Porthkerry Road, Rhoose Technical Note – Assessment of Revised Access

Introduction

This technical note, which has been produced to provide further supporting evidence for the proposed housing application at Porthkerry Road Rhoose (Application Number 2014/00550/OUT), provides details of geometrical changes that have been made to the design of the scheme's proposed main access on Porthkerry Road. The revisions to the access represent an update from the original drawing (CIV15342-C-SA-95-SK01 A08), which was included as Appendix F of the schemes supporting Transport Assessment (TA) dated May 2014 and is also included as Appendix A of this technical note. Amendments to the drawing have been made to address comments raised by Vale of Glamorgan (VoG) highways regarding the original access proposals, which are also discussed within this note.

The technical note also includes details of the updated capacity assessment of the junction, which takes into account the revised geometry.

Proposed Access

VoG have now stated that the development access would need to accommodate bus movements within the site. They have also requested that swept path movements should be provided for an 11m long bus that show that this type of vehicle can turn into and out of the site without conflict. In addition, VoG have also expressed concerns regarding the right angle bend within the western portion of the site and the ability of buses to negotiate this corner without conflicting with vehicles travelling in the opposite direction. Previous swept path analysis carried out of the access has shown that whilst buses of this size can access the site within the proposed road space there is a requirement in some instances for the vehicle to marginally overrun the centreline. This design was proposed on the basis that the only buses expected to access the site would be school buses, which will arrive and depart on a weekly basis.

A revised access design has therefore been provided as Appendix B (Drawing CIV15342-C-SA-95-SK15 1st Issue). This design includes amendments to the geometry of the access to address VoG's comments. These changes include adjustments to the radii at the junction mouth and the widening of the road / increase of turning radii on the western bend within the site. The width of the access road has also been reduced from 6.8m to 6.5m so that it is consistent with the agreed width of the internal roads.

Drawings showing the swept path movements of buses (Dart SLF 11.20m) entering and exiting the site access (Drawing CIV15342-C-SA-95-SK12 1st Issue), and negotiating the revised internal bend within the western portion of the site (Drawing CIV15342-C-SA-95-SK16 1st Issue) have been included as Appendix C. These drawings show that a bus (approximately 11m in length) can negotiate the access and internal bend without conflicting with vehicles travelling in the opposite direction.

It is noted that the only buses expected to access the site in the foreseeable future will be school buses. These amendments have been undertaken to address concerns raised by the highway

authority, in relation to the potential for increased usage by buses of the access road for a future public service. We maintain that the original access design would provide adequate dimensions to accommodate general car traffic and low frequency bus movements.

Junction Capacity Analysis

A capacity assessment has been undertaken of the revised access proposals. This junction has been assessed using PICADY junction modelling software. The geometries inputted into this model have been measured from the revised access design plans.

The PICADY analysis assesses the operation of the junction with the vehicle flows of the Forecast Year With LDP traffic scenario. Thus, traffic flows entered into this model remain unchanged from that assessed within the original TA submitted in support of the planning application.

A summary of the results for this PICADY analysis is shown in Table 1 below. In addition the full PICADY output for this assessment has also been included as Appendix D.

Table 1: Results of PICADY analysis for Revised Proposed Access Junction – Forecast Year With LDP

Arm	AM		PM	
	RFC	Queue	RFC	Queue
Access arm (left turn)	0.113	0.13	0.040	0.04
Access arm (right turn)	0.780	3.25	0.349	0.53
Porthkerry Road West (ahead and right turn)	0.076	0.14	0.075	0.14

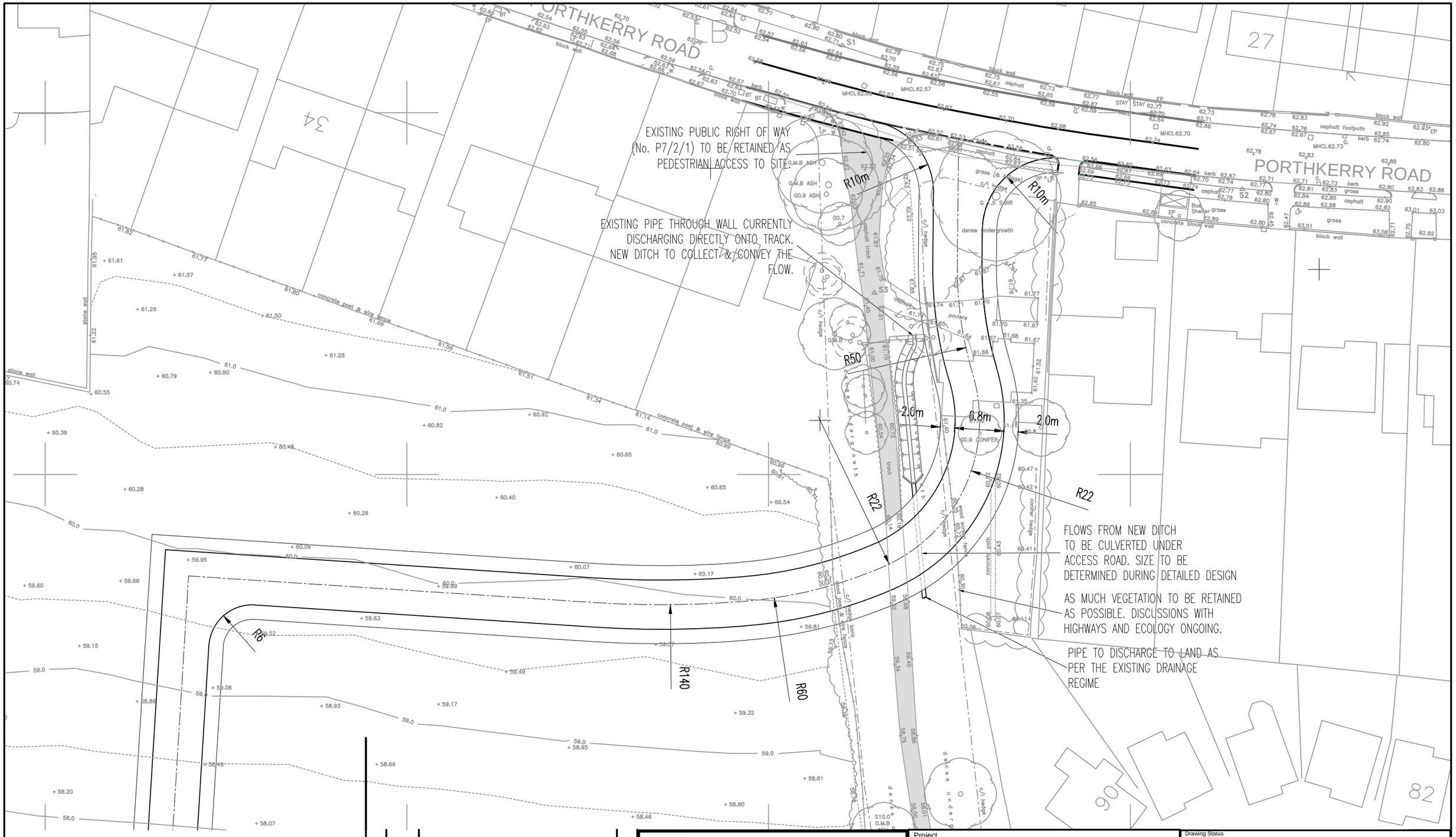
It can be seen from the results in Table 1 that the junction is forecast to operate within capacity with limited queuing in the AM and PM peak hour of the Forecast Year With LDP scenario.

Summary

It can be seen from the analysis above that the revised access proposals will provide suitable geometry to accommodate the movements of an 11m long bus. In addition, assessments have shown that the revised access junction is forecast to operate within capacity with limited queuing in the AM and PM peak hour of the Forecast Year With LDP scenario. The geometries of the access are also in accordance with standards outlined within the Design Manual for Bridges (DMRB) documents, as well as VoG own requirements regarding access junctions of this type. It is therefore clear that there is no technical reason why this revised access should not be approved.

APPENDICES

A. Original Access Proposals



GENERAL NOTES

Rev	Date	Description	By

Amendments

Waterman

38 Cathedral Road Cardiff CF11 9LL

t 029 2038 4400 f 03333 444 501

mail@watermangroup.com www.watermangroup.com

Project: Porthkerry Road, Rhoose

Title: Preliminary Design of Access Road

Client: Taylor Wimpey

Drawing Status: Preliminary

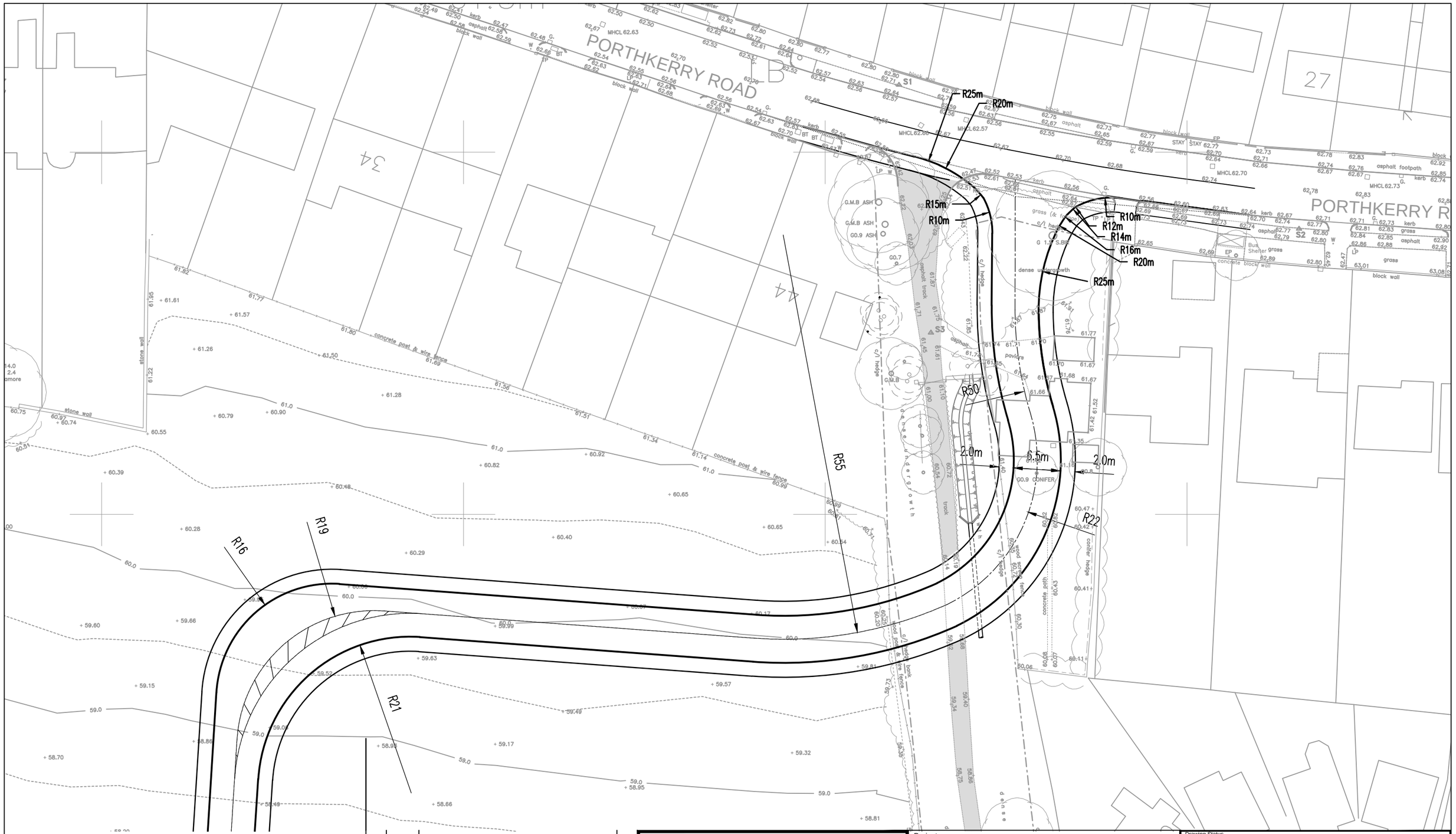
Designed by	VW	Checked by		Project No	15342
Drawn by	VW	Date	03.02.14		
Scales @ A3 work to figured dimensions only	1:500			Computer File No	C-15342-SA-95-SK01 A08 Revision References Removed.dwg

Publisher	Zone	Category	Number	Revision
C	SA	95	SK01	A07

File Path \\nt-cf\WTDLVProjects\15342 - Porthkerry Rd, Rhoose, Taylor Wimpey\CAD\95 - HIGHWAYS\

A1-Waterman-S, C-15342-SA-NS-BASE

B. Revised Access Proposals



GENERAL NOTES

Rev	Date	Description	By
1st Issue	21.10.14	Issue	JD

Amendments

Waterman

38 Cathedral Road Cardiff CF11 9LL

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mail@watermangroup.com www.watermangroup.com

Project: Porthkerry Road, Rhoose

Title: Preliminary Design of Access Road

Client: Taylor Wimpey

Drawing Status: Preliminary

Designed by	JD	Checked by	AW	Project No
Drawn by	RS	Date	21.10.14	15342

Scales @ A3 — work to figured dimensions only: 1:500

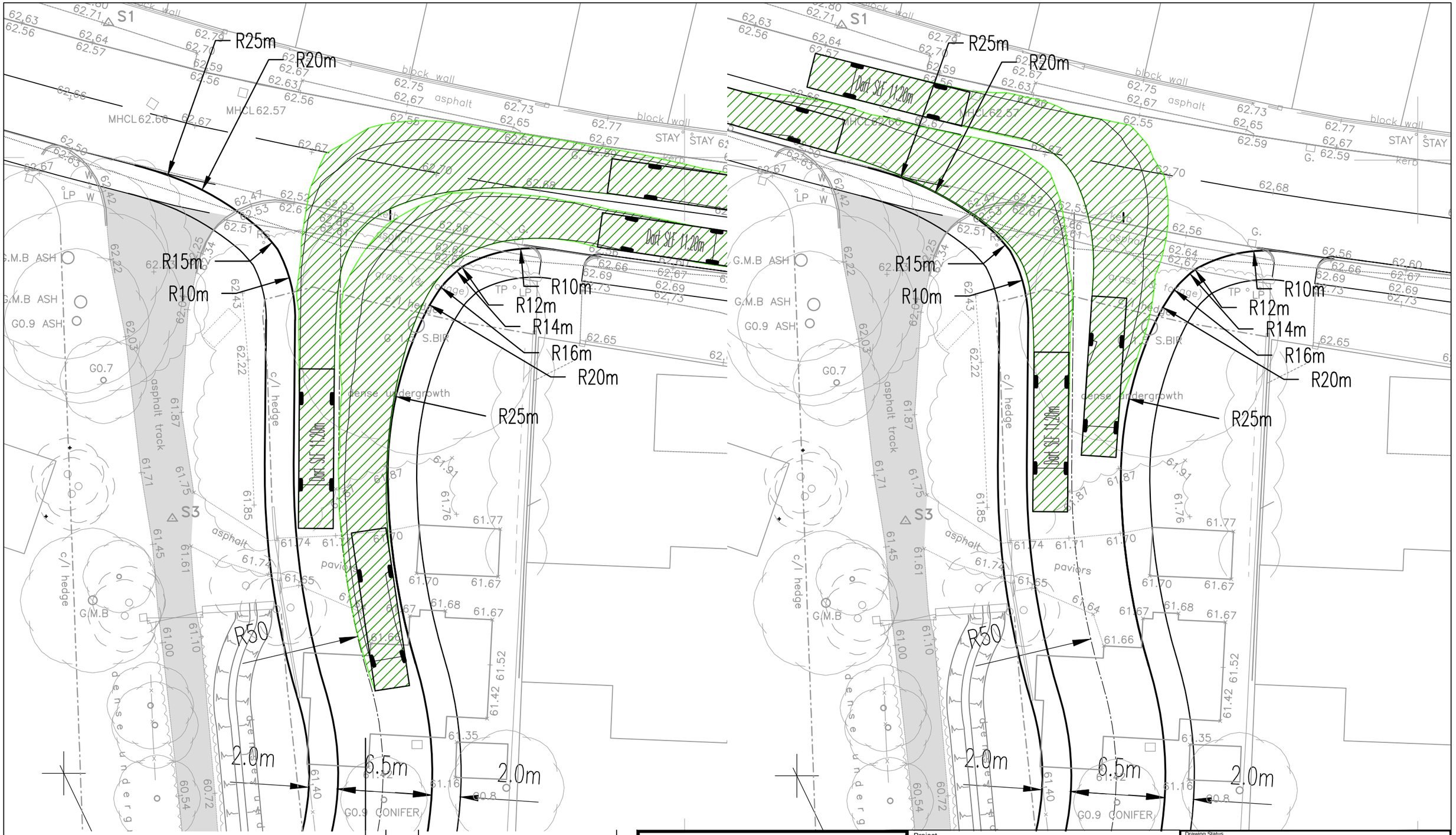
Computer File No: C-15342-SA-95-SK15 1st Issue Potential Revised Access Solution.dwg

Publisher	Zone	Category	Number	Revision
C	SA	95	SK15	1st Issue

File Path: K:\Projects\15342 - Porthkerry Rd, Rhoose, Taylor Wimpey\CAD\95 - HIGHWAYS\

A1-Waterman-S, C-15342-SA-NS-BASE

C. Autotrack Analysis of Revised Access Proposals



GENERAL NOTES

Rev	Date	Description	By
1st Issue	21.10.14	Issue	RSM

Amendments

Waterman

38 Cathedral Road Cardiff CF11 9LL
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Project
Porthkerry Road, Rhoose

Title
Potential Access - Autotrack Analysis of Junction Mouth (Dart SLF 11.20m Bus)

Client
Taylor Wimpey

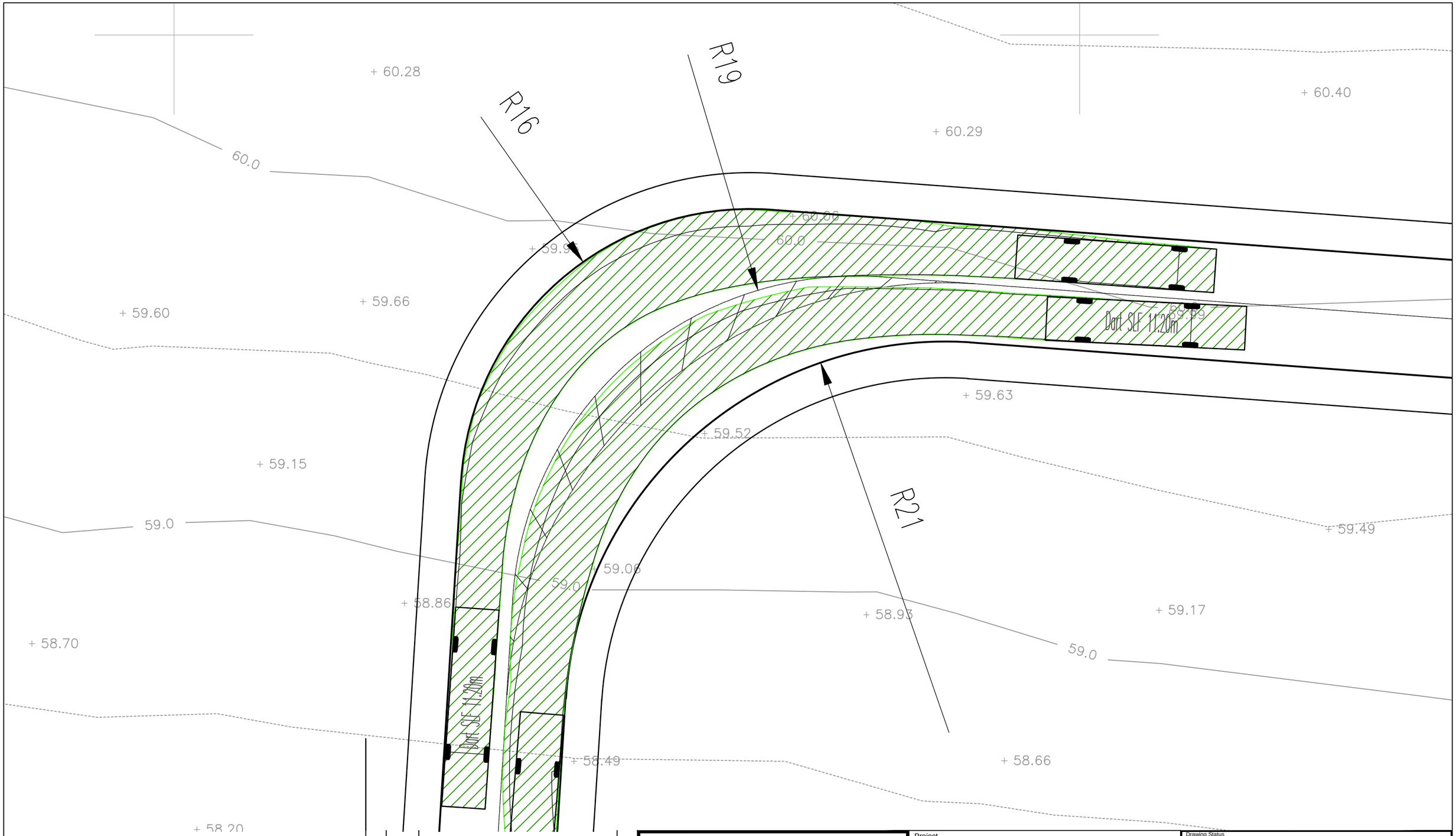
Drawing Status
Preliminary

Designed by JD	Checked by AW	Project No 15342	
Drawn by RS	Date 21.10.14		
Scales @ A3 work to figured dimensions only	1:250	Computer File No C-15342-SA-95-SK12 1st Issue Revised Autotrack Analysis of Potential Revised Access	

Publisher	Zone	Category	Number	Revision
C	SA	95	SK12	1st Issue

File Path K:\Projects\15342 - Porthkerry Rd, Rhoose, Taylor Wimpey\CAD\95 - HIGHWAYS\

A1-Waterman-S, C-15342-SA-NS-BASE



GENERAL NOTES

Rev	Date	Description	By
A01	21.10.14	Issue	JD

Amendments

Waterman

38 Cathedral Road Cardiff CF11 9LL

t 029 2038 4400 f 03333 444 501

mail@watermangroup.com www.watermangroup.com

Project: Porthkerry Road, Rhoose

Title: Internal Bend - Autotrack Analysis (Dart SLF 11.20m Bus)

Client: Taylor Wimpey

Drawing Status: Preliminary

Designed by: JD	Checked by: AW	Project No: 15342		
Drawn by: JD	Date: 21.10.14			
Scales @ A3 work to figured dimensions only: 1:200	Computer File No: C-15342-SA-95-SK16 1st Issue Potential Revised Internal Bend Tracking.dwg			
Publisher	Zone	Category	Number	Revision
C	SA	95	SK16	1st Issue

File Path K:\Projects\15342 - Porthkerry Rd, Rhoose, Taylor Wimpey\CAD\95 - HIGHWAYS\

A1-Waterman-S, C-15342-SA-NS-BASE

D. Details of PICADY Assessment of Revised Access Proposals

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 5.1 ANALYSIS PROGRAM
RELEASE 5.0 (JUNE 2010)

FOR SALES AND DISTRIBUTION INFORMATION,
PROGRAM ADVICE AND MAINTENANCE CONTACT:
TRL SOFTWARE SALES
TEL: CROWTHORNE (01344) 770758, FAX: 770356
EMAIL: software@trl.co.uk

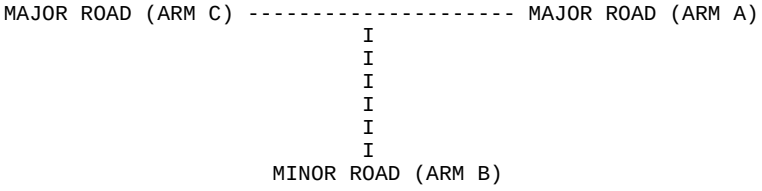
Run with file:-
"K:\Projects\15342 - Porthkerry Rd, Rhoose, Taylor Wimpey\DESIGN\PICADY\Proposed Access Junction\
Assessment of Proposed Revised Access.vpi"
(drive-on-the-left) at 09:33:00 on Monday, 20 October 2014

RUN INFORMATION

RUN TITLE	: Assessment of Proposed Revised Site Access Junction
LOCATION	:
DATE	: 03/09/12
CLIENT	:
ENUMERATOR	:
JOB NUMBER	: 15342
STATUS	:
DESCRIPTION	:

MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA



ARM A IS Porthkerry Road East
ARM B IS Access
ARM C IS Porthkerry Road West

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B
STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C
ETC.

GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 7.43 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 2.20 M.
- VISIBILITY	(VC-B)237.00 M.
- BLOCKS TRAFFIC (SPACES)	YES (0)
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 19.0 M.
- VISIBILITY TO RIGHT	(VB-A) 40.0 M.
- LANE 1 WIDTH	(WB-C) -
- LANE 2 WIDTH	(WB-A) -
WIDTH AT 0 M FROM JUNCTION	10.00 M.
WIDTH AT 5 M FROM JUNCTION	3.76 M.
WIDTH AT 10 M FROM JUNCTION	3.25 M.
WIDTH AT 15 M FROM JUNCTION	3.25 M.
WIDTH AT 20 M FROM JUNCTION	3.25 M.
- LENGTH OF FLARED SECTION	DERIVED: 0 PCU

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

Intercept For STREAM B-C	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
0.00	0.00	0.00

* Due to the presence of a flare, data is not available

Intercept For STREAM B-A	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B
0.00	0.00	0.00	0.00	0.00

* Due to the presence of a flare, data is not available

Intercept For STREAM C-B	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
711.21	0.26	0.26

(NB These values do not allow for any site specific corrections)

TRAFFIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: AM Peak 2019 + LDP

TIME PERIOD BEGINS 07.15 AND ENDS 08.45

LENGTH OF TIME PERIOD - 90 MIN.
LENGTH OF TIME SEGMENT - 15 MIN.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	4.07	6.11	4.07
ARM B	15.00	45.00	75.00	4.24	6.36	4.24
ARM C	15.00	45.00	75.00	4.96	7.44	4.96

Demand set: AM Peak 2019 + LDP

TURNING PROPORTIONS
TURNING COUNTS
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
07.15 - 08.45	ARM A	0.000	0.387	0.613
		0.0	126.0	200.0
		(0.0)	(0.0)	(6.4)
	ARM B	0.832	0.000	0.168
		282.0	0.0	57.0
		(0.0)	(0.0)	(0.0)
	ARM C	0.917	0.083	0.000
		364.0	33.0	0.0
		(4.6)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET AM Peak 2019 + LDP
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.15-07.30									
B-C	0.72	10.61	0.067		0.00	0.07	1.0		0.10
B-A	3.54	7.38	0.480		0.00	0.89	12.3		0.25
C-AB	0.61	13.56	0.045		0.00	0.06	1.0		0.08
C-A	4.38								
A-B	1.58								
A-C	2.51								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.30-07.45									
B-C	0.85	10.07	0.085		0.07	0.09	1.4		0.11
B-A	4.23	7.06	0.598		0.89	1.41	19.7		0.34
C-AB	0.78	13.90	0.056		0.06	0.09	1.3		0.08
C-A	5.17								
A-B	1.89								
A-C	3.00								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-C	1.05	9.31	0.112		0.09	0.13	1.8		0.12
B-A	5.17	6.63	0.780		1.41	3.03	39.1		0.60
C-AB	1.11	14.50	0.076		0.09	0.14	2.1		0.07
C-A	6.18								
A-B	2.31								
A-C	3.67								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B-C	1.05	9.27	0.113		0.13	0.13	1.9		0.12
B-A	5.17	6.63	0.780		3.03	3.25	47.4		0.66
C-AB	1.11	14.50	0.076		0.14	0.14	2.1		0.07
C-A	6.18								
A-B	2.31								
A-C	3.67								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-C	0.85	10.00	0.085		0.13	0.09	1.4		0.11
B-A	4.23	7.06	0.598		3.25	1.57	26.1		0.38
C-AB	0.78	13.90	0.056		0.14	0.09	1.4		0.08
C-A	5.17								
A-B	1.89								
A-C	3.00								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-C	0.72	10.56	0.068		0.09	0.07	1.1		0.10
B-A	3.54	7.37	0.480		1.57	0.95	15.2		0.27
C-AB	0.61	13.56	0.045		0.09	0.07	1.0		0.08
C-A	4.37								
A-B	1.58								
A-C	2.51								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.1	
07.45	0.1	
08.00	0.1	
08.15	0.1	
08.30	0.1	
08.45	0.1	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.9	*
07.45	1.4	*
08.00	3.0	***
08.15	3.2	***
08.30	1.6	**
08.45	1.0	*

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.1
07.45	0.1
08.00	0.1
08.15	0.1
08.30	0.1
08.45	0.1

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-C	78.5	52.3	8.7	0.11	8.7	0.11
B-A	388.2	258.8	159.8	0.41	159.9	0.41
C-AB	74.7	49.8	8.8	0.12	8.8	0.12
C-A	471.7	314.5				
A-B	173.4	115.6				
A-C	275.3	183.5				
ALL	1461.8	974.5	177.3	0.12	177.4	0.12

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS
A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

*******END OF RUN*******

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

Intercept For STREAM B-C	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
0.00	0.00	0.00

* Due to the presence of a flare, data is not available

Intercept For STREAM B-A	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B
0.00	0.00	0.00	0.00	0.00

* Due to the presence of a flare, data is not available

Intercept For STREAM C-B	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
711.21	0.26	0.26

(NB These values do not allow for any site specific corrections)

TRAFFIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: PM Peak 2019 + LDP

TIME PERIOD BEGINS 17.00 AND ENDS 18.30

LENGTH OF TIME PERIOD - 90 MIN.
LENGTH OF TIME SEGMENT - 15 MIN.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	8.20	12.30	8.20
ARM B	15.00	45.00	75.00	1.60	2.40	1.60
ARM C	15.00	45.00	75.00	3.59	5.38	3.59

Demand set: PM Peak 2019 + LDP

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
17.00 - 18.30	ARM A	0.000	0.248	0.752
		0.0	163.0	493.0
		(0.0)	(0.0)	(1.0)
	ARM B	0.844	0.000	0.156
		108.0	0.0	20.0
		(0.0)	(0.0)	(0.0)
	ARM C	0.895	0.105	0.000
		257.0	30.0	0.0
		(3.1)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET PM Peak 2019 + LDP
AND FOR TIME PERIOD 2

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-C	0.25	10.43	0.024		0.00	0.02	0.4		0.10
B-A	1.36	6.73	0.201		0.00	0.25	3.5		0.18
C-AB	0.51	11.84	0.043		0.00	0.06	0.9		0.09
C-A	3.09								
A-B	2.05								
A-C	6.19								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
B-C	0.30	9.91	0.030		0.02	0.03	0.5		0.10
B-A	1.62	6.29	0.257		0.25	0.34	4.9		0.21
C-AB	0.65	11.88	0.055		0.06	0.09	1.3		0.09
C-A	3.65								
A-B	2.44								
A-C	7.39								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-C	0.37	9.18	0.040		0.03	0.04	0.6		0.11
B-A	1.98	5.68	0.349		0.34	0.52	7.4		0.27
C-AB	0.90	12.01	0.075		0.09	0.13	2.0		0.09
C-A	4.36								
A-B	2.99								
A-C	9.05								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.45-18.00									
B-C	0.37	9.17	0.040		0.04	0.04	0.6		0.11
B-A	1.98	5.68	0.349		0.52	0.53	7.9		0.27
C-AB	0.90	12.01	0.075		0.13	0.14	2.0		0.09
C-A	4.36								
A-B	2.99								
A-C	9.05								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
18.00-18.15									
B-C	0.30	9.90	0.030		0.04	0.03	0.5		0.10
B-A	1.62	6.29	0.257		0.53	0.35	5.5		0.22
C-AB	0.65	11.88	0.055		0.14	0.09	1.3		0.09
C-A	3.65								
A-B	2.44								
A-C	7.39								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
18.15-18.30									
B-C	0.25	10.42	0.024		0.03	0.02	0.4		0.10
B-A	1.36	6.72	0.202		0.35	0.26	4.0		0.19
C-AB	0.51	11.84	0.043		0.09	0.06	0.9		0.09
C-A	3.09								
A-B	2.05								
A-C	6.19								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.15	0.0	
17.30	0.0	
17.45	0.0	
18.00	0.0	
18.15	0.0	
18.30	0.0	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.15	0.2	
17.30	0.3	
17.45	0.5	*
18.00	0.5	*
18.15	0.4	
18.30	0.3	

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.1
18.30	0.1

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY (MIN)	* QUEUEING * DELAY (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY (MIN)	* INCLUSIVE QUEUEING * DELAY (MIN/VEH)
B-C	27.5	18.4	2.9	0.11	2.9	0.11
B-A	148.7	99.1	33.3	0.22	33.3	0.22
C-AB	62.0	41.3	8.6	0.14	8.6	0.14
C-A	333.0	222.0				
A-B	224.4	149.6				
A-C	678.6	452.4				
ALL	1474.2	982.8	44.8	0.03	44.8	0.03

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS
A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

*******END OF RUN*******

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