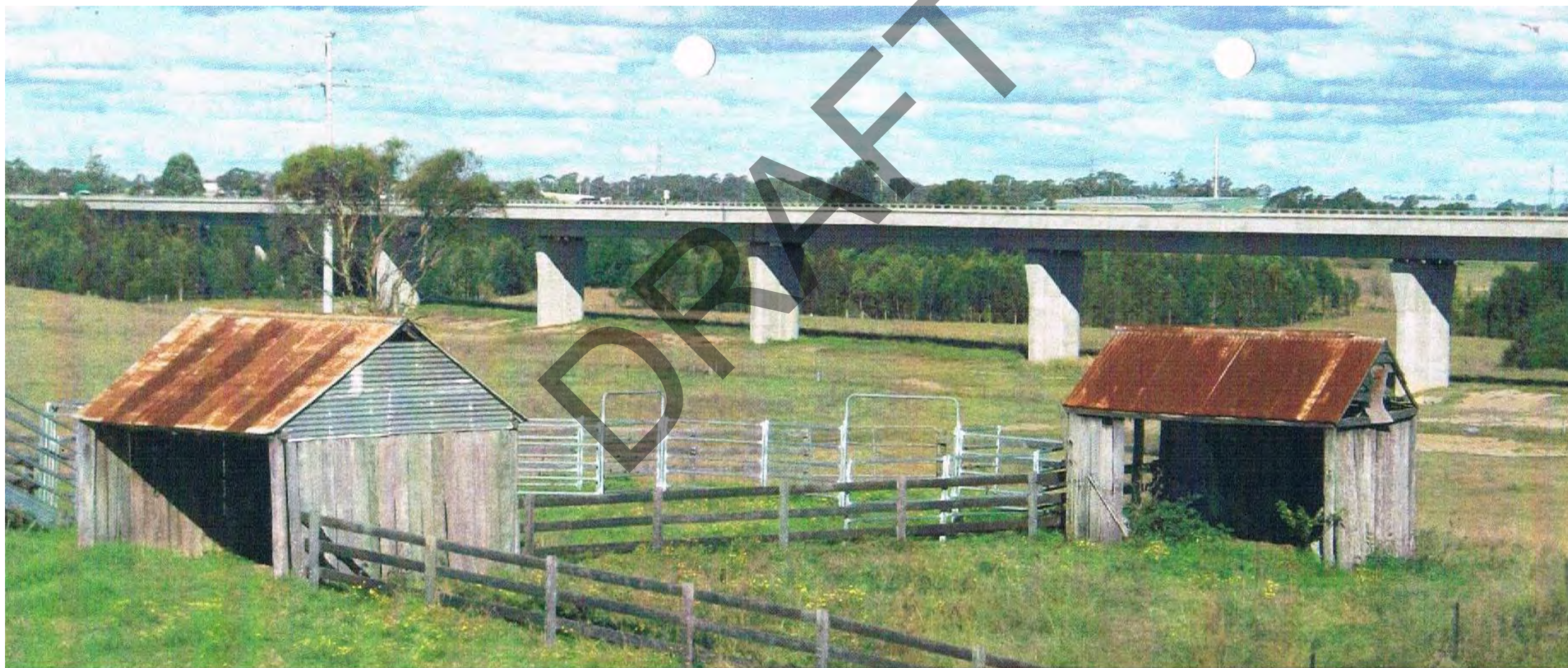
Transport
Roads & Maritime
Services



Windsor Flood Plain Bridge NSW



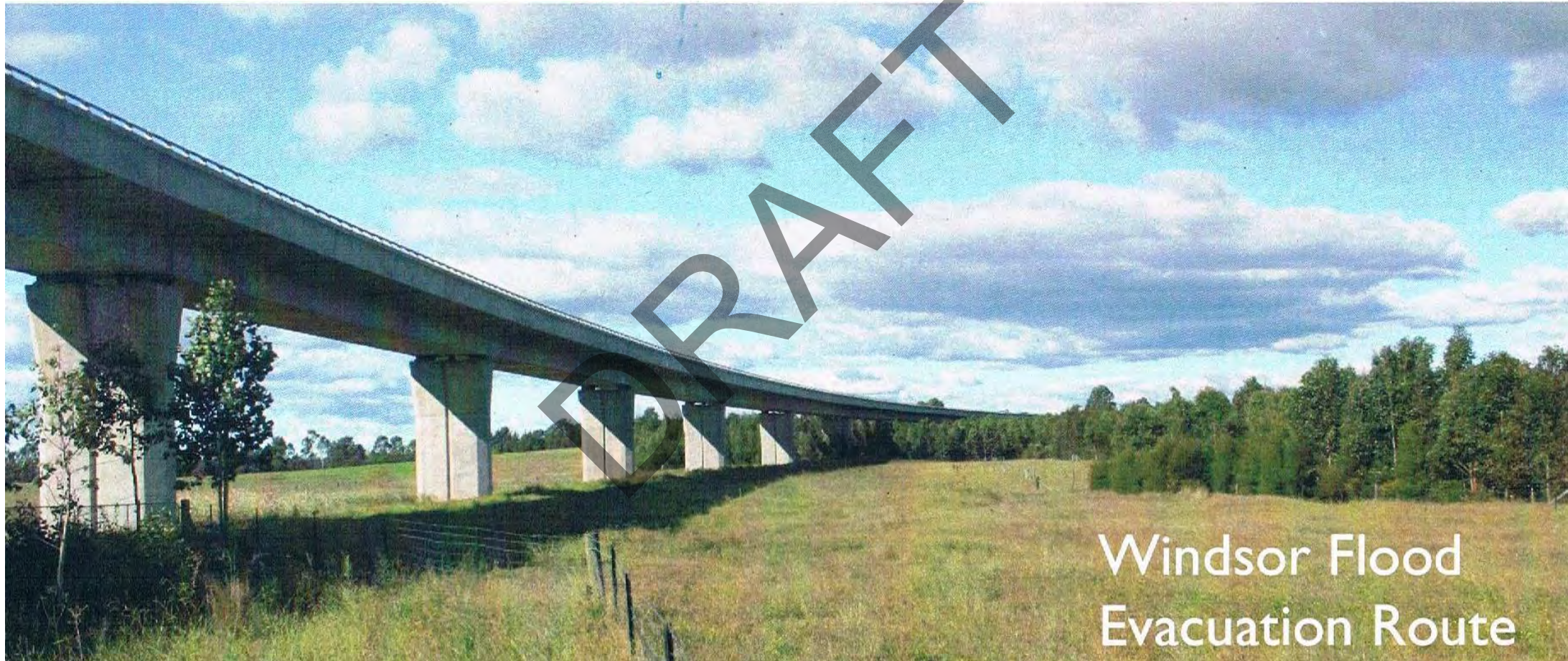
Transport
Roads & Maritime
Services



Windsor Flood Plain Bridge NSW



Transport
Roads & Maritime
Services



Windsor Flood
Evacuation Route

Ballina Bypass Bridge NSW



Transport
Roads & Maritime
Services



Ballina Bypass Bridge NSW



Transport
Roads & Maritime
Services



Karuah Bridge NSW



Transport
Roads & Maritime
Services



Iron Cove Bridge NSW



Transport
Roads & Maritime
Services



Alfords Point Bridge NSW



Transport
Roads & Maritime
Services



Minnamurra Bridge NSW



Transport
Roads & Maritime
Services



Terragong Bridge

Tristram Viaduct New Zealand



Transport
Roads & Maritime
Services



Pen-Link Victoria



Transport
Roads & Maritime
Services



Myall River Bridges NSW (proposed)



Transport
Roads & Maritime
Services



Myall River Bridges NSW (proposed)



Transport
Roads & Maritime
Services



CROSS SECTION

Scale 1:200

PARTIAL ELEVATION

Scale 1:200



PLAN VIEW OF PIERS

Scale 1:200

OPTION 2

Minnamurra Bridge NSW



Transport
Roads & Maritime
Services



**Appendix 11 Workshop #1 and #2 Meeting
Statements**

DRAFT



Design workshop #1 meeting statement

A new and collaborative process is providing a unique opportunity for a panel of independent industry experts to actively work with local community members on the design of the Berry bridge and Berry northern interchange. This is part of the community review group's agreed way forward to address community concerns for the design.

The first workshop was held on 27 October with a final workshop scheduled for 7 November. A report outlining the workshops outcomes will be published in late November.

This workshop started with establishing the group's expectations for this process. Participants agreed that they are working to develop:

- the lowest possible bridge height
- a solution on how to address the interchange at the northern end of the bypass.

It was agreed to focus on minimising aesthetic, noise and environmental impacts, as well as providing a value for money solution.

Discussions were on assessment criteria, physical boundaries and bridge design options including:

- possibilities for reducing the median separation
- bridge aesthetics including possible use of two narrower parallel bridges in place of one wider bridge, and alternative bridge spans and configurations
- exploring designs to allow for the future provision of a third lane on the bridge
- noise barrier options
- low grade road levels to reduce truck braking noise
- ways to reduce the slope of the banks in the cutting
- flooding considerations and opportunities to enhance mitigation

Previous bridge and interchange options were reviewed and refinements were identified.

Actions were taken from the day to investigate the feasibility of implementing the refinements to the proposed options.

27 October 2011

Design workshop #2 meeting statement

On 7 November 2011 the second workshop for the engineering and architectural design of the Berry bridge and northern interchange took place. Industry experts and community members continued to actively work on the one proposed community based alignment option.

Discussions started with understanding the main outcomes of this process which is to have a preferred vertical and horizontal road alignment and recognise the preferred principles for the bridge design.

A presentation from Shoalhaven City Council was given to help understand the overarching principles of flood modelling and flood prevention for Berry and the Broughton Mill Creek catchment.

Investigations and development work arising from the first workshop were presented by RMS and the industry experts. The group's subsequent discussions formed the basis of the following alignment objectives:

- The community based alignment (BR3) at the eastern end is the base model for the main line horizontal geometry
- The refinement of the alignment at the northern interchange is to be further explored
- The gradient of the main line should be at or below 3% to manage noise impacts
- Maintain natural barriers where possible (noise benefits)
- Adjust the vertical and/or horizontal alignment of Woodhill Mountain Road to achieve vehicle clearance under the bridge

Various architectural and engineering bridge design options were looked at with the following objectives formed:

- Eliminate obtrusive noise barriers
- No more than three bridge expansion finger joints 300m apart to keep noise to a minimum
- Pile caps (if required) should be buried
- Explore both twin and single bridge options
- Explore at least two bridge type concepts around bridge planks and "super-tee" girders. Develop architectural concepts for each type.
- The bridge target alignment to achieve 4.6m clearance over Woodhill Mountain Road

The key outcomes of the workshop were to:

- Reduce the height of Berry bridge which has been lowered by approximately 7 metres with the northern interchange layout adjusted to accommodate this lowering.
- Agree to a set of design objectives to address the visual and noise impacts of the upgrade.

A report outlining the workshop process and outcomes will be published by the end of November.