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1. Introduction

1.1 Introduction

GHD were engaged by the Victorian Planning Authority (VPA) to prepare a report to update the Infrastructure Costing Plan (ICP) for the Sunbury South and Lancefield Road Precinct Structure Plans (PSP 1074 and PSP 1075) following the Planning Panel Conclaves.

Further to this report, GHD has updated the detailed design drawings and cost plans provided by the VPA with revised rates quantities based on updated design amendments and direction from the VPA and conclaves. GHD notes that not all drawings and quantities have been updated, only those that have been changed as a result of the Conclaves. GHD also notes that previous costings are to be consider superseded. Quantities and rates expressed in previous costings are not to be referred to or referenced unless directed by the VPA.

When reviewing this report, it is advised that the cost plans be read in conjunction with the Functional Design drawings.

1.2 Design Development

The Sunbury South and Lancefield Road Precinct Structure Plans (PSP 1074 and PSP 1075) can be considered the origin point of this project. Prepared by the VPA in consultation with Hume City Council and with the assistance of relevant government agencies, service authorities and major stakeholders. The PSPs are a long-term plan for urban development, describing how the land is expected to be developed, and how and where services are planned to support development.

Following the formulation of PSP 1074 and PSP 1075, Aurecon were engaged in 2015 to prepare a concept drawing package, associated cost estimates and report for five grade separations and/or bridges associated with the PSPs. This design package references a study completed by GTA Consultants which established road widths and conceptual road alignments.

Further to Aurecon's involvement with the project, Parsons Brinckerhoff were later engaged in 2016 to further develop the work completed by Aurecon and undertake an infrastructure design study of the same PSP areas. High level, 2-dimensional concept designs were developed for numerous road and intersection projects using elements of the previous designs completed by GTA, Aurecon and Hume City Council as a base.

The desired lane arrangement for each intersection was provided by the VPA. The road alignments used were drawn from those established by GTA, Aurecon, Hume City Council and from those identified in the Future Urban Structure Plan as supplied by the VPA. In some cases, the alignments were adjusted slightly to conform to the basis of design as established by VicRoads, Hume City Council and the VPA.

GHD consolidated the previous reports and made a number of updates to the design and cost plans which were summarised in a report dated November 2019.

The ICP was advertised for public consultation in 2020. The Planning Panel was adjourned in November 2020 to enable the VPA to respond to submitters. The subject of this report responds to design considerations raised by submitters throughout the Panel Hearing

1.3 Scope and limitations

This report has been prepared by GHD for Victorian Planning Authority and may only be used and relied on by Victorian Planning Authority as advice for the infrastructure items to be funded under the Sunbury South PSP and Lancefield Road PSP Infrastructure Contributions Plan.

GHD otherwise disclaims responsibility to any person other than Victorian Planning Authority arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared

GHD has prepared the preliminary cost estimate set out in attached document to this report ("Cost Estimate") using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD (refer to section 5).

The Cost Estimate has been prepared for the purpose of understanding high level costs associated with the development and must not be used for any other purpose.

The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the works can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

2. VPA supplied information

Table 1 below is a summary of information provided by the VPA including drawings, reports and other sources of information that has informed this updated report. GHD has also been provided addition information verbally, via email and through directions in meetings that has been utilised in the preparation of the designs and cost plans. Please refer to Appendix B for full copies.

Table 1 Summary of VPA Information

Description	Author	Date
Northern Roads Upgrade Project – Issue for Tender Drawings	Major Roads Projects Authority	6 December 2018
Conclave Summary Final	Rob Howard Mark Bruer Mark Fleming Stephen Watters Lance Weatherall Mark Whalen	27 October 2020
Expert Witness Report	Spiire	8 October 2020
Expert Witness Report	SMEC	14 October 2020
Sunbury Growth Corridor - Jackson Creek Northern Bridge Removal	GTA Consultants	21 December 2020
GTA Memo regarding ultimate design SS-IN-03	GTA Consultants	March 2021

3. Relevant drawings

Table 3 is a summary of the final concept design drawings that provides relevant detail for all infrastructure items captured; refer Appendix A for drawings.

The naming convention for the drawing titles is explained in Table 2 below:

Table 2 Naming Conventions

Component	Explanation	Comment
LR	Lancefield Road	
SS	Sunbury South	
IN (IT)	Intersection	IT updated to IN as requested by VPA for latest revision
BR (BD)	Bridge	BD updated to BR as requested by VPA for latest revision
RD	Roads	

Table 3 Drawing Index

Drawing number	Scope item	Designer
CIV-0100	Title Sheet	GHD
CIV-0101	Drawing Index	GHD
CIV-0201	Sections	PB
CIV-0202	Sections	PB
CIV-0203	Sections	GHD
CIV-0204	Sections	GHD
CIV-0205	Sections	PB
CIV-0300	Vehicle Swept Path SS-RD-07	GHD
CIV-0400	Long Sections	GHD
CIV-0401	Long Sections	GHD
CIV-0501	Lancefield Road PSP	GHD
CIV-0502	Sunbury South PSP	GHD
CIV-1000	LR-RD-01	GHD
CIV-1001	LR-RD-01/LR-IT1	PB
CIV-1002	LR-RD-01/LR-IN-02	GHD
CIV-1004	LR-RD-01/LR-IT3	PB
CIV-1006	LR-RD-01/.LR-IT4	PB
CIV-1020	LR-RD-02	GHD
CIV-1023	LR-RD-02	GHD
CIV-1030	LR-RD-03/LR-RD-04	GHD
CIV-1032	LR-RD-03	GHD

Drawing number	Scope item	Designer
CIV-1033	LR-RD-04/LR-IN-06	GHD
CIV-1100	SS-RD-02	GHD
CIV-1101	SS-RD-02/SS-IN-04	GHD
CIV-1102	SS-RD-02/SS-IN-03	GHD
CIV-1103	SS-RD-02/SS-IN-02	GHD
CIV-1104	SS-RD-02/SS-IN-01	GHD
CIV-1110	SS-RD-01	GHD
CIV-1111	SS-RD-01/SS-IN-12	GHD
CIV-1112	SS-RD-01/SS-IN-08	GHD
CIV-1120	SS-RD-03	GHD
CIV-1121	SS-RD-03/SS-IN-07	GHD
CIV-1122	SS-RD-03/SS-IN-05	GHD
CIV-1130	SS-RD-04	GHD
CIV-1131	SS-RD-04/SS-IN-09	GHD
CIV-1132	SS-RD-04	GHD
CIV-1133	SS-RD-04/SS-IN-10	GHD
CIV-1134	SS-RD-04	GHD
CIV-1135	SS-RD-04	GHD
CIV-1136	SS-RD-04	GHD
CIV-1140	SS-RD-05	GHD
CIV-1141	SS-RD-05/SS-IN-09	GHD
CIV-1142	SS-RD-05	GHD
CIV-1143	SS-RD-05/SS-IN-14	GHD
CIV-1151	SS-RD-06	GHD
CIV-1160	SS-RD-07	GHD
CIV-1161	SS-RD-07	РВ
CIV-1162	SS-RD-07/SS-IN-14	GHD
CIV-1163	SS-RD-07/SS-IN-13	GHD
CIV-1164	SS-RD-07/SS-IN-15	GHD
CIV-1170	SS-RD-08	GHD
CIV-1171	SS-RD-08/SS-IN-15	GHD
CIV-1172	SS-RD-08	GHD
CIV-1173	SS-RD-08/SS-IN-11	GHD
CIV-1501	LR-IT1	PB
CIV-1502	LR-IN-01	GHD
CIV-1503	LR-IT3	PB
CIV-1504	LR-IT4	PB

Drawing number	Scope item	Designer
CIV-1601	SS-IN-01	GHD
CIV-1602	SS-IN-02	GHD
CIV-1603	SS-IN-03	GHD
CIV-1604	SS-IN-04	GHD
STR-0102	SS-BR-01	GHD
STR-0103	SS-BR-01	GHD
CIV-2015	Retaining Wall Detail	GHD

4. GHD design changes scope

4.1 Background

GHD has undertaken design changes based on the information in Table 1 for Sunbury South and Lancefield Road PSP's road layout and cost estimates.

A summary of GHD's scope is outlined in Table 4 below.

Table 4 Scope items

Item	Project	Description		
1	All	Update relevant rates for excavation and disposal of rock to \$55 as agreed in the conclave		
2	LR-BR-01	Remove from ICP		
3	LR-RD-01B	Remove from ICP		
4	LR-RD-02A	Remove from ICP		
5	LR-IN-01	Update design and cost sheet to include items identified in SMEC Expert Witness Update cost plan to include additional utility relocations agreed at costing conclave Update cost plan to include stormwater culvert as agreed at costing conclave Update interim design to show taper back to existing carriageway		
6	LR-IN-02	Update cost plan to include additional utility relocations agreed at costing conclave Update design and cost sheet to include items identified in SMEC Expert Witness		
7	LR-IN-03	Update cost plan to include additional utility relocations agreed at costing conclave Update current interim design to align with GTA report (dated - 21/12/2020) recommendations		
8	LR-IN-04	Update cost plan to include additional utility relocations agreed at costing conclave Update current interim design to align with GTA report (dated - 21/12/2020) recommendations		
9	SS-IN-08	Update cost plan to include additional utility relocations agreed at costing conclave Update interim design to show taper back to existing carriageway		
10	SS-IN-11	Update cost plan to rectify typographical error in previous report for quantity of item 1.2.1 Cut and Disposal		
11	SS-IN-12	Update cost plan to include additional utility relocations agreed at costing conclave		
12	SS-IN-01	Update central median of ultimate and interim designs, and associated land-take and costs, to align with DoT proposed designs		
13	SS-IN-02	Update central median of ultimate and interim designs, and associated land-take and costs, to align with DoT proposed designs		

Item	Project	Description
14	SS-IN-03	Update cost plan to include additional utility relocations agreed at costing conclave
		Update current interim design to align with GTA report (dated - 21/12/2020) recommendations
		Update to current ultimate design to respond to GTA Memo (March 2021) recommendations
15	SS-IN-04	Update cost plan to include additional utility relocations agreed at costing conclave
16	SS-BR-01	Provide design and costs of two feasible alternative bridge designs with varied bridge typologies and vertical alignments.
17	SS-BR-03	Amend bridge typology from culvert to concrete single span as per Melbourne Water requirements.

4.2 SS-BR-04 Bendigo Rail line Bridge

No proposed amendments were required to SS-BR-04 following the Planning Panel hearings.

4.3 LR-BR-01

The traffic conclave concluded that LR-BR-01 is not essential to the functioning of the transport network and should be removed from the ICP. The item has been removed from this report to reflect this change.

4.4 SS-BR-01

Submitters to the Planning Panel had proposed a number of alternative designs and alignments for SS-BR-01, which provided the same functionality but could be delivered at a lower cost to developers. GHD reviewed the proposed alternatives to ascertain if any of the nominated alternatives were feasible.

The proposals included a number of alternative alignments which sought to reduce the overall length and height of the bridge. A number of these alternative routes encroached on the environmental overlays at the site and were not deemed acceptable by DELWP's MSA Team. VPA advised the current alignment is to be maintained.

A second proposal was to amend the vertical alignment of the bridge to shorten the overall span. GHD reviewed the proposed vertical geometry of SS-BR-01 and was able to reduce the overall length of the bridge from 315m to 280m. The redesign also reduced the overall height of the bridge by approximately 5m from 43m to 38m. The proposed reduction in length and height reduces the overall cost of delivery by approximately \$6.7 million.

The third proposal was to mix the bridge typologies of concrete super T and steel box girder. The proposal was to include a section of steel box girder at the centre of the bridge which can span up to 50m as opposed to the concrete super T span of 35m. This option reduced the number of pylons required to support the bridge, however the higher rate for construction of the steel box girder (\$4,450 per sq.m) as opposed to the concrete super T (\$2,450 per sq.m) offset these cost savings.

A summary of the cost comparisons is outlined in Table 5 below showing the differential between a full concrete and a concrete with steel box girder section. The full concrete option is still approximately \$1.7million cheaper and is the design that has been adopted.

 Table 5
 Bridge cost comparison

Item	Typology	Cost
1	Concrete Super T 315m (previously exhibited)	\$41,735,842
2	Concrete Super T 280m	\$35,006,298
3	Concrete Super T with Steel Box Girder Section 280m	\$36,763,553

5. Cost summary

GHD has prepared the cost plans with revised quantities based on updated design amendments and direction from the VPA based on Conclave statements and information contained in Table 1. All previous costing calculations are to be considered outdated and superseded. Reasonable and verifiable assumptions have been carried forward from previous reports.

A summary of the overall development costs is captured in Table 6 below. Individual projects including intersection, road and bridge cost sheets have been attached in Appendix C.

 Table 6
 Overall development costs

Sunbury South				
ROADS SEGMENTS				
	Construction Costs (excl GST)	Other Project Costs (excl GST)	Total (excl GST)	
SS-RD-04-01	\$10,803,583	\$4,456,478	\$15,260,061	
SS-RD-04-02	\$4,497,464	\$1,855,204	\$6,352,668	
SS-RD-04-03	\$8,137,724	\$3,356,811	\$11,494,536	
SS-RD-04-04	\$2,479,366	\$1,022,739	\$3,502,105	
SS-RD-04-05	\$12,211,446	\$5,037,221	\$17,248,667	
SS-RD-05	\$4,296,855	\$1,772,453	\$6,069,308	
SS-RD-06	\$2,964,886	\$1,223,016	\$4,187,902	
SS-RD-07	\$7,071,877	\$2,917,149	\$9,989,026	
SS-RD-08	\$3,288,136	\$1,356,356	\$4,644,492	
SS-RD-09	\$2,435,924	\$1,004,819	\$3,440,743	
SUB-TOTAL	\$58,187,262	\$24,002,246	\$82,189,508	
INTERSECTIONS				
SS-IN-01	\$5,685,541	\$2,345,286	\$8,030,826	
SS-IN-02	\$5,929,953	\$2,446,106	\$8,376,058	
SS-IN-03	\$7,782,490	\$3,210,277	\$10,992,768	
SS-IN-04	\$5,487,841	\$2,263,734	\$7,751,575	
SS- IN-05	\$3,431,439	\$1,415,469	\$4,846,907	
SS- IN-07	\$3,638,548	\$1,500,901	\$5,139,449	
SS- IN-08	\$4,278,536	\$1,764,896	\$6,043,433	
SS- IN-09	\$6,275,352	\$2,588,583	\$8,863,934	
SS-IN-10	\$3,669,728	\$1,513,763	\$5,183,491	
SS-IN-11	\$1,004,846	\$414,499	\$1,419,344	
SS-IN-12	\$3,771,952	\$1,555,930	\$5,327,882	
SS-IN-13	\$1,044,815	\$430,986	\$1,475,802	
SS-IN-14	\$1,044,815	\$430,986	\$1,475,802	
SS-IN-15	\$645,334	\$266,200	\$911,534	
SUB-TOTAL	\$53,691,189	\$22,147,615	\$75,838,804	

Sunbury South					
BRIDGES					
SS-BR-01	\$23,613,017	\$11,393,280	\$35,006,297		
SS-BR-02	\$2,053,540	\$929,227	\$2,982,767		
SS-BR-03	\$1,711,581	\$774,490	\$2,486,071		
SS-BR-04	\$10,695,005	\$6,550,690	\$17,245,695		
SUB-TOTAL	\$38,073,143	\$19,647,687	\$57,720,830		
Lancefield Road					
ROAD SEGMENTS					
LR-RD-02-03A	\$3,984,103	\$1,643,443	\$5,627,546		
LR-RD-02-03B	\$3,698,030	\$1,525,437	\$5,223,467		
LR-RD-03	\$1,934,607	\$798,025	\$2,732,632		
LR-RD-04	\$2,856,206	\$1,178,185	\$4,034,391		
SUB-TOTAL	\$12,472,946	\$5,145,090	\$17,618,036		
INTERSECTIONS					
LR- IN-01	\$5,667,398	\$2,337,802	\$8,005,199		
LR- IN-02	\$5,000,164	\$2,062,568	\$7,062,732		
LR- IN-03	\$5,100,119	\$2,103,799 \$7,203,91			
LR- IN-04	\$4,978,482	\$2,053,624	\$7,032,105		
LR- IN-06	\$367,083	\$151,422	\$518,505		
SUB-TOTAL	\$21,113,246	\$8,709,214	\$29,822,460		
BRIDGES					
LR-BR-02	\$5,069,696	\$3,105,189	\$8,174,885		
LR-BR-03	\$4,824,350	\$2,954,914	\$7,779,264		
SUB-TOTAL	\$9,894,046	\$6,060,103	\$15,954,149		
TOTAL	\$193,431,832	\$85,711,955	\$279,143,787		

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
- Rock excavation and disposal rates are based upon the agreed rate of \$55 per cu.m from the costing conclave
- Allowances for utility relocations were derived from the costings conclave which agreed to adopt the rates from in SMEC's Expert Witness Report
- 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 unless noted otherwise
- 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 bridges that appear in the cost sheets
- 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 typical road layout, such as 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

6. Design assumptions

The following design standards and reference documents (versions current as of July 2018) have been used in this investigation:

- Austroads Guide to Road Design (AGRD) and corresponding VicRoads supplements
- Engineering Design and Construction Manual (VPA April 2011)
- VicRoads Standard Specification for Roadworks and Bridgeworks.
- Growth Area Road Network Planning Guidance and Policy Principles (VicRoads working document)

The design speeds adopted are outlined in Table 7 below

Table 7 Adopted design speeds

Road type	Posted speed limit	Design speed	Reference
Connector Boulevard	60 km/h	60 km/h	Growth Area Road Network Planning – Guidance and Policy Principles
Connector Street	60 km/h	60 km/h	Growth Area Road Network Planning – Guidance and Policy Principles
Arterial (primary)	60 km/h	60 km/h	Growth Area Road Network Planning – Guidance and Policy Principles

Horizontal geometry design inputs are outlined in Table 8 below

Table 8 Horizontal geometry design inputs

Criteria	Value	Comment	Reference
Minimum radius for adverse cross fall	60 km/h = 200 m 80 km/h = 500 m	Urban Side friction factor = 0.17 Urban Side friction factor = 0.13	VicRoads Supplement to AGRD, Part 3, Table V7.2
Minimum radius for horizontal curves with superelevation	60 km/h = 98 m 80 km/h = 240 m	Desirable min. friction factor	AGRD, Part 3, Table 7.5
Minimum horizontal curve length	60 km/h = 100 m 80 km/h = 180 m		AGRD, Part 3, Table 7.6
Merge taper length	100 m (60 km/h) 130 m (80 km/h)		AGRD Part 3 Table 9.8

The design vehicles for intersections have not been changed from PB's early assumptions of the following, based on Austroads Design Vehicles and Turning Path Templates Guide:

Arterial/ Arterial
 Prime mover and semi-trailer (19 m)

Arterial/Collector (Connector) - Single unit truck/bus (12.5 m)

• Collector/Collector

(Connector/Connector) - Single unit truck/bus (12.5 m)

Intersection turn lane lengths have been adopted from table 4.1 within the Growth Area Road Network Planning – Guidelines & Policy Principles, as outlined in Table 9 below.

Table 9 Intersection turn lengths

Road type	Turn lane	Assumed volumes	Total turn land length (incl taper)
Primary Arterial	Left	400 veh/hr	100m (incl 25m taper)
	Single Right	200 veh/hr	200m (incl 25m taper)
	Double Right	400 veh/hr	170m (incl 55m taper)
Secondary Arterial	Left	400 veh/hr	100m (incl 20m taper)
	Right	200 veh/hr	200m (incl 20m taper)
Connector Street	Left	500 veh/hr	100m (incl 15m taper)
	Right	500 veh/hr	100m (incl 30m taper)

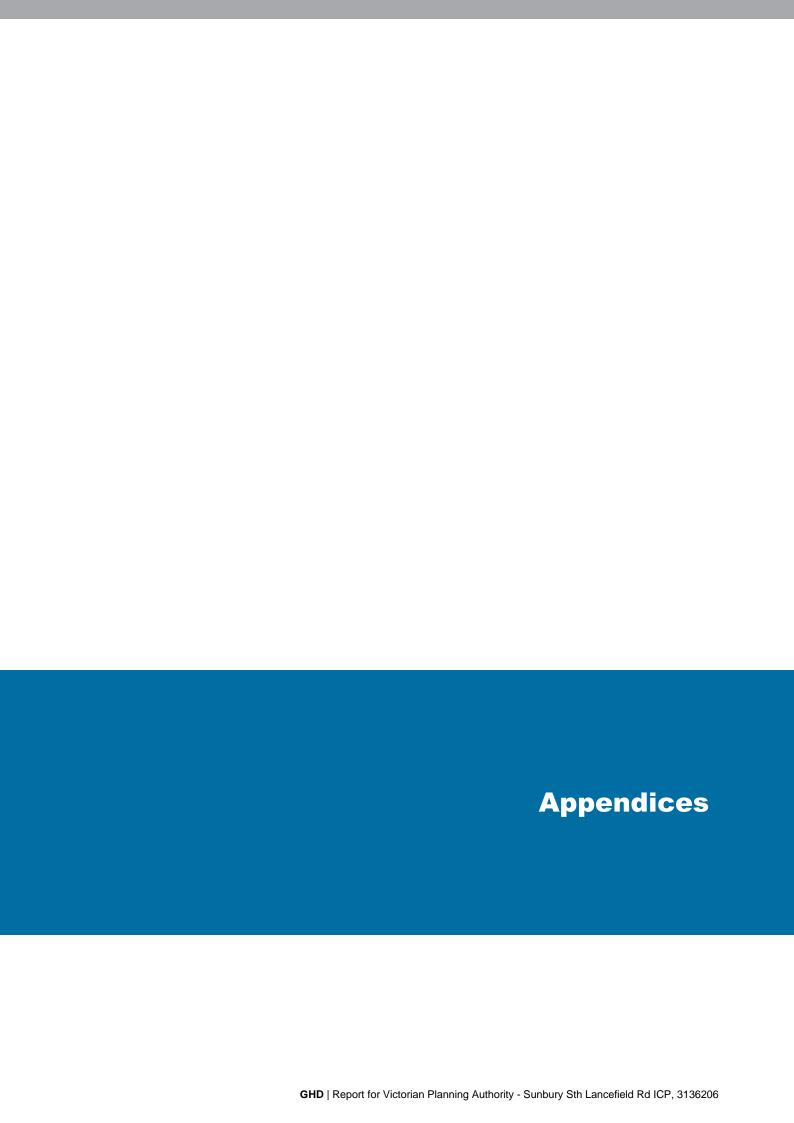
Vertical geometry adopted in the design is outlined in Table 10 below.

Table 10 Vertical geometry

Vertical geometry limits	Value	Comment	Reference
Minimum k value for a crest curve	60 km/h = 11.8 80 km/h = 29.3	Desirable minimum value for a 2.0s reaction time (2.5s is not available for these speeds)	AGRD, Part 3, Table 8.7
Minimum k value for a sag curve	60 km/h = 10 80 km/h = 17	Other Urban and Rural Roads without street lighting	AGRD, Part 3, Figure 8.7
Minimum longitudinal grade	1%	Desirable minimum value for drainage purposes	AGRD, Part 3, Table 8.5
Maximum longitudinal grade	60 km/h = 7-9% 80 km/h = 5-7%	Rolling Terrain	AGRD Part 3 Table 8.3

The geometry for road batters listed below has been reproduced from previously generated road cross-sections. The batter slope may not be applicable along all roads due to soil conditions on site. The grades will need to be reviewed following receipt of further detailed site specific geotechnical information.

- Fill batters 6:1
- Cut batters 3:1

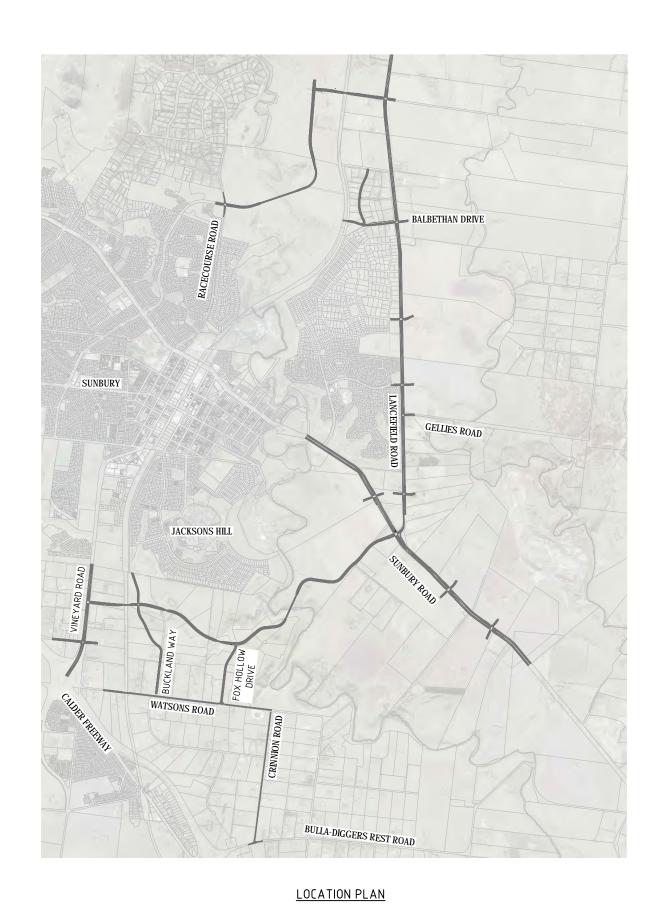


Appendix A – Current Drawings





SUNBURY SOUTH AND LANCEFIELD ROAD PSP INFRASTRUCTURE DESIGN STUDY





F	AMENDED TO VPA COMMENTS - GHD	SL	LM*	MW*	06.08.19
Е	RE-ISSUED FOR INFORMATION - GHD	DAC	LM*	MW*	02.08.18
D	LR-RD2 AND LR-BD1 ALIGNMENT UPDATED	GW	-	-	01.05.17
С	COVER SHEET UPDATED	GW	-	-	15.12.16
В	UPDATED LOCATION PLAN WITH LATEST LAYOUT	DH	-	-	30.06.16
No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Project Manager	Project Director	Date



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PRELIMINARY GHD Drawing No. 31-36206-CIV-0100

Project Title SUNBURY STH AND LANCEFIELD RD PSP TITLE SHEET

Orticle Original Size A3 Drawing No: 2113308A-CIV-0100 Rev: F

Date: 6 August 2019 - 12:41 PM Plotted By: Shane Laybourne

d File No: \\ghdnet\GHD\AU\Melbourne\Projects\31\36206\CADD\Drawings\31-36206-CIV-0100.dwg

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2113308A - CIV -	1030	LAYOUT PL
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2113308A -	- CIV –	1100	LAYOUT PLA
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2113308A - CIV - 1	604	SS-IN-04
044333001 6014 4		00 111 00

JACKSONS CREEK BRIDGE (SS-BR-01)

	(
2113308A - STR - 0102	GENERAL ARRANGEMENT	SHEET 1		
2113308A - STR - 0103	GENERAL ARRANGEMENT	SHEET 2		

JACKSONS CREEK BRIDGE (LR-BR-01)

-2113308A -	STR-	- 0401	GENERAL ARRANGEMENT	SHEET 1
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21122001		V / V 3	GENEDAL ADDANGEMENT	

JACKSONS CREEK BRIDGE INVESTIGATION

2113308A -	STR -	2015	RETAINING WALL	SOIL NAIL	DETAILS

<u>LEGEND</u>

	PROPOSED LAND TAKE AREA	— w — — —	EXISTING WATER MAIN
	UNDERPASS	s	EXISTING SEWER
	STRUCTURE	— T — — —	EXISTING TELECOMMUNICATIONS
	RETAINING WALL	— G—- —	EXISTING GAS
215.00	CONTOUR	——— E(OH) ———	EXISTING ELECTRICITY OVERHEAD
	CADASTRAL BOUNDARY	—	EXISTING ELECTRICITY UNDERGROUND
	KERB	— HV — — —	EXISTING ELECTRICITY HIGH VOLTAGE
	EARTHWORKS (CUT/FILL BATTER)	— D— — —	EXISTING DRAINAGE
	PROPOSED ROW		

GENERAL NOTES

- 1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE FOLLOWING DESIGN REPORTS
 - PB DOCUMENT No. "211308A CIV REP 002 RevC"
 - GHD DOCUMENT "SUNBURY SOUTH LANCEFIELD ROAD ICP DESIGN AND COSTING REPORT" SEPTEMBER 2019
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- 4. CONTOURS SHOWN ARE GENERATED FROM LIDAR DATA PROVIDED BY VPA (FORMALLY MPA).

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M UPDATED DRAWING INDEX

K UPDATED DRAWING LIST

L UPDATED GENERAL NOTES AND LEGEND

J ADDED NEW DRAWINGS AND REMOVED SS DRAWINGS

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PRELIMINARY GHD Drawing No. 31-36206-CIV-0101

SUNBURY STH AND LANCEFIELD RD PSP

Project SUNBURY STH AND LANCEFIELD RD PSP
Title DRAWING INDEX, LEGEND
AND GENERAL NOTES

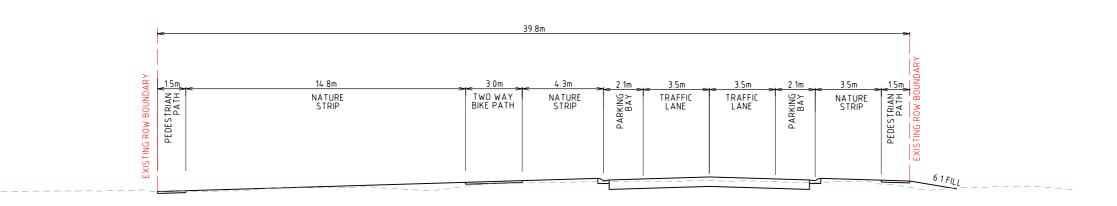
LM* MW* 06.11.19

SL LM* MW* 18.09.19

SL LM* MW* 12.08.19

SL LM* MW* 27.05.19

SUNBURY ROAD - ULTIMATE - TYPICAL SECTION (SS-RD1)



CONNECTOR ROAD (LR-RD3)

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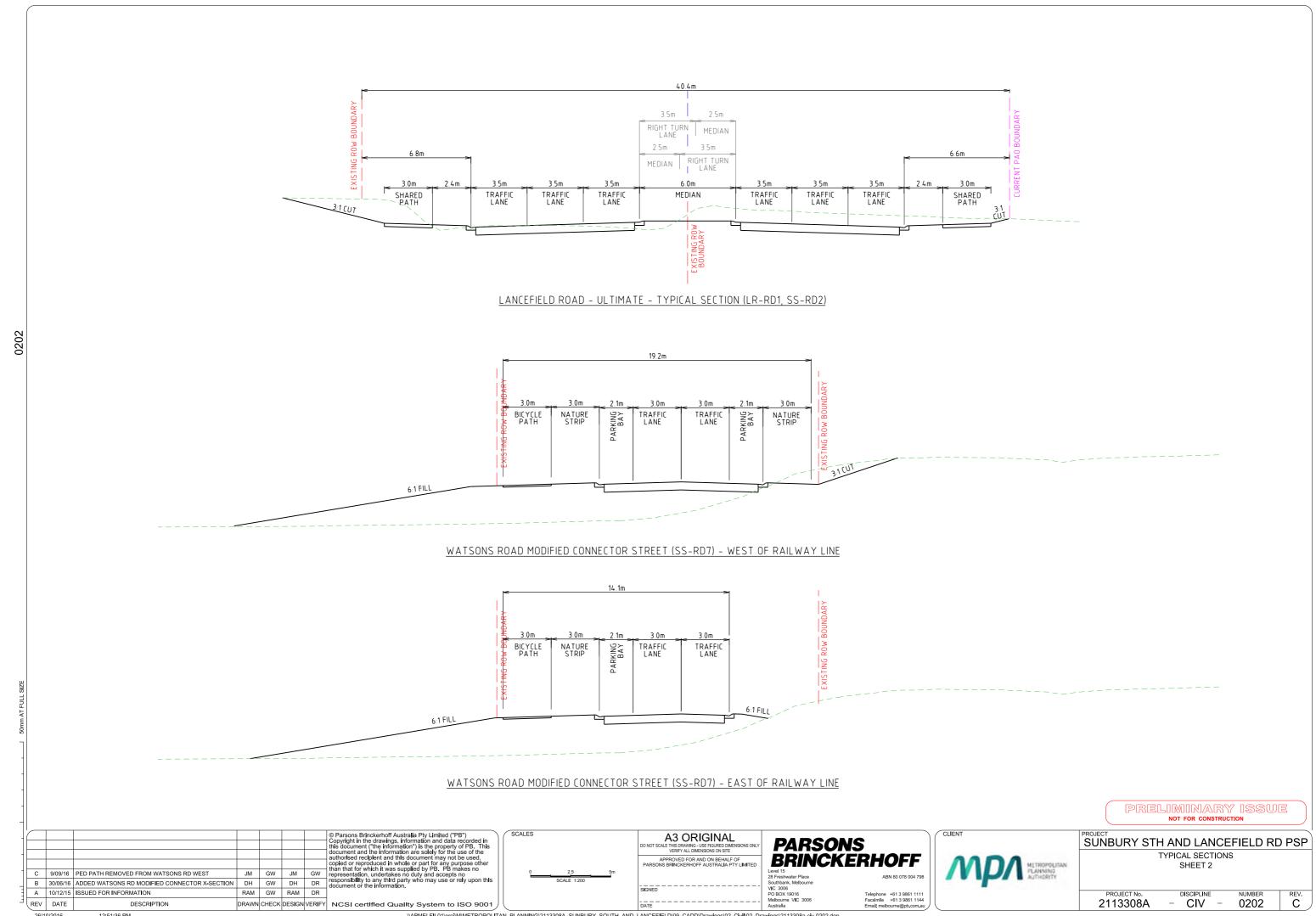
PRELIMINARY ISSUE

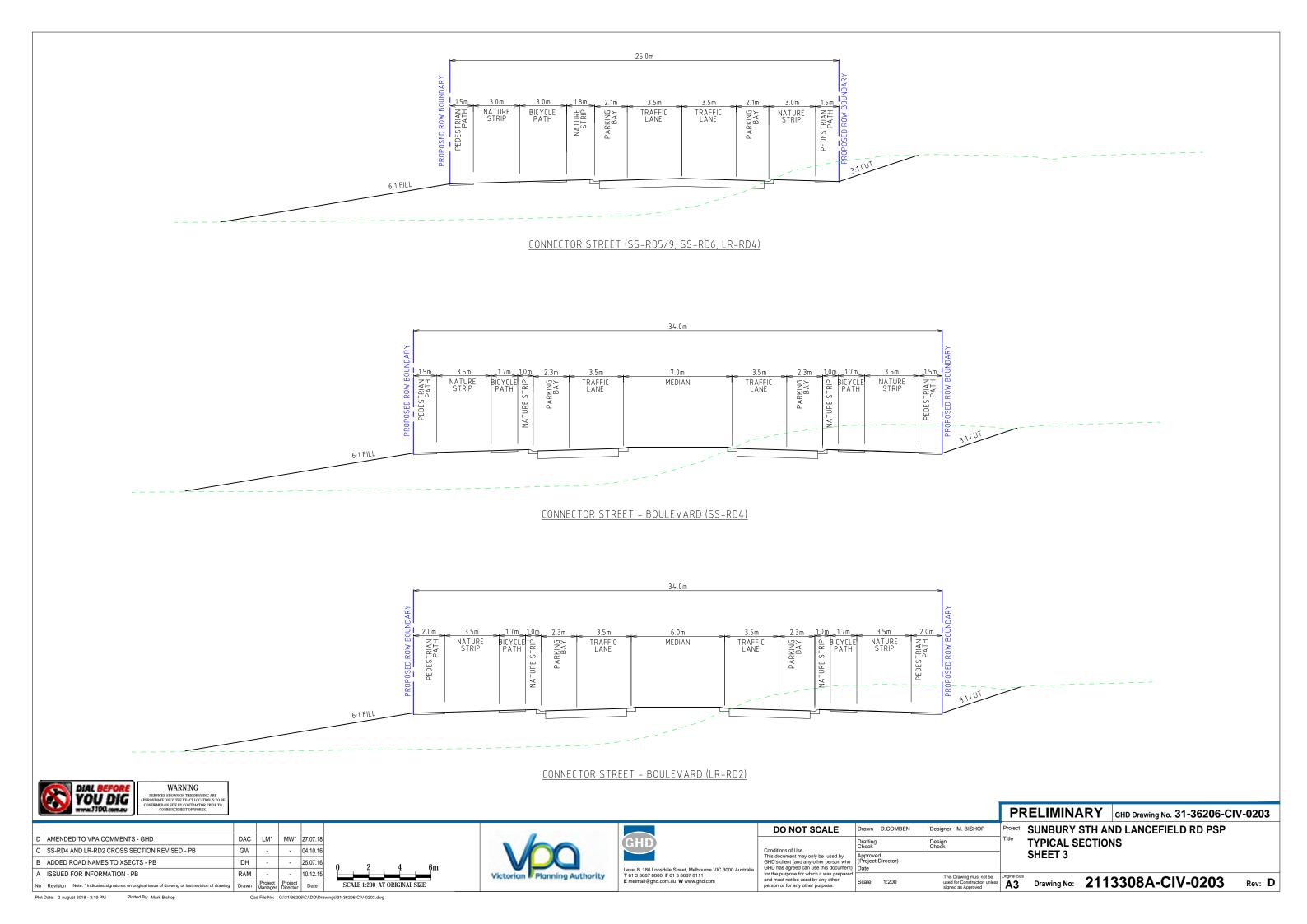
NOT FOR CONSTRUCTION SUNBURY STH AND LANCEFIELD RD PSP TYPICAL SECTIONS SHEET 1 REV. 2113308A - CIV -0201

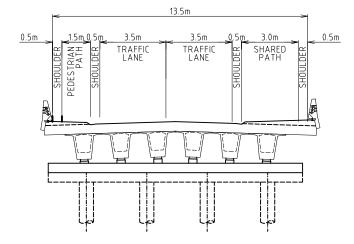
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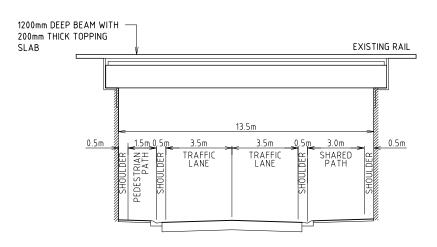
SCALES







BRIDGE STRUCTURE (SS-BR-01, SS-BR-02, SS-BR-03, LR-BR-03)

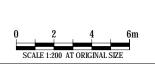


UNDERPASS (SS-BR-04, LR-BR-02)



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AMENDED TO VPA COMMENTS - GHD	SL	LM*	MW*	08.08.19
AMENDED TO VPA COMMENTS - GHD	DAC	LM*	MW*	27.07.18
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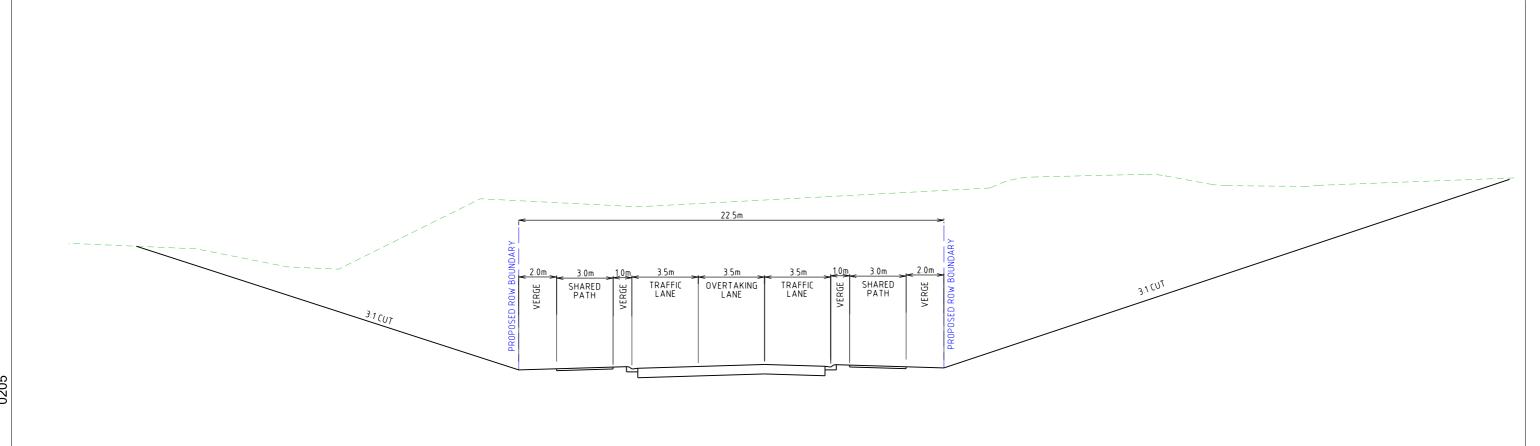
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Project Title SUNBURY STH AND LANCEFIELD RD PSP TYPICAL SECTIONS SHEET 4

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A3 Drawing No: 2113308A-CIV-0204



LR-RD2 - OVERTAKING LANE ON STEEP GRADE (CH1220-1710)

PRELIMINARY ISSUE

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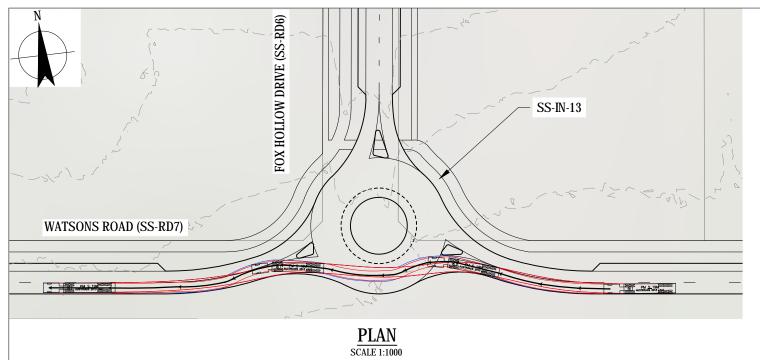
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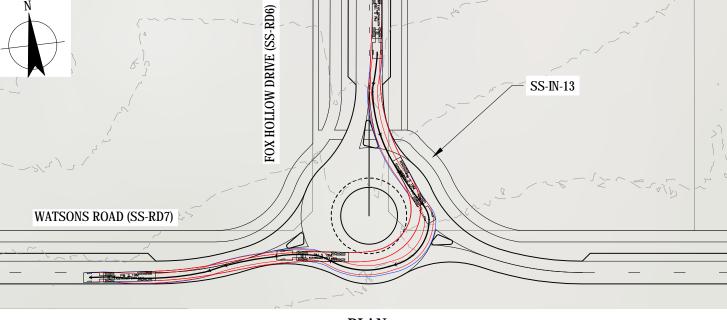
TYPICAL SECTIONS
SHEET 5

PROJECT No. DISCIPLINE NUMBER 2113308A - CIV - 0205

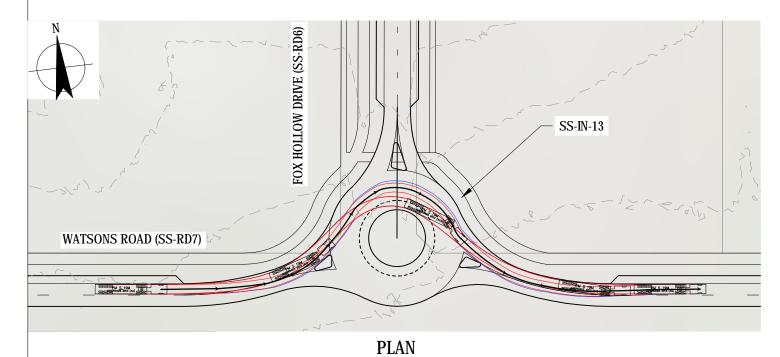
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PLAN



SCALE 1:1000

LEGEND:

VEHICLE PATH

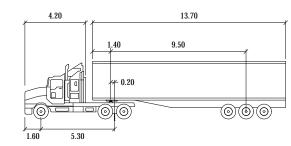
REAR TYRES

FRONT TYRES

VEHICLE BODY

NOTE:

DESIGN SPEED 5km/h UNLESS NOTED OTHERWISE.



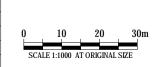
19M PRIME MOVER AND SEMI TRAILER (PM S 19M)

meters : 2.50 : 2.50 : 2.50 : 2.50 Tractor Width Trailer Width : 6.0 : 27.8 : 70.0 Lock to Lock Time Steering Angle Articulating Angle Tractor Track Trailer Track



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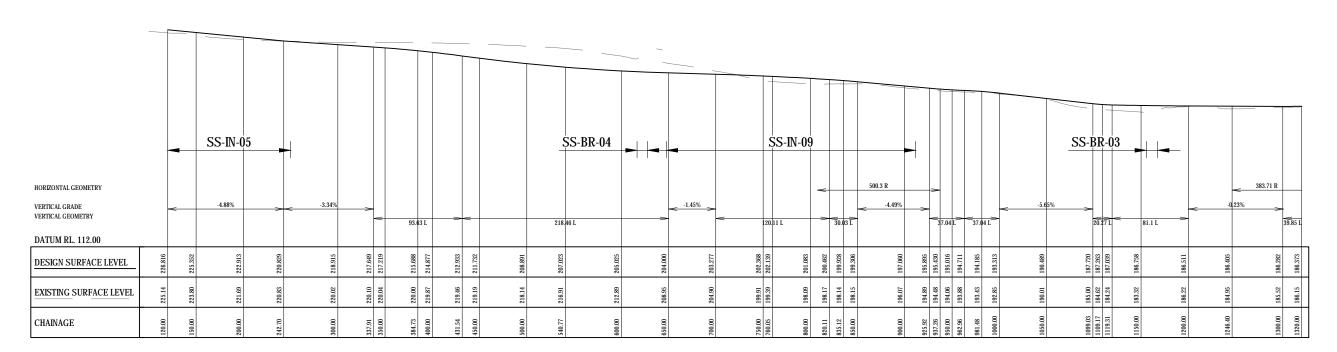


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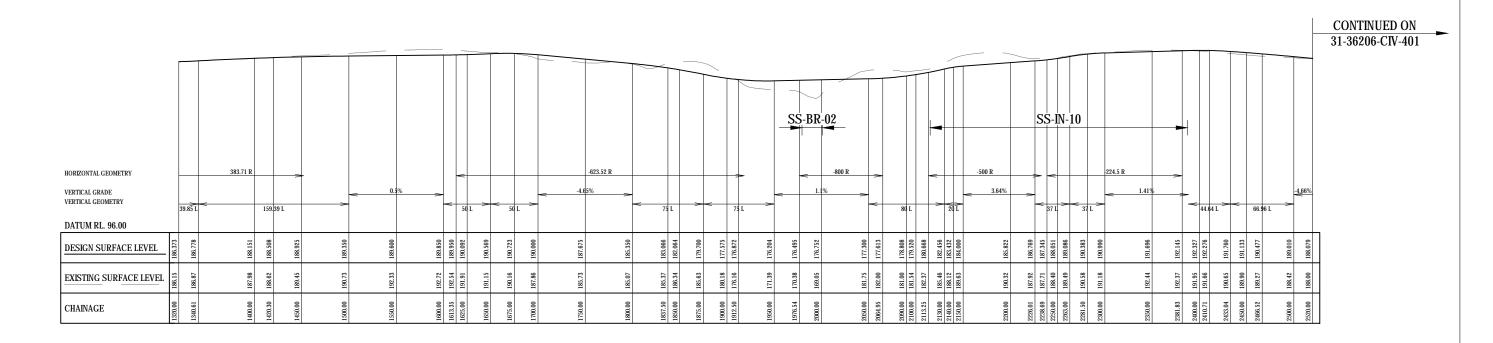
A3 Drawing No: 31-36206-CIV-0300

Rev: B



SS-RD4 LONGITUDINAL SECTION (CONTINUATION BELOW)

SCALE 1:2000 H, 1:1000V



SS-RD4 LONGITUDINAL SECTION (CONTINUATION ON 31-36206-CIV-401)

SCALE 1:2000 H, 1:1000V



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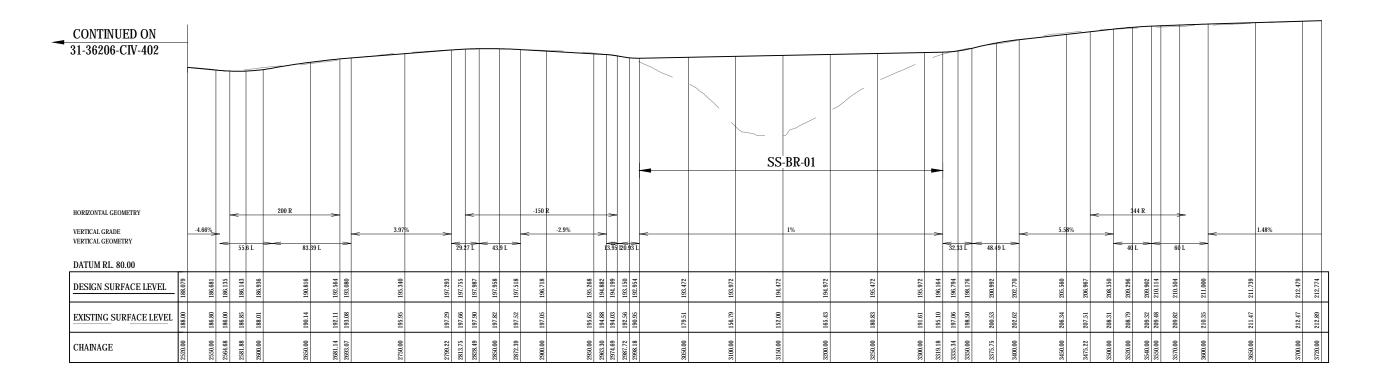
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A3 Drawing No: 31-36206-CIV-0400

Rev: B

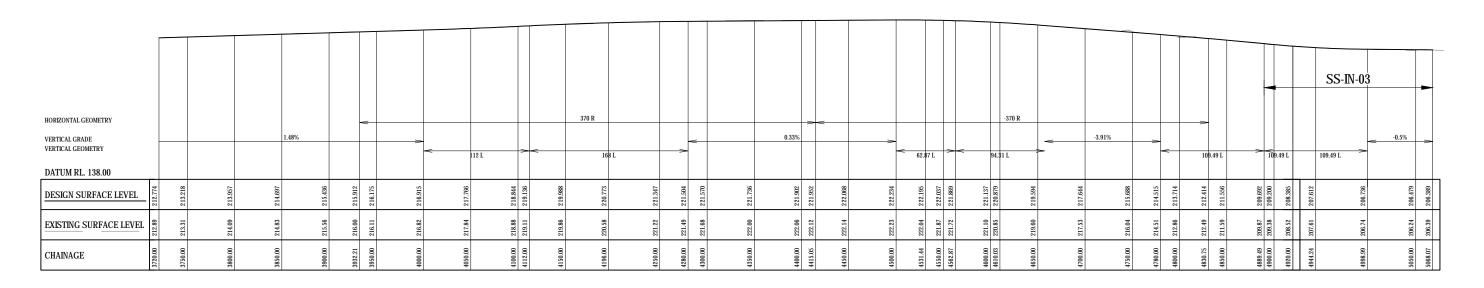
LM* MW* 18.09.19

SL LM* MW* 22.05.19



SS-RD4 LONGITUDINAL SECTION (CONTINUATION BELOW)

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SS-RD4 LONGITUDINAL SECTION

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Project SUNBURY STH AND LANCEFIELD RD PSP

Title LONGITUDUNAL SECTION
SS-RD4-02 & SS-RD4-01

SHEET 2 OF 2

A3 Drawing No: 31-36206-CIV-0401

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LM* MW* 18.09.19

SL LM* MW* 22.05.19

