Proposed Truck Stop
Barnetby, Lincolnshire
CGQ/210457/TN/2 - 22 September 2022

Introduction

1. SCP has been commissioned by Brocklesby Estate and Lindum Group Ltd to produce a Transport Assessment (TA) in support of a planning application seeking to secure approval for the development of land located to the south of the M180, near Barnetby Le Wold, North Lincolnshire. The proposal comprises a lorry park with up to 200 no. parking bays including erection of an amenity building; provision of fuel filling station including erection of canopy and sales building comprising ancillary retail floor space; provision of electric vehicle forecourt and charging points; erection of up to 2 no. drive-thru restaurant units including associated car parking; formulation of a left-in, left-out only access on to the A18 northbound; and formulation of left-out only access on to the A18 eastbound.

2. The site is located approximately 2km to the north of Barnetby le Wold and abuts the M180 / A180 and A15 interchange on land to the south of the M180 Barnetby Top Interchange and to the north and west of the A18. The site is bounded by the M180 to the north, to the east and south is the A18 and to the west by open farmland. The location of the proposed site is shown on the plan attached in **Appendix 1**.

3. A TA was submitted to North Lincolnshire Council (NLC) and National Highways (NH) in November 2021 with a response received in March 2022. SCP have subsequently agreed the scope to address the issues raised by NLC and NH.

4. This Technical Note details the response to the issues raised by NH. The issues raised which are to be addressed were as follows:

   i) National Highways note that the traffic island proposed at the northern site access is small, presenting a low impact deterrent for right turners. It is considered that with the access design provided, there will still be a proportion of customers that would not adhere to the left in left out restriction.

   ii) There is a history of accidents of similar circumstance on the A15 / M180 / Barnetby Lane Link Road Gyratory. Considering the impact of the proposed development, the applicant should undertake a detailed assessment of the A180 junction and explore safety increasing measures at the junction approaches to reduce the frequency of

'driver error' incidents to ensure that the observed high frequency of collisions in not exacerbated considering the increased traffic turning movements that the proposed development would generate.

iii) National Highways note that EV charging bays are included within the development proposals, however, are not mentioned within the trip generation calculations. National Highways request for further details of the EV charging facility and this use to be included in traffic generation estimations.

iv) SCP has assumed 50/50 split of HGVs at the M180 interchange. To be robust, an assessment should also be based on observed throughflow movements at the M180 interchange. Potential discrepancies in the traffic flow diagrams presented should also be investigated and analysis corrected.

v) Notwithstanding Policy EC1, allocating the site for a "Service Station and lorry park", The proposed development will result in a significant increase in vehicle turning movements at the M180 gyratory. National Highways requires confirmation that the M180 junction will operate appropriately; therefore, a capacity assessment should be undertaken at the M180 junction in accordance with the requirements set out in Circular 02/2013.

vi) We note that there is no assessment of merge/diverge operation presented within the TA. National Highways require this assessment to confirm the safe operation of the M180 junction.

vii) The Transport Assessment should consider the relative change in HGV movements and provide an assessment of the impact on pavement design.

5. The remaining sections of this note provide a response to address each issue.

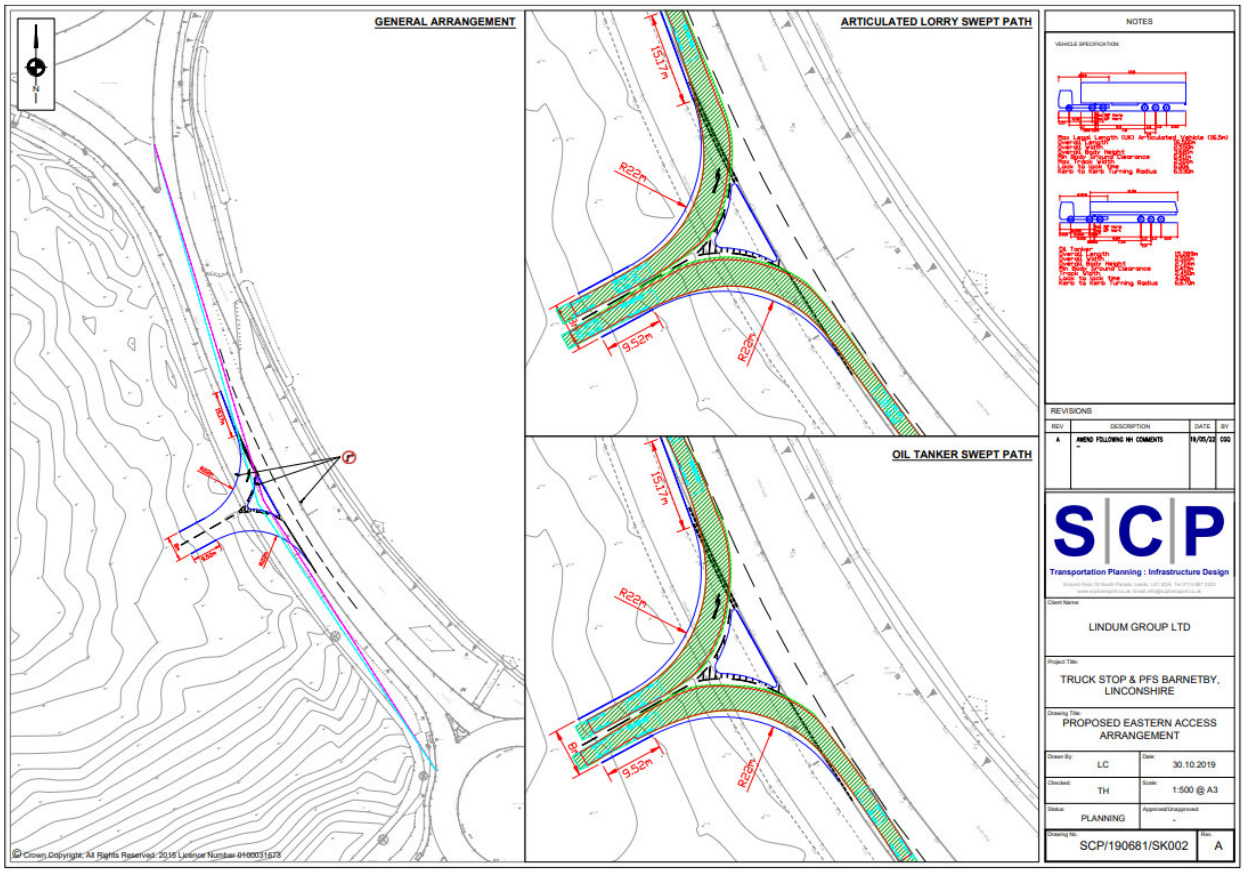
Issue i)

6. The proposed eastern access arrangement consists of a left in and left out only arrangement. There is no central island on the main carriageway (the A18) and therefore a right turn should be discouraged as much as possible.

7. The proposed site access general arrangement has been amended to make the possibility of right turn manoeuvres more challenging to execute. This has been achieved by increasing the

size of the separation island and adjusting the angle of the exit and entry to dissuade right turning. The amended general arrangement is shown at **Figure 1** below and a full scaled version is attached at **Appendix 2**.

Figure 1: Eastern Site Access Amended General Arrangement



8. A Stage 2 Road Safety Audit of the site access will be undertaken following approval of the development and site access. This will include an assessment of any issues raised by the interaction of HGVs and light vehicles at the site access and within the site.

Issue ii)

9. The M180/A180 junction has been assessed for capacity using the Arcady9 modelling software. The results of the junction capacity assessment are presented in **Table 1,** over, and the results in full are attached at **Appendix 3**.

Table 1: M180/A180 Interchange

Arm	AM			PM		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Base 2022						
A180 East	0.43	1	6	0.67	2	10
A18	0.56	1	5	0.46	1	4
M180 West	0.58	2	6	0.53	1	5
Barnetby Top	0.31	1	11	0.17	0	8
A15	0.66	2	5	0.56	1	4
Base 2032						
A180 East	0.54	1	8	0.85	6	25
A18	0.66	2	7	0.55	1	6
M180 West	0.69	3	9	0.62	2	6
Barnetby Top	0.47	1	19	0.23	0	11
A15	0.75	3	7	0.63	2	4
Base 2032 + Development						
A180 East	0.73	3	14	1.11	109	381
A18	0.83	5	14	0.71	3	9
M180 West	0.79	4	14	0.68	2	8
Barnetby Top	0.69	2	48	0.28	1	14
A15	0.81	5	10	0.69	2	5

10. The interchange is shown to operate with spare capacity with development traffic on all arms except for A180 East in the PM peak hour which has an RFC of 1.11, suggesting it is operating above capacity.

11. On further inspection of the model outputs, in each 15 minute period from 16:30 to 17:30, the highest RFC is 0.84 and queues and delays are minimal over each 15 minute period. Additionally, the development scenario modelled does not take into account the diversion of pass-by trips into the site from the A180 and M180 and is therefore a worst-case scenario.

12. It is therefore concluded that overall, the M180/A180 interchange operates within capacity, with all arms operating below the recommended 0.85 RFC threshold.

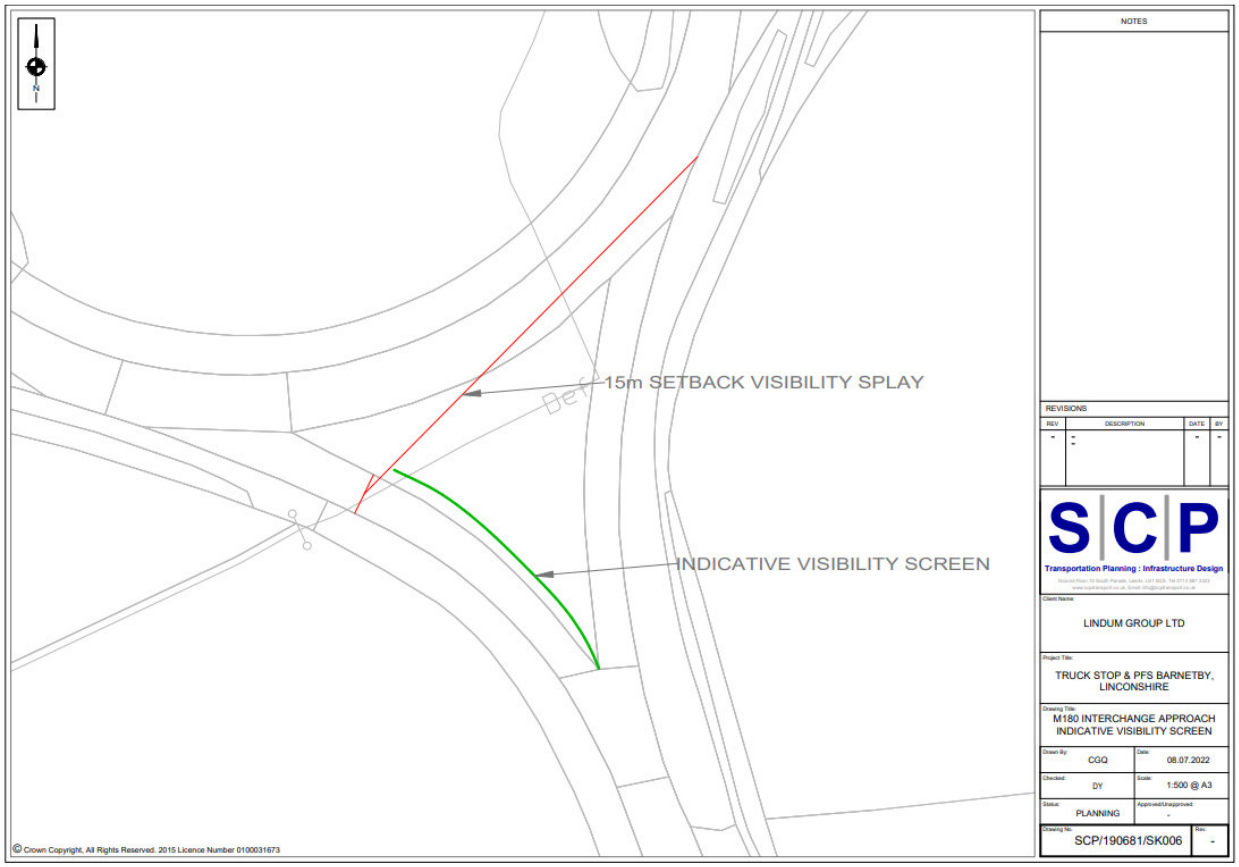
13. Having reviewed the personal injury collision data in the TA, the risk of collisions on the southern approach to the interchange could be exacerbated by the left-out only eastern access to the site. It is proposed that a potential increased risk in terms of road safety is mitigated by increasing the length and position of the visibility screen which is currently on the approach to the roundabout. A visibility screen is commonly used on the approach to roundabouts to reduce the opportunity

for drivers to accelerate and overshoot the junction give way. The existing visibility screen is set back from the edge of the carriageway and does not include the full length of the verge on the approach to the give way. As is demonstrated in **Figure 2** below, vehicles approaching the give way have visibility of the circulatory prior to the give way which could result in drivers accelerating.

Figure 2: M180/A180 Interchange Southern Approach Existing Visibility Screen

14. It is proposed to lengthen the screen and relocate the position of it so it is closer to the edge of carriageway to increase the effectiveness of the screen. A plan showing an indicative visibility screen is shown at **Figure 3**, over and a full scaled version is attached at **Appendix 3**.

Figure 3: M180/A180 Interchange Southern Approach Indicative Visibility Screen



15. It is concluded that the proposed development will not have a substantial impact on the M180/A180 interchange in terms of capacity as the majority of trips are already on the network and simply diverted trips rather than new trips. Any road safety issues raised as a result of the redistribution of traffic to the M180/A180 interchange from the eastern access to the southern approach have been mitigated by providing an improved visibility screen on the approach to the roundabout.

Issue iii)

16. Electric vehicle charging to be dealt with under separate cover.

Issue iv)

17. The mainline HGV flows on the M180 and A180 have been extracted from National Highway's Webtris for both eastbound and westbound HGVs to calculate which direction lorries will arrive at the site from. This is based on the assumption set out in the TA that HGVs using the lorry park will divert from the M180/A180 to the site before continuing on their journey.

18. The Webtris data defines an HGV as a vehicle over 6.61m in length, vehicles shorter than this have been excluded.

19. Eastbound and westbound mainline trips have been extracted for the same time period, a neutral week was chosen (i.e. there were no school holidays occurring at the time) and this year (2022) for it to be up to date information. The week selected was Monday 14th March 2022 to Sunday 20th March 2022. The counts are split into equal 15 minute periods from 00:00 to 23:59 each day. The total vehicles over 6.61m was calculated for the mainline flows in each direction and a percentage split was calculated. **Table 2** below presents the results.

Table 2: HGV Mainline Flows

Direction	No. of 6.61m + Length Vehicles	% Split
Eastbound	27,700	50%
Westbound	28,012	50%
Total	55,712	

20. Table 2 shows that over a typical week, the number of HGVs passing the site in each direction is approximately the same and works out at a 50% split. Therefore, the arrival distribution of 50% from eastbound traffic and 50% from westbound traffic is justified and no amendments are required.

Issue v)

21. See Issue ii) above.

Issue vi)

22. The impact of the development on the slip roads of the adjacent M180/A180 interchange has been assessed in accordance with the diagrams in DMRB CD122 which sets out the layout and size requirements for new and improved grade separated junctions and interchanges on rural and urban trunk roads and motorways.

23. The assessments compare peak hourly flows for the AM and PM merges / diverges with hourly M180 mainline flows. For the merge assessments, the upstream mainline flows have been obtained from the NH WebTRIS webiste. For the diverge assessments, the downstream mainline flows have been obtained from the NH WebTRIS website.

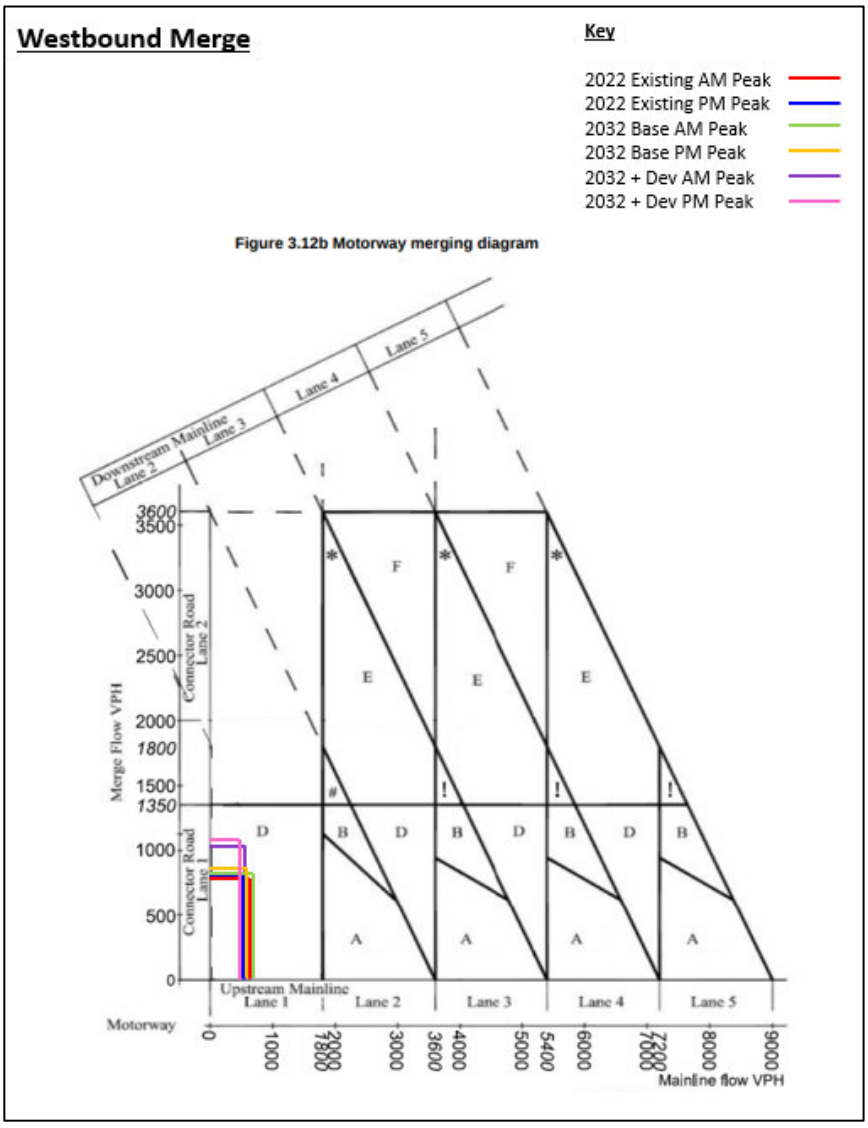
24. The assessments are carried out for the year of application (2022), ten years hence without proposed development (2032) and ten years hence with proposed development. The mainline and slip flows for each scenario are outlined in **Table 3** below.

Table 3: M180/A180 Interchange Merge/Diverge Assessment Flows

Scenario		Direction & Merge/Diverge	Mainline Traffic Flow	Slip Traffic Flow
2022	AM Peak	Westbound Merge	546	776
		Westbound Diverge	546	304
		Eastbound Merge	497	404
		Eastbound Diverge	497	952
	PM Peak	Westbound Merge	473	842
		Westbound Diverge	473	400
		Eastbound Merge	539	325
		Eastbound Diverge	539	797
2032 Without Development	AM Peak	Westbound Merge	600	852
		Westbound Diverge	600	334
		Eastbound Merge	546	443
		Eastbound Diverge	546	1045
2032 Without Development	PM Peak	Westbound Merge	518	922
		Westbound Diverge	518	438
		Eastbound Merge	591	356
		Eastbound Diverge	59	873
2032 With Development	AM Peak	Westbound Merge	478	1015
		Westbound Diverge	478	480
		Eastbound Merge	493	530
		Eastbound Diverge	493	1106
	PM Peak	Westbound Merge	398	1087
		Westbound Diverge	398	583
		Eastbound Merge	538	446
		Eastbound Diverge	538	934

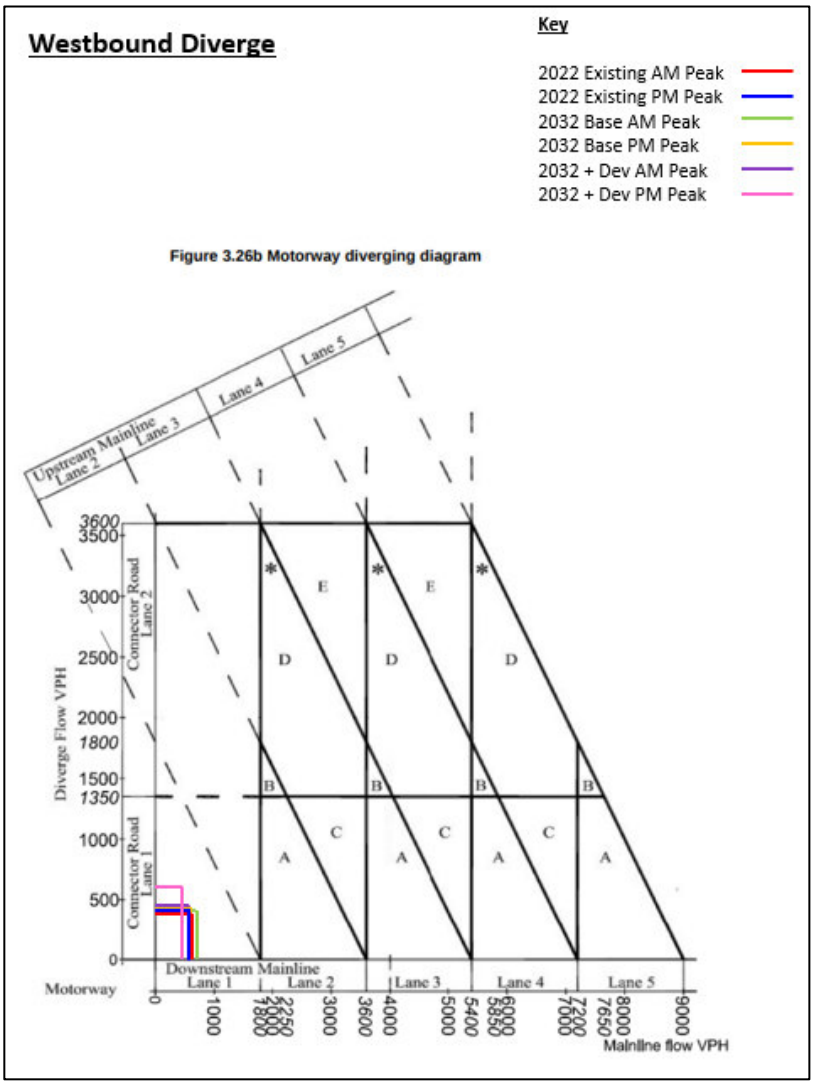
25. The traffic flows shown in Table 3 have been used to plot on the merge and diverge assessment graphs extracted from CD 122. **Figure 4** below shows the graph for each scenario on the Westbound Merge.

Figure 4: Westbound Merge



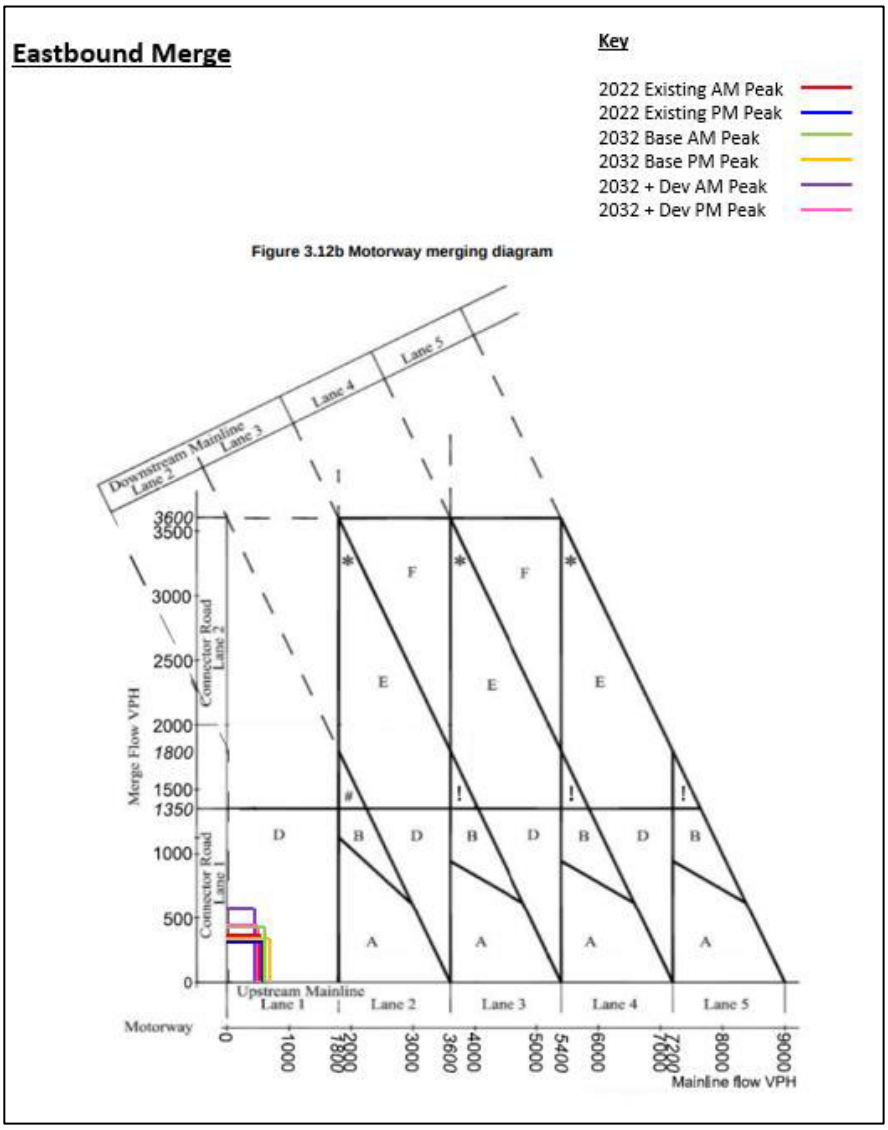
26. **Figure 5** over shows the graph for each scenario on the Westbound Diverge.

Figure 5: Westbound Diverge



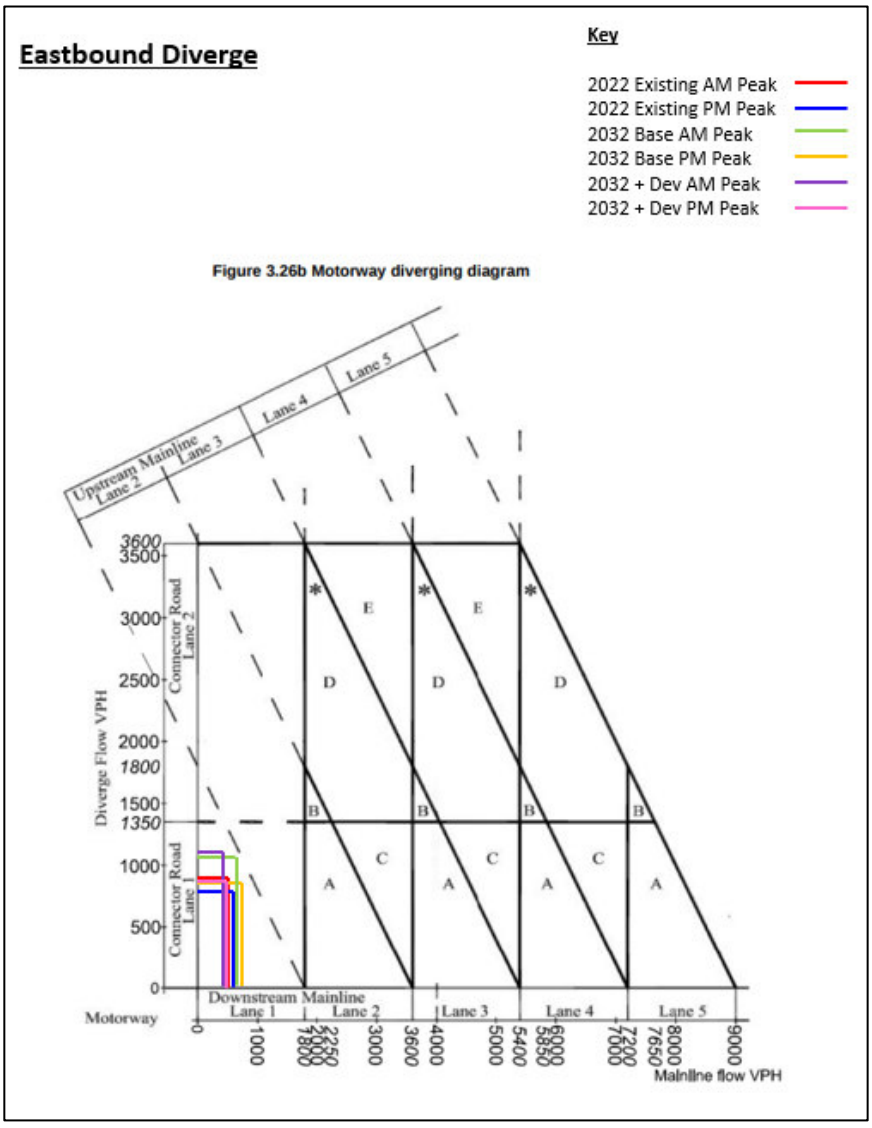
27. **Figure 6** over shows the graph for each scenario on the Eastbound Merge.

Figure 6: Eastbound Merge



28. **Figure 7** over shows the graph for each scenario on the Eastbound Diverge.

Figure 7: Eastbound Diverge



29. As is shown in Figures 4 to 7 above, there are no merge or diverge where the addition of development traffic or background network traffic over ten years results in any required changes to the layout and size of the M180/A180 interchange.

30. No further assessment is required.

Issue vii)

31. Pavement design is considered to be a post planning issue. This can be addressed on request, however information about the existing pavement design specification would be required.

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APPENDIX 1

NOTES

REVISIONS

REV	DESCRIPTION	DATE	BY
-	- -	-	-

Client Name:

LINDUM GROUP LTD

Project Title:

PROPOSED TRUCK STOP,
BARNETBY TOP

Drawing Title:

SITE LOCATION PLAN

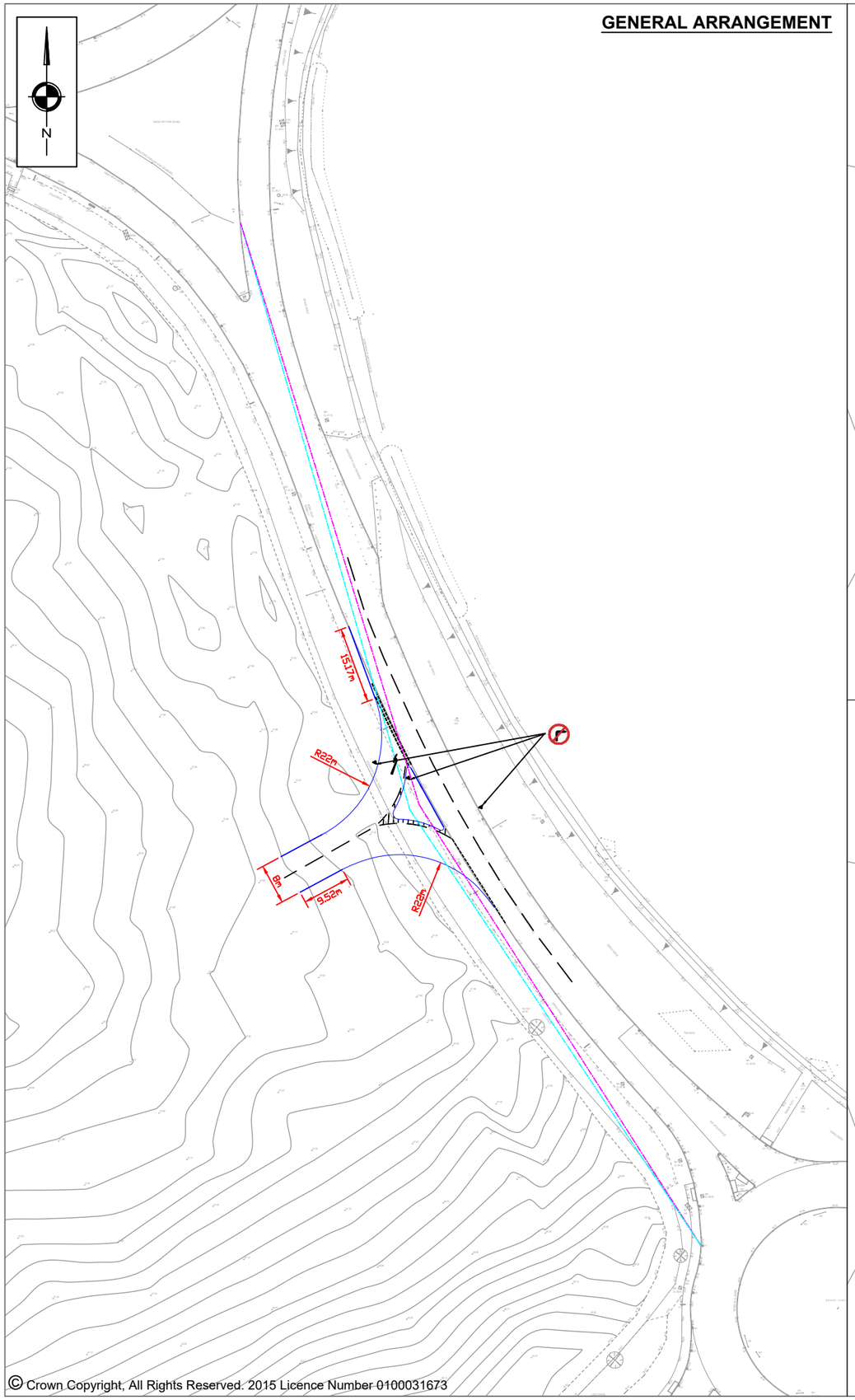
Drawn By:	Status:
SC	PLANNING
Checked:	**Scale:**
TH	NTS

Drawing No.	Rev.
SCP/210457/D01	-

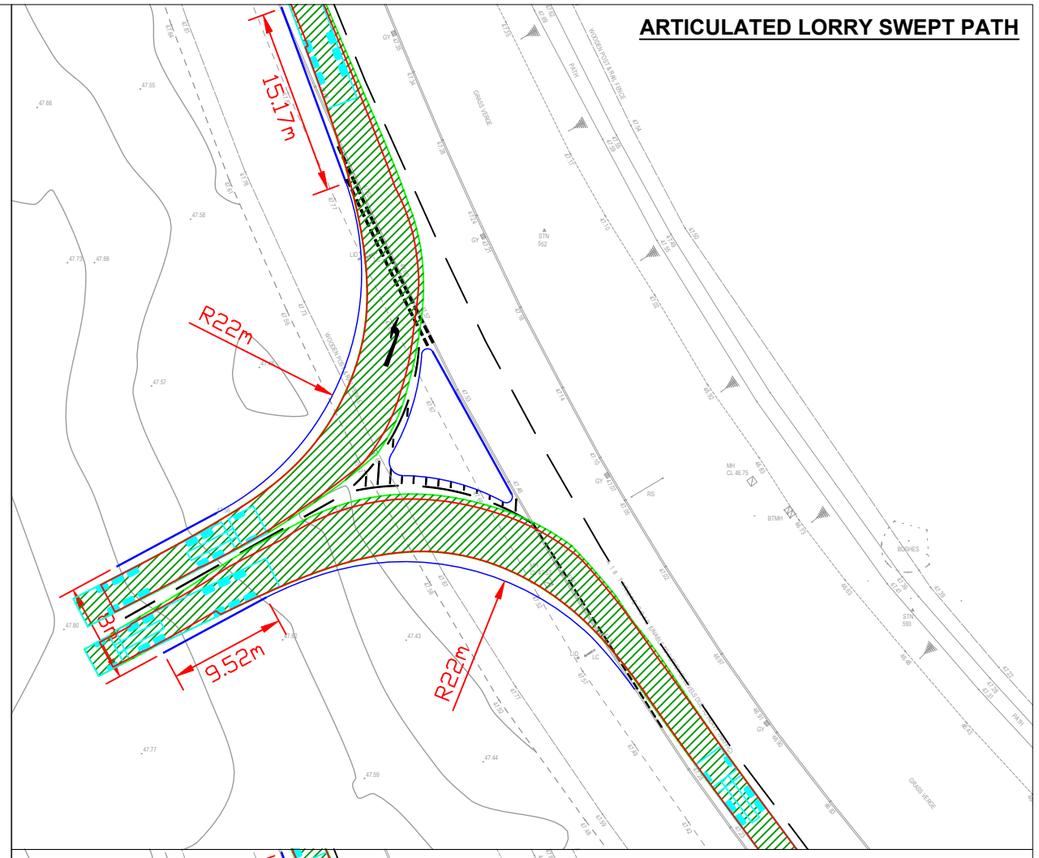
S|C|P

APPENDIX 2

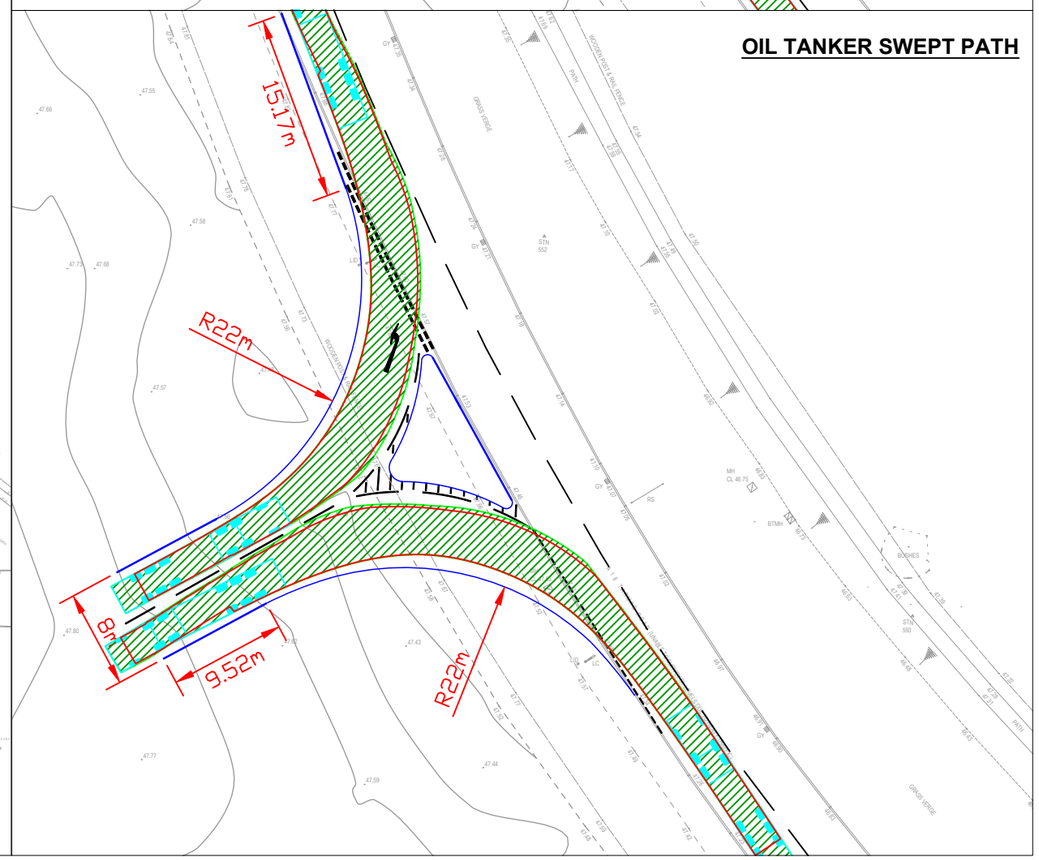
GENERAL ARRANGEMENT



ARTICULATED LORRY SWEPT PATH

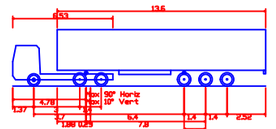


OIL TANKER SWEPT PATH



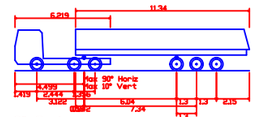
NOTES

VEHICLE SPECIFICATION:



Max Legal Length (UK) Articulated Vehicle (16.5m)

Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.581m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	6.530m



Oil Tanker

Overall Length	15.289m
Overall Width	2.500m
Overall Body Height	2.704m
Min Body Ground Clearance	0.419m
Track Width	2.450m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	6.570m

REVISIONS

REV	DESCRIPTION	DATE	BY
A	AMEND FOLLOWING NH COMMENTS –	19/05/22	CGQ

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Transportation Planning : Infrastructure Design
Ground Floor,10 South Parade, Leeds, LS1 5QS, Tel 0113 887 3323
www.scptransport.co.uk, Email info@scptransport.co.uk

Client Name:
LINDUM GROUP LTD

Project Title:
TRUCK STOP & PFS BARNETBY, LINCONSHIRE

Drawing Title:
PROPOSED EASTERN ACCESS ARRANGEMENT

Drawn By:	Date:
LC	30.10.2019
Checked: TH	Scale: 1:500 @ A3
Status: PLANNING	Approved/Unapproved: -

Drawing No.	Rev.
SCP/190681/SK002	A

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APPENDIX 3

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Barnetby Interchange Arcady Model.j9
Path: L:\Job Library\2021\210457 - Barnetby on the wold - Truck Stop\Traffic Data\Traffic Models
Report generation date: 17/08/2022 11:33:36

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2022									
1 - A180	D1	0.9	5.54	0.43	A	D2	2.1	10.02	0.67	B
2 - A18		1.3	4.94	0.56	A		0.9	4.34	0.46	A
3 - M180		1.6	5.81	0.58	A		1.2	4.82	0.53	A
4 - Barnetby Top		0.5	10.87	0.31	B		0.2	7.89	0.17	A
5 - A15		2.1	4.87	0.66	A		1.4	3.54	0.56	A
	2032									
1 - A180	D3	1.3	7.67	0.54	A	D4	5.7	24.98	0.85	C
2 - A18		2.1	7.01	0.66	A		1.3	5.74	0.55	A
3 - M180		2.5	8.54	0.69	A		1.8	6.45	0.62	A
4 - Barnetby Top		1.0	19.27	0.47	C		0.4	10.77	0.23	B
5 - A15		3.3	6.82	0.75	A		1.9	4.32	0.63	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

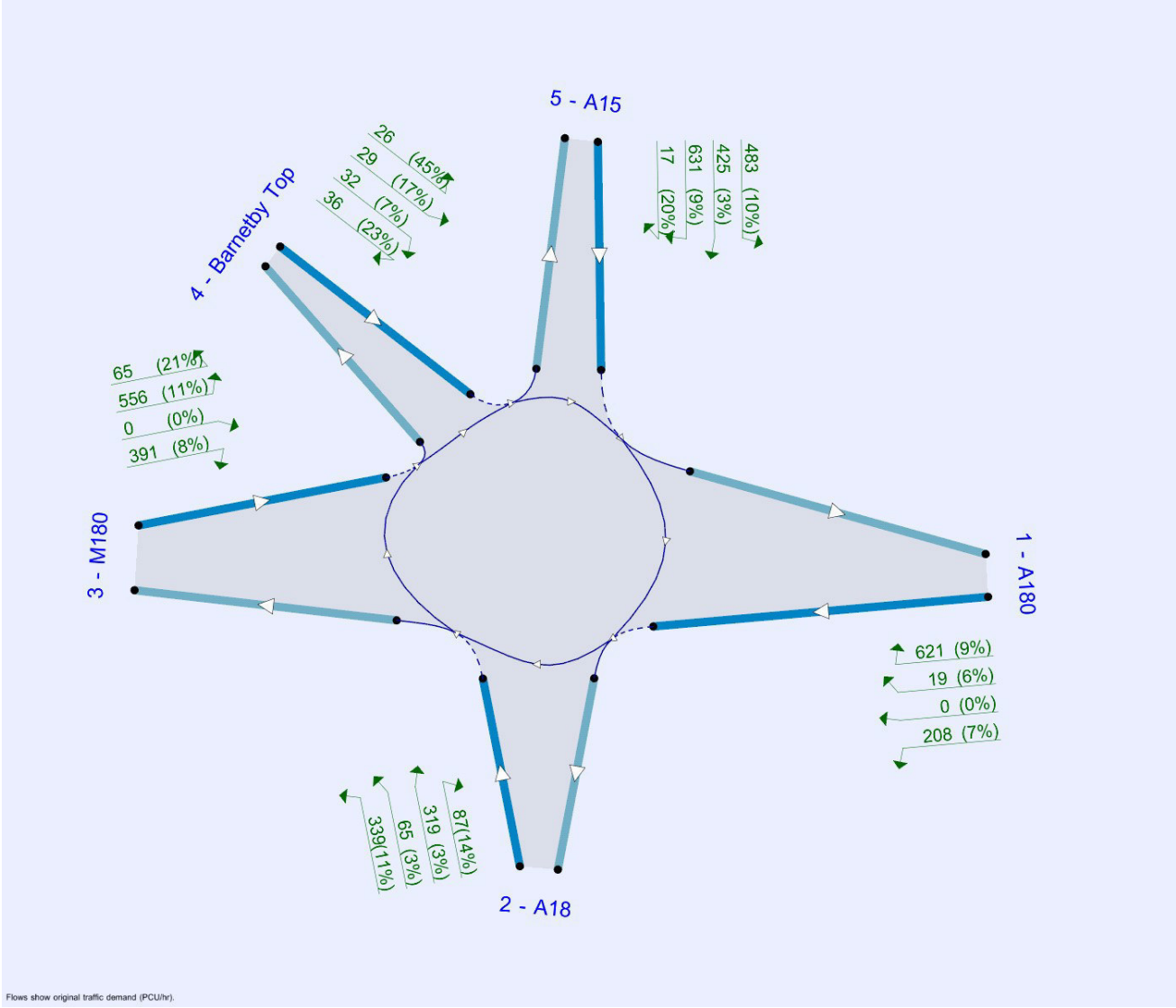
File summary

File Description

Title	
Location	
Site number	
Date	16/08/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	SCP\calum.gill-quirke
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D1	2022	AM	DIRECT	07:30	08:30	60	15
D2	2022	PM	DIRECT	16:30	17:30	60	15
D3	2032	AM	DIRECT	07:30	08:30	60	15
D4	2032	PM	DIRECT	16:30	17:30	60	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Profile Type	D1 - 2022, AM	The DIRECT profile type is intended to be used for demand that varies over time. You are using it with the 'Use O-D data' option, but your O-D data does not vary over time. Are you sure this is correct?
Warning	Large Roundabout	1 - A180 - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	M180/A180 Interchange	Large Roundabout		1, 2, 3, 4, 5	5.43	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	A180	
2	A18	
3	M180	
4	Barnetby Top	
5	A15	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - A180	7.00	7.40	0.1	62.0	163.0	9.0	
2 - A18	6.60	7.80	7.1	69.0	162.0	5.0	
3 - M180	7.18	9.80	4.0	34.0	162.0	28.0	
4 - Barnetby Top	5.00	5.05	0.1	15.7	159.0	61.0	
5 - A15	7.40	7.40	0.0	56.0	159.0	10.0	

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - A180	0	177.00
2 - A18	0	109.00
3 - M180	0	173.00
4 - Barnetby Top	0	50.00
5 - A15	0	79.00

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - A180	1.196	2844
2 - A18	1.248	3143
3 - M180	1.202	2993
4 - Barnetby Top	0.792	2095
5 - A15	1.227	3169

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D1	2022	AM	DIRECT	07:30	08:30	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1 - A180		✓	100.000
2 - A18		✓	100.000
3 - M180		✓	100.000
4 - Barnetby Top		✓	100.000
5 - A15		✓	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	2	119	0	16	434
	2 - A18	174	3	385	29	392
	3 - M180	1	312	4	34	621
	4 - Barnetby Top	55	30	52	0	37
	5 - A15	706	286	549	44	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	100	17	0	25	13
	2 - A18	10	0	7	8	8
	3 - M180	0	13	33	26	14
	4 - Barnetby Top	16	26	12	0	13
	5 - A15	8	8	11	14	0

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:30-07:45	1 - A180	571	571
	2 - A18	983	983
	3 - M180	972	972
	4 - Barnetby Top	174	174
	5 - A15	1585	1585
07:45-08:00	1 - A180	571	571
	2 - A18	983	983
	3 - M180	972	972
	4 - Barnetby Top	174	174
	5 - A15	1585	1585
08:00-08:15	1 - A180	571	571
	2 - A18	983	983
	3 - M180	972	972
	4 - Barnetby Top	174	174
	5 - A15	1585	1585
08:15-08:30	1 - A180	571	571
	2 - A18	983	983
	3 - M180	972	972
	4 - Barnetby Top	174	174
	5 - A15	1585	1585

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - A180	0.43	5.54	0.9	A
2 - A18	0.56	4.94	1.3	A
3 - M180	0.58	5.81	1.6	A
4 - Barnetby Top	0.31	10.87	0.5	B
5 - A15	0.66	4.87	2.1	A

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	571	1272	1322	0.432	568	0.9	5.430	A
2 - A18	983	1095	1777	0.553	978	1.3	4.828	A
3 - M180	972	1088	1686	0.577	966	1.5	5.660	A
4 - Barnetby Top	174	1931	566	0.307	172	0.5	10.511	B
5 - A15	1585	628	2397	0.661	1577	2.1	4.740	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	571	1280	1313	0.435	571	0.9	5.543	A
2 - A18	983	1101	1769	0.556	983	1.3	4.940	A
3 - M180	972	1094	1678	0.579	972	1.6	5.811	A
4 - Barnetby Top	174	1943	557	0.312	174	0.5	10.863	B
5 - A15	1585	633	2392	0.663	1585	2.1	4.868	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	571	1280	1313	0.435	571	0.9	5.544	A
2 - A18	983	1101	1769	0.556	983	1.3	4.941	A
3 - M180	972	1094	1678	0.579	972	1.6	5.814	A
4 - Barnetby Top	174	1943	557	0.312	174	0.5	10.870	B
5 - A15	1585	633	2392	0.663	1585	2.1	4.870	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	571	1280	1313	0.435	571	0.9	5.544	A
2 - A18	983	1101	1769	0.556	983	1.3	4.941	A
3 - M180	972	1094	1678	0.579	972	1.6	5.814	A
4 - Barnetby Top	174	1943	557	0.312	174	0.5	10.871	B
5 - A15	1585	633	2392	0.663	1585	2.1	4.870	A

2022, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Profile Type	D2 - 2022, PM	The DIRECT profile type is intended to be used for demand that varies over time. You are using it with the 'Use O-D data' option, but your O-D data does not vary over time. Are you sure this is correct?
Warning	Large Roundabout	1 - A180 - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	M180/A180 Interchange	Large Roundabout		1, 2, 3, 4, 5	5.37	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - A180	0	177.00
2 - A18	0	109.00
3 - M180	0	173.00
4 - Barnetby Top	0	50.00
5 - A15	0	79.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D2	2022	PM	DIRECT	16:30	17:30	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1 - A180		✓	100.000
2 - A18		✓	100.000
3 - M180		✓	100.000
4 - Barnetby Top		✓	100.000
5 - A15		✓	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	0	190	0	17	567
	2 - A18	79	7	310	59	292
	3 - M180	0	357	0	59	508
	4 - Barnetby Top	27	29	33	0	23
	5 - A15	441	388	576	15	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	0	7	0	6	9
	2 - A18	14	0	11	3	3
	3 - M180	0	8	0	21	11
	4 - Barnetby Top	17	7	23	0	45
	5 - A15	10	3	9	20	0

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
16:30-16:45	1 - A180	774	774
	2 - A18	747	747
	3 - M180	924	924
	4 - Barnetby Top	112	112
	5 - A15	1420	1420
16:45-17:00	1 - A180	774	774
	2 - A18	747	747
	3 - M180	924	924
	4 - Barnetby Top	112	112
	5 - A15	1420	1420
17:00-17:15	1 - A180	774	774
	2 - A18	747	747
	3 - M180	924	924
	4 - Barnetby Top	112	112
	5 - A15	1420	1420
17:15-17:30	1 - A180	774	774
	2 - A18	747	747
	3 - M180	924	924
	4 - Barnetby Top	112	112
	5 - A15	1420	1420

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - A180	0.67	10.02	2.1	B
2 - A18	0.46	4.34	0.9	A
3 - M180	0.53	4.82	1.2	A
4 - Barnetby Top	0.17	7.89	0.2	A
5 - A15	0.56	3.54	1.4	A

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	774	1399	1171	0.661	766	2.0	9.453	A
2 - A18	747	1199	1647	0.454	743	0.9	4.260	A
3 - M180	924	1028	1758	0.526	919	1.2	4.710	A
4 - Barnetby Top	112	1798	672	0.167	111	0.2	7.724	A
5 - A15	1420	529	2520	0.564	1414	1.4	3.492	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	774	1405	1164	0.665	774	2.1	9.998	A
2 - A18	747	1208	1636	0.457	747	0.9	4.344	A
3 - M180	924	1036	1748	0.529	924	1.2	4.820	A
4 - Barnetby Top	112	1810	663	0.169	112	0.2	7.884	A
5 - A15	1420	532	2516	0.564	1420	1.4	3.536	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	774	1405	1164	0.665	774	2.1	10.011	B
2 - A18	747	1208	1636	0.457	747	0.9	4.345	A
3 - M180	924	1036	1748	0.529	924	1.2	4.822	A
4 - Barnetby Top	112	1810	662	0.169	112	0.2	7.887	A
5 - A15	1420	532	2516	0.564	1420	1.4	3.537	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	774	1405	1164	0.665	774	2.1	10.016	B
2 - A18	747	1208	1636	0.457	747	0.9	4.345	A
3 - M180	924	1036	1748	0.529	924	1.2	4.822	A
4 - Barnetby Top	112	1810	662	0.169	112	0.2	7.887	A
5 - A15	1420	532	2516	0.564	1420	1.4	3.537	A

2032, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Profile Type	D3 - 2032, AM	The DIRECT profile type is intended to be used for demand that varies over time. You are using it with the 'Use O-D data' option, but your O-D data does not vary over time. Are you sure this is correct?
Warning	Large Roundabout	1 - A180 - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	M180/A180 Interchange	Large Roundabout		1, 2, 3, 4, 5	7.87	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - A180	0	177.00
2 - A18	0	109.00
3 - M180	0	173.00
4 - Barnetby Top	0	50.00
5 - A15	0	79.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D3	2032	AM	DIRECT	07:30	08:30	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1 - A180		✓	100.000
2 - A18		✓	100.000
3 - M180		✓	100.000
4 - Barnetby Top		✓	100.000
5 - A15		✓	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	2	131	0	17	476
	2 - A18	191	3	423	32	431
	3 - M180	1	343	5	38	682
	4 - Barnetby Top	60	32	57	0	41
	5 - A15	775	314	603	49	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	100	17	0	25	13
	2 - A18	10	0	7	8	8
	3 - M180	0	13	33	26	14
	4 - Barnetby Top	16	26	12	0	13
	5 - A15	8	8	11	14	0

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:30-07:45	1 - A180	626	626
	2 - A18	1080	1080
	3 - M180	1069	1069
	4 - Barnetby Top	190	190
	5 - A15	1741	1741
07:45-08:00	1 - A180	626	626
	2 - A18	1080	1080
	3 - M180	1069	1069
	4 - Barnetby Top	190	190
	5 - A15	1741	1741
08:00-08:15	1 - A180	626	626
	2 - A18	1080	1080
	3 - M180	1069	1069
	4 - Barnetby Top	190	190
	5 - A15	1741	1741
08:15-08:30	1 - A180	626	626
	2 - A18	1080	1080
	3 - M180	1069	1069
	4 - Barnetby Top	190	190
	5 - A15	1741	1741

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - A180	0.54	7.67	1.3	A
2 - A18	0.66	7.01	2.1	A
3 - M180	0.69	8.54	2.5	A
4 - Barnetby Top	0.47	19.27	1.0	C
5 - A15	0.75	6.82	3.3	A

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	626	1394	1177	0.532	621	1.3	7.339	A
2 - A18	1080	1199	1647	0.656	1072	2.0	6.669	A
3 - M180	1069	1192	1561	0.685	1059	2.4	8.045	A
4 - Barnetby Top	190	2116	420	0.452	186	0.9	17.551	C
5 - A15	1741	686	2326	0.748	1728	3.2	6.445	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	626	1406	1163	0.538	626	1.3	7.655	A
2 - A18	1080	1209	1635	0.661	1080	2.1	6.994	A
3 - M180	1069	1201	1550	0.690	1069	2.5	8.523	A
4 - Barnetby Top	190	2133	406	0.468	190	1.0	19.184	C
5 - A15	1741	694	2317	0.751	1741	3.2	6.807	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	626	1406	1162	0.539	626	1.3	7.667	A
2 - A18	1080	1209	1634	0.661	1080	2.1	7.003	A
3 - M180	1069	1201	1550	0.690	1069	2.5	8.539	A
4 - Barnetby Top	190	2134	406	0.468	190	1.0	19.255	C
5 - A15	1741	694	2317	0.751	1741	3.3	6.816	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	626	1406	1162	0.539	626	1.3	7.668	A
2 - A18	1080	1209	1634	0.661	1080	2.1	7.007	A
3 - M180	1069	1201	1550	0.690	1069	2.5	8.542	A
4 - Barnetby Top	190	2134	406	0.468	190	1.0	19.267	C
5 - A15	1741	694	2317	0.751	1741	3.3	6.819	A

2032, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Profile Type	D4 - 2032, PM	The DIRECT profile type is intended to be used for demand that varies over time. You are using it with the 'Use O-D data' option, but your O-D data does not vary over time. Are you sure this is correct?
Warning	Large Roundabout	1 - A180 - Large roundabout data	Large Roundabout Circulating Flow is zero for one or more arms.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	M180/A180 Interchange	Large Roundabout		1, 2, 3, 4, 5	9.28	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
1 - A180	0	177.00
2 - A18	0	109.00
3 - M180	0	173.00
4 - Barnetby Top	0	50.00
5 - A15	0	79.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D4	2032	PM	DIRECT	16:30	17:30	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Scaling Factor (%)
1 - A180		✓	100.000
2 - A18		✓	100.000
3 - M180		✓	100.000
4 - Barnetby Top		✓	100.000
5 - A15		✓	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	0	208	0	19	621
	2 - A18	87	8	339	65	319
	3 - M180	0	391	0	65	556
	4 - Barnetby Top	29	32	36	0	26
	5 - A15	483	425	631	17	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1 - A180	2 - A18	3 - M180	4 - Barnetby Top	5 - A15
From	1 - A180	0	7	0	6	9
	2 - A18	14	0	11	3	3
	3 - M180	0	8	0	21	11
	4 - Barnetby Top	17	7	23	0	45
	5 - A15	10	3	9	20	0

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
16:30-16:45	1 - A180	848	848
	2 - A18	818	818
	3 - M180	1012	1012
	4 - Barnetby Top	123	123
	5 - A15	1556	1556
16:45-17:00	1 - A180	848	848
	2 - A18	818	818
	3 - M180	1012	1012
	4 - Barnetby Top	123	123
	5 - A15	1556	1556
17:00-17:15	1 - A180	848	848
	2 - A18	818	818
	3 - M180	1012	1012
	4 - Barnetby Top	123	123
	5 - A15	1556	1556
17:15-17:30	1 - A180	848	848
	2 - A18	818	818
	3 - M180	1012	1012
	4 - Barnetby Top	123	123
	5 - A15	1556	1556

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - A180	0.85	24.98	5.7	C
2 - A18	0.55	5.74	1.3	A
3 - M180	0.62	6.45	1.8	A
4 - Barnetby Top	0.23	10.77	0.4	B
5 - A15	0.63	4.32	1.9	A

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	848	1531	1012	0.838	828	4.9	19.552	C
2 - A18	818	1306	1514	0.540	813	1.2	5.475	A
3 - M180	1012	1118	1649	0.614	1005	1.7	6.107	A
4 - Barnetby Top	123	1959	545	0.226	122	0.3	10.239	B
5 - A15	1556	579	2459	0.633	1549	1.8	4.228	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	848	1540	1002	0.846	846	5.4	24.291	C
2 - A18	818	1322	1493	0.548	818	1.3	5.718	A
3 - M180	1012	1134	1630	0.621	1012	1.8	6.426	A
4 - Barnetby Top	123	1980	528	0.233	123	0.4	10.736	B
5 - A15	1556	583	2453	0.634	1556	1.9	4.319	A

17:00 - 17:15

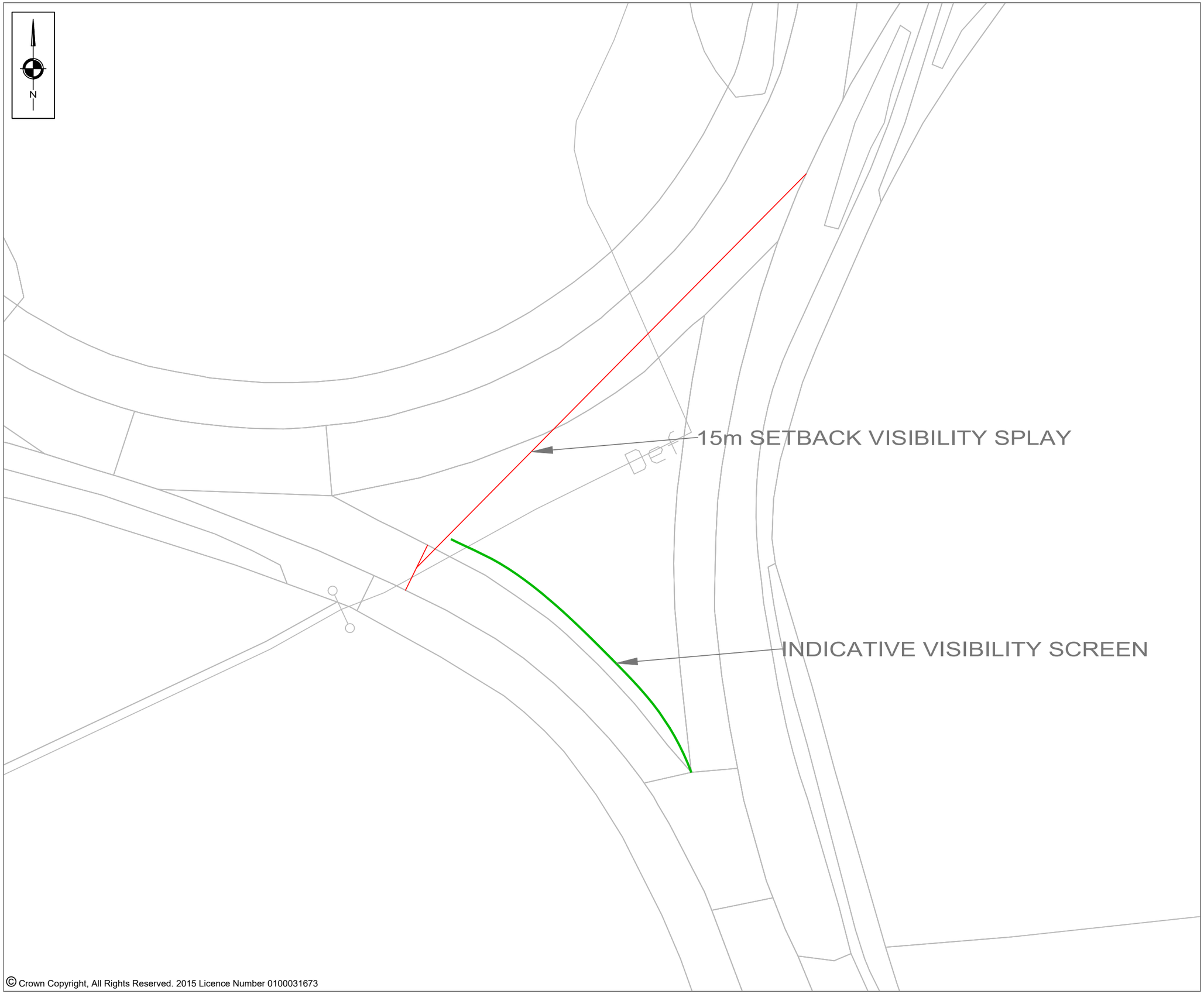
Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	848	1540	1002	0.846	847	5.6	24.806	C
2 - A18	818	1323	1492	0.548	818	1.3	5.732	A
3 - M180	1012	1135	1629	0.621	1012	1.8	6.445	A
4 - Barnetby Top	123	1981	527	0.234	123	0.4	10.764	B
5 - A15	1556	583	2453	0.634	1556	1.9	4.320	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - A180	848	1540	1002	0.846	848	5.7	24.978	C
2 - A18	818	1324	1491	0.549	818	1.3	5.735	A
3 - M180	1012	1136	1628	0.622	1012	1.8	6.449	A
4 - Barnetby Top	123	1982	526	0.234	123	0.4	10.770	B
5 - A15	1556	583	2453	0.634	1556	1.9	4.320	A

S|C|P

APPENDIX 4



NOTES

REVISIONS

REV	DESCRIPTION	DATE	BY
-	-	-	-

S|C|P
Transportation Planning : Infrastructure Design
Ground Floor,10 South Parade, Leeds, LS1 5QS, Tel 0113 887 3323
www.scptransport.co.uk, Email info@scptransport.co.uk

Client Name:
LINDUM GROUP LTD

Project Title:
TRUCK STOP & PFS BARNETBY, LINCONSHIRE

Drawing Title:
M180 INTERCHANGE APPROACH INDICATIVE VISIBILITY SCREEN

Drawn By:	Date:
CGQ	08.07.2022
Checked:	Scale:
DY	1:500 @ A3
Status:	Approved/Unapproved:
PLANNING	-

Drawing No.	Rev.
SCP/190681/SK006	-