

TECHNICAL NOTE 1

DATE:	20 July 2021	CONFIDENTIALITY:	Public
SUBJECT:	Harts Farm Way, Havant - SRN Junction Model Review		
PROJECT:	Highways England Spatial Planning	AUTHOR:	Sarah Thomas
CHECKED:	Zoe Townend	APPROVED:	Glen Strongitharm

1 INTRODUCTION

- 1.1 This Technical Note (TN) provides a summary of the Harts Farm Way junction model review undertaken.
- 1.2 The following junction models have been reviewed:
- Rusty Cutter Roundabout and
 - A27 / Harts Farm Way (Teardrop Roundabout).
- 1.3 The traffic flows have been taken from Appendix K of the Harts Farm Way Planning Application Transport Assessment.
- 1.4 No queue data was provided by the applicant, and it has therefore not been possible to compare the modelled queues with any observed queue data.
- 1.5 The traffic impact assessment has been based on the following scenarios:
- **2016 Observed Traffic Flows** (using survey data obtained from the consented application (app ref: AAP/18/00450: Land at Forty Acres Farm, Havant Road, Havant);
 - **2020 Base**;
 - **2020 Base + Development**;
 - **2025 Future Year**;
 - **2025 Future Year + Development**;
 - **2030 Future Year**;
 - **2030 Future Year + Development**.

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2 JUNCTION MODEL REVIEW

Rusty Cutter Roundabout Junction - Existing Junction Model

- 2.1 The Rusty Cutter roundabout junction has been set up as a partially signal-controlled roundabout in LinSig. The roundabout has signals operating on the A3(M) southbound off-slip, A3(M) northbound off-slip and the south and north circulatory sections, with the remaining arms operating as give-way movements.
- 2.2 The traffic flows have been entered in pcus, and Custom Delay Based Assignment has been used to assign the flows.
- 2.3 The following changes are required to the model to ensure that it is in keeping with the previously accepted model:
- Arm 1 - Both lanes. Lane lengths to be amended from 339.3m to 345m.
 - Arm 6 - All lanes. Lane lengths to be amended from 86.8m to 90m.
 - Arm 8 - All lanes. Lane lengths to be amended from 145.4m to 150m.
- 2.4 The capacity results by arm are provided in [Table 1](#).

Table 1 Rusty Cutter Roundabout: LinSig Capacity Results

Scenario	Arm	AM Peak		PM Peak	
		Max. Degree Sat (%)	Max. MMQ	Max. Degree Sat (%)	Max. MMQ
2016 Observed	A3 NB Off-slip	76.4%	12.6	73.8%	9.3
	Circulatory South	73.7%	10.5	73.6%	11.3
	A2030 Havant Road	48.1%	2.1	51.6%	2.4
	A3 SB Off-slip	75.8%	9.3	76.8%	8.5
	Circulatory North	64.8%	6.9	74.8%	8.5
	Bedhampton Hill	48.2%	2.2	37.5%	2.3
	A27 Link	53.9%	0.7	65.1%	2.0
2020 Base	A3 NB Off-slip	79.0%	13.8	78.3%	10.5
	Circulatory South	81.1%	11.9	78.0%	12.5
	A2030 Havant Road	54.0%	2.8	57.8%	3.2
	A3 SB Off-slip	81.0%	10.5	81.6%	9.8
	Circulatory North	69.1%	7.8	79.5%	8.4

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Scenario	Arm	AM Peak		PM Peak	
		Max. Degree Sat (%)	Max. MMQ	Max. Degree Sat (%)	Max. MMQ
	Bedhampton Hill	55.1%	2.7	41.2%	2.6
	A27 Link	58.5%	1.3	69.8%	2.8
2020 Base + Dev	A3 NB Off-slip	83.1%	15.4	78.8%	10.6
	Circulatory South	81.8%	13.1	79.6%	12.9
	A2030 Havant Road	56.7%	2.7	59.1%	3.3
	A3 SB Off-slip	83.1%	11.2	79.7%	9.3
	Circulatory North	69.6%	9.0	83.1%	11.6
	Bedhampton Hill	59.4%	3.1	41.5%	2.6
	A27 Link	59.3%	1.5	70.4%	2.8
2025 Base	A3 NB Off-slip	84.8%	16.0	84.2%	12.1
	Circulatory South	87.0%	14.9	83.6%	14.2
	A2030 Havant Road	62.2%	3.4	66.4%	4.2
	A3 SB Off-slip	87.0%	12.6	87.5%	11.6
	Circulatory North	74.3%	9.8	85.3%	11.0
	Bedhampton Hill	64.2%	3.5	46.1%	3.0
	A27 Link	64.9%	2.4	75.6%	4.0
2025 Base + Dev	A3 NB Off-slip	89.0%	18.1	84.6%	12.2
	Circulatory South	87.4%	15.0	85.0%	14.8
	A2030 Havant Road	65.3%	3.5	67.7%	4.3
	A3 SB Off-slip	87.4%	12.8	85.4%	11.0
	Circulatory North	77.8%	10.5	89.1%	14.2
	Bedhampton Hill	69.4%	4.0	46.4%	3.0
	A27 Link	65.4%	2.4	76.9%	4.2
2030 Base	A3 NB Off-slip	88.8%	19.7	89.0%	14.1
	Circulatory South	88.8%	17.1	88.4%	16.3
	A2030 Havant Road	69.6%	4.6	74.7%	5.2
	A3 SB Off-slip	88.8%	16.3	92.5%	14.4
	Circulatory North	87.1%	13.6	90.2%	15.1
	Bedhampton Hill	73.0%	4.7	49.1%	3.8

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Scenario	Arm	AM Peak		PM Peak	
		Max. Degree Sat (%)	Max. MMQ	Max. Degree Sat (%)	Max. MMQ
	A27 Link	64.9%	3.4	81.2%	5.3
2030 Base + Dev	A3 NB Off-slip	90.0%	22.8	89.5%	14.3
	Circulatory South	89.9%	18.7	89.5%	17.1
	A2030 Havant Road	73.1%	5.5	76.2%	5.6
	A3 SB Off-slip	91.0%	21.0	92.7%	14.5
	Circulatory North	89.3%	15.7	91.2%	15.0
	Bedhampton Hill	78.9%	10.0	50.9%	3.8
	A27 Link	69.3%	3.5	82.5%	5.8

2.4 The capacity results for the junction as a whole are provided in Table 2.

Table 2 Rusty Cutter Roundabout: LinSig Capacity Results (Junction)

Scenario	AM Peak		PM Peak	
	PRC (%)	Delay (pcuHr)	PRC (%)	Delay (pcuHr)
2016 Observed	17.8%	36.80 pcuHr	17.3%	32.80 pcuHr
2020 Base	11.0%	43.74 pcuHr	10.3%	37.94 pcuHr
2020 Base + Dev	8.3%	46.66 pcuHr	8.3%	38.94 pcuHr
2025 Base	3.5%	52.87 pcuHr	2.9%	46.49 pcuHr
2025 Base + Dev	1.2%	57.00 pcuHr	1.0%	48.35 pcuHr
2030 Base	1.3%	66.14 pcuHr	-2.7%	58.01 pcuHr
2030 Base + Dev	-1.1%	74.55 pcuHr	-3.0%	61.01 pcuHr

2.1 2.5 Table 1 and

3.1 2.4 The capacity results for the junction as a whole are provided in Table 2.

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Table 2 show that the junction is predicted to operate within its theoretical design capacity in the 2020 Base, 2020 Base + Dev, 2025 Base, 2025 + Dev and 2030 Base scenarios during the AM peak, and across the 2020 Base, 2020 Base + Dev, 2025 Base, 2025 + Dev scenarios during the PM peak.

- 2.6 In the 2030 + Dev scenario with AM peak flows, the junction begins to operate slightly above its theoretical design capacity on the A3 SB Off-slip, with queues of 21pcus, well within the available queuing space which extends for around 1km. The junction operates at its theoretical design capacity on the A3 NB Off-slip, with queues of 22.8 pcus, which is within the available queuing space (circa 43 pcus).
- 2.7 In the 2030 + Dev scenario with PM peak flows, the junction begins to operate slightly above its theoretical design capacity on the A3 SB Off-slip, with queues of 14.5pcus, and on Circulatory north, with queues of 15pcus, within the available queuing space (26pcus). The junction operates just under its theoretical design capacity on the A3 NB Off-slip, with queues of 14.3 pcus, which is within the available queuing space (circa 43 pcus).
- 2.8 As stated in paragraphs 2.3, a number of items require amending in the model, and the capacity results will need to be reviewed again once these changes have been made.

A27 / Harts Farm Way (Teardrop) Roundabout Junction - Existing Junction Model

- 2.9 The A27 / Harts Farm Way (Teardrop) roundabout junction has been set up as a partially signal-controlled dumbbell roundabout in LinSig. The A27 off-slip and A27 circulatory arms are signalised, with the remaining arms operating as give-way movements. This junction is located around 300m south of the Rusty Cutter roundabout junction.
- 2.10 The traffic flows have been entered in pcus, and Custom Delay Based Assignment has been used to assign the flows.
- 2.11 The following items in the model require attention:

Lane Connectors:

- The following lane connectors have link cruise speeds considerably higher than the default value of 35km/h and require amendment.
- Arm 2 (Lanes 2 and 3) to Arm 7 (Both lanes). The link cruise speed is set to 248km/h.
- Arm 7 (Both lanes) to Arm 8 (Both lanes). The link cruise speed is set to 248km/h.
- Arm 3 (Both lanes) to Arm 8 (Both lanes). The link cruise speed is set to 248km/h.
- Arm 1 (Lane 2) to Arm 13. The link cruise speed is set to 248km/h.

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- Lane connector should be added from Arm 2 (Lane 1) to Arm 6 (Lane 2).

Intergreens:

- The intergreen for Phase C to B is currently set at 0. Reasoning for the use of this value should be provided.

Give-way Parameters:

- On Arm 1 (A27 Link Road), the maximum flow while giving way has been set at 2532 pcu/hr. Reasoning for the use of this value should be provided.

Sat. flow data:

- Arm 1 (A27 Link Road) - Lane 1. The lane width is set at 5.0m. A plan showing the measurement should be provided.

Lane Details:

- Arm 2 (A27 WB Off-slip). Two lane section has been set at 470m long, which appears to be an overestimate. A plan showing the measurement should be provided.
- Arm 4 (Circ (East) 1) - Lane 2. Lane length has been left at the default value of 345m. A plan showing the correct measurement should be provided.
- Arm 7 (Circ (South)) - Both lanes. Lane lengths have been left at the default value of 345m. A plan showing the correct measurement should be provided.
- Arm 8 (Circ (West) 2) - Both lanes. Lane lengths have been left at the default value of 345m. A plan showing the correct measurement should be provided.
- Arm 10 (Circ (West) 1). Lane length has been left at the default value of 345m. A plan showing the correct measurement should be provided.
- Arm 11 (Circ (North)). Lane length has been left at the default value of 345m. A plan showing the correct measurement should be provided.
- Arm 13 (Circ (East) 2). Lane length has been left at the default value of 345m. A plan showing the correct measurement should be provided.

2.12 All of the above items require amending in the model.

2.13 The capacity results are provided in Table 3 ~~Table 3~~.

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Table 3 A27 Teardrop Junction: LinSig Capacity Results

4.1 Scenario	Arm	AM Peak		PM Peak	
		Max. Degree Sat (%)	Max. MMQ	Max. Degree Sat (%)	Max. MMQ
2016 Observed	A27 Link Road	72.3%	1.3	46.1%	0.4
	A27 WB Off-Slip	77.5%	9.0	63.2%	5.6
	Circulatory (East)	77.0%	7.6	49.8%	3.3
	Harts Farm Way	23.7%	0.7	66.3%	3.5
2020 Base	A27 Link Road	77.1%	1.7	48.9%	0.5
	A27 WB Off-Slip	79.0%	9.3	63.6%	5.5
	Circulatory (East)	81.2%	8.9	50.4%	3.4
	Harts Farm Way	21.8%	0.7	72.0%	5.1
2020 Base + Dev	A27 Link Road	81.9%	2.2	48.9%	0.5
	A27 WB Off-Slip	79.8%	9.2	65.9%	5.6
	Circulatory (East)	82.9%	9.7	48.3%	3.3
	Harts Farm Way	26.3%	0.6	77.4%	6.2
2025 Base	A27 Link Road	82.9%	2.4	52.5%	0.6
	A27 WB Off-Slip	82.1%	9.9	69.2%	6.2
	Circulatory (East)	83.2%	9.8	51.3%	3.5
	Harts Farm Way	34.8%	0.4	76.9%	6.3
2025 Base + Dev	A27 Link Road	87.7%	3.5	52.5%	0.6
	A27 WB Off-Slip	82.1%	9.9	72.2%	6.4
	Circulatory (East)	87.4%	11.8	49.2%	3.4
	Harts Farm Way	37.7%	0.4	83.4%	7.0
2030 Base	A27 Link Road	87.6%	3.4	55.5%	0.6
	A27 WB Off-Slip	83.9%	10.3	60.6%	5.4
	Circulatory (East)	86.9%	11.4	62.9%	4.4
	Harts Farm Way	41.1%	0.4	87.7%	7.4

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4.1 Scenario	Arm	AM Peak		PM Peak	
		Max. Degree Sat (%)	Max. MMQ	Max. Degree Sat (%)	Max. MMQ
2030 Base + Dev	A27 Link Road	92.4%	5.6	55.5%	0.6
	A27 WB Off-Slip	85.5%	10.5	63.2%	6.0
	Circulatory (East)	88.2%	12.7	67.3%	4.8
	Harts Farm Way	45.4%	0.4	88.7%	9.2

Table 4 A27 Teardrop Junction: LinSig Capacity Results (Junction)

Scenario	AM Peak		PM Peak	
	PRC (%)	Delay (pcuHr)	PRC (%)	Delay (pcuHr)
2016 Observed	16.2%	14.54 pcuHr	35.7%	7.79 pcuHr
2020 Base	10.9%	16.64 pcuHr	25.0%	8.85 pcuHr
2020 Base + Dev	8.6%	18.26 pcuHr	16.3%	9.47 pcuHr
2025 Base	8.2%	19.51 pcuHr	17.1%	10.68 pcuHr
2025 Base + Dev	2.6%	22.73 pcuHr	7.9%	11.67 pcuHr
2030 Base	2.7%	23.24 pcuHr	2.6%	11.83 pcuHr
2030 Base + Dev	-2.7%	27.34 pcuHr	-1.4%	13.11 pcuHr

2.14 **Table 3 A27 Teardrop Junction: LinSig Capacity Results** Table 3 and Table 4 shows that the junction is predicted to operate within its theoretical design capacity in the 2020 Base, 2020 Base + Dev, 2025 Base, 2025 + Dev and 2030 Base scenarios during the AM peak, and across all scenarios during the PM peak. In the 2030 + Dev scenario with AM peak flows, the junction begins to operate slightly above its theoretical design capacity on the A27 Link Road, with queues of 5.6 pcus, within the available queuing space (circa 49pcus). During the 2030 Base + Dev scenarios, queuing on the A27 WB Off-slip reaches 10.5 pcus in the AM peak and 6.0 pcus in the PM peak, well within the queuing space available (circa 87 pcus).

2.15 As stated in paragraph 2.11, a number of items require amending in the model, and the capacity results will need to be reviewed again once these changes have been made.

Primary Site Access - Proposed junction model

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2.16 The primary site access is to be taken from Harts Farm Way. The junction modelling undertaken shows that the proposed junction operates well within capacity and does not show any queuing back onto the A27.

Summary of existing junction models

2.17 A summary of the existing junction model review is as follows:

- **A3(M) Rusty Cutter Roundabout Junction:** Changes to lane lengths required. The model should be modified accordingly.
- **A27 / Harts Farm Way (Teardrop) Roundabout Junction:** A number of items need to be updated in the model. The model should be modified accordingly.

3 CONCLUSIONS

3.1 This Technical Note (TN) provides a summary of the review undertaken. **Table 5** sets out whether the junction models are considered fit for purpose and also whether the junction operates within capacity.

Table 5 Junction Review Summary

5.1 Junction	Junction Model Review	
	Fit for Purpose?	Operates within capacity?
Rusty Cutter Roundabout Junction	X	✓
A27 / Harts Farm Way (Teardrop) Roundabout Junction	X	✓

3.2 **Table 5** shows that both of the junction models require some sort of amendment before they can be considered fit for purpose. Both of the junctions operate within capacity, although this may change following the required modification of the models.