

Technical Memorandum

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2018/987

Date: 9 FEB 2021



Date: Thursday, 10 December 2020
To: Mr Josh Sondergeld, Stockland Development Pty Ltd
From: Mr Andrew McPhail, Calibre Professional Services Pty Ltd

Pages: 12
Ref: 17-000934.3015TM03.AM.rl

Subject: AURA Precinct 11 to 14 – Further Issues (3 Dec 2020) Response

Calibre Professional Services has been engaged by Stockland Development Pty Ltd to provide engineering support for the submission of the Development Application over the subject site known as Aura Precincts 11 (Part), 12 (Part), 13 (Part), and 14 (DEV2018/987). The PDA Development Application is for a Development Permit for Reconfiguring a Lot, Material Change of Use and Operational Works (Advertising Devices) in accordance with a Plan of Development and Context Plan at 167 Bells Creek Road, Bells Creek. Previously Calibre has issued the Engineering Services Report 17-000934.3015ESR01 dated 28 July 2020 and Technical Memorandum 17-000934.3015TM02.AM.rl dated 11 November 2020.

This Technical Memorandum is to provide additional information following the EDQ Further Issues letter dated 3 December 2020 and Lot Layout Changes Request dated 30 November 2020.

Bruce Highway Interchange

4. Provide amended plans that facilitates the footprint of the finalised interchange between the east west arterial and the Bruce Highway with evidence of support from DTMR.

Response

Refer to Calibre Sketch plan 17-000934.3015-SK1002 Rev B (attached) for interchange layout plan. This layout has been used as the basis for the updated ROL plan included in the updated Plan of Development, dated December 2020, prepared by Urbis Liaison details with DTMR is provided in the overall Further Issues Response spreadsheet.

Highway Buffer

7. Clarify the figure of the proposed earth mound along the Bruce Highway which performs as a noise barrier as the levels in the drawings are difficult to read. For clarity, this figure shall be clearly annotated with the top edge reduced level (RLs) of the earthbound every 10m along the mound, any change in mound height and at the mound ends.

Response

Refer to Calibre Sketch plan 17-000934.3015 sheets SK108 Rev E & SK109 Rev F (attached) which indicate the proposed acoustic bund in accordance with ASK Consulting Acoustic Reporting July 2020. Additional top of bund levels has been added at 50m intervals and at critical top of embankment grade changes to assist with clarity. Given the bund is approximately 1.5km long provision of levels at 10m intervals is significantly finer intervals than are needed to define the top of Acoustic bund and can be considered during detailed design, and as part of the Highway Buffer Plan assessment.

Lot Design – General

15. Amend design to address safety concerns created by 4 way intersection at locations associated with higher density (road and lane intersections).

Response

“4 way” intersections

In Calibre Technical Memorandum 17-000934.3015TM02.AM.rl dated 11 November 2020 a response was prepared for the several so called “4 way intersections” between laneways and streets within Stage 1447 and Stage 1443. This response has been reproduced and updated to address specifically for the intersection highlighted in Lot Layout Changes Request dated 30 November 2020 School Precinct Item 6.

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Stage 1430 (between lots 7309 & 7308) does have a so called “4 way intersections” between a laneway and adjacent streets (refer to Calibre Sketch plan **17-000934.3015-SK2013** in previous technical memorandum). The layout proposed is considered consistent with EDQ PDA Guideline No. 06 (dated Feb 2019) “Street and Movement network” Figure 2, reproduced on the next page, which also has “4 way intersections” between laneways and streets.

This laneway in Stage 1430 and others in Stages 1447 and 1448 have:

- Good sight distance with parking bays restricted adjacent to laneway entrance
- Laneway alignments are perpendicular to the higher order Road, as per Figure 2 EDQ PDA Guideline No. 06.
- Laneway connections to a roadway is considered more like a driveway than an intersection and is located a lot depth away from the adjoining road intersection, as per Figure 2 EDQ PDA Guideline No. 06.

Calibre Sketch plan **17-000934.3015-SK2002** (in previous technical memorandum concerning intersection in Stage 1447) demonstrates the driveway nature of the laneway entrances, which is also applicable for the intersection queries in Item 6. The sketch plan demonstrates:

- Delineation of the higher order road with continuation of the kerb alignment and vehicle crossing
- Delineation of the higher order road with different surfacing texture and colour
- The cross section indicates the changes in elevation
- As such there is great clarity regarding the higher order roadway and priorities between turning movements.

Figure 2 Neighbourhood street network diagram



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Calibre Sketch plan **17-000934.3015-SK2012** (in previous technical memorandum) provides details on another so called “4 way intersections” between laneway and streets in Stage 1443, which is very similar to the Intersection in Stage 1430. This Laneway entrance is designed to demonstrate:

- Delineation of the higher order road with continuation of the kerb alignment and vehicle crossing
- Delineation of the higher order road with different surfacing texture and colour
- The cross section indicates the changes in elevation
- Good sight distances with no parking bays immediately adjacent
- Refuge Collection Vehicle can enter and exit laneway safely (refer to Calibre Sketch plan **17-000934.3015-SK2013** in previous technical memorandum for the Stage 1430 intersection).
- The Laneway entrance, or fourth leg of the intersection, is more like a driveway than an additional road in the intersection
- As such there is great clarity for pedestrian and vehicular traffic regarding the higher order roadway and priorities between turning movements.

The laneway Stage 1430 is estimated to have a lower traffic volume than the intersection in Stage 1443 which is less than 1000 vehicles per day. For a Neighbourhood Lane EDQ PDA Guideline No. 06 indicates a maximum 500 vehicles per day. This laneway has significantly lower traffic volume.

All laneways are designed to have a low speed environment, as per Sunshine Coast Planning Scheme Schedule SC6.17 the design speed is 20km/hr. A low speed environment reduces stopping distance and improves viewing time as approaching the higher order road.

Therefore, at this development approval phase it is determined that the layout presented is suitable for safe and effective movements.

Off-set intersection spacing

Further details are also provided to address the intersection highlighted in Lot Layout Changes Request dated 30 November 2020 District Centre / Brook Item 1 concerning off-set intersection spacing, as circled in several locations east and south of district centre.

Figure 1 below indicates the three off-set intersections that EDQ had identified in the Lot Layout Changes Request. As per the earlier discussions the spacing of driveways and adjacent road network is to be considered regarding the traffic volumes for each intersection.

The Aura Precinct 11-14 Traffic Modelling Refresh dated July 2020 prepared by PWC indicates the peak AM and PM along the adjacent Neighbourhood Connector B Roadway. The location highlighted corresponds to approximately 1000 vehicles per day (vpd). Off-set intersection locations A and B between laneways, or which are like driveway entrances, will have a dramatically lower traffic load than the Neighbourhood Connector B Roadway. Neighbourhood Lane EDQ PDA Guideline No. 06 indicates a maximum 500 vehicles per day and no minimum intersection spacing. These two intersections have significantly lower traffic volume, and therefore have no defined minimum for intersection spacing. Sight distance and proximity to parking bays etc will be reviewed at Detailed Design Phase.

When considering off-set intersection C we are looking at the interaction of a laneway and adjacent road intersection. The roadway T intersection at Off-Set Intersection C may have a catchment up to 1000 vpd, if vehicles are heading towards the eastern access of Stage 1451 and no vehicles use any of the other 7 exits from the surrounding Precinct. The southern arm of the roadway T Intersection where the laneway joins may have a total catchment of 52 lots or approximately 400 vehicles per day, refer to the green dashed line on Figure 1 below. For a Neighbourhood Access

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Street EDQ PDA Guideline No. 06 indicates <3000 vehicles per day and no minimum intersection spacing. Therefore, at this development approval phase it is determined that the layout presented is suitable for safe and effective movements due to low traffic volumes and low speed environments.



Figure 1 – Off-set Intersection review

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Lot Design – General

16. Amend design for Lot 8282 as it does not appear to facilitate driveway access when combined with the acoustic barrier fencing.

Response

Based on the on the August 2020 layout there is a minimum 7.5m frontage, from the west, that is not impacted by Sound Barriers. To allow for potential queue length at the adjacent intersection this frontage has now been increased for the December 2020 submission, refer to the ROL Plans.

Traffic and Transport

84. Section 2.2 of the report “Aura Precinct 11-14 Traffic Modelling Refresh” dated July 2020 prepared by PWC provides details of the basis of the update to the earlier traffic modelling report. The Applicant is to verify that these assumptions correlate accurately to the final configuration of the P11-14 Masterplan and that traffic modelling and intersection design is based on the final land use and masterplan.

Response

All model inputs and assumptions are consistent between the PWC Original Reporting and Refresh P11-14 Traffic Modelling Reports, except from those updates to reflect the latest planning assumptions (identified in Section 2.2 & 2.3 of Refresh report).

85. EDQ is concerned that the configuration of intersections that include off road contraflow cycle ways may not meet the prescribed levels of service when appropriate signal cycle times are implemented to achieve the required 20% modal share for cycling. Specifically, intersections that include left or right turning movements across contraflow cycleways, that have not been provided with dedicated left or right turn slots may not meet the prescribed levels of service or design warrants when signal cycle times provide priority to cyclists on the contraflow. Please provide sufficient detail that demonstrates that signal cycle times can be established that provide priority to cyclists on the contraflow (to support the requirement of the 20% modal share) and still meet the prescribed levels of service for all intersection vehicular movements. Include an assessment of any implications to intersection configuration including any additional dedicated right of left turn lanes required.

Response

The Aura Visum Model by PWC was not developed to specifically consider the impact of active transport on vehicles. This impact is included in the more detailed assessments using the Microsimulation Model (P7-10) and SIDRA (outside P7-10). These assessments are best placed to refine turn pocket requirements both in terms of location and length by considering a greater number of factors (including active transport).

The assumptions and approach for the active transport mode share was developed and agreed as part of the initial model development (UCSTM). See attached an extract of this previous report, specifically Section 5.4.2. Assumptions documented in this section are consistent with the current Visum model.

During detailed design all trunk road intersections are modelled with SIDRA to demonstrate all peak movement of vehicles, pedestrians and cyclists are accommodated in accordance with LGIA and Traffic Master Planning Requirements, which includes 20% modal shift to cycle movements. To provide an example of this process within this Development Application, one intersection has been modelled in SIDRA as a compliance example, presented below.

Please see the SIDRA output for the intersection 70, Figure 2 below. The followings are considered during SIDRA assessment:

- **Volume:** As per PWC Refresh Report, cyclist volume is estimated by considering 20% modal share while maintaining the same volume of motor vehicles as per VISUM model's volume (i.e. Cyclist Volume = Vehicle Volume from VISUM Model x 1.25 x 20%). This volume is then used through SIDRA to test intersection performance in accordance with LGIA parameters. Furthermore, pedestrian volume is taken as 60 peds/hour.

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- **Signal for bicycle crossing:** Total cycle time for this intersection is set to be 90 seconds. The green time for bicycle crossing is kept the same as the green time of the vehicles' on the same approach (direction) of the intersection. Separate timing for bicycle crossing cannot be provided due to the limitation of SIDRA. Since the left turning vehicle from the West approach and North approach have to give way to the bicyclist and pedestrians, an additional 7 second start loss for these two movements was set in SIDRA. Pedestrian green time will be terminated within this 7 seconds (as per SIDRA).
- **SIDRA results:** SIDRA result shows that the intersection performance (both in AM and PM peak hour) is compliance to the LGIA requirements (volume on capacity ratio less or equal to 0.90). The summary of the results are:
 - Level of Service: at least Level of Service D in all lanes and Level of Service D in pedestrian crossing
 - Volume on capacity ratio: less than 0.52 in all lanes
 - 95th percentile Queue length in all approaches are less than the approach length.
 - This methodology is applied to all trunk intersections with contraflow during detailed design.

SITE LAYOUT

Site: 1 [Aura Intersection 70_AM - Option 2 - Copy]

Aura
Site Category: 4 leg intersection
Signals - Fixed Time Isolated

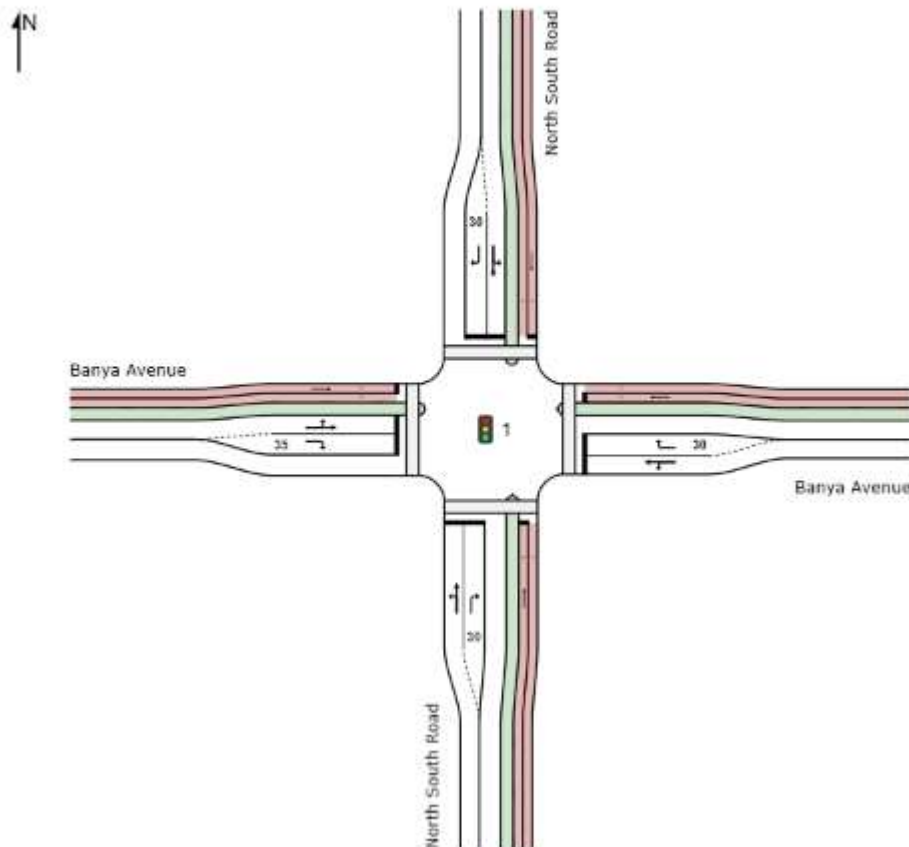


Figure 2 – Intersection 70 SIDRA Modelling Layout

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86. Intersection 87 Layout Plan. The IA (Profile IC1) calls for on-road cycle lanes on the Industrial Trunk Connector northern leg of the intersection. The substitution of cycle tracks is acceptable for a consistent network however, there remains a requirement for a footpath on the eastern verge adjacent to the cycle track. Amend Industrial Trunk Connector cross section.

Response

Precinct 13 is being removed from the application with the Industrial Trunk Connector subject to future application.

87. Intersection 80 is identified as an all turns T intersection in the PWC Refresh however the Calibre Functional Layout identifies this intersection as a left in left out only. This is considered to be a superior outcome, however, update the PWC report accordingly and confirm that restricting vehicle movement at intersection 80 does not have an adverse impact on other local intersections that now need to accommodate additional turning movements by traffic accessing the neighbourhood connector in Stages 1457-1452.

Response

Stockland's obligation under the LGIA is only to construct this road to 2 lanes which will operate as per the PWC traffic model as an all movements intersection. The Calibre functional layout (17-000934.3015-DA657) demonstrates that a 4 lane sub-arterial can be accommodated within the provided road reserve (by others) which is assumed to be a LILO intersection. This will be subject to determination by others at a later stage. Figure 3 below indicates future the 4 lane sub-arterial intersection as per Calibre functional layout (17-000934.3015-DA657).

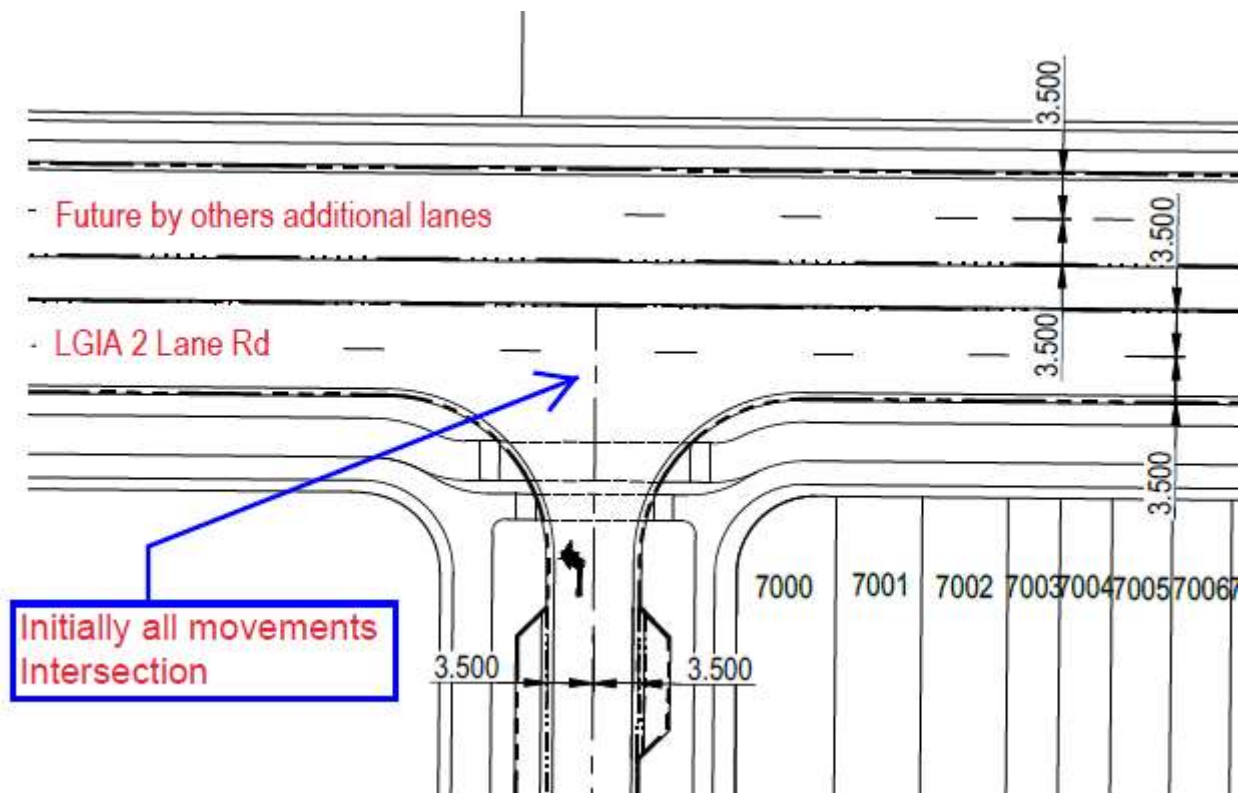


Figure 3 – Intersection 80

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88. Intersection 85 is shown as a signalised intersection on the Road Network Hierarchy in the PWC report but is not designed as such in the Calibre Functional Layout Plan. Amend accordingly.

Response

Calibre Concept design plan **17-000934.3015-DA656** (attached) has been updated as per PWC Refresh P11-14 Traffic Modelling Report to show a signalised intersection.

89. Intersection 91 needs to specifically cater for the travel path students will use from the contraflow to the school including consideration of signal cycle times that provide priority to cyclists and pedestrians at peak times. As a minimum the Functional Layout is to be amended to provide for 3.0m shared pathways along the relevant frontages of the school and increased clearance between the shared pathway and the kerb to cater for higher volume of cyclists and pedestrians generated at peak times. In the context of accommodating peak movement of vehicles, pedestrians, and cyclists at this intersection please confirm that this intersection can achieve the prescribed minimum levels of service.

Response

The Typical Cross sections have been updated adjacent to the School Site to include 3.0m shared footpaths adjacent to the School, refer to the POD and the updated cross sections for Trunk Connector E and Neighbourhood Connector B.

During detailed design refinements will be undertaken for the intersection, if required, to accommodate all peak movement of vehicles, pedestrians and cyclists.

Hydrology and Hydraulics

90. While the flood study aims to be conservative with regard to peak water levels, it is unclear if these assumptions could lead to an underestimation of peak flood hazard (as defined by a combination of flow velocity and depth). Therefore, an assessment which removes or changes some of the conservative is required to be undertaken. These changes could include but may not be limited to the below:

- a) Reduce Manning's "n" to an industry accepted value (note, during our discussion a value of 0.04 was mentioned – it would be up to Calibre to select a reasonable 'lower bound' based on their knowledge of the site).**
- b) Removal of the CAMCOS railway embankment and culverts**
- c) Lowering the tailwater to allow assessment of significant local events where the water levels in Bells Creek are relatively low.**

Response

See combined response Item 90 & 91.

91. If a 1D model is utilized for this assessment, justification the use of this 1D model is required to demonstrate that the results are suitable. This could for example be done by showing a comparison to the TUFLOW model for an event assessed on both platforms.

Response (Item 90 & 91)

In order to inform the potential sensitivity surrounding changes to Manning's values, removal of the culverts at the CAMCOS and adopting a free draining outlet a 1D analysis was completed in XPSWMM. The following scenarios were investigated:

- **As Designed 1D Analysis** – This scenario has been set up to match the conditions input into the TUFLOW model reported in Calibre's Aura Brook Flood Investigation Report (Rev C).
- **Low Manning's** – A conservatively low manning's roughness of 0.04 was adopted to assess the potential risk to increased velocity and associated scour. A manning's roughness of 0.04 represents short grass where the water depth exceeds the grass height and on a slightly irregular surface (SCC Flood Hazard Overlay Code 2015). This low Manning's is not expected to be an ultimate roughness, with this investigation instead looking at interim periods during establishment of the proposed vegetation.

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- Low Manning's, CAMCOS Culvert Removed, Free Draining Outlet – Similar to the above a low Manning's of 0.04 was adopted. In addition, the CAMCOS culverts were removed and replaced with a channel. The model was also set to have a free draining outlet, which represents no interaction with the regional event. It is noted the 2yr ARI event was already assumed to have a free draining outlet in the previous TUFLOW investigation.

The 1D model adopted for this analysis was originally set up as a 'fast model' for the TUFLOW investigation. A 1D model operates on a number of different processes and underlying mathematics in comparison to a 2D model and hence results between the two models will differ. Comparisons between the models were completed using flow depths at specific locations (Refer **Figure 4** below), since the variability in velocity across the flow width and along the channel was not suitable to compare against a single 1D result. A comparison of the below (Refer **Table 1**) WSL's show that the differences in depth at selected locations have an average difference of 6%, which is considered appropriate for this investigation. Additionally, the following results will conclude scour limits are well below the allowable 2.0m/s for the grassed channel scenario being investigated (**Refer Table 2**).



Figure 4 - 1D Network Layout (Selected Locations).

Table 1 - Water Surface Level (WSL) comparison (mAHD) for various scenarios.

Node Name	Node Invert (mAHD)	100yCC As Designed TUFLOW	100yCC As Designed 1D Analysis	Depth Difference	100yCC Low Mannings, CAMCOS Culvert Removed, Free Draining Outlet
Node 1	3.5	6.68	6.85	5%	6.15
Node 2	3.26	6.68	6.74	2%	6.08
Node 3	2.95	6.31	6.52	6%	5.44
Node 4	2.81	5.92	6.26	11%	5.33

Note the above levels are for comparison only and not for the setting of lot levels.

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Below is a summary of the velocity results provided for the three (3) scenarios across the 2yr and 100yCC velocities.

Table 2 - Channel Velocity Comparisons (m/s).

Link Name	2y As Designed	2yr Low Mannings	2yr Low Mannings, CAMCOS Culvert Removed	100yCC As Designed	100yCC Low Mannings	100yCC Low Mannings, CAMCOS Culvert Removed, Free Draining Outlet
Link 1	0.31	0.69	0.69	0.488	1.09	1.09
Link 2	0.39	0.96	0.96	0.369	0.99	1.16
Link 3	0.46	1.04	1.05	0.393	0.66	1.23
Link 4	0.34	0.72	0.74	0.231	0.39	1.00
Link 5	0.42	0.97	0.97	0.499	0.95	1.28
Link 6	0.36	0.86	0.87	0.554	0.95	1.10

The above results generally show that velocities in the 100yCC event aren't considerably higher than the lower flow 2yr event. This is the result of the 2yr event being contained within the low flow channel, whereas the 100yCC event is spread across a much wider flow width and shallow overbank flow and hence the average velocity is reduced. Based on an assumed surface covering of grass a velocity of 2.0m/s can generally be adopted as the upper limit allowable. The maximum velocity identified within this assessment was 1.28m/s, significantly under the allowable limit of 2.0m/s.

The development of the Brook will be completed in several construction stages with each stage moving from earthworks, into establishment and finally maturation at different times. During the earthworks stage there may be erosion take place in areas where suitable ground cover isn't established (ie. bare dirt), as with any earthworks. Any erosion would be fixed as part of the earthworks and sediment captured within the downstream high efficiency sediment basins.

A review of the 2yr hazards was completed for the third scenario where low Manning's were adopted with the CAMCOS culvert removed. It was identified that under this sensitivity the increased velocity does produce high D.V hazards (above 0.6m²/s) throughout the Brook, however this is within the low flow channel and outside of pedestrian areas. The Brook includes a number of pedestrian bridges allowing access over the low flow channel in the 2yr ARI event.

Additional Analysis demonstrated that the hazard is only slightly higher than previously reported and the pathway network is located within an area of lower hazard.

92. The DFE defined in this study for the properties in Aura Precinct 11 to Precinct 14 is based on peak water levels in Aura Brook only. High water levels from Bells Creek backing up into the brook should also be considered, i.e. the DFE should be defined as the higher of the local (Aura Brook) and regional (Bells Creek) flow.

Response

To address Item 91 a review of the DFE's within the Aura Brook was undertaken. The review compared the levels stated within the Calibre Aura Brook Flood Investigation Report against the regional 100yCC level. It was determined that the 100yCC regional flood levels was 5.4mAHD, which was supplied by BMT. All reporting location nominated within the report have a WSL above 5.4mAHD, with the lowest point in the channel adjacent to Residential lots Precinct 11, Location 13, having a 100yCC WSL of 5.84. Therefore, the regional flooding event is not governing the DFE levels at any of the nominated reporting locations.

Further to the above, the Figure 5 below is an extract of Calibre Drawing 18-000340-D-100CC-A has been provided. The area indicated in red box does require the adoption of the regional flood levels for the DFE.

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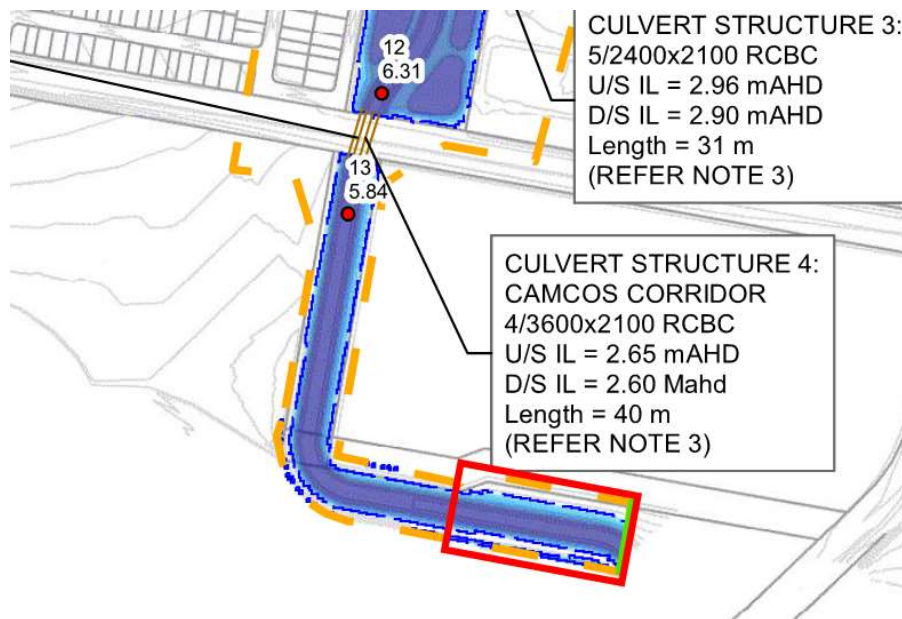


Figure 5 - 1D Network Layout (Selected Locations).

93. The Calibre report relies upon the approved design for the open drain adjacent to the district sports fields in P11 as the design basis for open drains in P11-14. The design outcome (including provision of a concrete invert) for the open drain in P11 was driven by specific localised constraints pertaining to longitudinal grade and concerns over stormwater ponding, mosquito breeding, and siltation issues. This site specific design outcome is not to be considered as a precedence for future drain design and contingent upon the specific constraints identified in future open drains, designs are to be based on the principals of natural channel design where possible.

Response

Noted.

Aura Brook design is based on natural channel design principles within a multi-functional urban corridor. While the Baby or Mini Brook corridor can incorporate a channel incorporating natural channel design principals.

94. Provide details demonstrating that the design and configuration of all open stormwater channels provide for a suitable access and maintenance track for maintenance vehicles to all sections of drains at suitable intervals and with appropriate flood immunity. The Calibre report is to be amended accordingly.

Response

Calibre Sketch Plan 17-000934.3015-SK2016 (attached) has been prepared to demonstrate access and maintenance track proposal for the Aura Brook and Mini Brook. These items are all required to undergo Compliance Assessment and achieve required maintenance outcomes. ESR is not proposed to be updated.

Lot Layout Changes Request dated 30 November 2020 Southern neighbourhood bordering rail Item 4 Amend design to address spacing of intersections as circled.

Response

Within the EDQ Lot Layout Changes Request dated 30 November 2020 several intersections were highlighted in Southern neighbourhood bordering rail Item 4. For all roads with movements less than 3000 vehicles per day we have adopted the Sunshine Coast Planning Scheme. Based on the PWG Traffic modelling this roadway has less than 3000 vehicles per day. The 60/40m rule for intersection spacing has been applied for neighbourhood and local streets. As per the Sunshine Coast Council Planning Scheme Schedule SC6.17 Table SC6.17B.

Narrower intersection spacings does occur in some locations, for Laneways entrances (vehicle crossings), are discussed earlier in this technical memo.

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If you have any queries regarding these investigations, please do not hesitate to contact Mark Wyer or the undersigned.

Yours sincerely

Calibre Professional Services Pty Ltd

Andrew McPhail
Principal Engineer

Attachments

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17-000934.3015TM03.AM.RL



If you have any queries regarding these investigations, please do not hesitate to contact Mark Wyer or the undersigned.

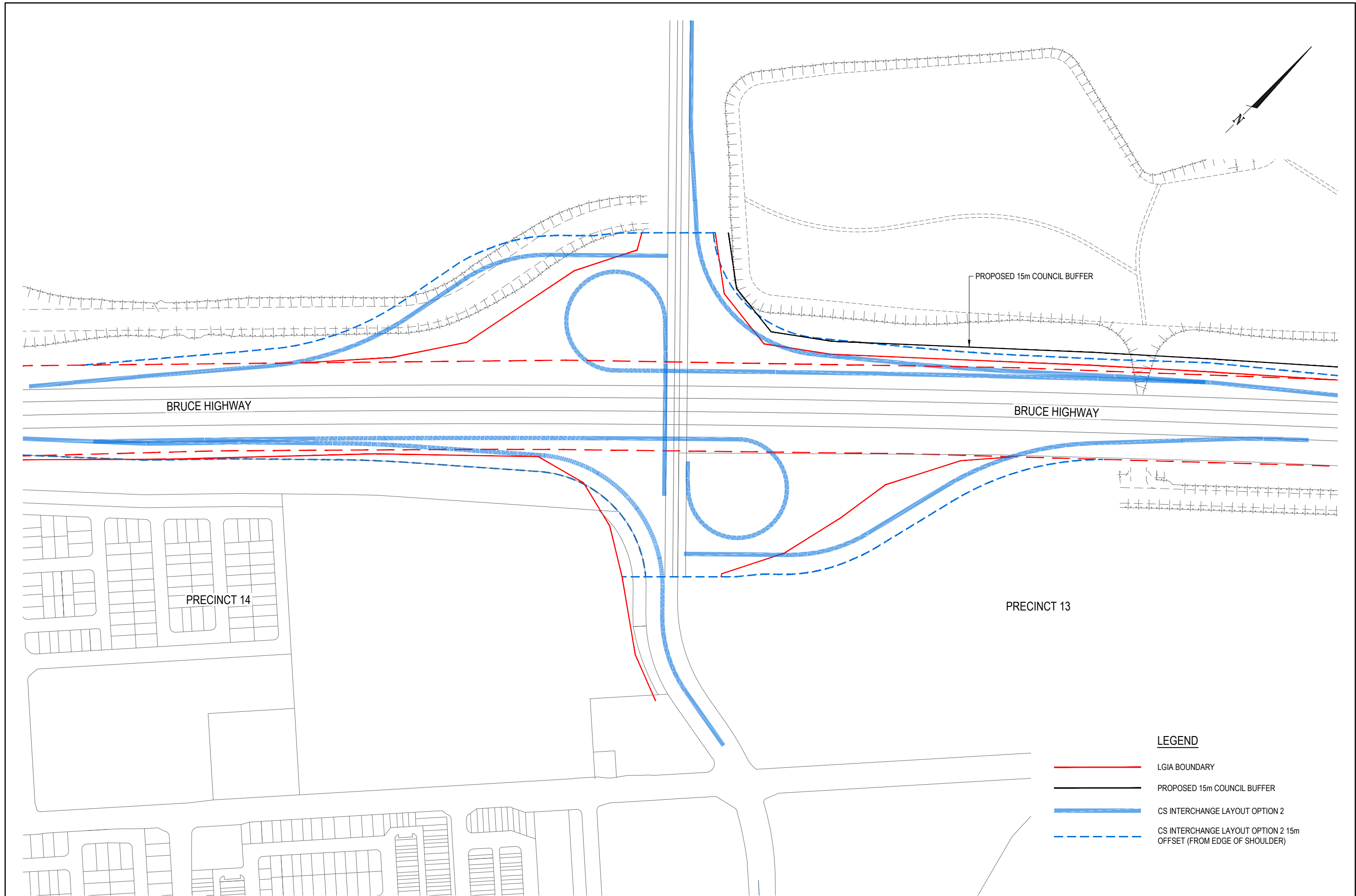
Yours sincerely

Calibre Professional Services Pty Ltd

A handwritten signature in blue ink, appearing to read 'A McPhail'.

Andrew McPhail
Principal Engineer

Attachments



LEGEND

- LGIA BOUNDARY
- PROPOSED 15m COUNCIL BUFFER
- CS INTERCHANGE LAYOUT OPTION 2
- - - CS INTERCHANGE LAYOUT OPTION 2 15m OFFSET (FROM EDGE OF SHOULDER)

FILE: 3015-SK1002.dwg DATE: 16-09-2020 USER: CARLOS HERNANDEZ
XREFS: X:17-000934 3015 - TITLE

FIRST	DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
ISSUE	BG	BG	BG	MW	16.09.20	
A	BG	HT	AM	AM	30.11.20	COMPARISON OF LGIA BOUNDARY AND PROPOSED INTERCHANGE SHIFT
B	AM	CHC	AM	AM	08.12.20	UPDATED LAYOUT
C						
D						
E						
F						
G						

AMENDMENTS

STATUS

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED BY:

SIGN: DATE:

SCALE

0 20 40 60 80 100 120 140 160

SCALE 1:2000 (A1)

SCALE 1:4000 (A3)

CLIENT

STOCKLAND DEVELOPMENTS
PTY LTD

calibre
© calibregroup.com

PROJECT

AURA
PRECINCT 11 (PART), 12 (PART)
13 (PART) AND 14 ROL

Calibre Consulting (QLD) Pty Ltd
Level 3, 16 Innovation Parkway
Birtinya QLD Australia 4575
Telephone 07 5314 2520
Facsimile 07 5314 2522

DRAWING TITLE

INTERCHANGE
WITH 15m SHIFT
LAYOUT PLAN

DISCLAIMER
ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR
PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY,
DO NOT SCALE.

PROJECT No.

17-000934

DRAWING No.

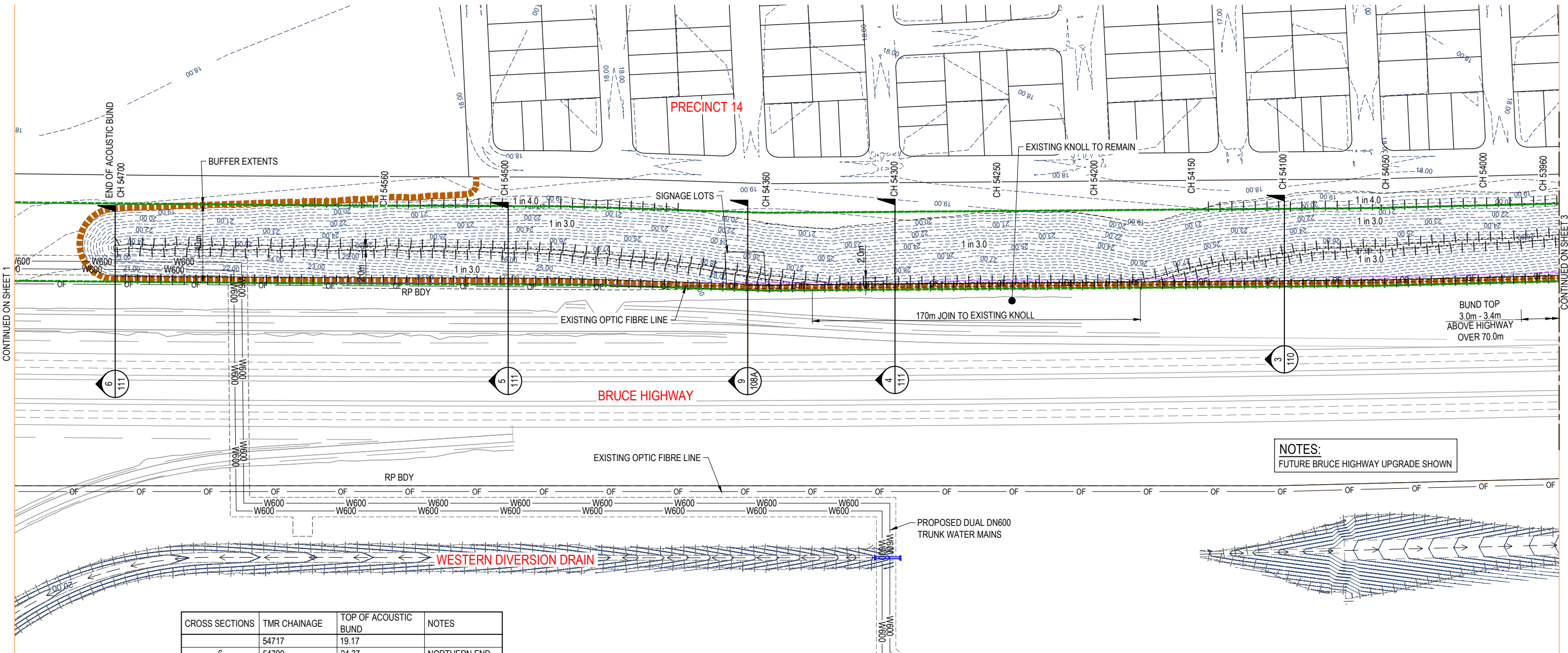
3015-SK1002

REVISION

B

LEGEND

- 8.00 PROPOSED CONTOURS
- TOP OF BATTER
- BOTTOM OF BATTER
- 40m BUFFER EXTENTS
- BUFFER ACCESS MAINTENANCE TRACK



CROSS SECTIONS	TMR CHAINAGE	TOP OF ACOUSTIC BUND	NOTES
6	54717	19.17	NORTHERN END
	54700	24.37	
	54650	25.16	
	54600	25.83	
5	54550	26.49	
	54500	27.20	
	54450	27.97	
	54400	28.54	
9	54360	28.73	
	54340	29.95	
4	54300	30.28	Existing GL
	54250	30.30	Existing GL
	54200	30.50	Existing GL
	54170	28.55	Existing GL
3	54100	27.55	
	54050	27.09	

CONCEPT DESIGN:
ALL INFORMATION PRESENTED ON THIS
DRAWING IS CONCEPTUAL ONLY AND TO
BE CONFIRMED IN SUBSEQUENT
DETAILED DESIGN

- NOTES:
1. ULTIMATE BRUCE HIGHWAY UPGRADE SHOWN (PENDING DETAILED DESIGN).
 2. TOP OF BUND LEVEL DERIVED FROM INFORMATION PROVIDED BY TMR FOR FUTURE BRUCE HIGHWAY UPGRADE LEVELS AND ASK CONSULTING ACOUSTIC REPORTING DATED JULY 2020 MINIMUM ACOUSTIC MOUND HEIGHT.
 3. ACOUSTIC MOUND MINIMUM HEIGHT ABOVE ADJACENT TRAFFIC LANE 3.0M UNLESS NOTED OTHERWISE.
 4. LGIP INDICATES DISTRICT LINER PARK MAXIMUM CROSSFALL 1 IN 4 (DESIRED 1 IN 6) HOWEVER, DURING DETAILED DESIGN MINOR RETAINING WALLS COULD BE INCORPORATED FOR LANDSCAPE AND AESTHETIC ENHANCEMENT.

1:1000 10 0 10 20 30 40 50m A1
1:2000 A3

AURA
PRECINCT 11, 12 & 14
ROL



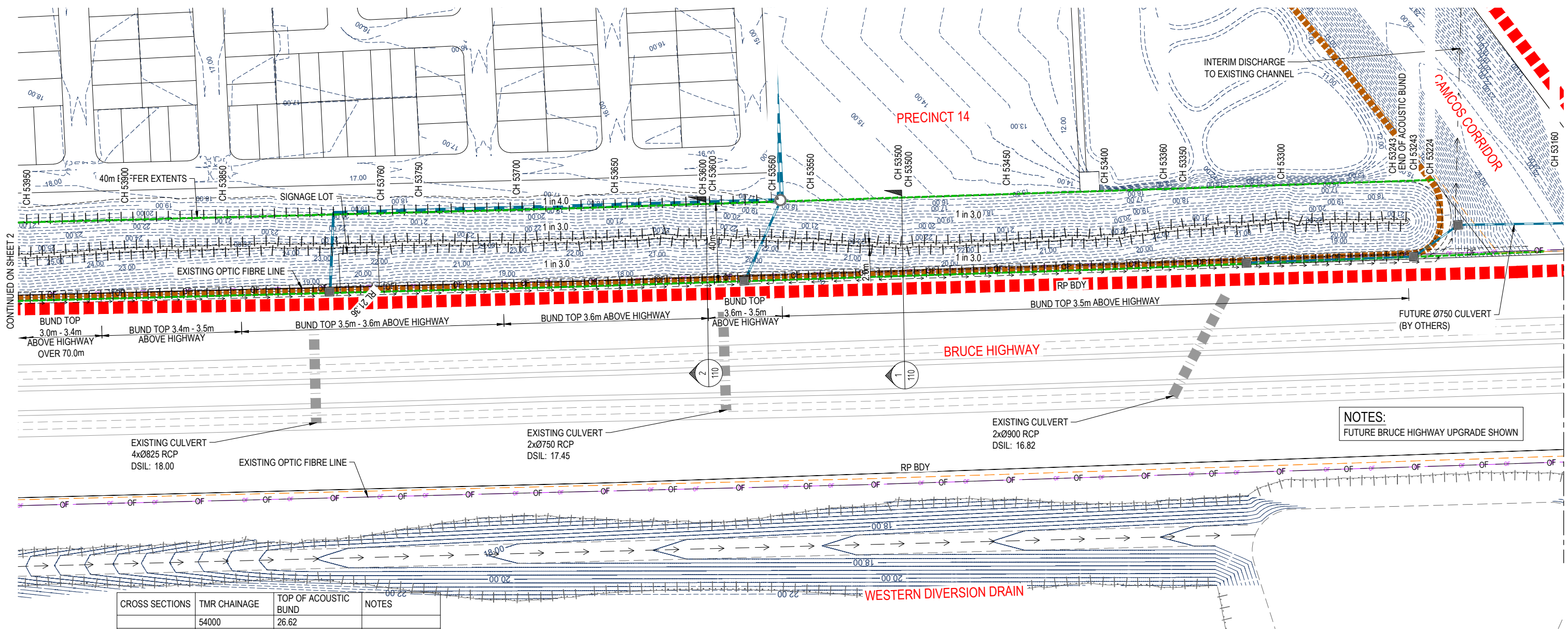
ACOUSTIC TREATMENT
PLAN SHEET 2 OF 3

Drawing No.:
17-000934.3015-SK108

Revision:
E

08/12/2020

- LEGEND
- PROPOSED CONTOURS
 - TOP OF BATTER
 - BOTTOM OF BATTER
 - 40m BUFFER EXTENTS
 - BUFFER ACCESS
 - MAINTENANCE TRACK

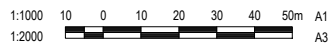


NOTES:
FUTURE BRUCE HIGHWAY UPGRADE SHOWN

CROSS SECTIONS	TMR CHAINAGE	TOP OF ACOUSTIC BUND	NOTES
	54000	26.62	
	53970	26.20	
	53960	26.25	
	53900	25.66	
	53850	25.17	
	53830	24.98	
	53800	24.72	
	53750	24.34	
	53700	24.00	
	53650	23.75	
2	53600	23.50	
	53550	23.30	
1	53500	23.00	
	53450	22.78	
	53400	22.55	
	53350	22.33	
	53300	22.11	
	53243	21.85	
	53224	16.05	Southern End

CONCEPT DESIGN:
ALL INFORMATION PRESENTED ON THIS
DRAWING IS CONCEPTUAL ONLY AND TO
BE CONFIRMED IN SUBSEQUENT
DETAILED DESIGN

- NOTES:
- ULTIMATE BRUCE HIGHWAY UPGRADE SHOWN (PENDING DETAILED DESIGN).
 - TOP OF BUND LEVEL DERIVED FROM INFORMATION PROVIDED BY TMR FOR FUTURE BRUCE HIGHWAY UPGRADE LEVELS AND ASK CONSULTING ACOUSTIC REPORTING DATED JULY 2020 MINIMUM ACOUSTIC MOUND HEIGHT.
 - ACOUSTIC MOUND MINIMUM HEIGHT ABOVE ADJACENT TRAFFIC LANE 3.0M UNLESS NOTED OTHERWISE.
 - LGIP INDICATES DISTRICT LINER PARK MAXIMUM CROSSFALL 1 IN 4 (DESIRED 1 IN 6) HOWEVER, DURING DETAILED DESIGN MINOR RETAINING WALLS COULD BE INCORPORATED FOR LANDSCAPE AND AESTHETIC ENHANCEMENT.



AURA
PRECINCT 11, 12 & 14
ROL



EXTRACT ONLY



MWH®

BUILDING A BETTER WORLD



Ultimate Caloundra South Transport Model Revised Model Development Report

Prepared for Stockland
November 2013

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QUALITY STATEMENT

SUNSHINE COAST PROJECT MANAGER

Grant Haywood

PROJECT TECHNICAL LEAD

David Leahy

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CHECKED BY

David Leahy 29/11/2013

REVIEWED BY

Jon Dare-Williams 29/11/2013

APPROVED FOR ISSUE BY

David Leahy 2/11/2013

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REVISION SCHEDULE

Rev No	Date	Description	Signature or Typed Name (documentation on file).			
			Prepared by	Checked by	Reviewed by	Approved by
0	2012-11-19	Draft Report	DL&ML	DL	JDW	DL
1	2012-11-26	Final Draft Report	DL&ML	DL	JDW	DL
2	2012-12-04	Final Draft Report v2	DL&ML	DL	DL	DL
3	2013-01-25	Final	DL&ML	DL	DL	DL
4	2013-02-05	Revised Draft – SCTFM5	DL&ML	DL	DL	DL
5	2013-10-15	Revised Final	DL&ML	DL	DL	DL
6	2013-10-23	Revised Final v2	DL&ML	DL	DL	DL
7	2013-11-18	Revised Final v3	DL&ML	DL	DL	DL
7.01	27/11/2013	Revised Final v3.1	DL&ML	DL	DL	DL
7.1	2013-11-19	Revised Final v4	DL&ML	DL	DL	DL
7.11	2013-11-29	Revised Final v4.1	DL&ML	DL	DL	DL

Executive Summary

The Caloundra South project is one of the largest mixed use projects in Australia with a predicted population of 50,000 persons and a development horizon of 25 to 35 years.

The site, which is located on the southern edge of the Sunshine Coast, is the largest greenfield site in a single ownership in South East Queensland. This provides a unique opportunity to undertake appropriate and managed long-term planning.

To assess the traffic demand from this development, the Ultimate Caloundra South Transport Model version 5.06 (UCSTM) was developed by MWH on behalf of Stockland.

The UCSTM was originally developed from Transport and Main Roads and Sunshine Coast Region Council existing strategic model at the time, SCTFMv3.5. This report documents the models recent update based on SCTFMv5. It has also been with validation and calibration based on TMR's Saturn Guidelines.

A comparison of SCTFMv3 and SCTFMv5 trip generation attraction and production factors are shown in Table 18 and Table 19 respectively. While there are some small increases in some of production and attraction factors, overall there is a decrease in trip generation. A comparison trip generation adjustment factors is shown in Table 20. Overall, the SCTFMv5 reduction factors have reduced from SCTFMv3.5.

Results from the model indicate the traffic network is expected to operate efficiently with over 99% of the network (mid-blocks) and 85% of intersections operating with a level of service of C or better.

When the model's results are benchmarked against those presented by the document "Caloundra South Integrated Transport Strategy" the model shows that the assumptions originally made are generally in agreement to the UCSTM results and that at this time any difference do not warrant a change in the proposed network's function or structure.

Table 12 Trip Production Parameters (Part 3 of 3)

Trip Purpose	Population (0-17yrs)	Population (18-64yrs)	Population (65yrs+)	Total Workers	Visitors	
					Domestic	International
Home based work				1.168		
Home based Education	1.208					
Home based shopping	0.345	0.764	1.165			
Home based recreation						
Home based other	0.000					
Non-home based						
Commercial vehicles						
Home based visitors					1.119	1.128
Non-home based visitors						

5.4.2 Time period and Mode choice

The time period factors are based on SCTFM v5 while the mode choice parameters are based on the South-East Queensland (SEQ) 1992 Household Travel Survey (HTS).

Table 13 SCTFMv5 Time Period Splits / 92 HTS Mode Share Splits

Trip Purpose	AM		PM		Mode Share			Avg. Vehicle Occupancy
	Production to attraction	Attraction to production	Production to attraction	Attraction to production	Walk/Cycle	Car	PT	
Commercial vehicles	0.067	0.067	0.042	0.042	0%	100%	0%	1.00
Home based Education	0.399	0.061	0.004	0.046	29%	56%	15%	2.37
Home based other	0.101	0.029	0.051	0.104	10%	89%	1%	1.60
Home based recreation	0.101	0.029	0.051	0.104	26%	73%	1%	1.78
Home based shopping	0.101	0.029	0.051	0.104	18%	81%	1%	1.50
Home based visitors	0.101	0.029	0.051	0.104	21%	75%	4%	2.55
Home based work	0.19	0.009	0.023	0.2	8%	90%	2%	1.16
Non-home based	0.051	0.051	0.062	0.062	13%	85%	2%	1.43
Non-home based visitors	0.051	0.051	0.062	0.062	21%	75%	4%	2.54

When considering the ultimate development scenario, we have reviewed the mode share targets that are presented in TMR's Connecting SEQ 2031. The following targets are presented for the Sunshine Coast Region:

Table 14 Connecting SEQ 2031 Mode Shares - Sunshine Coast

Mode	2006 Actual	2031 Forecast	Increase
Walk / Cycle	10.1%	18%	78%
Public Transport	3.6%	10%	178%
Car	86.3%	72%	-17%

We note that the targets presented in the Connecting SEQ 2031 document are aspirational in nature, so consideration has been given to both the HTS mode share as well as Connecting SEQ 2031 targets. We have made the following modifications for mode share from those estimated from the HTS.

- Increase all walk/cycle share by 10%
- Increase all public transport shares by 100%, with the exception of HBE, which increases by 10%

- Increase public transport share in the Town Centre by 200%, with the exception of HBE, which increases by 10%. The Town Centre is generally within an 800m radius of the proposed rail station (see Figure 8).

The adjusted time period and mode share splits used within the UCSTM are shown in Table 15 and Table 16

Table 15 UCSTM Time Period / Mode Share Splits (Not Town Centre)

Trip Purpose	AM		PM		Mode Share			Avg. Vehicle Occupancy
	Production to attraction	Attraction to production	Production to attraction	Attraction to production	Walk/Cycle	Car	PT	
Commercial vehicles	0.067	0.067	0.042	0.042	0.0%	100.0%	0%	1.00
Home based Education	0.399	0.061	0.004	0.046	31.9%	51.6%	17%	2.37
Home based other	0.101	0.029	0.051	0.104	11.0%	87.0%	2%	1.60
Home based recreation	0.101	0.029	0.051	0.104	28.6%	69.4%	2%	1.78
Home based shopping	0.101	0.029	0.051	0.104	19.8%	78.2%	2%	1.50
Home based visitors	0.101	0.029	0.051	0.104	23.1%	68.9%	8%	2.55
Home based work	0.19	0.009	0.023	0.2	8.8%	87.2%	4%	1.16
Non-home based	0.051	0.051	0.062	0.062	14.3%	81.7%	4%	1.43
Non-home based visitors	0.051	0.051	0.062	0.062	23.1%	68.9%	8%	2.54

Table 16 UCSTM Time Period / Mode Share Splits (Town Centre)

Trip Purpose	AM		PM		Mode Share			Avg. Vehicle Occupancy
	Production to attraction	Attraction to production	Production to attraction	Attraction to production	Walk/Cycle	Car	PT	
Commercial vehicles	0.067	0.067	0.042	0.042	0.0%	100.0%	0%	1.00
Home based Education	0.399	0.061	0.004	0.046	31.9%	51.6%	17%	2.37
Home based other	0.101	0.029	0.051	0.104	11.0%	86.0%	3%	1.60
Home based recreation	0.101	0.029	0.051	0.104	28.6%	68.4%	3%	1.78
Home based shopping	0.101	0.029	0.051	0.104	19.8%	77.2%	3%	1.50
Home based visitors	0.101	0.029	0.051	0.104	23.1%	64.9%	12%	2.55
Home based work	0.19	0.009	0.023	0.2	8.8%	85.2%	6%	1.16
Non-home based	0.051	0.051	0.062	0.062	14.3%	79.7%	6%	1.43
Non-home based visitors	0.051	0.051	0.062	0.062	23.1%	64.9%	12%	2.54

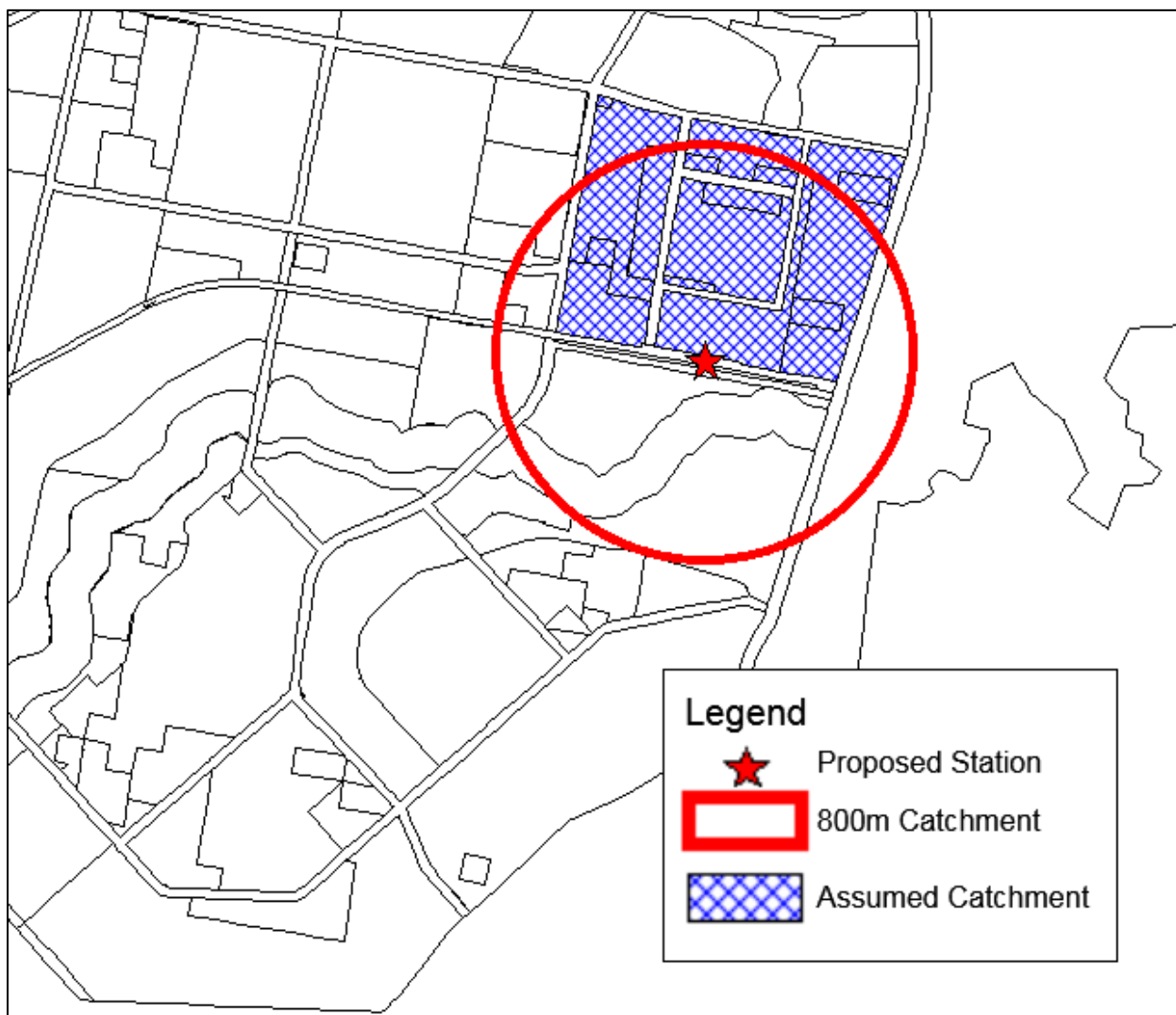


Figure 8 Rail Catchment (800m radius catchment)

Using these two sets of targets we have the following estimated resultant total mode shares for the Caloundra South development.

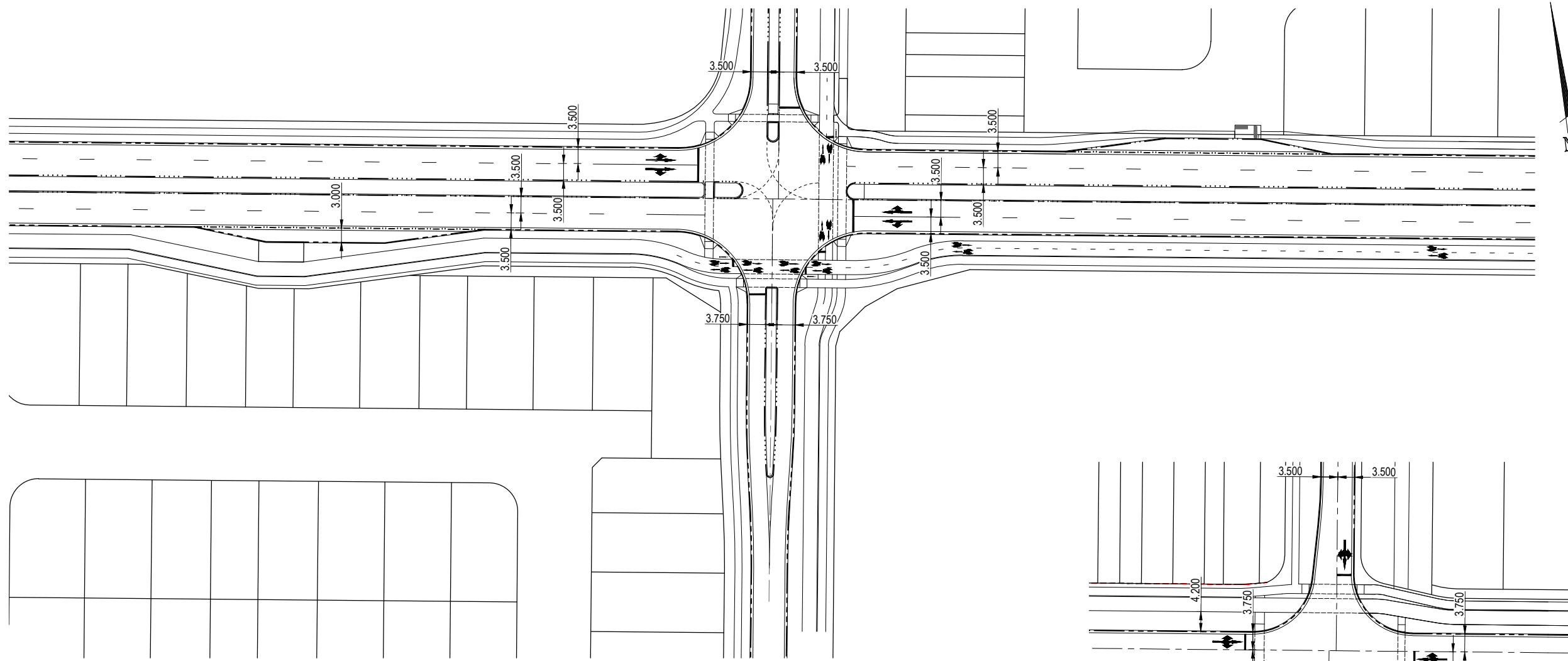
Table 17 Mode Share and Person Trip Estimates

Mode	92 HTS Mode Share	92 HTS Mode Share Person Trips	UCSTM modified Mode Share	UCSTM modified Person Trips	Connecting SEQ Share
PT / Walk / Cycle	20.3%	37,668	24.1%	44,649	28.0%
Car	79.7%	147,897	75.9%	140,916	72.0%

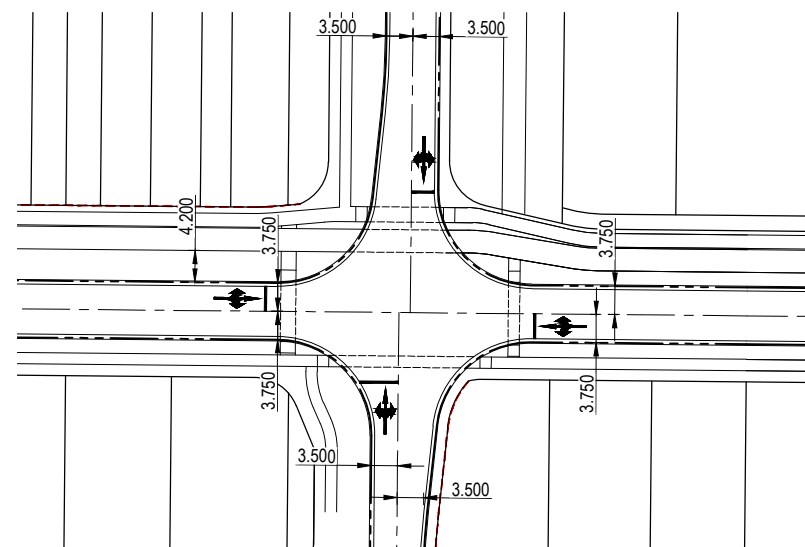
We believe that these target mode shares are an appropriate assumption for modelling purposes based on the infrastructure, for both active transport and public transport planned within the area together with current published government policy.

5.4.3 Distribution

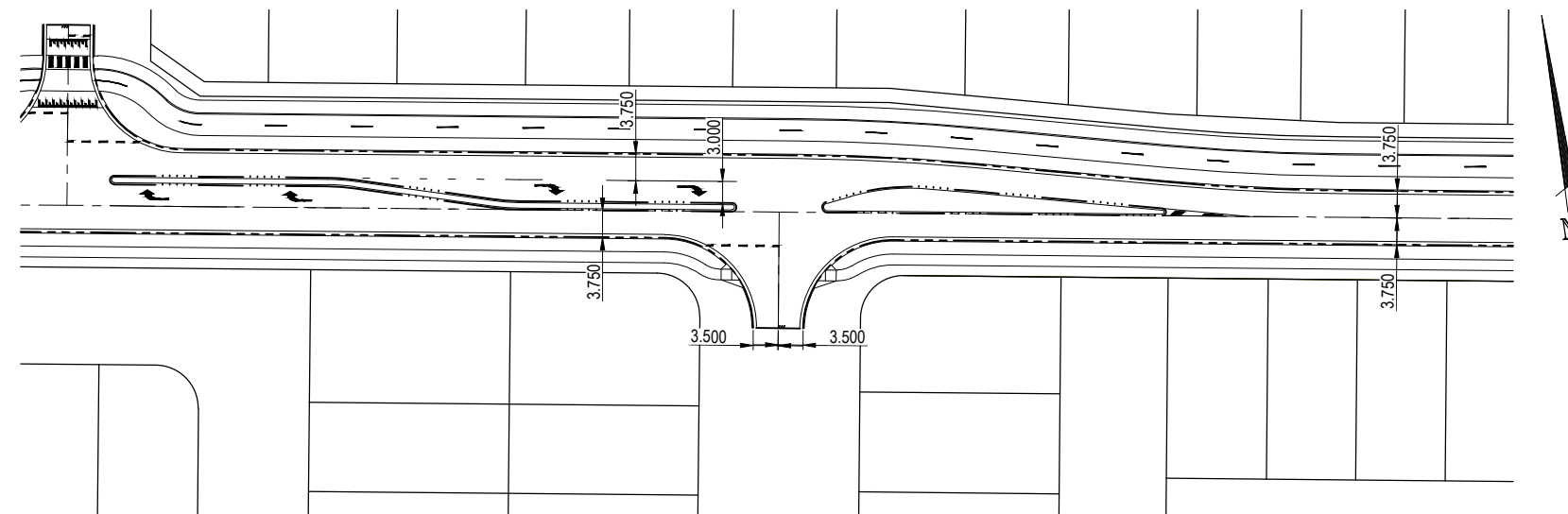
Trip length distribution is based on the SCTFMv5 trip distribution. Origin and destination totals for each of the Caloundra South zones are estimated and then used within a furnishing process using the SCFTMv5 origin destination matrix supplied by SCRC.



INTERSECTION 67 LAYOUT PLAN
SCALE: 1:500 (A1)
SCALE: 1:1000 (A3)



INTERSECTION 85 LAYOUT PLAN
SCALE: 1:500 (A1)
SCALE: 1:1000 (A3)



INTERSECTION 62 LAYOUT PLAN
SCALE: 1:500 (A1)
SCALE: 1:1000 (A3)

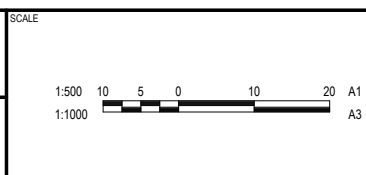
REFER TO 3015-DA650 FOR LEGEND

CONCEPTUAL DESIGN ONLY
REFER TO DA650 FOR NOTES

FILE: 3015-DA650.dwg DATE: 16-06-2020 USER: ADAM TEGG
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FIRST ISSUE	DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
A	CB	DC	AM	MW	21.07.20	MINOR UPDATE INTERSECTION 85 PATH
B	AM	CHC	AM	AM	26.11.20	
C						
D						
E						
F						
G						

PRELIMINARY NOT FOR CONSTRUCTION	
APPROVED BY:	
SIGN:	DATE:



CLIENT

STOCKLAND DEVELOPMENTS
PTY LTD

Calibre Consulting (QLD) Pty Ltd
Level 3, 16 Innovation Parkway
Birtinya QLD Australia 4575
Telephone 07 5314 2520
Facsimile 07 5314 2522

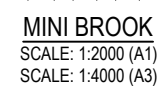
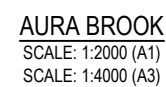
© calibregroup.com

PROJECT

AURA
PRECINCT 11 (part), 12
(part), 13 (part) AND 14 ROL

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DRAWING TITLE		
INTERSECTION FUNCTIONAL LAYOUT SHEET 6		
PROJECT No.	DRAWING No.	REVISION
17-000934	3015-DA656	A



LEGEND:

LEGEND:

- | | |
|---|---|
|  | LOT BOUNDARY |
|  | CADASTRE |
|  | DEVELOPED CONTOURS (0.5m) |
|  | CHANNEL TOP OF BATTER |
|  | CHANNEL TOE OF BATTER |
|  | WETLAND |
|  | POND |
|  | BIO-RETENTION BASIN |
|  | INLET POND |
|  | INLET POND BATTER |
|  | BIO BATTER |
|  | MAIN MAINTENANCE VEHICLE
ACCESS ROUTES |

STORMWATER CULVERTS AND
PEDESTRIAN UNDERPASS.
REFER TO DWG 3015-SK2014

NOTES

1. ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPT ONLY AND TO BE CONFIRMED FOR SUBSEQUENT DETAILED DESIGN.
2. DETAIL DESIGN OF DRAINAGE IS TO PROVIDE SUITABLE ACCESS AND MAINTENANCE TRACKS BE PROVIDED FOR VEHICLES WITH A MINIMUM OF 2 YEAR ARI FLOOD IMMUNITY. TYPICALLY TRACKS WILL FOLLOW MAJOR PATH NETWORK AS IS HIGHLIGHTED ON PLAN.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CALIBRE REPORT 18-000340_FIR.01C DATED JUNE 2020.
4. LOW FLOW CHANNEL HAS MINIMUM CAPACITY OF 2 YEAR ARI FLOW

STORMWATER CULVERTS AND
PEDESTRIAN UNDERPASS.
REFER TO DWG 3015-SK2001

XREFS: X-17-000934.3015 SK20201016_Aura P11-14 Southern Re-Design, X-17-000934.3015 - BASE, 2020 0423 Aura - MASTER PLAN - kw, X-17-000934 - LOTS, 20201110_Aura P11-14 APPLICATION MASTER PLAN - Redesigns, 3015-DA650, X-20-000315.1015-BASE, X-17-000934.2008-BASE, X-17-000934.1012-BASE, X-17-000934.1017-BASE, X-17-000934.2007-BASE, X-17-000934.2004-BASE, X-17-000934.1013-BASE, X-17-000934.3015 - BASE, PATHS

STATUS	ISSUED FOR APPROVAL
APPROVED	
BY:	
SIGN:	DATE:

1:2000 20 10 0 20 40 60 80 100 A1
1:4000 A3

STOCKLAND
DEVELOPMENTS PTY LTD



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PROJECT
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PRECINCT 11 (PART), 12 (PART)
13 (PART) AND 14 ROL

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OPEN DRAINS ACCESS AND MAINTENANCE TRACKS

PROJECT No.
17-000934

DRAWING No.
015-SK2016

VISION