# Sunbury South and Lancefield Road ICP, Infrastructure Costings Expert Witness Report

Expert Witness Report

**Client**
Hi-Quality Quarry Products Pty Ltd

**Issued**
18/10/2020


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Beveridge Williams

| | |
|---|---|
| Client: | Hi-Quality Quarry Products Pty Ltd |
| Issued: | 18/10/2020 |
| Version: | |
| Prepared by: | Mark Fleming |
| Checked by: | Mark Fleming |
| Project Number: | 2001039 |

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# Contents


**1 QUALIFICATIONS OF EXPERT 4**

Name and Address 4
Area of Expertise 4
Expertise to Make Report 4
Engagement 4
1.4.1. Relationship 4
1.4.2. Instructions 4
Assistance in Preparing Report 5

**2 BACKGROUND 6**

**3 THE BRIDGES 6**

**4 SCOPE OF WORKS 7**

4.1Form of Structure LR -BR-01 7
4.2 Alignment observations.LR-BR-01 8
4.3 Form of Structure SS -BR-01 8
4.4 Alignment Observation SS -BR-01 8
4.5 Cost break down 9
4.5.1 Quantities 9
4.5.2 Rates 9
4.5.3 Assumptions 9

**5 STATEMENT OF OPINION 10**

5.1 Declaration 11


# Appendices


Appendix A: Bridge Locations
Appendix B: Horzontal Alignment of Bridge Locations
Appendix C: Profile of SS-BR-01
Appendix D: Profile of LR-BR-1
Appendix E: Relevant Priced Schedules

# 1 QUALIFICATIONS OF EXPERT

## Name and Address

Mark Alan Fleming
22 Ellen Street, Parkdale.

Post Nominals
BEng(Civil), CPEng, EngExec, NER, GAICD

## Area of Expertise

I hold a Bachelor of Engineering (Civil) from Royal Melbourne Institute of Technology (RMIT). I have achieved the status of Chartered Professional Engineer (Engineering Executive) from Engineers Australia and I am registered on the National Engineering Register. I have also graduated from the Australian Institute of Company Directors, Director's course.
I have over 20 years' experience in civil engineering, ranging from local government through to private consulting and I am now the manager of the engineering department of Beveridge Williams, where we are highly specialised in land development consulting.
I have provided clients with project management and engineering advice through all phases of projects, from preliminary planning and feasibility, through design approval to construction management and completion of works.

## Expertise to Make Report

Most of my experience has been in the field of land development. I have served two local governments providing development advice and engineering and project management services and consulted to many small and large private developers providing project management and engineering master planning services, enabling the successful development of thousands of lots throughout Melbourne's growth areas. This regularly involves the delivery of DCP and ICP infrastructure. I have extensive experience in project delivery in Melbourne's South East Growth Corridor.

## Engagement

### 1.4.1. Relationship

I have been engaged by Norton Rose Fulbright on behalf of Hi-Quality Quarry Products to provide this report. Both I and my employer (Beveridge Williams) are completely independent of both parties.

### 1.4.2. Instructions

I have been provided with the following instructions:

1. review the briefing letter and the exhibited documents (as relevant to your area of expertise);
2. confer with instructing solicitors and counsel where necessary;
3. prepare an expert report setting out your opinion on the cost plans for LR-BR-01 and SS-BR-01 in the Design and Costings Report prepared by GHD (GHD Costings);
4. attend a conclave meeting with experts being called by other parties in a similar field in the week commencing 19 October 2020;
5. if necessary, appear at the Panel hearing, if required, for the purpose of presenting your expert opinion on the GHD Costings.

I have been provided with the following documents:

1. Planning Property Reports and Scheme Extracts
2. Ministerial Directions on the Preparation and Content of Infrastructure Contribution Plans
3. Infrastructure Contributions Plan Guidelines prepared by the Department of Environment, Land, Water and Planning
4. Incorporated Document - Sunbury South Precinct Structure Plan June 2018
5. Incorporated Document - Lancefield Road Precinct Structure Plan, June 2018
6. Panel Report - Amendments C207 and C208
7. Explanatory Report (Amendment C243)
8. Instruction Sheet (Amendment C243)
9. Sunbury South and Lancefield Road - Infrastructure Contribution Plan - April 2020
10. Public Acquisition Overlay map (additions) - Amendment C243
11. Public Acquisition Overlay map (deletions) - Amendment C243
12. Schedule 1 to Clause 45.11 Infrastructure Contributions Overlay (clean) - Amendment C243
13. Schedule 1 to Clause 45.11 Infrastructure Contributions Overlay (track changed) - Amendment C243
14. Schedule to Clause 72.04 Documents Incorporated in this Planning Scheme (clean) - Amendment C243
15. Schedule to Clause 72.04 Documents Incorporated in this Planning Scheme (track changed) - Amendment C243
16. Sunbury-South-and-Lancefield-Road-ICP-Infrastructure-Design-and-Costings-Report-GHD-November-2019
17. Letter from PPV 23.7.2020
18. Submissions 1-12
19. Directions letter from PPV 11.8.2020
20. 2020-08-25 Hume C243 Sunbury Lancefield Road ICP Bridge Design Chronology

I have also received a copy of the Expert witness code of conduct. I acknowledge that I have read and agree to be bound by this code of conduct.

### Assistance in Preparing Report

I have engaged the assistance of another engineer from within Beveridge Williams to assist in the preparation of data used to inform this report.

- Huw Taylor, Mice, CPEng, NER, RPEQ, Principal Infrastructure Engineer, Beveridge Williams.

Notwithstanding the above assistance, all conclusions and opinions detailed in this report are my own.

## 2 BACKGROUND

2.1 On 9 April 2020, the Victorian Planning Authority (VPA) publicly exhibited the Amendment. The Amendment seeks to replace an Infrastructure Contributions Plan (ICP) that applies to land affected by the Sunbury South and Lancefield Road Precinct Structure Plans (PSPs). The proposed ICP will replace the 'interim' Sunbury South and Lancefield Road ICP incorporated in the Hume Planning Scheme, which was approved by the Minister for Planning and gazetted on 5 December 2019 through Amendment C230.

2.2 Hi-Quality lodged a submission on 10 June 2020 to the VPA as the planning authority for the Amendment.

2.3 The VPA has referred submissions received on the Amendment to a Planning Panel.

## 3 THE BRIDGES

3.1 The proposed ICP provides for infrastructure to service both the Sunbury South PSP and the Lancefield Road PSP. Each PSP makes an allowance for a crossing of Jacksons Creek which would require the construction of two large bridge structures over Jacksons Creek (LR-BR-01 and SS-BR-01). I have been asked to form an opinion on the estimated cost of these two structures set against their form and alignment.

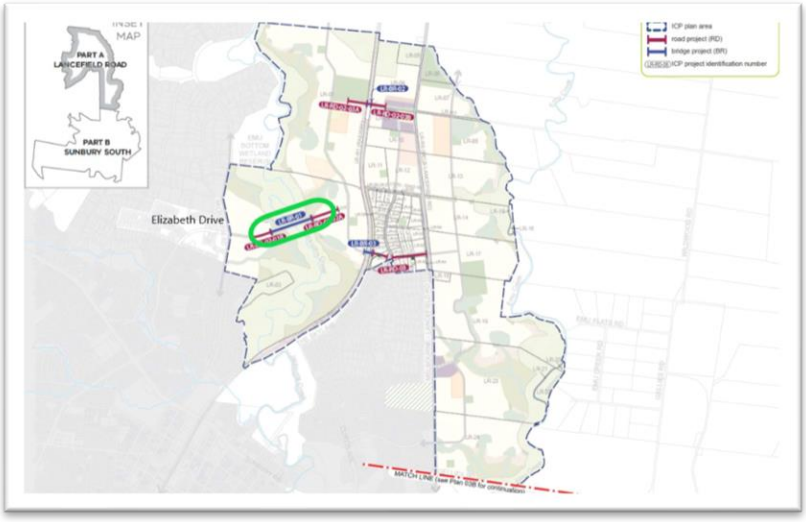



***Figure 1- Lancefield Rd PSP – Bridge over Jacksons Creek LR-BR-01***

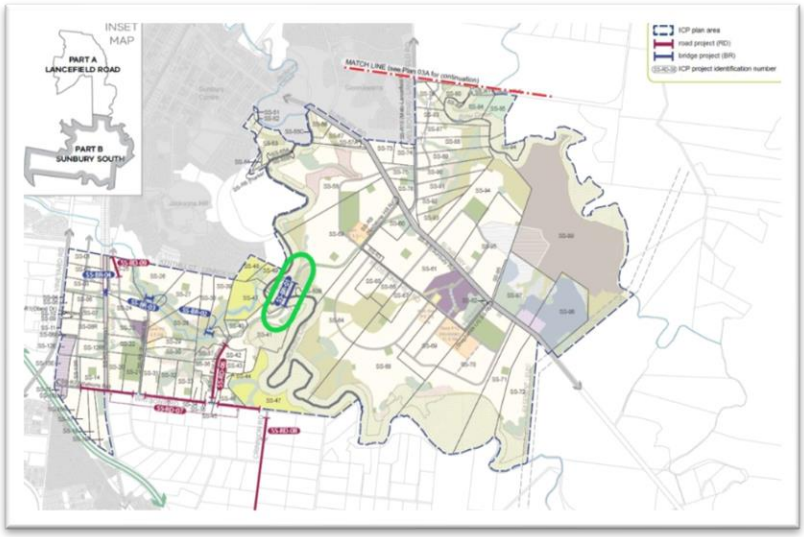


***Figure 2- Sunbury South PSP – Bridge over Jacksons Creek SS-BR-01***

3.2 The Lancefield Road PSP bridge over Jacksons Creek (LR-BR-01) is proposed to provide a connection between the existing residential area of Sunbury to the proposed Lancefield Road PSP area via an extension of the existing Elizabeth Drive. The proposal is for a bridge spanning 490 metres, utilising three steel girders on concrete piers to enable long spans, thereby minimising the number of piers required.

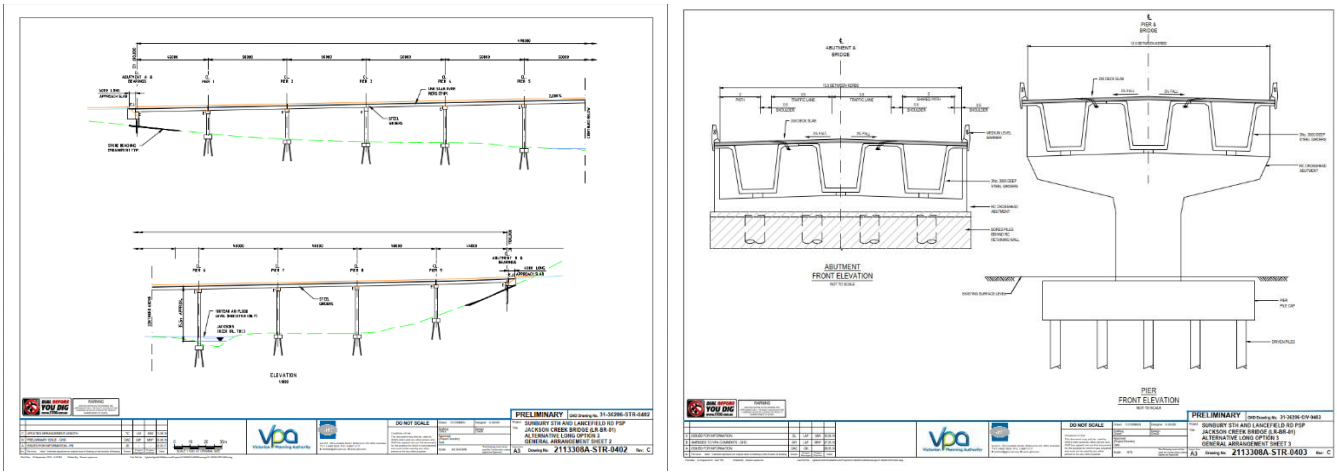
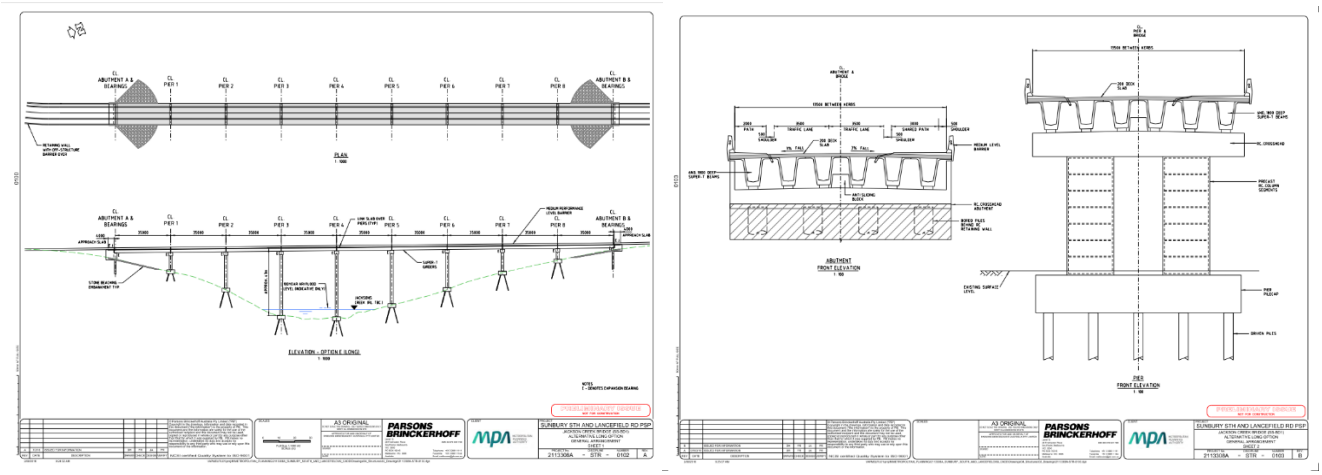


***Figure 3- LR-BR-01Concept Design***

3.3 The Sunbury South PSP Bridge over Jacksons Creek (SS-BR-01) is proposed to provide a connection between the two proposed South Sunbury PSP areas. The proposal is for a bridge spanning approximately 315 metres across the Creek, utilising six "Super-T" concrete beams on precast reinforced concrete columns and concrete piers.



# 4 SCOPE OF WORKS

## 4.1Form of Structure LR -BR-01

LR-BR-01, as presented, has an overall span of 490m providing the northern most crossing of Jacksons Creek:

See appendix A for general arrangement drawings.

The proposed cross section of the bridge and adjacent approaches, as presented, allows for a single lane in each direction of 3.5 m width and a shared path for pedestrians and cyclists adjacent the east bound carriageway and a pedestrian only path adjacent the west bound carriageway.

The construction form is detailed as 3000 mm deep steel girders, on Reinforced Concrete cross heads supported by driven piles, the general arrangement drawings suggest 3 No steel girders will be sufficient for the cross section with individual spans of up to 50m.

The use of steel girders allows for spans greater than those that can be accomplished with super T concrete beams and hence reduces the quantum of work required to take place in the creek, overall span is approximately 490 m and requires nine piers and two abutments over the full span.

In the decision to go with the steel girder option it appears that the VPA have selected a more expensive option based on the reduction to effects on the waterway and cultural heritage. My opinion is that with a long bridge/wide waterway that these issues could be overcome and that a super-T multi-span option of circa 35m per span would be more cost effective this needs to be considered against the constructability issues and those of any sensitive overlays.

### 4.2 Alignment observations.LR-BR-01

Other options to optimise the design/ cost of LR-BR-01, on observation I believe that the vertical alignment can be lowered by approximately 500mm over the length of the bridge. This will reduce the overall footprint of the structure, the bulk earthwork quantities and overall span of the structure and could lead to a reduction of overall cost.

### 4.3 Form of Structure SS -BR-01

SS-BR-01, as presented, has an overall span of approximately 315m providing the southernmost crossing of Jacksons Creek:

The proposed cross section of the bridge and adjacent approaches, as presented, allows for a single lane in each direction of 3.5 m width and a shared path for pedestrians and cyclists adjacent the east bound carriageway and a pedestrian only path adjacent the west bound carriageway.

The construction form is detailed as 1800 mm deep super T concrete girders, on reinforced concrete cross heads supported by driven piles, the general arrangement drawings suggest 6 Super T girders will be sufficient for the cross section with individual spans of up to 35m which is in keeping with current design practise. The structure form accommodates a pre-cast option for the piers and cross heads which is in keeping with current construction approaches.

The decision to adopt the Super T beam option is most likely to be driven around overall materials cost, the structure SS-BR-01 however has a height above ground in the order of 43 m, and overall cost may, from a constructability point of view, be affected by this, the large span will be reflected in the corresponding installation requirements and can amount to a considerable cost. It may be worth considering a change to steel girders for this structure. Which probably needs a constructability workshop.

### 4.4 Alignment Observation SS -BR-01

Other options to optimise the design/ cost of SS-BR-01, on observation I believe that a vertical alignment can be lowered by approximately 500mm over the length of the bridge. This will reduce the overall footprint of the structure, the bulk earthwork quantities and overall span of the structure and could lead to a reduction of overall cost by up to 5 to 8 %. Also, the horizontal alignment of SS-BR-01 suggests that an amendment could be achievable with a corresponding reduction in overall span of the structure.

## 4.5 Cost break down

### 4.5.1 Quantities

I have considered the cost break down for both structures and found that they represent a reasonable cost profile in the present market, there may be possibilities to reduce some cost through amendments to geometrical alignment however this is estimated at a net saving of approximately 5% to 8% , it would be worth considering holding a constructability workshop during which the issue of steel / concrete girders can be discussed and investigated. I note that three options were considered for LR-BR-01

The bill of quantities supplied, see Appendix C, has been reviewed. The use of a square metre rate for deck area is appropriate, as is a cubic metre rate for the columns and pile caps and a lineal metre rate for the piles.

The only items which may not be required is the anti-throw screen, given there is no road below, however, there may be a desire to install some sort of anti-jump screen given the height of the bridge.

### 4.5.2 Rates

I have also made a high level assessment of the rates used in the estimate. Large ticket items such Super T, Steel Girders and bulk earthworks have been bench tested against recent similar projects and have proven to be in the right order of magnitude. Rates for such items can vary significantly at the time of construction as they are based on factors such as cost of materials and demand.

The rates applied for other items such as road pavement, concrete paths, cut and fill and kerb and channel are higher than one might expect on a significant road project, however are much more complicated on a bridge construction project and are therefore deemed satisfactory.

The rates applied are reasonable and stand the test of benchmarking against similar structures constructed elsewhere within Victoria.

### 4.5.3 Assumptions

Cost assumptions made by GHD are listed in Victorian Planning Authority, Sunbury Sth Lancefield Rd ICP Design and Costings Report summarised below.

*" 5.1 Cost assumptions*

*The following assumptions have been taken into consideration within each high-level cost*

*estimate:*

- *The cost estimates assume a traditional lump sum competitively tendered procurement method*
- *The cost estimates are based on carrying out the works during normal working hours*
- *The cost estimates assume road works outside the alignments for each option are excluded*
- *Cost template was supplied by the VPA*
- *Road pavement profile has been assumed to be 685mm deep to reflect Hume City Council*
- *Trunk Collector Street detail, refer Hume Standard Drawing SD06. Due to the limited geotechnical information, this pavement depth also reflects an insitu subgrade CBR value of 2%*
- *Earthwork volumes for pedestrian footpaths or similar have been added to the cut and fill values. The bulk cut and fill quantities allowed in the estimate will need to be tested and revised subsequent to further analysis and design*
- *Where batters have been designed the calculated cut and fill values have been added to the volumes used in the cost estimates*
- *Extra over allowance rate for rock excavation is based on the assumption of the possibility of rock being encountered everywhere. The assumption based off the geotechnical reports that indicate that rock should be breakable through normal excavation means, however production rates would be slower. GHD has applied this extra over allowance to 50% of the excavated area based upon discussion with VPA and Hume Council*

- *Preliminary vertical road design was completed on roads SS-RD-04, SS-RD-05, SS-RD-06, LR-RD-02-02, LR-RD-02-03 and LR-RD-03 only, using previous design inputs from GTA, Aurecon and WSP*
- *Earthworks quantities for GHD designed elements were calculated using a 3D model created for roads SS-RD-04, SS-RD-05, SS-RD-06, LR-RD-02-02, LR-RD-02-03 and LR-RD-03. Cut and fill volumes were calculated using 3d design software (12d Model) by comparing two elevation surfaces: the design surface (vertical geometry, including road cross sections and batter interfaces) and existing surface (constructed from LIDAR data provided by VPA)*
- *Cut and fill quantities are based upon insitu volumes, no bulking factors have been applied to excavated soil quantities.*
- *Bridge cost estimates exclude all civil and retaining wall works associated with the approaches unless noted otherwise. These works have been included in the adjacent road cost estimates.*
- *GHD has made no allowance for contaminated material.*
- *Street lighting poles 12m high with luminaries placed every 50m along roads to one side, unless noted otherwise*
- *An allowance for traffic signals has been made based on type and size of intersection at locations*
- *Rates used in the cost estimates are based on recent project data and benchmarked rates for concept cost estimates for projects of a similar nature in the Melbourne region*
- *GHD | Report for Victorian Planning Authority - Sunbury Sth Lancefield Rd ICP, 3136206 | 16*
- *Cost estimates are based on the information provided to GHD and knowledge of similar projects. The costs used for calculations have been validated via an external third party.*
- *All structural rates are high level allowances based on concept drawings. Adjustments to structural rates upon further structural design developments are anticipated*
- *The cost review assumes that a structured cost planning / value engineering process will be followed throughout the design process and that the project will be appropriately documented prior to tender*
- *No flood modelling has been incorporated into the costing allowance for culverts that appear in the cost sheets*
- *The Harpers Creek crossing SS-BR-03 is a culvert. GHD has maintained the size assumed by Aurecon it its previous report and adopted a 2.4m span precast concrete inverted culvert on a concrete base.*
- *LR-BR-03 consists of a bridge over existing rail, LIDAR data advises that the current rail level is approximately 5-6m below the adjacent land. Therefore, GHD has made minimal allowance for fill to the bride approach to meet the required 5.75m clearance stipulated by Transport for Victoria.*
- *Road design has been completed using AutoCAD software, the software has also been utilised to derived road lengths which have been measured along the road centre line from intersection to intersection, intersection to bridge structure and precinct boundary to intersection as applicable. Road project lengths and chainages are detailed in Appendix G for South Sunbury and Appendix H for Lancefield Road.*
- *Intersection extents are defined at the earliest point where a road layout differs from the start of a turn lane.*
- *Retaining walls details are based on the soil nail retaining wall detail prepared by WSP in their Memo Sunbury South and Lancefield Road PSP – Infrastructure cost estimates, dated 28 April 2017.*
- *Habitat compensation fees were provided by the VPA following receipt of advice from DELWP.*
- *Along road alignments, batters have been substituted for retaining wall when batter widths exceed 20m perpendicular to the edge of pavement works. Further design refinement and value engineering will be required to identify the optimal design.*
- *All other assumptions have been noted in the cost estimates for each option "*

The assumptions made are in keeping with the level of design development.

# 5 STATEMENT OF OPINION

With further design optimisation, it may be possible to reduce the costs for the bridges. The main opportunity is likely in the height of the bridge, which may result in a reduction of between 5 and 8%. This design optimisation requires significant further detailed assessment and a constructability workshop which may not be ideal at this point.

The cost of materials can vary significantly at the time of construction but a contingency amount of 20% has been allowed. This is appropriate for an estimate at this stage of development.

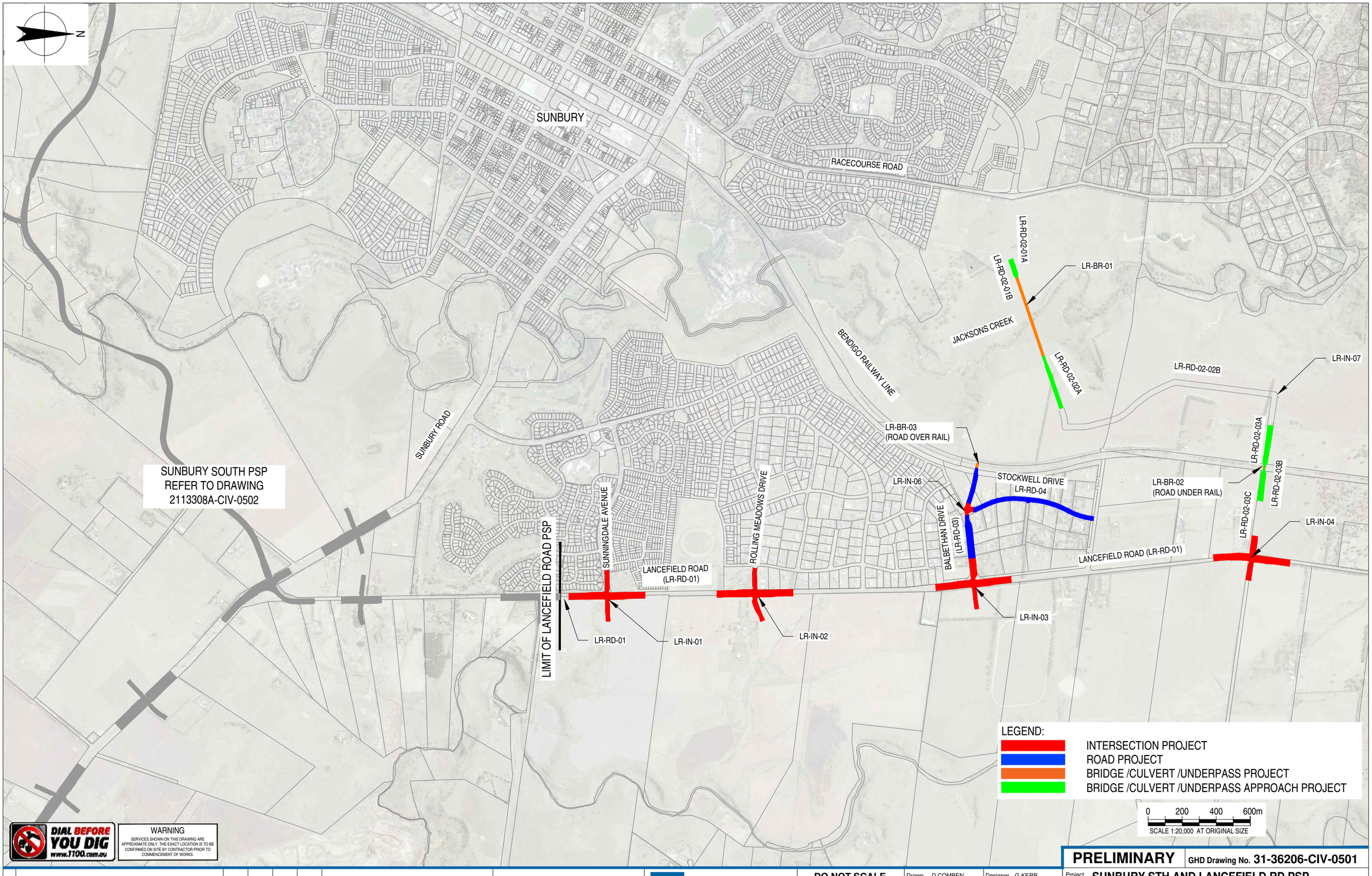
I am of the opinion that estimated costs for bridges SS-BR-01 and LR-BR-01 are reasonably accurate for the amount of design development that has been undertaken for. As presented the designs are off the shelf solutions with comparative cost estimates readily available. There may be scope for further investigation into the design form, but I suspect that overall costs will equate to the same. As is always the case, the accuracy of such estimates is simply based on the degree of development of the design and final costs may vary from the figures presented.

## 5.1 Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld.

**Mark Fleming**
Engineering Manager
Beveridge Williams
flemingm@bevwill.com.au

**APPENDIX A: BRIDGE LOCATIONS**

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| J | INTERSECTION LR-IN-06 ADDED | SL | LM* | MW* | 12.09.19 |
| I | UPDATED PROJECT NAMING CONVENTION - GHD | SL | LM* | MW* | 12.08.19 |
| H | AMENDED TO VPA COMMENTS - GHD | SL | LM* | MW* | 06.08.19 |

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| Drafting Check | | Design Check | |
| Approved (Project Director) | | | |
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**PRELIMINARY** GHD Drawing No. 31-36206-CIV-0501

Project SUNBURY STH AND LANCEFIELD RD PSP
Title OVERALL LAYOUT PLAN
LANCEFIELD ROAD PSP

Original Size A3 Drawing No: **2113308A-CIV-0501** Rev: J

Plot Date: 18 September 2019 - 2:54 PM Plotted By: Shane Laybourne Cad File No: G:\31\36206\CADD\Drawings\31-36206-CIV-0501-0502.dwg

N

SUNBURY

JACKSONS HILL

LIMIT OF SUNBURY SOUTH PSP
FOR CONTINUATION REFER TO
DRAWING 2113308A-CIV-0501

GELLIES ROAD

SS-IN-08

BOULEVARD FRANCIS

LANGEFIELD ROAD (SS-RD-01)

SS-IN-12

SS-IN-04

SS-IN-03

SUNBURY ROAD (SS-RD-02)

SS-IN-02

SS-IN-01

JACKSONS CREEK

SS-RD-04-01

SS-BR-01

SS-RD-04-02

SS-BR-02

SS-IN-10

VINEYARD ROAD (SS-RD-03)

SS-RD-09

SS-IN-09

SS-BR-04
(ROAD UNDER RAIL)

SS-BR-03
(CULVERT)

SS-RD-04-05

SS-RD-04-04

SS-RD-04-03

SS-IN-05

BUCKLAND WAY (SS-RD-05)

HARPERS CREEK

MOORE ROAD

SS-IN-07

OLD VINEYARD ROAD

BENDIGO RAILWAY LINE

FOX HOLLOW DRIVE (SS-RD-06)

SS-IN-15

REFER TO INSET A
CRINNION ROAD

WATSONS ROAD (SS-RD-07)

SS-IN-14

SS-IN-13

WATSONS ROAD (SS-RD-07)

BUCKLEY ROAD

CRINNION ROAD (SS-RD-08)

SS-IN-11

BULLA-DIGGERS REST ROAD

INSET A
CRINNION ROAD
SCALE 1:20,000

LEGEND:

- INTERSECTION PROJECT
- ROAD PROJECT
- BRIDGE /CULVERT /UNDERPASS PROJECT

0 200 400 600m
SCALE 1:20,000 AT ORIGINAL SIZE

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| K | ROAD PROJECT SS-RD-09 ADDED | SL | LM* | MW* | 12.09.19 |
| J | INTERSECTION SS-IN-15 ADDED | SL | LM* | MW* | 21.08.19 |
| I | INTERSECTION SS-IN-14 ADDED | SL | LM* | MW* | 12.08.19 |
| H | AMENDED TO VPA COMMENTS - GHD | SL | LM* | MW* | 06.08.19 |

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Project SUNBURY STH AND LANCEFIELD RD PSP
Title OVERALL LAYOUT PLAN
SUNBURY SOUTH PSP

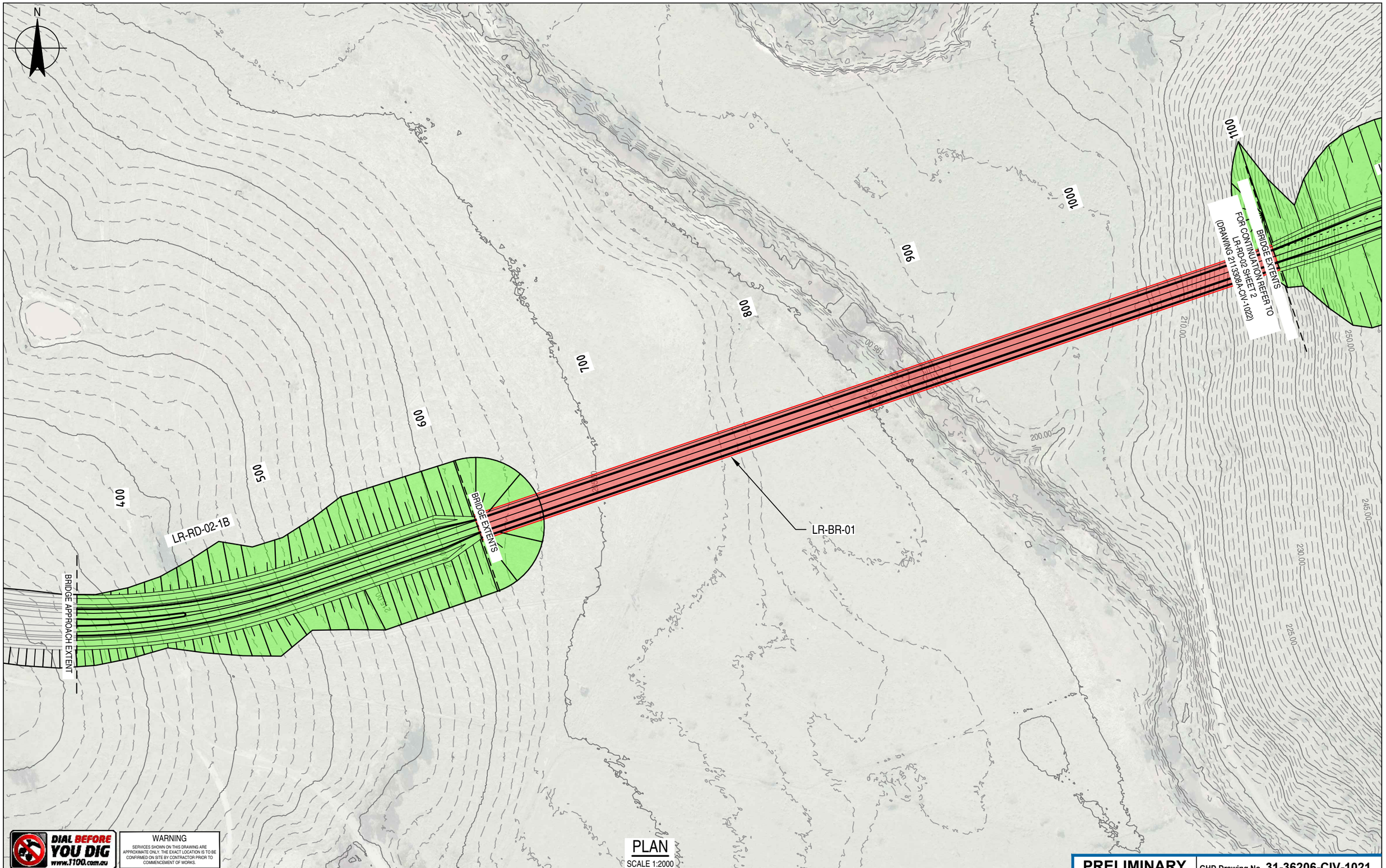
Original Size A3

Drawing No: 2113308A-CIV-0502 Rev: K

Plot Date: 18 September 2019 - 1:45 PM Plotted By: Shane Laybourne

Cad File No: G:\31\36206\CADD\Drawings\31-36206-CIV-0501-0502.dwg

**APPENDIX B: HORZONTAL ALIGNMENT OF BRIDGE LOCATIONS**




PLAN
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| K | AMENDED TO VPA COMMENTS - GHD | SL | LM* | MW* | 26.08.19 |
| J | AMENDED TO VPA COMMENTS - GHD | SL | LM* | MW* | 06.08.19 |
| I | AMENDED TO VPA COMMENTS - GHD | DH | LM* | MW* | 27.05.19 |
| H | AMENDED TO COMMENTS - GHD | SL | LM* | MW* | 08.02.19 |
| G | AMENDED TO VPA COMMENTS - GHD | DAC | LM* | MW* | 02.08.18 |

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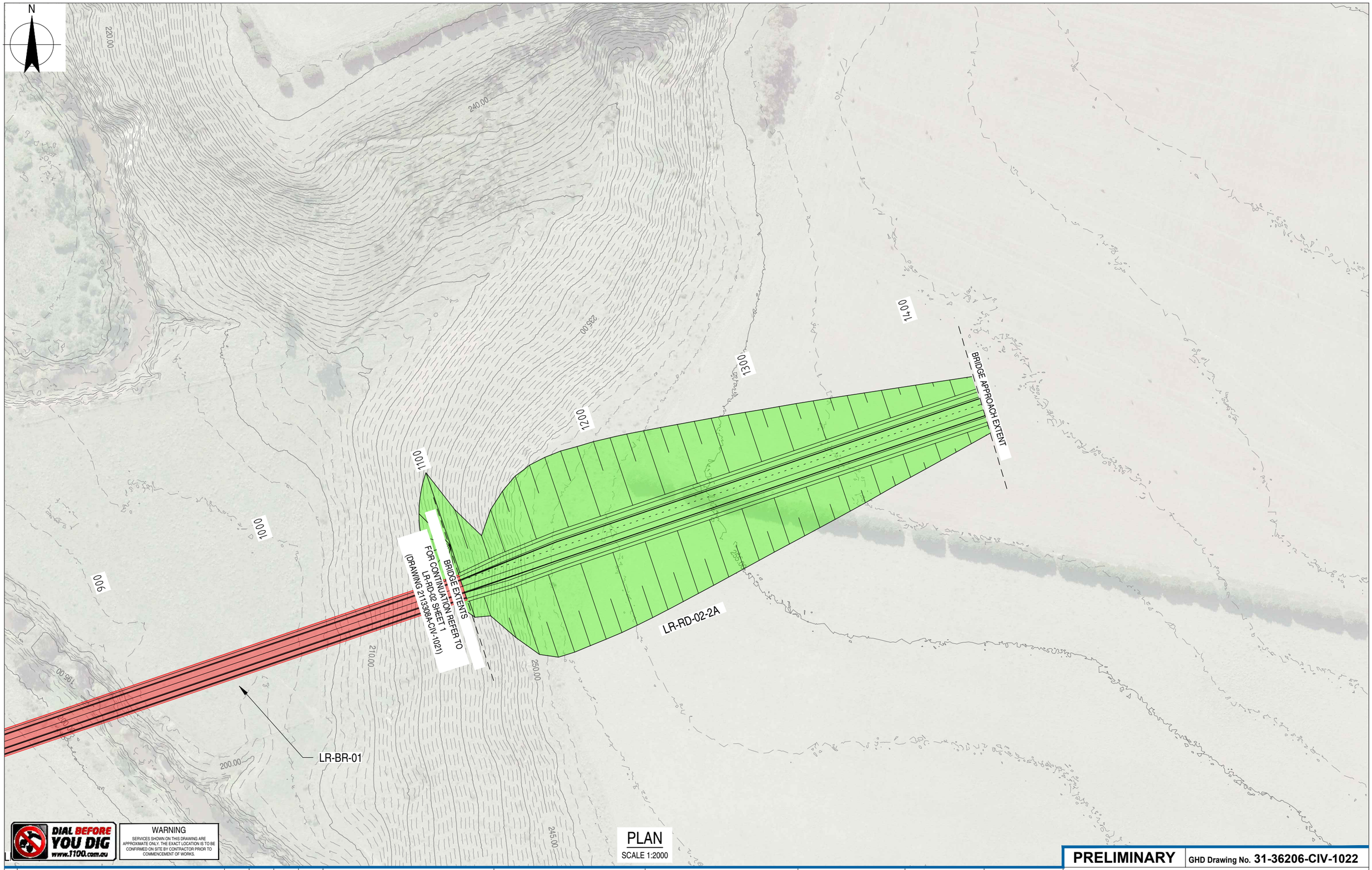
Project SUNBURY STH AND LANCEFIELD RD PSP
Title ALIGNMENT PLAN
ULTIMATE LAYOUT
LR-RD-02 SHEET 1

Original Size A3 | Drawing No: 2113308A-CIV-1021 | Rev: K

Plot Date: 19 September 2019 - 10:29 AM Plotted By: Shane Laybourne Cad File No: G:\31\36206\CADD\Drawings\31-36206-CIV-1021-1025.dwg

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| K | UPDATED LR-BR-01 ALIGNMENT | | SL | LM* | MW* | 19.09.19 |
| J | AMENDED TO VPA COMMENTS - GHD | | SL | LM* | MW* | 06.08.19 |
| I | AMENDED TO VPA COMMENTS - GHD | | DH | LM* | MW* | 27.05.19 |
| H | AMENDED TO COMMENTS - GHD | | SL | LM* | MW* | 08.02.19 |
| G | AMENDED TO VPA COMMENTS - GHD | | DAC | LM* | MW* | 02.08.18 |

0 20 40 60m
SCALE 1:2000 AT ORIGINAL SIZE

Victorian Planning Authority

GHD
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|---|---|---|---|
| Drawn | D.COMBEN | Designer | G.KERR |
| Drafting Check | | Design Check | |
| Approved (Project Director) | | | |
| Date | | | |
| Scale | 1:2000 | This Drawing must not be used for Construction unless signed as Approved | |

**PRELIMINARY**

GHD Drawing No. 31-36206-CIV-1022

Project: SUNBURY STH AND LANCEFIELD RD PSP

Title: ALIGNMENT PLAN
ULTIMATE LAYOUT
LR-RD-02 SHEET 2

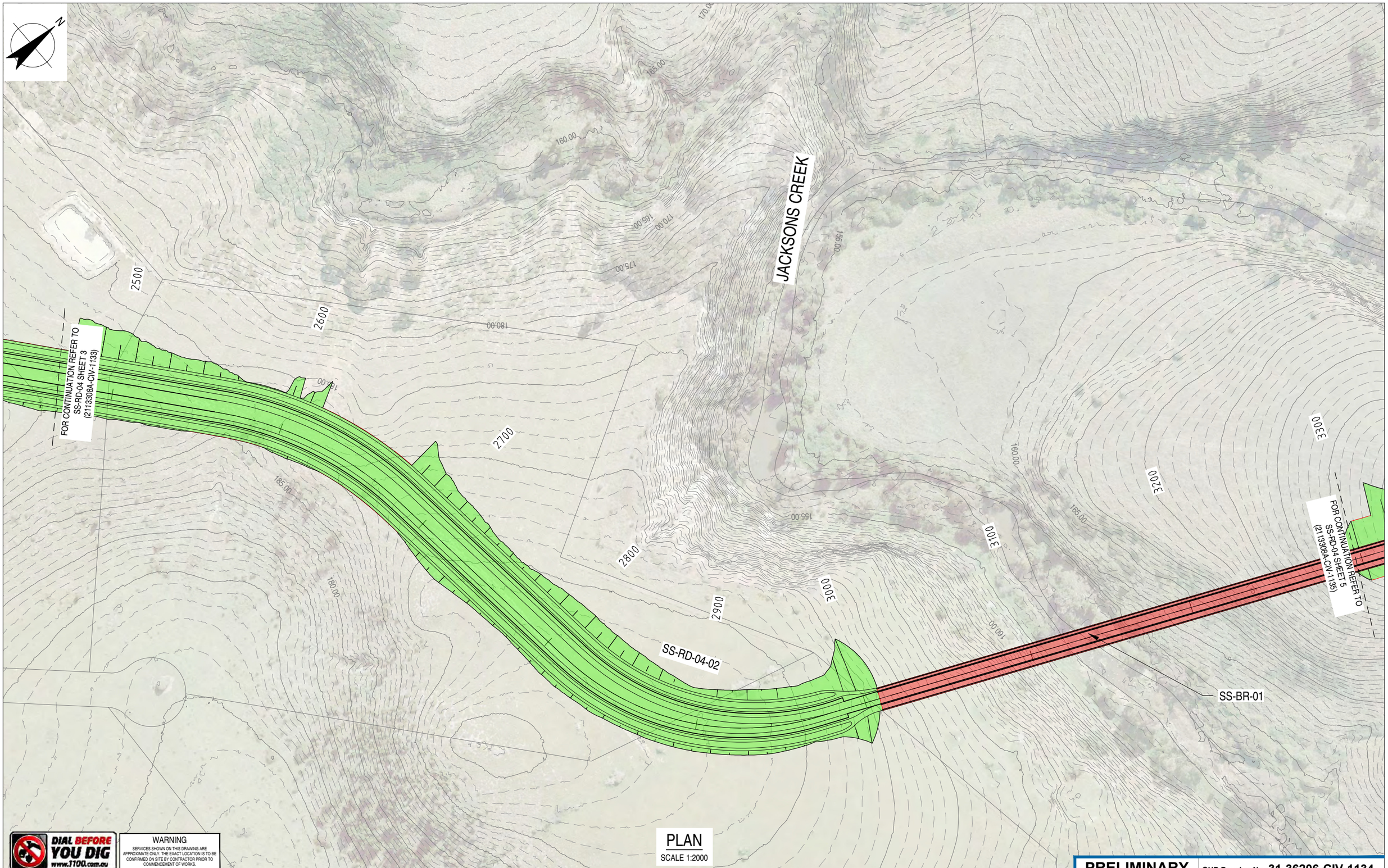
Original Size: A3

Drawing No: 2113308A-CIV-1022

Rev: K

Plot Date: 19 September 2019 - 11:33 AM Plotted By: Shane Laybourne

Cad File No: G:\31\36206\CADD\Drawings\31-36206-CIV-1021-1025.dwg




PLAN
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| J | AMENDED TO VPA COMMENTS - GHD | SL | LM* | MW* | 18.09.19 |
| I | AMENDED TO VPA COMMENTS - GHD | SL | LM* | MW* | 08.08.19 |
| H | AMENDED TO VPA COMMENTS - GHD | DAC | LM* | MW* | 02.08.18 |
| G | ISSUED FOR REVIEW - GHD | JT | LM* | MW* | 13.07.18 |
| F | ISSUED FOR REVIEW - GHD | DAC | GK* | MW* | 05.06.18 |

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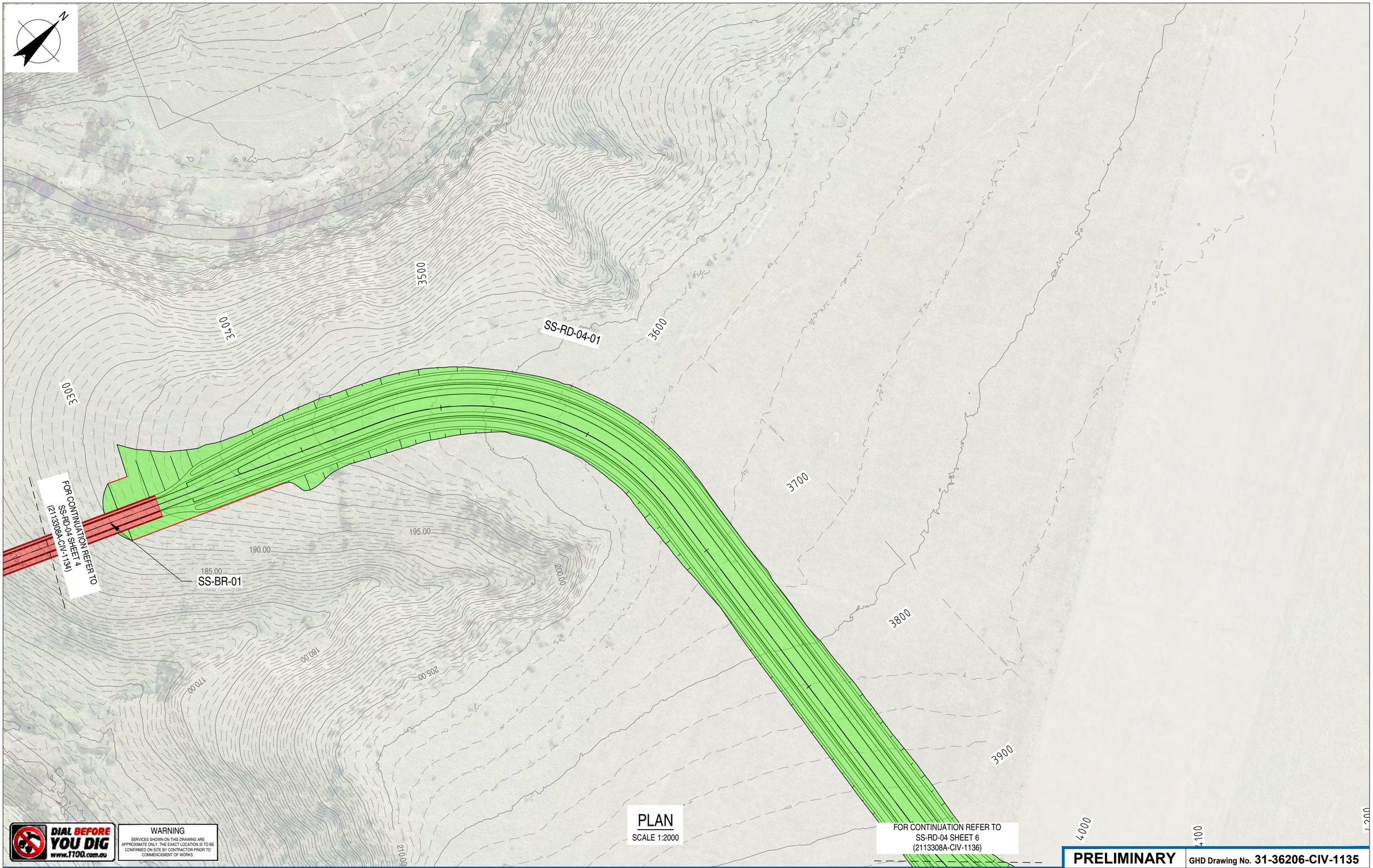
| Drafting Check | | Design Check | |
| Approved (Project Director) | | | |
| Date | | | |
| Scale | 1:2000 | This Drawing must not be used for Construction unless signed as Approved | |

**PRELIMINARY** GHD Drawing No. 31-36206-CIV-1134

Project SUNBURY STH AND LANCEFIELD RD PSP
Title ALIGNMENT PLAN
ULTIMATE LAYOUT
SS-RD-04 SHEET 4

Original Size A3
Drawing No: 2113308A-CIV-1134
Rev: J

Plot Date: 18 September 2019 - 6:09 PM Plotted By: Shane Laybourne Cad File No: \\ghdnet\ghd\AU\Melbourne\Projects\31\36206\CADD\Drawings\31-36206-CIV-1134.dwg




PLAN
SCALE 1:2000

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|---|---|---|---|---|---|---|
| H | AMENDED TO VPA COMMENTS - GHD | | SL | LM* | MW* | 18.09.19 |
| G | AMENDED TO VPA COMMENTS - GHD | | SL | LM* | MW* | 08.08.19 |
| F | AMENDED TO VPA COMMENTS - GHD | | DAC | LM* | MW* | 02.08.18 |
| E | ISSUED FOR REVIEW - GHD | | JT | LM* | MW* | 16.07.18 |
| D | ISSUED FOR REVIEW - GHD | | DAC | GK* | MW* | 05.06.18 |

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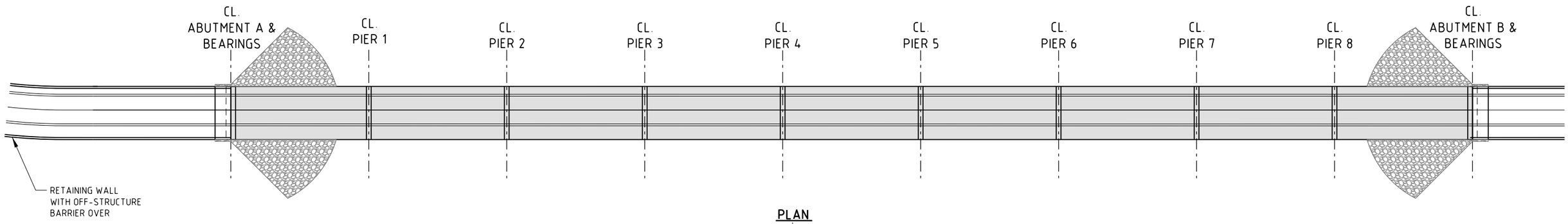
PRELIMINARY
GHD Drawing No. 31-36206-CIV-1135

Project SUNBURY STH AND LANCEFIELD RD PSP
Title ALIGNMENT PLAN
ULTIMATE LAYOUT
SS-RD-04 SHEET 5

Original Size A3
Drawing No: 2113308A-CIV-1135
Rev: H

Plot Date: 18 September 2019 - 6:11 PM Plotted By: Shane Laybourne
Cad File No: \\ghdnet\ghd\AU\Melbourne\Projects\31\36206\CADD\Drawings\31-36206-CIV-1135.dwg

**APPENDIX C: PROFILE OF SS-BR-01**




**PLAN**
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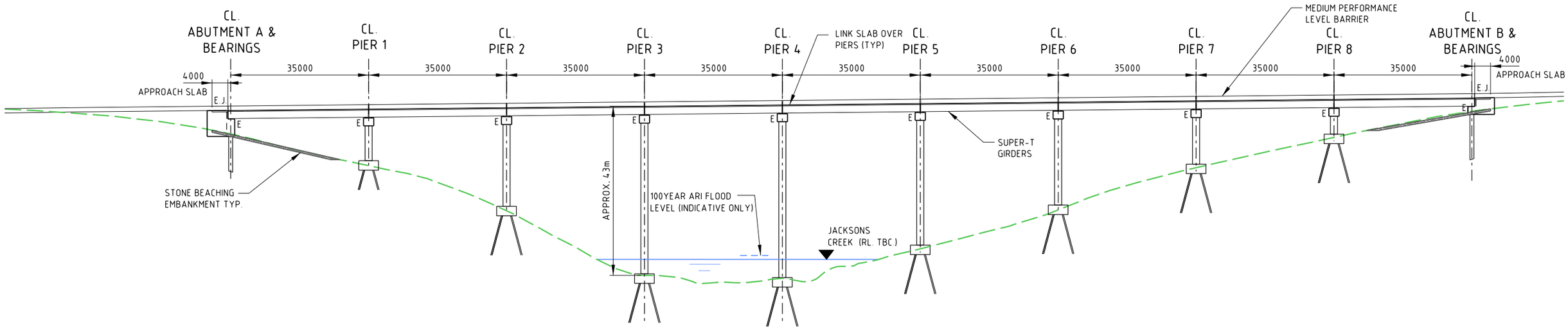


**ELEVATION - OPTION E (LONG)**
1 : 1000

NOTES
E - DENOTES EXPANSION BEARING

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

| REV | DATE | DESCRIPTION | DRAWN | CHECK | DESIGN | VERIFY |
|---|---|---|---|---|---|---|
| A | 7/3/16 | ISSUED FOR INFORMATION | DH | FR | JA | FR |

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0 10 20 30
Full Size 1:1000 A3
SCALE (m)

A3 ORIGINAL
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VERIFY ALL DIMENSIONS ON SITE

APPROVED FOR AND ON BEHALF OF
PARSONS BRINCKERHOFF AUSTRALIA PTY LIMITED

SIGNED

DATE

PARSONS BRINCKERHOFF
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ABN 80 078 004 798
Telephone +61 3 9861 1111
Facsimile +61 3 9861 1144
Email: melbourne@pb.com.au

CLIENT
METROPOLITAN PLANNING AUTHORITY

PROJECT
SUNBURY STH AND LANCEFIELD RD PSP
JACKSON CREEK BRIDGE (SS-BD1)
ALTERNATIVE LONG OPTION
GENERAL ARRANGEMENT
SHEET 1

| PROJECT No. | DISCIPLINE | NUMBER | REV. |
|---|---|---|---|
| 2113308A | STR | 0102 | A |

0100

50mm AT FULL SIZE

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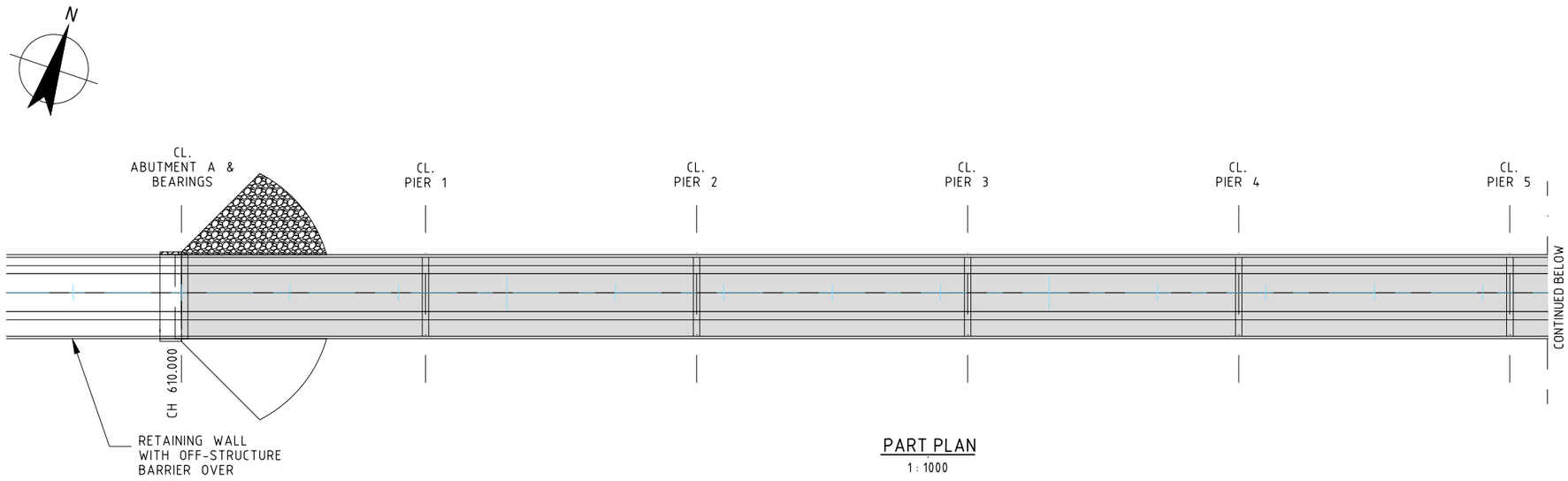
**APPENDIX D: PROFILE OF LR-BR-1**




PART PLAN

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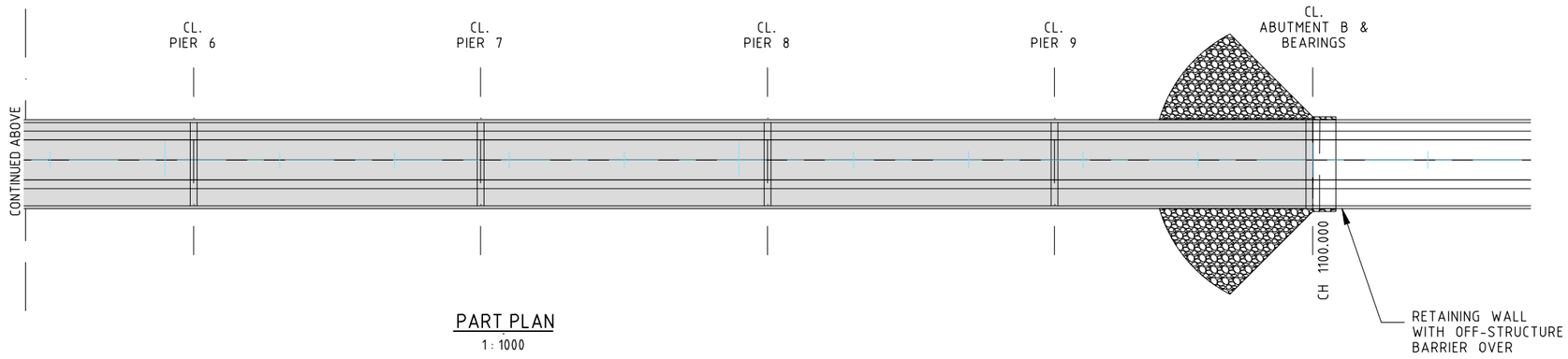


PART PLAN

1 : 1000

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|---|---|---|---|---|---|
| C | UPDATED ARRANGEMENT LENGTH | TC | LM | MW | 13.08.18 |
| B | PRELIMINARY ISSUE - GHD | DAC | LM* | MW* | 02.08.18 |
| A | ISSUED FOR INFORMATION - PB | JD | - | - | 22.03.17 |

0 10 20 30m

SCALE 1:1000 AT ORIGINAL SIZE

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| Drafting Check | | Design Check | |
| Approved (Project Director) | | | |
| Date | | | |
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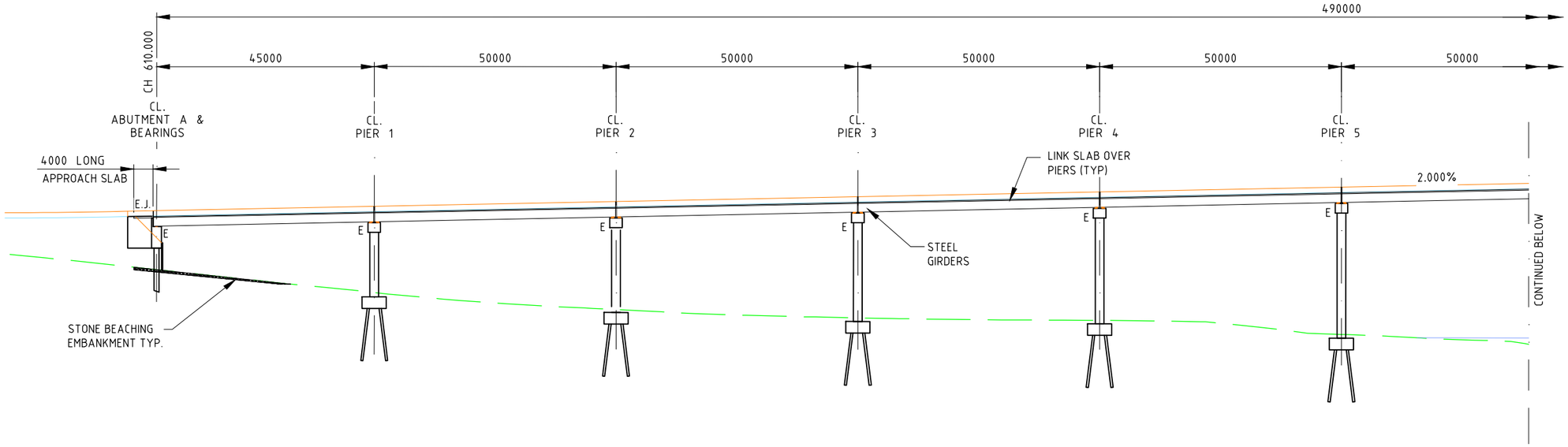
**PRELIMINARY** GHD Drawing No. **31-36206-STR-0401**

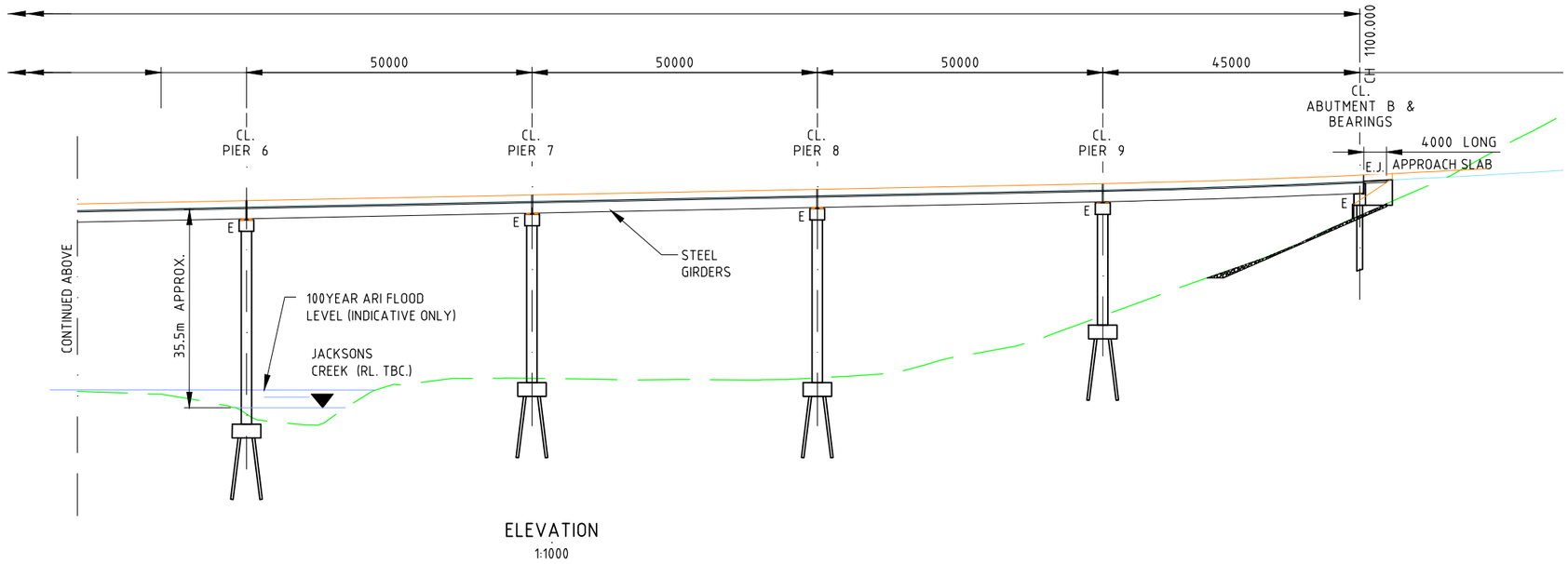
Project **SUNBURY STH AND LANCEFIELD RD PSP**

Title **JACKSON CREEK BRIDGE (LR-BR-01)**
**ALTERNATIVE LONG OPTION 3**
**GENERAL ARRANGEMENT SHEET 1**

Original Size **A3** Drawing No: **2113308A-STR-0401** Rev: **C**

Plot Date: 18 September 2019 - 6:32 PM Plotted By: Shane Laybourne Cad File No: \\ghdnet\ghd\AU\Melbourne\Projects\31\36206\CADD\Drawings\31-36206-STR-0401.dwg

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|---|---|---|---|---|---|
| C | UPDATED ARRANGEMENT LENGTH | TC | LM | MW | 13.08.18 |
| B | PRELIMINARY ISSUE - GHD | DAC | LM* | MW* | 02.08.18 |
| A | ISSUED FOR INFORMATION - PB | JD | - | - | 22.03.17 |

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Drawn D.COMBEN | Designer G.KERR
Drafting Check | Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

PRELIMINARY
GHD Drawing No. 31-36206-STR-0402

Project SUNBURY STH AND LANCEFIELD RD PSP
Title JACKSON CREEK BRIDGE (LR-BR-01)
ALTERNATIVE LONG OPTION 3
GENERAL ARRANGEMENT SHEET 2

Original Size A3
Drawing No: 2113308A-STR-0402
Rev: C

Plot Date: 18 September 2019 - 6:32 PM Plotted By: Shane Laybourne
Cad File No: \\ghdnet\ghd\AU\Melbourne\Projects\31\36206\CADD\Drawings\31-36206-STR-0402.dwg

**APPENDIX E: RELEVANT PRICED SCHEDULES**

# LR-BR-01 - Bridge Steel Girder

## Approx. length 490m

| Item | Description | | Quantity | Unit | Rate | Amount | Comments |
|---|---|---|---|---|---|---|---|
| | **WORKS** | | | | | | |
| 1 | **SITEWORKS AND EARTHWORKS** | | | | | | |
| | **1.1** | **Pre-construction** | | | | | |
| | 1.1.1 | Site preparation | 2 | Item | $ 5,500.00 | $ 11,000.00 | |
| | 1.1.2 | Strip Site Locally | - | sq.m | $ 2.75 | $ - | |
| | **1.2** | **Earthworks** | | | | | |
| | 1.2.1 | Bulk excavation and fill | 10,000 | cu.m | $ 43.20 | $ 432,000.00 | |
| | 1.2.2 | EO Allowance for rock excavation works | 5,000 | cu.m | $ 96.80 | $ 484,000.00 | EO allowance of encountering rock to 50% of excavated area. |
| | 1.2.3 | Fill only | - | cu.m | $ 37.80 | $ - | |
| | **1.3** | **Set-Out** | | | | | |
| | 1.3.1 | Allow for site setout and marking | 1 | Item | $ 12,500.00 | $ 12,500.00 | |
| 2 | **STRUCTURE** | | | | | | |
| | **2.1** | **Slab & Foundations/Piers/Beams** | | | | | |
| | 2.1.1 | Bridge Structure | 7,383 | sq.m | $ 4,450.00 | $ 32,854,350.00 | Conc slab (200mm thk) including 3000mm deep steel girders Steel Girder, 50m spans with rinforced concrete deck |
| | 2.1.2 | Elastomeric Bearings | - | Item | $ 1,650.00 | $ - | |
| | 2.1.3 | Cast in-situ concrete base slab with footings | - | sq.m | $ 550.00 | $ - | |
| | 2.1.4 | Bridge Columns | 8,970 | cu.m | $ 1,100.00 | $ 9,867,000.00 | Pier concrete Column 12,000w x 2500d 40Mpa |
| | 2.1.5 | Pile | 2,600 | Lm | $ 1,800.00 | $ 4,680,000.00 | Foundation Concrete bored Piles 900d x 20,000l 50Mpa |
| | 2.1.6 | Pile Cap | 624 | cu.m | $ 650.00 | $ 405,600.00 | Concrete pier Pile Cap 16,000l x 2500w x 1200d 40Mpa |
| | 2.1.7 | Retaining Walls - Wing & Keeper Walls | - | sq.m | $ 1,100.00 | $ - | |
| | 2.1.8 | Retaining Walls - Fender Wall | - | Item | $ 16,500.00 | $ - | |
| | 2.1.9 | Retaining Wall | - | sq.m | $ 1,120.00 | $ - | |
| | 2.1.10 | Bridge deck | - | sq.m | $ 480.00 | $ - | |
| | 2.1.11 | Constructability | 1 | Item | | $ 7,624,177.50 | Includes site reinstatement, temproary works, staging etc. |
| | **2.2** | **Abutments** | | | | | |
| | 2.2.1 | RC Abutment / Crosshead Beam | 1,208 | cu.m | $ 2,500.00 | $ 3,020,900.00 | 1200w x 1000d 40Mpa |
| | 2.2.2 | Anti Sliding Blocks | - | Item | $ 2,500.00 | $ - | |
| | 2.2.3 | Abutment Walls and Bearings | - | Item | $ 400,000.00 | $ - | |
| | 2.2.4 | Bored piles | - | Item | $ 9,712.80 | $ - | |
| | **2.3** | **Bridge Containment Barriers** | | | | | |
| | 2.3.1 | Bridge containment barriers | 1,000 | Lm | $ 2,850.00 | $ 2,850,000.00 | |
| | 2.3.2 | Barriers - Medium Containment | - | LM | $ 1,750.00 | $ - | |
| | 2.3.3 | Barriers - Armco (off structure) | - | LM | $ 110.00 | $ - | |
| | **2.4** | **Other** | | | | | |
| 3 | **ON-BRIDGE WORKS** | | | | | | |
| | **3.1** | **Ashphalt Wearing Course Over Slab** | | | | | |
| | 3.1.1 | Asphalt pavement | 4,410 | sq.m | $ 110.00 | $ 485,100.00 | |
| | 3.1.2 | Road pavement under bridge | - | sq.m | $ 250.00 | $ - | |
| | 3.1.3 | Cycle track | - | sq.m | $ 1,200.00 | $ - | |
| | **3.2** | **Kerb and Channel** | | | | | |
| | 3.2.1 | Kerb and channel | 1,000 | Lm | $ 75.00 | $ 75,000.00 | |
| | **3.3** | **Footpath** | | | | | |
| | 3.3.1 | Footpath | 1,500 | sq.m | $ 66.00 | $ 99,000.00 | |
| | **3.3** | **Footpath** | | | | | |
| | 3.3.1 | Bridge walkway | - | sq.m | $ 1,500.00 | $ - | |
| | 3.3.2 | Pedestrian footpath | - | sq.m | $ 155.00 | $ - | |
| | 3.3.3 | Shared path | - | sq.m | $ 155.00 | $ - | |
| | **3.4** | **Lighting On-Bridge** | | | | | |
| | 3.4.1 | Lighting | 34 | Item | $ 17,500.00 | $ 595,000.00 | Includes Poles |
| | 3.4.2 | Allowance for Conduits | - | LM | $ 16.50 | $ - | |
| | **3.5** | **Other** | | | | | |
| 4 | **OFF-BRIDGE WORKS** | | | | | | |
| | **4.1** | **Approach Slabs** | | | | | |
| | 4.1.1 | Reinforced concrete slabs (approach slabs) | 50 | cu.m | $ 500.00 | $ 25,000.00 | |
| | **4.2** | **Safety Gurad Rail/Barrier** | | | | | |
| | 4.2.1 | Handrails | - | Item | $ 5,000.00 | $ - | |
| | 4.2.2 | Guard rails | 200 | LM | $ 1,500.00 | $ 300,000.00 | Vehicle approach barriers |
| | 4.2.3 | Safety rails | - | Item | $ 1,700.00 | $ - | |
| | **4.3** | **Drainage** | | | | | |
| | 4.3.1 | Drainage to bridge | - | Item | $ 22,000.00 | $ - | |
| | 4.3.2 | Drainage to lowered road under | - | Item | $ 100,000.00 | $ - | |
| | 4.3.3 | Rock Beaching | - | cu.m | $ 100.00 | $ - | |
| | **4.4** | **Scour Protection** | | | | | |
| | **4.5** | **Other** | | | | | |
| 5 | **MISCELLANEOUS** | | | | | | |
| | 5.1 | Architectural screens / cladding to Piers / Deck | 1,000 | LM | $ 1,200.00 | $ 1,200,000.00 | |
| | 5.2 | Anti Throw screens | 980 | LM | $ 1,650.00 | $ 1,616,901.00 | |
| | 5.3 | Dewatering works | - | Item | $ 250,000.00 | $ - | |
| | 5.4 | Melbourne Water Temp Diversion | - | sq.m | $ 1,000.00 | $ - | |
| | 5.5 | Linemarking | 490 | Item | $ 32.00 | $ 15,680.00 | |
| | 5.6 | Signage | - | Item | $ 25,000.00 | $ - | |
| | 5.7 | Occupation costs | - | Item | $ 20,000.00 | $ - | |
| | 5.8 | Construction occupation | - | Item | $ 1,035,000.00 | $ - | |
| | 5.9 | Habitat Compensation Fee (Estimate) | 1 | Item | $ 19,497.12 | $ 19,497.12 | Estimate from DELWP |
| 6 | **RAIL RELATED ITEMS** | | | | | | |
| | 6.1 | Occupation costs (minor) | - | Item | $ 20,000.00 | $ - | |
| | 6.2 | Construction occupation | - | Item | $ 1,035,000.00 | $ - | |
| | 6.3 | Signalling Adjustments | - | Item | $ 750,000.00 | $ - | |
| | 6.4 | Rail Occupation Costs (Power Off) - N/A Vline Only | - | Note | | | |
| | 6.5 | Rail Occupation Costs (Major) - Vline | - | Wkend | $ 100,000.00 | $ - | |
| | 6.6 | Track & Ballast | - | Item | $ 1,650.00 | $ - | |
| | 6.7 | OHLE (Assume + 100m each way) | - | TM | $ 550.00 | $ - | |
| 7 | **SERVICES** | | | | | | |
| | 7.1 | APA Gas | - | Item | $ 4,400,000.00 | $ - | |
| | 7.2 | Telstra NBN | - | Item | $ 400,000.00 | $ - | |
| | 7.3 | Western Water Sewer | - | Item | $ 300,000.00 | $ - | |
| | 7.4 | Services relocation | - | Item | $ 150,000.00 | $ - | |
| | 7.5 | Increase in Head Contractor Preliminaries (22% to 25%) | 3 | % | $ 66,672,705.62 | $ 2,000,181.17 | |
| | | | | | **SUB TOTAL - WORKS** | **$ 68,672,886.79** | |
| 8 | **DELIVERY** | | | | | | |
| | 8.1 | Council Fees | 3% | Item | | $ 2,231,868.82 | |
| | 8.2 | VicRoads Fees | 0% | Item | | $ - | |
| | 8.3 | Traffic Management | 5% | Item | | $ 3,433,644.34 | |
| | 8.4 | Environmental Management | 1% | Item | | $ 343,364.43 | |
| | 8.5 | Survey & Design | 5% | Item | | $ 3,433,644.34 | |
| | 8.6 | Supervision & Project Management | 15% | Item | | $ 10,300,933.02 | Increased due to scale of project |
| | 8.7 | Site Establishment | 3% | Item | | $ 1,716,822.17 | |
| | 8.8 | Contingency | 20% | Item | | $ 13,734,577.36 | |
| | | | | | **SUB TOTAL - DELIVERY** | **$ 35,194,854.48** | |
| | | | | | **TOTAL** | **$ 103,867,741.27** | |

# SS-BR-01 (Long Option)

## Approx. length 315m

| Item | Description | Quantity | Unit | Rate | Amount | Comments |
|---|---|---|---|---|---|---|
| | **WORKS** | | | | | |
| 1 | **SITEWORKS AND EARTHWORKS** | | | | | |
| | **1.1 Pre-construction** | | | | | |
| | 1.1.1 Site preparation | 2 | Item | $ 5,500.00 | $ 11,000.00 | |
| | 1.1.2 Strip Site Locally | - | sq.m | $ 2.75 | $ - | |
| | **1.2 Earthworks** | | | | | |
| | 1.2.1 Bulk excavation and fill | 6,922 | cu.m | $ 43.20 | $ 299,008.80 | |
| | 1.2.2 EO Allowance for rock excavation works | 3,461 | cu.m | $ 96.80 | $ 335,000.60 | EO allowance of encountering rock to 50% of excavated area. |
| | 1.2.3 Fill only | - | cu.m | $ 37.80 | $ - | |
| | **1.3 Set-Out** | | | | | |
| | 1.3.1 Allow for site setout and marking | 1 | Item | $ - | $ 12,500.00 | |
| 2 | **STRUCTURE** | | | | | |
| | **2.1 Slab & Foundations/Piers/Beams** | | | | | |
| | 2.1.1 Bridge structure | 4,785 | sq.m | $ 2,450.00 | $ 11,723,250.00 | Allow for reinforced single span concrete bridge (Total width 13.5m approx.) 200mm thick deck slab on top of super 1800mm deep T-Beams |
| | 2.1.2 Elastomeric Bearings | - | Item | $ 1,650.00 | $ - | |
| | 2.1.3 Cast in-situ concrete base slab with footings | - | sq.m | $ 550.00 | $ - | |
| | 2.1.4 Bridge Columns | 1,386 | sq.m | $ 3,500.00 | $ 4,851,000.00 | |
| | 2.1.5 Piles | 80 | Item | $ 3,584.70 | $ 286,776.00 | Driven piles Approx. 10 per pier |
| | 2.1.6 Pile Cap | 8 | Item | $ 31,950.00 | $ 255,600.00 | |
| | 2.1.7 Retaining Walls - Wing & Keeper Walls | - | sq.m | $ 1,100.00 | $ - | |
| | 2.1.8 Retaining Walls - Fender Wall | - | Item | $ 16,500.00 | $ - | |
| | 2.1.9 Retaining Wall | - | sq.m | $ 1,120.00 | $ - | |
| | 2.1.10 Bridge Deck | - | sq.m | $ 480.00 | $ - | |
| | 2.1.11 Constructability | 1 | Item | | $ 2,691,649.26 | Allowance for temporary works due to site conditions |
| | **2.2 Abutments** | | | | | |
| | 2.2.1 RC Abutment / Crosshead Beam | 130 | cu.m | $ 2,500.00 | $ 325,000.00 | |
| | 2.2.2 Anti Sliding Blocks | 10 | Item | $ 2,500.00 | $ 25,000.00 | |
| | 2.2.3 Abutment Walls and Bearings | 1 | Item | $ 400,000.00 | $ 400,000.00 | |
| | 2.2.4 Bored piles | 8 | Item | $ 9,712.80 | $ 77,702.40 | Bored piles behind RC retaining wall |
| | **2.3 Bridge Containment Barriers** | | | | | |
| | 2.3.1 Bridge containment barriers | 646 | LM | $ 2,850.00 | $ 1,841,100.00 | |
| | 2.3.2 Barriers - Medium Containment | - | LM | $ 1,750.00 | $ - | |
| | 2.3.3 Barriers - Armco (off structure) | - | LM | $ 110.00 | $ - | |
| | **2.4 Other** | | | | | |
| 3 | **ON-BRIDGE WORKS** | | | | | |
| | **3.1 Ashphalt Wearing Course Over Slab** | | | | | |
| | 3.1.1 Asphalt pavement | 2,205 | sq.m | $ 110.00 | $ 242,550.00 | Road pavement - Traffic lane Allow Traffic lane (7m) wide |
| | 3.1.2 Road pavement under bridge | - | sq.m | $ 250.00 | $ - | |
| | 3.1.3 Cycle track | - | sq.m | $ 1,200.00 | $ - | |
| | **3.2 Kerb and Channel** | | | | | |
| | 3.2.1 Kerb and channel | 630 | LM | $ 75.00 | $ 47,250.00 | |
| | **3.3 Footpath** | | | | | |
| | 3.3.1 Bridge walkway | - | sq.m | $ 1,500.00 | $ - | |
| | 3.3.2 Pedestrian footpath | - | sq.m | $ 155.00 | $ - | |
| | 3.3.3 Shared path | 1,575 | sq.m | $ 132.00 | $ 207,900.00 | Shared path overlay total |
| | **3.4 Lighting On-Bridge** | | | | | |
| | 3.4.1 Lighting | 11 | Item | $ 17,500.00 | $ 192,500.00 | Assumed poles 12m high with luminaries |
| | 3.4.2 Allowance for Conduits | - | LM | $ 16.50 | $ - | |
| | **3.5 Other** | | | | | |
| 4 | **OFF-BRIDGE WORKS** | | | | | |
| | **4.1 Approach Slabs** | | | | | |
| | 4.1.1 Reinforced concrete slabs (approach slabs) | 108 | sq.m | $ 500.00 | $ 54,000.00 | Assumed 200mm thick |
| | **4.2 Safety Gurad Rail/Barrier** | | | | | |
| | 4.2.1 Handrails | - | Item | $ 5,000.00 | $ - | |
| | 4.2.2 Guard rails | 200 | LM | $ 1,500.00 | $ 300,000.00 | Vehicle approach barriers |
| | 4.2.3 Safety rails | - | Item | $ 20,000.00 | $ - | |
| | **4.3 Drainage** | | | | | |
| | 4.3.1 Drainage to bridge | 2 | Item | $ 150,000.00 | $ 300,000.00 | Works to approach slabs |
| | 4.3.2 Drainage to lowered road under | - | Item | $ 100,000.00 | $ - | |
| | 4.3.3 Rock Beaching | 560 | cu.m | $ 100.00 | $ 56,000.00 | 300mm thick |
| | **4.4 Scour Protection** | | | | | |
| | **4.5 Other** | | | | | |
| 5 | **MISCELLANEOUS** | | | | | |
| | 5.1 Architectural screens / cladding to Piers / Deck | 630 | LM | $ 2,000.00 | $ 1,260,000.00 | |
| | 5.2 Anti Throw screens | 630 | LM | $ 1,650.00 | $ 1,039,500.00 | |
| | 5.3 Dewatering works | 1 | Item | $ 250,000.00 | $ 250,000.00 | Allowance for dewatering works |
| | 5.4 Melbourne Water Temp Diversion | - | sq.m | $ - | $ - | |
| | 5.5 Linemarking | 315 | LM | $ 32.00 | $ 10,080.00 | |
| | 5.6 Signage | - | Item | $ 25,000.00 | $ - | |
| | 5.7 Occupation costs | - | Item | $ 20,000.00 | $ - | |
| | 5.8 Construction occupation | - | Item | $ 1,035,000.00 | $ - | |
| | 5.9 Habitat compenstaion fee | 1 | Item | $ 88,000.88 | $ 88,000.88 | Estimate from DELWP |
| 6 | **RAIL RELATED ITEMS** | | | | | |
| | 6.1 Occupation costs (minor) | - | Item | $ 20,000.00 | $ - | |
| | 6.2 Construction occupation | - | Item | $ 1,035,000.00 | $ - | |
| | 6.3 Signalling Adjustments | - | Item | $ 750,000.00 | $ - | |
| | 6.4 Rail Occupation Costs (Power Off) - N/A Vline Only | - | Note | | | |
| | 6.5 Rail Occupation Costs (Major) - Vline | - | Wkend | $ 100,000.00 | $ - | |
| | 6.6 Track & Ballast | - | Item | $ 1,650.00 | $ - | |
| | 6.7 OHLE (Assume + 100m each way) | - | TM | $ 550.00 | $ - | |
| 7 | **SERVICES** | | | | | |
| | 7.1 APA Gas | - | Item | $ 4,400,000.00 | $ - | |
| | 7.2 Telstra NBN | - | Item | $ 400,000.00 | $ - | |
| | 7.3 Western Water Sewer | - | Item | $ 300,000.00 | $ - | |
| | 7.4 Services relocation | 1 | Item | $ 150,000.00 | $ 150,000.00 | Allowances for service relocation surrounding approach slabs |
| | 7.5 Increase in Head Contractor Preliminaries (22% to 25%) | 3 | % | $ 27,332,367.94 | $ 819,971.04 | Allowance for scale of project |
| | | | | **SUB TOTAL - WORKS** | **$ 28,152,338.98** | |
| 8 | **DELIVERY** | | | | | |
| | 8.1 Council Fees | 3% | Item | | $ 914,951.02 | |
| | 8.2 VicRoads Fees | 0% | Item | | $ - | |
| | 8.3 Traffic Management | 5% | Item | | $ 1,407,616.95 | |
| | 8.4 Environmental Management | 1% | Item | | $ 140,761.69 | |
| | 8.5 Survey & Design | 5% | Item | | $ 1,407,616.95 | |
| | 8.6 Supervision & Project Management | 12% | Item | | $ 3,378,280.68 | Increase due to scale of project |
| | 8.7 Site Establishment | 3% | Item | | $ 703,808.47 | |
| | 8.8 Contingency | 20% | Item | | $ 5,630,467.80 | |
| | | | | **SUB TOTAL - DELIVERY** | **$ 13,583,503.56** | |
| | | | | **TOTAL** | **$ 41,735,842.54** | |