RSP

RiverOak Strategic Partners

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Examination Document

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5. Junction Assessments – Baseline Validation

5.1.1 This Section of the TA sets out the study area for detailed assessment and detailed development of baseline models and how these have been validated against recorded data on the existing highways network.

5.2 Study Area

5.2.1 The study area was discussed with KCC during the consultation process and it was as agreed this should cover all the major junctions that were included in the strategic highways model. It is considered that the scope for this TA is a wide scope that includes all the major junctions in Thanet. The junction scope for detailed assessment of the proposals for the airport is as follows;

- Junction 1: A256 / Sandwich Rd (Four arm standard roundabout);
- Junction 2: A299 / A256 / Cottington Link Rd (Four arm standard roundabout);
- Junction 3: A299 / Canterbury Rd / Hengist Way (Three arm standard roundabout);
- Junction 4: A299 / B2190 (Four arm standard roundabout);
- Junction 5: B2190 / Minster Rd (Three arm standard roundabout);
- Junction 6: A299 / Seamark Rd / A253 / Willetts Hill (Five arm standard roundabout);
- Junction 7: A299 / A28 (Five arm standard roundabout);
- Junction 8: A28 / Park Ln / Station Rd (Three arm mini roundabout with left in / left out simple priority);
- Junction 9: Park Ln / Manston Rd / Acol Hill (Left in / left out simple priority);
- Junction 10: Shottendane Rd / Manston Rd / Margate Hill (Four arm staggered);
- Junction 11: Columbus Ave / Spitfire Way (Three arm standard roundabout);
- Junction 12: Manston Road / B2050 / Spitfire Way (Four arm staggered priority);
- Junction 13: Manston Court Road / B2050 (Three arm priority);
- Junction 14: A28 / B2052 / Maynard Avenue (Three arm priority);
- Junction 15: Manston Rd / Hartsdown Rd / Tivoli Rd / College Rd / Nash Rd (Five arm signalised);
- Junction 16: Ramsgate Rd / College Rd / A254 / Beatrice Rd (Five arm signalised);
- Junction 17: Ramsgate Road / Poorhole Lane / Margate Road / Star Lane (Four arm standard roundabout);
- Junction 18: Star Ln / Manston Court Rd (Left in / left out simple priority);
- Junction 19: A256 / New Cross Rd (Three arm standard roundabout);
- Junction 20a: A256 (N) / A256 (S) / Manston Road East (Three arm priority);
- Junction 20b: A256 / Manston Road West (Three arm standard roundabout);
- Junction 21a: Canterbury Road / Haine Road (Three arm standard roundabout);
- Junction 21b: A299 / A256 / Sandwich Rd / Canterbury Rd E (Four arm signalised);
- Junction 22: Airport Access (Left in / left out priority);

- Junction 23: Star Lane / Star Lane Link (Three arm priority junction);
- Junction 24: Star Lane Link / Nash Road (Four arm standard roundabout);
- Junction 25: Tesco Access (Three arm standard roundabout);
- Junction 26: Newington Rd / Manston Rd (Three arm mini roundabout);
- Junction 27: Newington Rd / High Street (Three arm mini roundabout); and
- Junction 28: Wilfred Rd / A255 / Grange Rd (Four arm signalised).

5.2.2 The location of these junctions is set out in **Figure 5.1.**

5.2.3 As the traffic generation and distribution methodology was developed further, it was apparent that three of the junctions above were not likely to experience any increase in traffic as a result of the proposals. As such Junctions 14 and 19 were removed from further assessment. Junction 18 was also not included. This was a small access to a housing estate which was erroneously included in the scope.

5.3 Model Validation Thresholds

Priority and roundabout junctions

5.3.1 For the purpose of junction modelling, all priority and roundabout junctions have been modelled in Junctions 9 (PICADY/ARCADY respectively). Ratio of Flow to Capacity (RFC) is used to assess the junction's performance with a threshold of 0.85 RFC equating to the junction's theoretical capacity. Above this threshold queues and delays begin to build exponentially.

Signalised junctions

5.3.2 The capacity of signalised junctions has been modelled within LinSig 3. Signalled junctions can be considered to reach their theoretical capacity when the junctions total practical reserve capacity (PRC) becomes negative. In addition, individual arms are considered to reach their theoretical capacity when their Degree of Saturation (DoS) exceeds 90%.

5.3.3 It must be noted that when considering the junctions, it is appropriate to take a holistic view of the available storage and queuing evident as it is common place for a junction to be used to regulate traffic flow through a network. Signalised junctions can therefore operate at capacity with large queues and delays provided they do not cause blocking back to strategic junctions and where the queues are transient and are discharged each cycle. They can therefore still be considered to operate satisfactorily if required as a regulator of flow onto the surrounding highway network.

5.4 Baseline Junction Validation

5.4.1 The base junction models queue outputs have been compared against observed queues (undertaken at the time of the traffic surveys) to ensure that the outputs of the models reflect the existing network performance and where required adjusted to ensure that the model can be considered reflective of the existing junction performance. It should be noted that all the queue data presented in this report denotes vehicles. To determine how closely the base models, reflect the observed queueing data, both % difference and a statistic called GEH has been used.

5.4.2 The GEH statistic is used as it takes account of both the level of change (as does the % change) but also the magnitude of change that occurs. For example, a change in queue length from 1 to 2 vehicles will give a high percentage change (+100%) whilst the GEH statistic would report a low number (0.8) as the level of change is actually low and that 1 and 2 statistically are very similar. A change from 100 to 200 would give the same percentage change (+100) but the GEH would be much higher at 8.2 due to the significant differences statistically between the two numbers.

5.4.3 The following specifications have been used during the validation assessment and are an industry standard approach, having been agreed with Highways England and tested at Inspector level as a sound basis for comparing two sets of queues:

- Red (×) GEH > 5 - numbers differ statistically and do not validate;
- Amber (?) GEH between 2 to 5 – numbers alter slightly from each other in term of magnitude but validation can be considered to be achieved; and
- Green (✓) GEH < 2 – numbers are statistically the same – validation achieved.

5.4.4 The base junction modelling geometric properties have been based on a combination of Ordnance Survey (OS) data and site observations. The base junction model outputs are provided within **Appendix D** and summarised below. Note the following:

- Observed MMQ means the Mean Maximum Queue and is the mean number of vehicles (or passenger car units [pcus]) which have added onto the back of the queue up to the time when the queue finally clears; and
- The modelled average queue is taken from the junction modelling is measured in number of vehicles (or pcu).

Junction 1: A256 / Sandwich Rd (four-arm standard roundabout)

Table 5.1 2017 Base AM Model – Junction 1 – A256 / Sandwich Rd (Four-Arm Standard Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Sandwich Rd	6	0	2983%	3.3	?	-50%	3	147%	1.8	✓
A256 (S)	3	12	-73%	3.2	?	+20%	2	117%	1.1	✓
Jutes Ln	1	0	171%	0.8	✓	-	0	983%	1.3	✓
A256 (N)	6	0	-	3.4	?	-20%	7	-22%	0.6	✓

Table 5.2 2017 Base PM Model – Junction 1 – A256 / Sandwich Rd (Four-Arm Standard Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Sandwich Rd	4	0	1692%	2.5	?	-50%	1	412%	2.0	✓
A256 (S)	1	7	-83%	2.9	?	+20%	3	-65%	1.4	✓
Jutes Ln	1	0	275%	0.8	✓	-	0	275%	0.8	✓
A256 (N)	5	1	437%	2.3	?	-20%	2	169%	1.7	✓

5.4.5 Both the AM and PM base model evidence queues smaller than those observed along all approaches except A256 (S) where the model overestimates the queue length in both AM and PM peaks. Junction capacity adjustments have been made using the % adjustments to three arms to more closely align the modelled queues to the observed. The validated junction model shows queues validate against the observed queues and as such the validated model is accepted for the future year testing of Junction 1.

Junction 2: A299 / A256 / Cottington Link Rd (four-arm standard roundabout)

Table 5.3 2017 Base AM Model – Junction 2 – A299 / A256 / Cottington Link Rd (Four-Arm standard

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A299 Hengist Way (E)	10	4	150%	2.3	?	-	9	8%	0.2	✓
A256	15	2	590%	4.3	?	-	10	48%	1.3	✓
Cottington Link Rd	3	3	7%	0.1	✓	-15%	7	-55%	1.7	✓
A299 Hengist Way (N)	6	1	101%	2.9	?	-40%	2	210%	2.0	✓

Table 5.4 2017 Base PM Model – Junction 2 – A299 / A256 / Cottington Link Rd (Four-Arm standard roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A299 Hengist Way (E)	6	1	374%	2.5	?	-	3	120%	1.6	✓
A256	20	4	433%	4.7	?	-	27	-24%	0.6	✓
Cottington Link Rd	2	2	-2%	0.0	✓	-15%	4	-46%	1.1	✓
A299 Hengist Way (N)	4	0	1233%	2.5	?	-40%	1	300%	1.9	✓

5.4.6 Both the AM and PM peak hour base models evidence queues smaller than those observed on all approaches except Cottington Link Rd, which validates well. Junction capacity adjustments have been made to bring the modelled queues closer to the observed as reflected in the validated model. Further to the capacity model adjustments, both AM and PM validated model results are shown to accord with the observed queues and as such has been used for future year testing.

Junction 3: A299 / Canterbury Rd / Hengist Way (three-arm standard roundabout)

Table 5.5 2017 Base AM Model – Junction 3 – A299 / Canterbury Rd / Hengist Way (Three-Arm Standard Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Canterbury Rd	3	0	1400%	2.2	?	-50%	0	650%	2.0	✓
A299 Hengist Way (S)	4	1	400%	2.1	?	-30%	2	122%	1.3	✓
A299 Hengist Way (W)	4	1	218%	1.6	✓	-10%	1	150%	1.3	✓

Table 5.6 2017 Base PM Model – Junction 3 – A299 / Canterbury Rd / Hengist Way (Three-Arm Standard Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Canterbury Rd	2	0	1900%	1.9	✓	-50%	0	567%	1.6	✓
A299 Hengist Way (S)	4	1	410%	2.1	?	-30%	2	140%	1.4	✓
A299 Hengist Way (W)	5	2	217%	1.8	✓	-10%	2	138%	1.5	✓

5.4.7 The base models validate for the A299 Hengist Way (W), and could be considered to validate on the other arms in both the AM and PM peak hour periods. None the less, capacity adjustments have been made to more closely align the model to the observed queue data. The validated model is considered too closely validate to the observed queues and has been used in the future year modelling.

Junction 4: A299 / B2190 (four-arm standard roundabout)

Table 5.7 2017 Base AM Model – Junction 4 – A299 / B2190 (Four-Arm Standard Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Hengist Way (E)	11	2	622%	3.8	?	-34%	9	23%	0.6	✓
Tothill Street	11	44	-75%	6.2	✗	+26%	9	27%	0.7	✓
A299 (W)	13	4	204%	3.0	?	-12%	12	13%	0.4	✓

AM	Base Model					Validated Model				
B2190 (N)	15	2	763%	4.5	?	-33%	13	17%	0.6	✓

5.4.8 The AM base model evidences queues smaller than those observed on all approaches apart from Tothill Street where the model underestimates the observed queues. Capacity adjustments have been made to bring the AM base modelled queues closer to the observed, with the validated model reflecting similar queues to those observed. The validated AM base model will be used for future year testing.

Table 5.8 2017 Base PM Model – Junction 4 – A299 / B2190 (Four-Arm Standard Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Hengist Way (E)	11	1	900%	4.0	?	-42%	9	25%	0.7	✓
Tothill Street	11	9	14%	0.4	✓	-	9	23%	0.6	✓
A299 (W)	13	6	127%	2.3	?	-9%	12	4%	0.1	✓
B2190 (N)	19	2	681%	5.0	✗	-28%	18	6%	0.2	✓

5.4.9 During the PM peak hour, the base model underestimates queues on all approaches. Different capacity adjustments are required in the PM than during the AM model and as such a standalone PM validated base model has been created. The validated PM base model is considered to closely reflect the observed queues and has been used for future year model testing.

Junction 5: B2190 / Minster Rd (three-arm standard roundabout)

Table 5.9 2017 Base AM+PM Model – Junction 5 – B2190 / Minster Rd (Three-Arm Standard Roundabout)

	AM Peak					PM Peak				
Movement	**Observed MMQ**	**Modelled Average Queue**	**% Diff**	**GEH**	**Validated**	**Observed MMQ**	**Modelled Average Queue**	**% Diff**	**GEH**	**Validated**
B2190 (East)	2	0	483%	1.4	✓	2	1	250%	1.2	✓
B2190 (South)	0	1	-100%	1.1	✓	1	1	67%	0.4	✓
Minster Rd	3	1	450%	1.8	✓	2	0	706%	1.8	✓

5.4.10 The base model is considered to closely validate to the observed queues in both the AM and PM peak hour periods. No adjustment of the base model is therefore required to validate the junction and the base junction model has been used to model the future year scenarios.

Junction 6: A299 / Seamark Rd / A253 / Willetts Hill (five-arm standard roundabout)

Table 5.10 2017 Base AM Model – Junction 6 – A299 / Seamark Rd / A253 / Willetts Hill (Five-Arm Standard Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A299 (East)	5	2	175%	1.7	✓	-20%	4	26%	0.5	✓
Willetts Hill	2	0	1025%	1.9	✓	-	0	1025%	1.9	✓
A253 Canterbury Rd	6	0	2983%	3.3	?	-76%	4	67%	1.1	✓
A299 (North)	9	2	431%	3.1	?	-32%	8	10%	0.3	✓
Seamark Rd	2	0	1983%	1.9	✓	-	0	1983%	1.9	✓

5.4.11 The base AM model does not closely validate to the observed queues on A253 Canterbury Rd and A299 (North). Capacity adjustments have been made to bring the modelled queues closer to the observed as reflected in the validated model. The validated model has been used to model the future year AM model run scenarios.

Table 5.11 2017 Base PM Model – Junction 6 – A299 / Seamark Rd / A253 / Willetts Hill (Five-Arm Standard Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A299 (East)	6	2	253%	2.2	?	-20%	4	62%	1.0	✓
Willetts Hill	2	0	1400%	1.6	✓	-	0	1400%	1.6	✓
A253 Canterbury Rd	8	1	1400%	3.5	?	-63%	6	25%	0.6	✓
A299 (North)	11	2	408%	3.4	?	-32%	9	24%	0.7	✓
Seamark Rd	2	0	1733%	1.8	✓	-	0	1733%	1.8	✓

5.4.12 The PM base model has been adjusted to more closely align with the observed queue data. The resultant validated PM model is considered to closely match the observed queue data and has been used for future year PM model run scenarios.

Junction 7: A299 / A28 (five-arm standard roundabout)

Table 5.12 2017 Base AM Model – Junction 7 – A299 / A28 (Five-Arm Standard Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A28 (East)	14	9	54%	1.5	✓	-	14	4%	0.2	✓
A299 (South)	10	2	459%	3.3	?	-	8	23%	0.6	✓
Canterbury Rd	5	0	1483%	2.8	?	-20%	1	265%	2.0	✓
A299 (West)	10	3	294%	3.0	?	-	7	40%	1.0	✓
Potten St Rd	1	0	-	1.4	✓	-	0	900%	1.2	✓

5.4.13 The AM base model has been adjusted to more closely reflect the observed queue data. The validated model is considered to closely reflect to observed queues and has been used for the future year junction modelling.

Table 5.13 2017 Base PM Model – Junction 7 – A299 / A28 (Five-Arm Standard Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A28 (East)	8	1	522%	3.1	?	-	2	251%	2.5	✓
A299 (South)	7	1	518%	3.0	?	-	5	61%	1.1	✓
Canterbury Rd	9	1	983%	3.6	?	-20%	14	-36%	1.5	✓
A299 (West)	16	9	78%	2.0	✓	-	17	-8%	0.3	✓
Potten St Rd	1	0	817%	1.1	✓	-	0	817%	1.1	✓

5.4.14 The PM base model has been adjusted to mode closely reflect the observed queue data. Whilst the A28 (East) falls outside of the most rigorous criteria (less than 2) the junction as a whole is considered to validate with the observed queueing. The total queues observed equate to 41, whilst the validated PM model queue total is 38 and as such the validated model has been accepted as a close representation of the performance of the junction and has been used for the future year assessments.

Junction 8: A28 / Park Ln / Station Rd (three-arm mini roundabout with left in / left out simple priority)

5.4.15 Junction 8 comprises a mini roundabout (Jct 8a) and a simple T junction (Jct 8b) to its south west. These models have been assessed individually due to the limitations within Junctions 9 of combining the two junctions and taking account of the collocated pedestrian crossings and the effect of the yellow box markings.

5.4.16 The following tables (5.14 – 5.15) summarise the results for the mini roundabout (Junction 8a).

Table 5.14 2017 Base AM Model – Junction 8a – A28 / Station Rd (Three-Arm Mini Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A28 (East)	12	8	62%	1.5	✓	-8%	14	-11%	0.4	✓
A28 (South)	4	3	49%	0.8	✓	-	3	55%	0.8	✓
Station Rd	15	2	806%	4.5	?	-40%	19	-24%	1.1	✓

Table 5.15 2017 Base PM Model – Junction 8a – A28 / Station Rd (Three-Arm Mini Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A28 (East)	10	3	193%	2.5	?	-8%	5	101%	1.8	✓
A28 (South)	6	9	-38%	1.3	✓	-	9	-38%	1.3	✓
Station Rd	7	1	521%	2.9	?	-40%	6	16%	0.4	✓

5.4.17 Adjustments have been made to both Station Road and A28 (East) approaches to reduce the model capacity to more closely align the outputs to the observed queue data to achieve a validated model for use in the future year modelling assessments.

5.4.18 Junction 8b has been modelled in Junctions 9 and as shown in **table 5.16** is validated to the observed traffic queues.

Table 5.16 2019 Base AM+PM Junction 8b – Manston Rd / Acol Hill (Simple-Priority Junction)

Time Period	AM Peak					PM Peak				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated
A – A28 (N)	2	0	2067%	1.9	✓	2	0	-	1.8	✓
B – Park Lane	3	2	33%	0.4	✓	4	6	-44	1.3	✓
C – A28 (S)	3	**2**	915	1.0	✓	3	1	225	1.5	✓

5.4.19 The base model has been used for the assessment of the future year modelling scenarios.

Junction 9: Park Lane / Manston Road / Acol Hill (left in / left out simple priority)

Table 5.17 2017 Base AM+PM Model – Junction 9 – Park Ln / Manston Rd / Acol Hill (Left in / Left out Simple Priority)

Time Period	AM Peak					PM Peak				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated
Manston Rd – all movement	2	1	261%	1.3	✓	2	1	367%	1.5	✓
Acol Hill – all movement	0	0	-	0.4	✓	0	0	67%	0.2	✓

5.4.20 No adjustment of the base model is required to validate the model as both the AM and PM base model results are shown to accord with the observed queues. The base model has been used for the future year junction capacity testing.

Junction 10: Shottendane Road / Manston Road / Margate Hill (four-arm staggered priority junction)

Table 5.18 2017 Base AM Model – Junction 10 – Shottendane Rd / Manston Rd / Margate Hill (Four-Arm Staggered Junction)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Margate Hill all movements	2	1	160%	1.1	✓	-	1	247%	1.3	✓
Manston Rd East all movements	1	0	254%	1.1	✓	-	0	254%	1.1	✓
Shottendane Rd to Manston Rd East	7	4	-42%	1.7	✓	-	4	-42%	1.7	✓
Shottendane Rd to Margate Hill & Manston Rd West		8					8			
Manston Rd West all movements	0	0	0.0%	0.0	✓	-	0	0.0%	0.0	✓

Table 5.19 2017 Base PM Model – Junction 10 – Shottendane Rd / Manston Rd / Margate Hill (Four-Arm Staggered Junction)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Margate Hill all movements	2	17	-82%	4.5	?	-	6	-52%	1.5	✓
Manston Rd East all movements	3	1	233%	1.1	✓	-	1	233%	1.1	✓
Shottendane Rd to Manston Rd East	4	0	289%	1.8	✓	-	0	289%	1.8	✓
Shottendane Rd to Margate Hill & Manston Rd West		1					1			
Manston Rd West all movements	0	0	0.0%	0.0	✓	-	0	0.0%	0.0	✓

5.4.21 The existing junction has restricted visibility to the left and right due to third party land constraints. In reality drivers have more visibility as currently their views are not impeded on the third party land where it meets the highway boundary. To better reflect the current visibilities and validate the model visibilities have been increased to the right and left along Margate Hill. As part of the mitigation proposals consideration of formalising / improving the visibility on this approach is discussed. The validated model is considered to represent the existing performance of the junction and has been used to model the future year scenarios.

Junction 11: Columbus Ave / Spitfire Way (three-arm standard roundabout)

Table 5.20 2017 Base AM+PM Model – Junction 11 – Columbus Ave / Spitfire Way (Three-Arm Standard Roundabout)

Time Period	AM Peak					PM Peak				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated
Spitfire Way (East)	0	1	-100%	1.1	✓	2	1	221%	1.3	✓
Columbus Ave (West)	1	0	344%	1.1	✓	0	0	-58%	0.3	✓
Columbus Ave (North)	1	0	-	1.1	✓	2	0	858%	1.7	✓

5.4.22 The base model is considered to validate well to the observed queue data and as such no amendments have been made. The base model has been used to run the future year assessments.

Junction 12: Manston Road / B2050 / Spitfire Way (four-arm staggered priority junction)

Table 5.21 2017 Base AM Model – Junction 12 – Manston Road / B2050 / Spitfire Way (Four-Arm Staggered Priority Junction)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Spitfire Way - all movement	9	16	-48%	2.3	?	-	9	-5%	0.2	✓
B2050 (East)	1	1	11%	0.1	✓	-	1	11%	0.1	✓
Manston Road – all movement	3	4	-27%	0.6	✓	-	4	-17%	0.3	✓
B2050 (West)	1	0	567%	1.3	✓	-	0	1233%	1.5	✓

Table 5.22 2017 Base PM Model – Junction 12 – Manston Road / B2050 / Spitfire Way (Four-Arm Staggered Priority Junction)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Spitfire Way - all movement	11	60	-82%	8.2	✗	-	41	-74%	5.9	✓
B2050 (East)	0	0	-17%	0.1	✓	-	0	-17%	0.1	✓
Manston Road – all movement	4	4	-5%	0.1	✓	-	3	16%	0.3	✓
B2050 West	0	0	0%	0.8	✓	-	0	0%	0.8	✓

5.4.23 Whilst the model appears to represent significantly higher queues on Spitfire Way than the observed queues no attempt to increase the capacity on this arm has been made due to on-site observations indicating that the back of queue observed exceeded that of what was practical to be measured on site. In conclusion the modelled queues are taken forward as a robust assessment of the junctions existing performance, with mitigation proposals considered later in the report to add additional capacity to this junction.

Junction 13: Manston Court Road / B2050 (three-arm priority junction)

Table 5.23 2017 Base AM Model – Junction 13 – Manston Court Road / B2050 (Three-Arm Priority Junction)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Modelled Average Queue	% Diff	GEH	Validated	Intercept Adjustment
Manston Court Road all movements	3	1	550%	2.0	?	2	71%	0.8	✓	-160 PCU/HR
B2050 Manston Rd (E) all movements	0	0	0%	0.4	✓	0	0%	0.4	✓	

Table 5.24 2017 Base PM Model – Junction 13 – Manston Court Road / B2050 (Three-Arm Priority Junction)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Modelled Average Queue	% Diff	GEH	Validated	Intercept Adjustment
Manston Court Road	4	1	511%	2.1	?	3	14%	0.6	✓	-160 PCU/HR
	0	0	0%	0.0	✓	0	0%	0.0	✓	

5.4.24 The base model overestimates the capacity of minor arm, intercept adjustment has been applied to bring the modelled queues closer to the observed as shown in the validated model outputs. Further to the capacity model adjustments, the validated PM model results are shown to accord with the observed queues and has been used to test the future year modelling scenarios.

Junction 15: Manston Rd / Hartsdown Rd / Tivoli Rd / College Rd / Nash Rd (five-arm signalised junction)

Table 5.25 2017 Base AM Model – Junction 15 – Manston Rd / Hartsdown Rd / Tivoli Rd / Nash Rd (Five-Arm Signalised Junction)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled MMQ	% Diff	GEH	Validated	Capacity Adjustment	Modelled MMQ	% Diff	GEH	Validated
College Rd Lane 1	12	19	-8%	0.4	✓	-	19	-8%	0.4	✓
College Rd Lane 2	5					-				
Nash Rd	5	8	-33%	1.0	✓	-	8	-33%	1.0	✓
Manston Rd Lane 1	12	15	10%	0.4	✓	-	15	10%	0.4	✓
Manston Rd Lane 2	5					-				
Hartsdown Rd	14	18	-26%	1.2	✓	-	18	-26%	1.2	✓

Table 5.26 2017 Base PM Model – Junction 15 – Manston Rd / Hartsdown Rd / Tivoli Rd / Nash Rd (Five-Arm Signalised Junction)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled MMQ	% Diff	GEH	Validated	Capacity Adjustment	Modelled MMQ	% Diff	GEH	Validated
College Rd Lane 1	9	25	-43%	2.4	?	-	21	-28%	1.6	✓
College Rd Lane 2	5					-				
Nash Rd	17	18	-6%	0.3	✓	-	23	-28%	1.4	✓
Manston Rd Lane 1	18	21	6%	0.3	✓	-	24	-33%	0.3	✓
Manston Rd Lane 2	5					-				
Hartsdown Rd	9	12	-29%	1.1	✓	-	14	-35%	1.4	✓

5.4.25 To achieve a validated more the signal timings were adjusted manually in the model to give more green time to Manston Road. The model is now considered to reflect the observed queues and as such has been used to test the future year scenarios

Junction 16: Ramsgate Rd / College Rd / A254 / Beatrice Rd (five-arm signalised junction)

Table 5.27 2017 Base AM+PM Model – Junction 16 – Ramsgate Rd / College Rd / A254 / Beatrice Rd (Five-Arm Signalised Junction)

Time Period	AM Peak					PM Peak				
Movement	**Observed MMQ**	**Modelled MMQ**	**% Diff**	**GEH**	**Validated**	**Observed MMQ**	**Modelled MMQ**	**% Diff**	**GEH**	**Validated**
A254 (SB) Ramsgate Road (9/1)	14	14	46%	1.5	✓	13	10	46%	1.5	✓
A254 (SB) Ramsgate Road (9/2)	5					3				
College Road B2052 (WB) (6/1)	20	25	-19%	1.0	✓	19	20	-19%	0.1	✓
A254 Ramsgate Road (NB) (1/1)	20	20	16%	0.7	✓	25	28	16%	0.1	✓
A254 Ramsgate Road (NB) (1/2)	4					3				
Beatrice Rd (4/1)	14	23	46%	0.6	✓	18	21	46%	0.1	✓
Beatrice Rd (4/2)	20					21				✓
Slip to College Rd (5/1)	0	0	-	0.8	✓	0	0	-	0.1	✓

5.4.26 The base model validates to the observed queues and as such has been used to test the future year scenarios

Junction 17: Ramsgate Road/Poorhole Lane/Margate Road/Star Lane (four-arm roundabout)

Table 5.28 2017 Base AM Model – Junction 17 – Ramsgate Road / Poorhole Lane / Margate Road / Star Lane (Four-Arm Standard Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Poorhole Lane	4	0	879%	2.4	?	-30%	2	130%	1.3	✓
Margate Road	5	5	-12%	0.3	✓	+17%	3	39%	0.6	✓
Star Lane	5	2	207%	1.8	✓	-20%	4	29%	0.5	✓
Ramsgate Road	6	8	-21%	0.6	✓	+15%	5	28%	0.6	✓

Table 5.29 2017 Base PM Model – Junction 17 – Ramsgate Road / Poorhole Lane / Margate Road / Star Lane (Four-Arm Standard Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Poorhole Lane	5	1	917%	2.7	?	-30%	3	96%	1.3	✓
Margate Road	7	24	-72%	4.4	?	+17%	8	-15%	0.4	✓
Star Lane	5	1	291%	2.1	?	-20%	3	69%	1.0	✓
Ramsgate Road	7	19	-65%	3.4	?	+15%	8	-13%	0.4	✓

5.4.27 The base model overestimates the capacity at Poorhole Lane and Star Lane, whilst underestimating the capacity on Margate Road and Ramsgate Road. The capacity amendments ensure that the validated model closely reflects the observed queues. And is acceptable.

Junction 20A (1/2): A256 (North) / A256 (South) / Manston Road (East) (three-arm priority)

Table 5.30 2017 Base AM Model – Junction 20A – A256 (N) / A256 (S) / Manston Road East (Three-Arm Priority Junction)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Intercept Adjustment	Modelled Average Queue	% Diff	GEH	Validated

AM	Base Model					Validated Model				
A256 (S) to Manston Road East	6	79	-93%	11.3	✗	+ 200 PCU/hr	4	38%	0.7	✓
Manston Road East to A256 (S)	8	4	100%	1.6	✓	-	9	-8%	0.2	✓

5.4.28 In order to validate the AM model an intercept capacity has been amended bringing the modelled queues closer to the observed. The AM model is considered to be validated.

Table 5.31 2017 Base PM Model – Junction 20A – A256 (N) / A256 (S) / Manston Road East (Three-Arm Priority Junction)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Intercept Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A256 (S) to Manston Road East	8	6	52%	1.1	✓	-	6	52%	1.1	✓
Manston Road East to A256 (S)	18	43	-59%	4.6	?	+ 70 PCU/hr	17	7%	0.3	✓

5.4.29 The PM base model underestimates the capacity on Manston Road East to A256 (S). However, after reviewing the video queue evidence it is considered that the A256 southbound traffic queue back up and blocks this entry, such interaction is not capable of being captured within the model. An adjustment to the intercept has allowed the model outputs to closely align to the observed queues and validate. The validated model has been carried forward for the future year modelling assessments.

Junction 20A: (3) A256 (North) / Manston Road (East) (three-arm priority junction)

5.4.30 Junction 20A and Junction 20B are closely located but to enable validation the modelling these junctions has been undertaken separately. For reference the junctions are set out in **Figure 5.2** showing the three give ways for Junction 20A.

Table 5.32 2017 Base AM+PM Model – Junction 20A – A256 (North) / Manston Road (East) (Three-Arm Priority Junction) (Ref 1)

Time Period	AM Peak					PM Peak				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated
Ref 1 - A256 (N) to Manston Road (East)	1	0	150%	0.6	✓	1	1	150%	0.8	✓

5.4.31 No adjustment is required within the base model to validate the model as both the AM and PM base model results are shown to accord with the observed queues.

Table 5.33 2017 Base AM Model – Junction 20A – A256 / Manston Road (Three-Arm Priority Junctions) (Ref 2 & 3)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Ref 2 – A256/Manston Rd East Movement	6	79	-93%	11.3	✗	-	4	38%	0.7	✓
Ref 3 – Manston Rd E to A256 S	8	4	100%	1.6	✓	+200 PCU	9	-8%	0.2	✓

5.4.32 In order to validate the AM model an intercept capacity has been amended bringing the modelled queues closer to the observed. The AM model is considered to be validated.

Table 5.34 2017 Base PM Model – Junction 20A – A256 / Manston Road (Three-Arm Priority Junctions) (Ref 2 & 3)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Ref 2 – A256/Manston Rd East Movement	8	6	52%	1.1	✓	-	8	52%	1.1	✓
Ref 3 – Manston Rd E to A256 S	18	43	-59%	4.6	?	+70 PCU	18	7%	0.3	✓

5.4.33 In order to validate the PM model an intercept capacity has been amended bringing the modelled queues closer to the observed. The AM model is considered to be validated.

Junction 20B: A256 / Manston Road (West) (three-arm roundabout junction)

Table 5.35 2017 Base AM Model – Junction 20B – A256 / Manston Road West (Three-Arm Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A256 North	4	11	-64%	2.5	?	+70%	3	40%	0.6	✓
A256 South	11	2	552%	3.7	?	-	9	19%	0.6	✓
Manston Road West	5	2	122%	1.5	✓	-5%	4	30%	0.6	✓

Table 5.36 2017 Base PM Model – Junction 20B – A256 / Manston Road (Three-Arm Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated

PM	Base Model					Validated Model				
A256 North	4	19	-78%	4.3	?	+70%	4	0%	0.0	✓
A256 South	14	1	964%	4.6	?	-13%	10	37%	1.1	✓
Manston Road West	7	1	511%	3.0	?	-30%	4	93%	1.5	✓

5.4.34 Traffic travelling from the For A256 (North) arm of the roundabout there is virtually no deflection for ahead traffic. As a consequence, the model underestimates the capacity on this approach. To reflect the observed queue lengths the capacity of this arm has been increased by 70%. Small reductions in capacity has been applied to A256 South and Manston Road West for both the AM and PM models at slightly different rates to validate both models. These models have been used to test the future year scenarios.

Junction 21A: Canterbury Road / Haine Road (three-arm standard roundabout)

5.4.35 Junction 21A and Junction 21B are closely located but to enable validation the modelling these junctions has been undertaken separately. The junctions are shown **Figure 5.3.**

Table 5.37 2017 Base AM Model – Junction 21A – Canterbury Road / Haine Road (Three-Arm Standard Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A256 Haine Road	6	4	71%	1.2	✓	+10%	3	126%	1.7	✓
A256 Cantebury Road	0	1	-100%	1.4	✓	-	1	-100%	1.5	✓
Canterbury Road West	4	2	83%	1.0	✓	+5%	2	60%	0.8	✓

Table 5.38 2017 Base PM Model – Junction 21A – Canterbury Road / Haine Road (Three-Arm Standard Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
A256 Haine Road	7	13	-47%	1.9	✓	+10%	5	8%	0.2	✓
A256 Cantebury Road	0	2	-100%	1.7	✓	-	1	-100%	1.7	✓
Canterbury Road West	4	10	-64%	2.4	?	+5%	4	-56%	1.8	✓

5.4.36 The base model has been adjusted to take into account the unequal lane usage. Despite this small capacity adjustments were required to better align the junction performance to the observed queue data. The validated model results are shown to accord with the observed queues and this validated model has been used to model the future year scenarios.

Junction 21B: A299 / A256 / Sandwich Rd / Canterbury Rd E (four-arm signalised junction)

Table 5.39 2017 Base AM Model – Junction 21B – A299 / A256 / Sandwich Rd / Canterbury Rd East (Four-Arm Signalised Junction)

AM	Base Model					Validated Model			
Movement	**Observed MMQ**	**Modelled MMQ**	**% Diff**	**GEH**	**Validated**	**Modelled MMQ**	**% Diff**	**GEH**	**Validated**
A256 Lane 1	12	14	-15%	0.6	✓	14	-15%	0.6	✓
A256 Lane 2	10	13	-20%	0.8	✓	13	-20%	0.8	✓
Canterbury Rd East Lane 1	14	15	54%	1.8	✓	29	-22%	1.2	✓
Canterbury Rd East Lane 2	8				✓				✓
Sandwich Rd	2	2	-10%	0.3	✓	4	-48%	1.1	✓
Hengist Way Lane 1	7	9	-26%	0.8	✓	9	-26%	0.8	✓
Hwngist Way Lane 2	6	4	94%	1.5	✓	8	3%	0.1	✓
Hengist Way Lane 3	2				✓				✓

Table 5.40 2017 Base PM Model – Junction 21B – A299 / A256 / Sandwich Rd / Canterbury Rd East (Four-Arm Signalised Junction)

PM	Base Model					Validated Model			
Movement	Observed MMQ	Modelled MMQ	% Diff	GEH	Validated	Modelled MMQ	% Diff	GEH	Validated
A256 Lane 1	12	15	-19%	0.8	✓	15	-22%	0.9	✓
A256 Lane 2	11	14	-19%	0.7	✓	14	-22%	0.8	✓
Canterbury Rd East Lane 1	13	10	96%	2.5	?				✓
Canterbury Rd East Lane 2	7								✓
Sandwich Rd	10	3	251%	2.8	?	8	26%	0.7	✓
Hengist Way Lane 1	8	13	-40%	1.6	✓	13	-42%	1.7	✓
Hengist Way Lane 2	15	5	357%	4.8	?	18			✓
Hengist Way Lane 3	7								✓

5.4.37 Blocking back was observed on Sandwich Road and in order to account for this effect the capacity on this arm has been manually reduced. In order to account for blocking back on Hengist Way a negative green has been applied to lanes 2 and 3 to reflect the less than full utilisation of the green time. These adjustments have brought the model outputs closer to the observed queues achieving validation. The validated model has been used to test the future year modelling scenarios.

Junction 23: Star Lane / Star Lane Link (three-arm priority junction)

Table 5.41 2017 Base AM+PM Model – Junction 23 – Star Lane / Star Lane Link (Three-Arm Priority Junction)

Time Period	**AM Peak**					**PM Peak**				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated
Star Lane West to Star Lane East	3	0	456%	1.9	✓	2	0	186%	1.1	✓
Star Lane East – all movements	1	1	50%	0.3	✓	1	1	-17%	0.2	✓

5.4.38 No adjustment of the base model is considered to be required to validate the model as both the AM and PM base model results are shown to accord with the observed queues. The base model has been used to test the future year scenarios.

Junction 24: Star Lane Link / Nash Road (four-arm standard roundabout)

Table 5.42 2017 Base AM Model – Junction 24 – Star Lane Link / Nash Road (Four-Arm Standard Roundabout)

AM	**Base Model**					**Validated Model**				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Star Lane East	3	1	400%	1.6	✓	-	1	400%	1.6	✓
Nash Road South	2	0	650%	1.4	✓	-	0	650%	1.4	✓
Star Lane West	2	0	463%	1.6	✓	-	0	463%	1.6	✓
Nash Road North	4	1	683%	2.3	?	-55%	3	51%	0.7	✓

Table 5.43 2017 Base PM Model – Junction 24 – Star Lane Link / Nash Road (Four-Arm Standard Roundabout)

PM	**Base Model**					**Validated Model**				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Star Lane East	3	1	224%	1.5	✓	-	1	224%	1.5	✓

PM	Base Model					Validated Model				
Nash Road South	2	0	650%	1.7	✓	-	0	650%	1.7	✓
Star Lane West	3	1	340%	1.7	✓	-	1	340%	1.7	✓
Nash Road North	3	0	928%	2.1	?	-55%	1	208%	1.5	✓

5.4.39 The base model overestimates the capacity of Nash Road North in both AM & PM peak hours. The model has been adjusted by decreasing the capacity on this approach to bring the modelled queues closer to the observed as shown in the validated model. Further to the capacity model adjustments, the validated model results are shown to accord with the observed queues and this model has been used to test the future year scenarios.

Junction 25: Tesco Access (three-arm standard roundabout)

Table 5.44 2017 Base AM+PM Model – Junction 25 – Tesco Access (Three-Arm Standard Roundabout)

Time Period	AM Peak					PM Peak				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated
Star Lane West to Star Lane East	1	1	67%	0.4	✓	1	1	150%	0.8	✓
Star Lane West to Star Lane Link	2	0	2067%	1.9	✓	2	0	1067%	1.9	✓
Star Lane East – all movements	2	1	41%	0.4	✓	4	3	26%	0.4	✓

5.4.40 No adjustment of the base model is considered to be required to validate the model as both the AM and PM base model results are shown to accord with the observed queues.

Junction 26: Newington Rd / Manston Rd (three-arm mini roundabout)

Table 5.45 2017 Base AM Model – Junction 26 – Newington Rd / Manston Rd (Three-Arm Mini Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Newington Rd North	4	1	271%	1.9	✓	-35%	3	32%	0.5	✓
Newington Rd South	5	5	-1%	0.0	✓	-	4	19%	0.4	✓
Manston Rd	6	16	-63	3.1	?	-	5	8%	0.2	✓

5.4.41 Despite the model validating during the AM period a minor adjustment has been made to Newington Road North to better align it to the observed queues. Further to the capacity model adjustments, the validated model results are shown to accord with the observed queues and this model has been used to test the future year scenarios.

Table 5.46 2017 Base PM Model – Junction 26 – Newington Rd / Manston Rd (Three-Arm Mini Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Newington Rd North	17	1	1973%	5.4	✘	-59%	17	2%	0.1	✓
Newington Rd South	3	3	3%	0.0	✓	-	3	16%	0.2	✓
Manston Rd	17	17	-63%	5.2	✘	-	17	1%	0.1	✓

5.4.42 Given that in PM peak the base model overestimates the capacity of Newington Road North, the PM model has been adjusted by decreasing the capacity to bring the modelled queues closer to the observed as shown in the validated model. Different capacity adjustment has been made for the AM and PM validated models to ensure they both align to the observed queues. Further to the capacity model adjustments, both models are considered to validate and have been used to test the future year modelling scenarios.

Junction 27: Newington Rd / High Street (three-arm mini roundabout)

Table 5.47 2017 Base AM Model – Junction 27 – Newington Rd / High Street (Three-Arm Mini Roundabout)

AM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated
Newington Rd North	9	87	-89%	11.2	✘	+50%	9	7%	0.2	✓
Newington Rd South	12	30	-61%	3.9	?	-	12	-4%	0.2	✓
Manston Rd	9	24	-63%	3.7	?	+12%	8	3%	0.2	✓

5.4.43 The AM base model underestimates the capacity of all the approach roads and therefore has been adjusted by increasing its capacity to bring the modelled queues closer to the observed as shown in the validated model outputs. Further to the capacity model adjustments, the validated model results are shown to accord with the observed queues.

Table 5.48 2017 Base PM Model – Junction 27 – Newington Rd / High Street (Three-Arm Mini Roundabout)

PM	Base Model					Validated Model				
Movement	Observed MMQ	Modelled Average Queue	% Diff	GEH	Validated	Capacity Adjustment	Modelled Average Queue	% Diff	GEH	Validated

PM	Base Model					Validated Model				
Newington Rd North	12	213	-94%	18.9	✘	+75%	12	8%	0.2	✓
Newington Rd South	13	14	-5%	0.2	✓	-	9	44%	1.2	✓
Manston Rd	12	72	-83%	9.2	✘	+22%	11	9%	0.3	✓

5.4.44 The PM base model underestimates the capacity of the junction and therefore has been adjusted by increasing its capacity to bring the modelled queues closer to the observed as shown in the validated model outputs. Further to the capacity model adjustments, the validated model results are shown to accord with the observed queues. Different capacity adjustment has been made for the AM and PM validated models. The validated models have been used to test the future year modelling scenarios.

Junction 28: Wilfred Rd / A255 / Grange Rd (four-arm signalised roundabout)

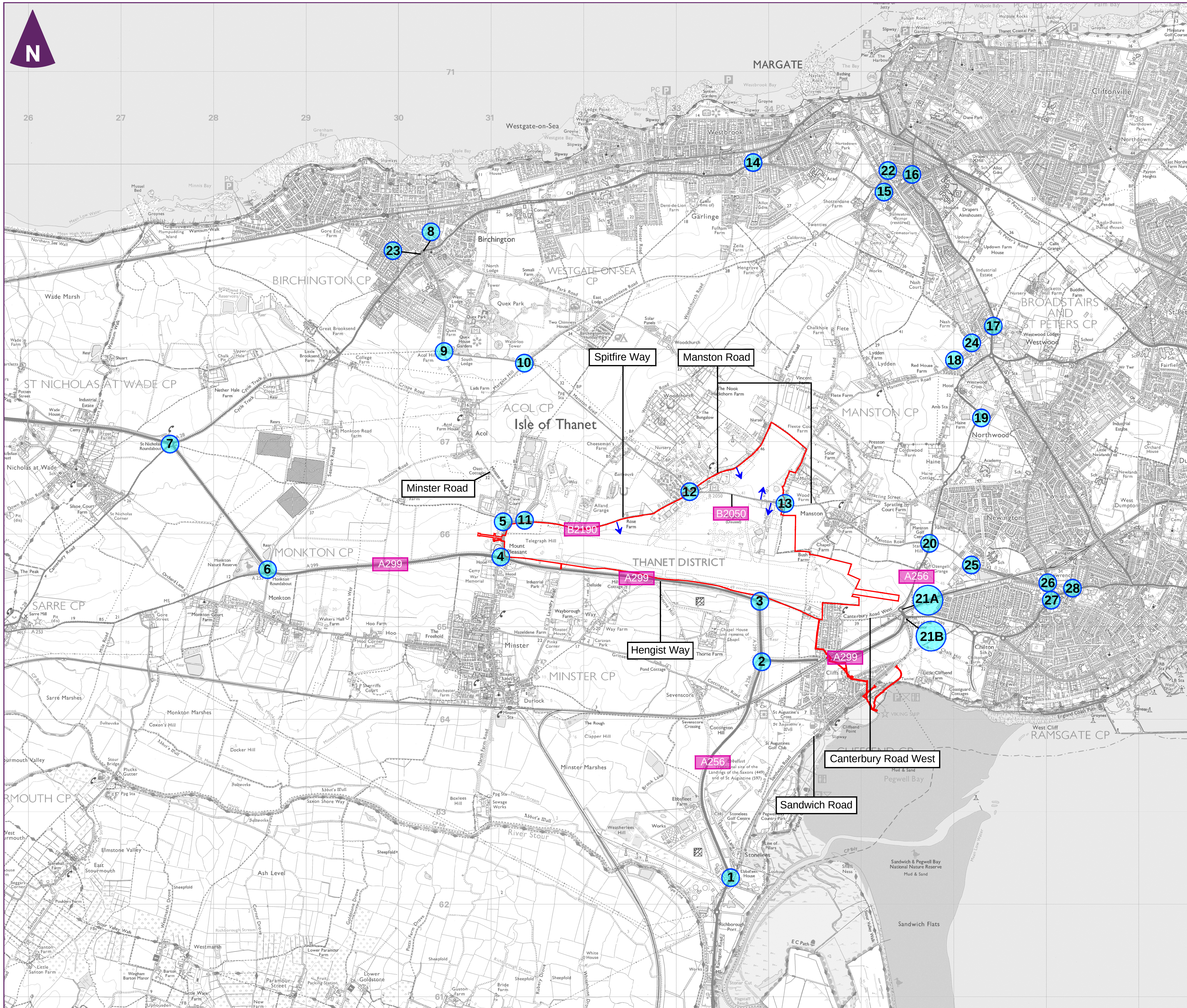
Table 5.49 2017 Base AM+PM Model – Junction 28 – Tesco Access (Three-Arm Standard Roundabout)

Time Period	AM Peak					PM Peak				
Movement	Observed MMQ	Modelled MMQ	% Diff	GEH	Validated	Observed MMQ	Modelled MMQ	% Diff	GEH	Validated
Wilfred Rd	8	9	-7%	0.2	✓	11	10	5%	0.2	✓
A255 Park Rd	9	10	-9%	0.3	✓	10	8	29%	0.8	✓
Grange Rd	5	5	1%	0.0	✓	5	5	9%	0.2	✓
A255 High Street	17	15	12%	0.5	✓	25	19	34%	1.3	✓

5.4.45 The base model validates to the observed queues and has been adopted for the future year testing.

5.5 Summary

5.5.1 A comparison of the existing network performance from recorded data in 2017 has provided this assessment with validated junction models that represent the existing base line conditions. These validated baseline models will be used as a basis for all future year testing of the Proposed Development impacts.



Key

Order Limits

Key junction

1 A256/Sandwich Road
2 A256/A299/Cottingham Link Road
3 A299/Canterbury Road West
4 A299/B2190 (Minster Road)/B2190 (Tothill Street)
5 B2190/Minster Road
6 A253 (Canterbury Road)/A299/Willetts Hill/Seamark Road
7 A299/A28 (Canterbury Road)/ Potten Street Road
8 A28 Canterbury Road/ The Square (The Station Road)
9 B2050 (Park lane)/Acol Hill/ B2050 (Manston Road)
10 B2050 (Manston Road)/Shottendane Road/Margate Hill
11 B2190 (Spitfire Way)/Columbus Avenue
12 B2050 (Manston Road)/Shottendane Road/B2190 (Spitfire Way)
13 B2050 (Manston Road)/Manston Court Road
14 A28 (Canterbury Road)/B2052 (George V Avenue)
15 B2052 Hartsdown Road/B2052 (Tivoli Road)/B2052 (College Road)/Nash Road/Empire Terrace/ManstonRoad (Coffin Corner)
16 A254 (Ramsgate Road)/B2052 (College Road)/B2052 (Beatrice Road)
17 A254 (Margate road)/A254 (Ramsgate Road)/Star Lane/Poorhole Lane
18 Star Lane Link/Manston court Road
19 A256 New Haine Road/New Cross Road
20 A256 (Haine Road)/B2050 (Manston Road)
21A A256 Haine Road/Canterbury Road West/A256
21B A299(Canterbury Road East)/A299 (Hengist Way)/Sandwich Road/A256 Lord of the Manor Roundabout
22 B2052 (Tivoli Road)/Tivoli Road/B2052 (Beatrice Road)
23 B2052 Park Lane/A28 (Canterbury Road)
24 Star Lane/Nash Road
25 B2050 Manston Road/Tesco Supermarket Access
26 B2050 (Manston Road)/B2014 (Newington Road)
27 B2014 (Newington Road)/A255 (High Street)
28 A255 (High Street)/A255 (Park Road)/Wilfred Road/Grange Road

Access points

0 m 1000 m 2000 m

Scale 1:40000 @ A3

Client

RSP

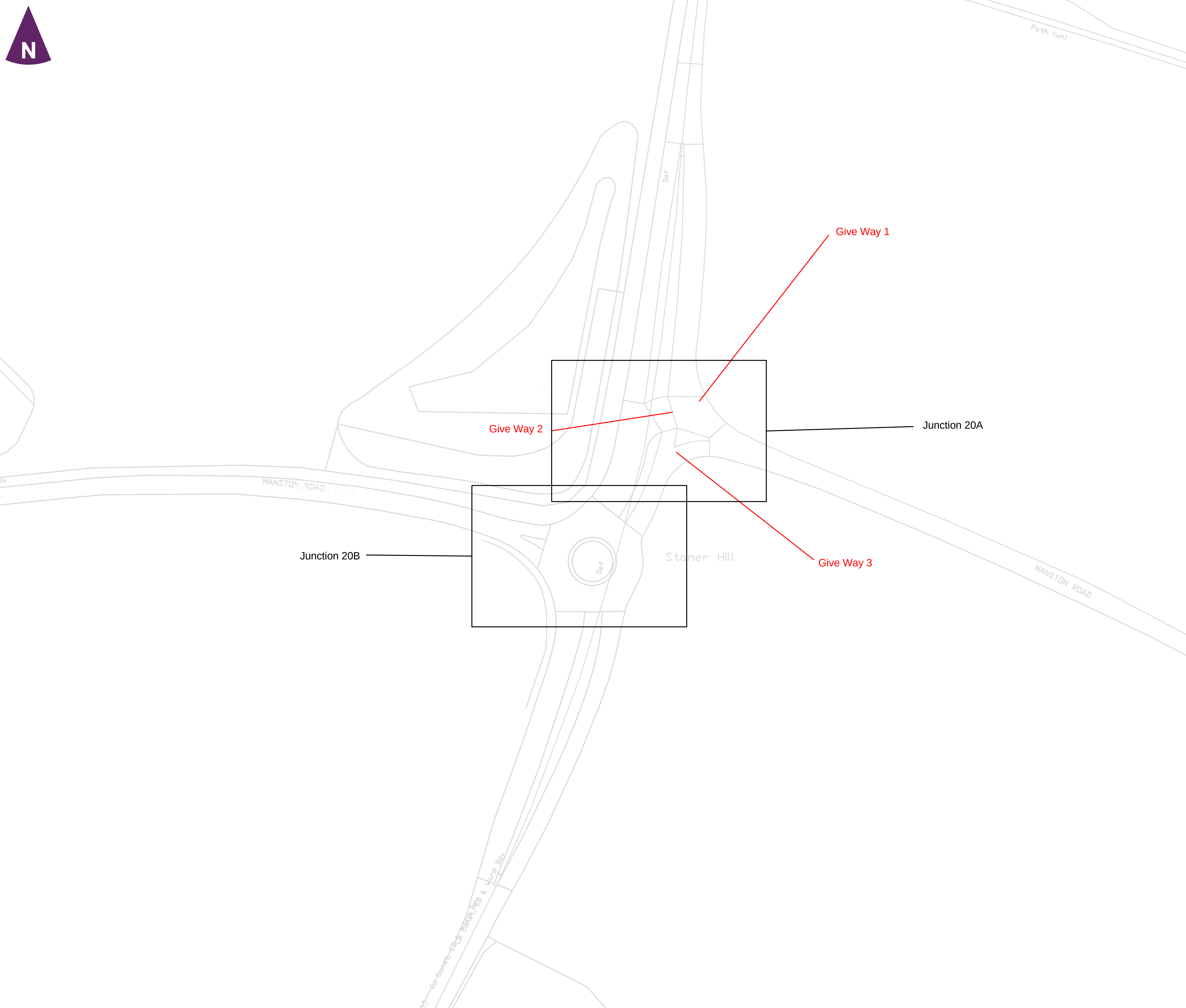
Manston Airport DCO
Transport Assessment

amec foster wheeler

Figure 5.1
Junctions within the scope of assessment

March 2018

38199-Lon501.dwg guya



Key

0 m 50 m

Scale 1:1250 @ A3

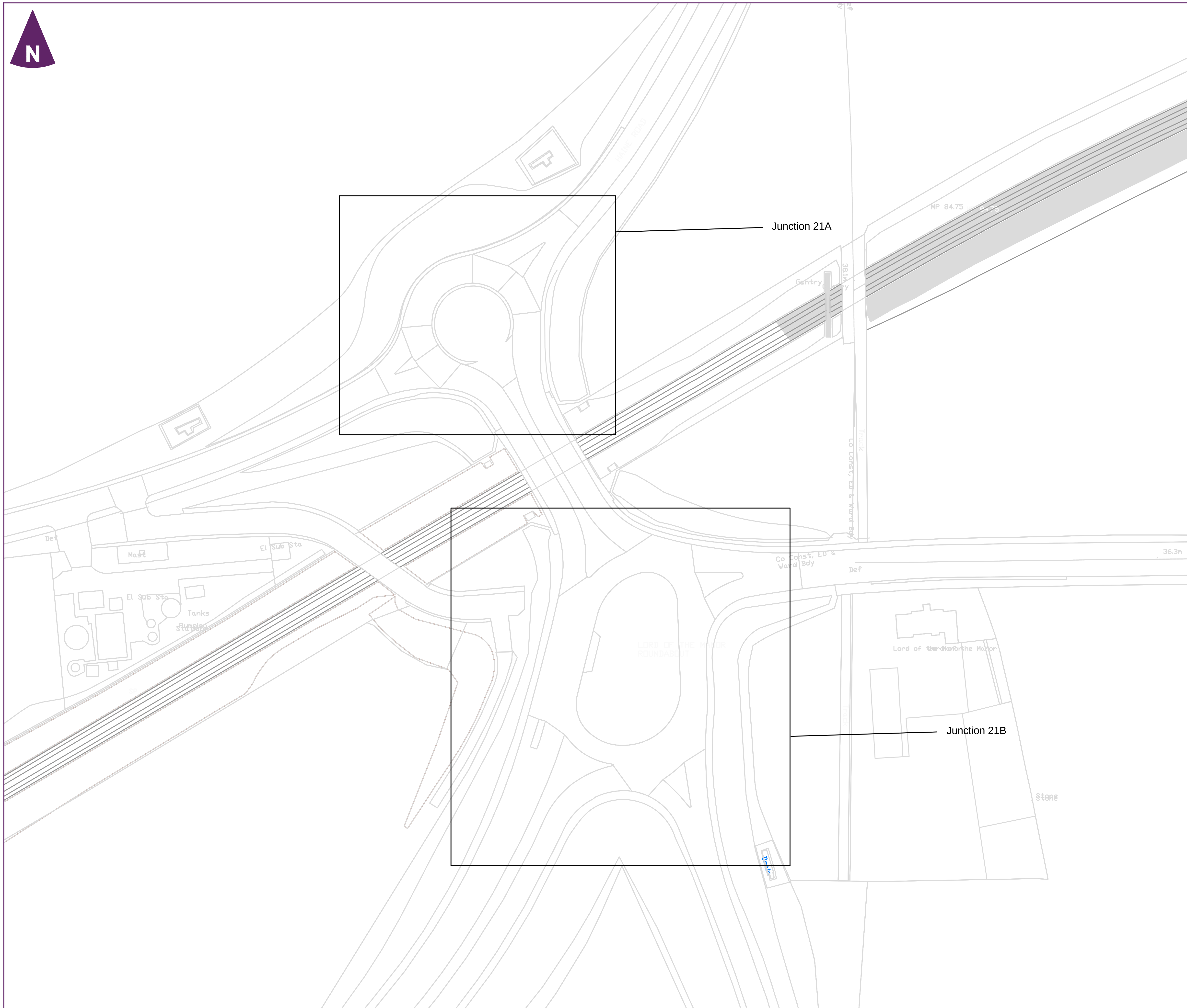
Client

Manston Airport DCO
Transport Assessment

Figure 5.2
Plan of junction 20

March 2018

38199-Lon502.dwg guya



Key

0 m 50 m
Scale 1:1250 @ A3

Client

RSP

Manston Airport DCO
Transport Assessment

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Figure 5.3
Plan of junction 21

March 2018 38199-Lon503.dwg guya

6. Development Proposals and Traffic Generation

6.1.1 This section of the TA sets out the details of the existing site, the Proposed Development and the traffic generation and distribution methodology for operational traffic. The details of the construction traffic generation and distribution methodology has been set out in the Preliminary CTMP included in **Appendix K**.

6.2 Existing Manston Airport

6.2.1 The site covers an area of approximately 296ha (732 acres) and comprises a combination of existing buildings and hardstanding, large expanses of grassland, and some limited areas of scrub and/or landscaping. This includes the 2,748m long, 60m wide runway, which is orientated in an east-west direction across the southern part of the site. The existing buildings are clustered along the east and north-west boundaries of the site, as shown on **Figure 6.1**, and include:

- a cargo handling facility comprising two storage warehouses 6 - 8m high, and one hangar 12m high, all finished with metal cladding, on an area of 5,200m^2, with gated entrances and a security box;
- a 12m high fire station building, constructed of brick and with a corrugated metal roof, on an area of 2,200m^2;
- a helicopter pilot training facility comprising two 10m high hangars with metal cladding, on an area of 950m^2;
- two 5m high museum buildings of brick construction, on an area of 2,000m^2;
- a 4m high terminal building, on an area of 2,400m^2;
- a 6m high air traffic control (ATC) building, including a 9m high viewing tower, on an area of 700m^2;
- a 12m high airplane maintenance hangar, with a taller 16m high movable section to enclose an airplane tail fin, on an area of 4,700m^2; and
- a fuel farm.

6.2.2 A network of hard surfacing, used for taxiways, aprons, passenger car parking, and roads connects the buildings to the runway and to the two main airport entrance points that are located in the east and west of the site. The buildings and facilities are generally surrounded by grassland. Post and wire security fencing of varying height runs alongside most of the airport perimeter.

6.2.3 The part of the site to the north of the B2050 (Manston Road), which bisects the centre of the site in a roughly east-west direction, is referred to as the ‘Northern Grass Area’. This part of the site is predominantly grassland, with some areas of hard standing, including a stretch of taxiway that formerly linked across to the main taxiway network. The two museums, the Spitfire and Hurricane Memorial Museum, and the Royal Air Force (RAF) Manston Museum, are located in the south-western corner of the ‘Northern Grass’. A small number of other redundant buildings, such as the former RAF ATC tower, are also located on the ‘Northern Grass Area’.

6.3 The Proposed Development

Overview

6.3.1 The aim of the Proposed Development is to reopen and develop Manston Airport into a dedicated air freight facility, which also offers passenger, executive travel, and aircraft engineering services. The facilities for air freight and cargo operations would be able to handle in excess of 10,000 air freight traffic movements per year, and the airport and facilities at the airport would be compliant with European Aviation Safety Agency (EASA), or other relevant licensing organisation standards.

6.3.2 A summary of the works to be undertaken as part of the proposed development are presented below:

- upgrade of Runway 28 to allow anticipated flights to arrive and depart;
- realignment of the parallel taxiways to provide compliant clearances to runway operations;
- construction of 19 aircraft stands for air freight aircraft;
- installation of new high mast lighting for aprons and stands;
- construction of 65,500m² of cargo facilities on the airport site;
- construction of a new ATC tower and demolishing the existing tower;
- construction of a new airport fuel farm;
- existing fire station refurbishment/replacement;
- construction of new aircraft maintenance hangars;
- development of the ‘Northern Grass Area’ for airport related businesses;
- safeguarding of the RAF Manston Museum and the Spitfire and Hurricane Memorial Museum and enhancement of existing facilities for museums on the site;
- highway improvement works, both on and off site; and
- extension of passenger service facilities including an apron extension to accommodate an additional aircraft stand and doubling of the current terminal size.

6.3.3 It is proposed that the airport will have capacity for circa 1.5million passengers per annum.

6.3.4 The proposed masterplan is provided as **Figure 6.2.**

Proposed site access

6.3.5 A series of new or enhanced access arrangements are needed to serve the Proposed Development:

- Cargo Facility – new access onto Spitfire Way in the form of a roundabout;
- Passenger Terminal – existing southern access onto Manston Road will be upgraded to a signal junction;
- Northern Grass Area – new southern access onto Manston Road in the form of a signal junction;
- Northern Grass Area – new western access onto Manston Road in the form of a priority junction; and
- Fuel Farm – exiting access onto Canterbury Road West will remain unchanged.

6.3.6 The accesses have been designed in accordance with the national design standards set out in the Design Manual for Roads and Bridges (DMRB) and have been based on junction modelling to ensure that the design has capacity to accommodate the full development and future traffic flows. The details of this work are provided as Section 7 of this TA, and briefly described below.

Cargo facility access with Spitfire Way

6.3.7 The Cargo Facility and associated vehicle parking for HGVs and staff will be served by one access which will be a new junction off Spitfire Way. This is proposed to be a three-arm roundabout.

Passenger terminal access with Manston Road

6.3.8 The Passenger Terminal and associated car parking for passengers and staff will be served by one access which is in the same location as the existing. The junction will be upgraded to a fully signalised junction, linked with a second new junction to the west (Northern Grass Area Southern Access).

6.3.9 The junction has been designed to incorporate pedestrian crossing facilities across the Airport access arm and across Manston Road.

Northern grass areas southern access with Manston Road

6.3.10 The Northern Grass Area will be served by two accesses, the main one being off the B2050 Manston Road which will be a three-arm signal junction and will be linked with the Passenger Terminal junction to optimise traffic flow throughput.

6.3.11 The junction has been designed to incorporate pedestrian crossing facilities across the access arm and across Manston Road.

Northern grass area western access with Manston Road

6.3.12 The second access to the Northern Grass Area will be off Manston Road to the west of the site. This will be a ghost island priority junction which incorporates a right turn lane.

Fuel farm access

6.3.13 The existing access to the fuel farm off Canterbury Road West is not proposed to be amended in any way as it is an established access to the facility that has been designed to accommodate large tankers.

6.3.14 **Figure 6.3** sets out the locations of the accesses set out above.

6.3.15 Detailed traffic and transport modelling of these junctions showing suitable operation in the future year development scenario are provided later in this TA in section 9.

Proposed development programme and phasing

6.3.16 The anticipated project programme is set out in **Table 6.1**.

Table 6.1 Project Programme

Component	Start Date	End Date	Airport Year of Operation
Construction Phase 1	Q3 2019	Q4 2020	Yrs. 1-2
Opening of the Airport	Q4 2020	N/A	Yr. 2
First Full Year of Freight Operations	Q1 2021	N/A	Yr. 3
Construction Phase 2	Q4 2020	2023	Yrs. 2-5
Start of Passenger Services	Q1 2022	N/A	Yr. 4
Construction Phase 3	2023	2030	Yrs. 5-12
Construction Phase 4	2030	2036	Yrs. 12-18
Peak Operations at the Airport	2039	N/A	Yr. 20

6.3.17 The estimated phasing is set out in **Table 6.2** below.

Table 6.2 Estimated Phasing

Programme Year	Construction Periods	Passenger Flights Per Year	Freight Facility lights per year
1 (2020)	Construction Phase 1 (Peak)	N/A	N/A
2 (2021)	Construction Phase 1 (Peak)	N/A	Cargo Facility Opens - 5,252
3 (2022)	Construction Phase 2 (Peak)	Terminal opens – 4,932	5,804
4 (2023)	Construction Phase 2 (Peak)	5,024	9,700
5 (2024)	Construction Phase 3	5,064	9,936
6 (2025)	Construction Phase 3	6,072	10,114
7 (2026)	Construction Phase 3	6,754	10,872
8 (2027)	Construction Phase 3	6,754	11,184
9 (2039)	Construction Phase 3	6,754	11,392
10 (2029)	Construction Phase 3	6,754	11,600
11 (2030)	Construction Phase 3	6,966	12,064
12 (2031)	Construction Phase 4	7,186	12,547
13 (2032)	Construction Phase 4	7,416	13,048
14 (2033)	Construction Phase 4	7,654	13,570
15 (2034)	Construction Phase 4	7,902	14,113
16 (2035)	Construction Phase 4	8,160	14,678
17 (2036)	Construction Phase 4	8,428	15,265
18 (2037)	Construction Phase 4	8,707	15,875
19 (2039)	***No Construction***	8,997	16,510
20 (2039)	***No Construction***	9,289 (Peak)	17,170 (Peak)

6.3.18 **Table 6.2** sets out some important considerations as follows:

- There are no construction traffic movements in the peak operational year (2039); and
- Construction Phases 1 and 2 are proposed to be the peak year for construction traffic movements based on calculations provided by the project team (as set out in the Preliminary CTMP).

6.4 Operational Airport Traffic Generation Methodology

6.4.1 This section sets out the methodology for estimating the operational traffic over the 20 year period of Proposed Development programme through to peak operating capacity. The methodology has been based on a series of detailed aviation estimates and figures developed by the wider project team.

6.4.2 The operational traffic generation of the proposed development is broadly split into several specific elements of the proposed site as follows:

- Freight trips (operational and staff);
- Passenger movements;
- Northern Grass Area development trips (staff and HGVs);
- Fuel farm tanker requirements;
- Redeveloped museum trips;
- Staff related to various elements of the airport operation; and
- Airport servicing HGVs.

6.4.3 For completeness, the TA includes the calculations for all years across the 24-year period and sets out how these figures have been developed. The traffic generation tables are included in **Appendix E.**

Freight HGV traffic generation

6.4.4 To inform the traffic generation for the proposed freight facility details for the twenty-year programme were provided by the client for the total import and export of cargo (in tonnage) across the period which results in the total flights as set out in **Table 6.2**. **Table 6.3** sets out the year and tonnage arriving at the airport (import), tonnage departing the airport (export) and total tonnage.

Table 6.3 Cargo Facility Total Tonnage Per Annum

Year	Tonnage	Year	Tonnage	Year	Tonnage	Year	Tonnage
1	N/A	6	Im – 85,832 Ex – 95,604 Tot – 181,436	11	Im – 107,592 Ex – 114,785 Tot – 222,377	16	Im – 140,889 Ex – 143,015 Tot – 283,904
2	Im – 39,865 Ex – 56,687 Tot – 96,553	7	Im – 92,375 Ex – 100,551 Tot – 192,908	12	Im – 114,034 Ex – 120,473 Tot – 234,508	17	Im – 146,524 Ex – 150,070 Tot – 296,594
3	Im - 47,335 Ex – 61,218 Tot – 108,553	8	Im – 96,979 Ex – 103,694 Tot – 200,673	13	Im – 118,691 Ex – 125,999 Tot – 244,690	18	Im – 156,217 Ex – 156,073 Tot – 312,344
4	Im – 76,326 Ex – 90,765 Tot – 167,092	9	Im – 112,105 Ex – 104,660 Tot – 216,765	14	Im – 125,949 Ex – 131,039 Tot – 256,989	19	Im – 162,522 Ex – 162,316 Tot – 324,838
5	Im – 81,455 Ex – 92,286 Tot – 173,741	10	Im – 102,609 Ex – 109,742 Tot – 212,351	15	Im – 133,064 Ex – 137,515 Tot – 270,579	20	Im – 171,949 Ex – 168,809 Tot – 340,758

6.4.5 Table 6.3 sets out the total tonnage into and out of the airport but this does not take into account the "tail to tail ratio" which accounts for goods that are imported into the airport, never leave the site, and are exported on another flight. This percentage is 10%. As such 10% of the total tonnage of freight imported and exported does not result in requiring a vehicle movement on the local highways network.

6.4.6 The freight has been assumed to leave the airport in 10 tonne HGV loads to be robust and in line with other facilities in the UK.

6.4.7 Taking into account this HGV load figure and the 10% tail to tail ratio, **Table 6.4** sets out the total HGVs generated per year to the proposed cargo facility.

Table 6.4 Cargo Facility Total HGVs Per Annum

Year	Annual HGVs	Year	Annual HGVs	Year	Annual HGVs	Year	Annual HGVs
1	N/A	6	Im – 7,725 Ex – 8,604 Tot – 16,329	11	Im – 9,683 Ex – 10,331 Tot – 20,014	16	Im – 12,680 Ex – 12,871 Tot – 25,551
2	Im – 3,588 Ex – 5,102 Tot – 8,690	7	Im – 8,312 Ex – 9,050 Tot – 17,362	12	Im – 10,263 Ex – 10,843 Tot – 21,106	17	Im – 13,187 Ex – 13,506 Tot – 26,693
3	Im – 4,260 Ex – 5,510 Tot – 9,770	8	Im – 8,728 Ex – 9,332 Tot – 18,061	13	Im – 10,682 Ex – 11,340 Tot – 22,022	18	Im – 14,064 Ex – 14,047 Tot – 28,111
4	Im – 6,869 Ex – 8,169 Tot – 15,038	9	Im – 10,089 Ex – 9,419 Tot – 19,509	14	Im – 11,335 Ex – 11,794 Tot – 23,129	19	Im – 14,627 Ex – 14,608 Tot – 29,235
5	Im – 7,331 Ex – 8,306 Tot – 15,637	10	Im – 9,235 Ex – 9,877 Tot – 19,112	15	Im – 11,976 Ex – 12,376 Tot – 24,352	20	Im – 15,475 Ex – 15,193 Tot – 30,668

6.4.8 To understand the daily and hourly flows of the HGVs, comparable with other key logistics sites across the UK, it assumed that the facility operates 365 days a year, 24 hours a day. An adjustment of these figures has been applied to consider efficient working, i.e. that a HGV may bring a full load to the airport and depart with a full load. For robust assessment, it is assumed that only 30% of these the HGVs are working efficiently for arrivals and departures to the airport.

6.4.9 The resulting figures for arrivals and departures to the cargo facility site and as such the final daily figures for freight movement (taking into account rounding up) are presented in **Table 6.5.**

Table 6.5 Cargo Facility Total HGVs Per Day

Year	Daily HGVs	Year	Daily HGVs	Year	Daily HGVs	Year	Daily HGVs
1	N/A	6	Arrivals – 64 Deps – 64 2-Way – 128	11	Arrivals – 78 Deps – 78 2-Way – 156	16	Arrivals – 98 Deps – 98 2-Way – 196
2	Arrivals – 34 Deps – 34 2-Way – 68	7	Arrivals – 68 Deps – 68 2-Way – 136	12	Arrivals – 82 Deps – 82 2-Way – 164	17	Arrivals – 104 Deps – 104 2-Way – 208
3	Arrivals – 38 Deps – 38 2-Way – 76	8	Arrivals – 70 Deps – 70 2-Way – 140	13	Arrivals – 84 Deps – 84 2-Way – 168	18	Arrivals – 108 Deps – 108 2-Way – 216
4	Arrivals – 58 Deps – 58 2-Way –106	9	Arrivals – 76 Deps – 76 2-Way – 152	14	Arrivals – 90 Deps – 90 2-Way – 180	19	Arrivals – 112 Deps – 112 2-Way – 224
5	Arrivals – 62 Deps – 62 2-Way – 124	10	Arrivals – 74 Deps – 74 2-Way – 148	15	Arrivals – 94 Deps – 94 2-Way – 188	20	Arrivals – 118 Deps – 118 2-Way – 236

6.4.10 The arrivals and departures per day have been evenly split across the 24-hour period with some slight tailing off in the 21:00 – 00:00 period as may be expected with overnight shift working, but as set out above this facility will be running across all 24 hours with movements into and out of the site potentially at all times. Table 1.1 provided in **Appendix E** sets out the flows across 24 hours for arrivals and departures across the twenty-year programme.

Airport passenger traffic generation

6.4.11 To inform the traffic generation for the proposed passenger terminal details for the 20-year programme were provided by the client with regards to anticipated total passenger movements and flights per year. The total number of flights per year has been set out in **Table 6.2**, but initial estimates are that these flights would be split between a range of carriers with differing average load amounts (passengers per aircraft).

6.4.12 Calculations were undertaken to split down the total flights per year to daily flights for each of the three key carriers. These are set out in **Table 6.6**. It should be noted that the three anticipated carriers are KLM, Blue Air (Blue) and Ryanair (Ryan).

Table 6.6 Anticipated Passenger Flights Per Day, Per Carrier

Year	Flights	Year	Flights	Year	Flights	Year	Flights
1	N/A	6	KLM – 4 Blue – 0 Ryan – 13	11	KLM – 4 Blue – 0 Ryan – 14	16	KLM – 4 Blue – 1 Ryan – 17
2	N/A	7	KLM – 4 Blue – 0 Ryan – 13	12	KLM – 4 Blue – 0 Ryan – 15	17	KLM – 4 Blue – 1 Ryan – 18
3	KLM – 4 Blue – 0 Ryan – 9	8	KLM – 4 Blue – 0 Ryan – 13	13	KLM – 4 Blue – 0 Ryan – 15	18	KLM – 4 Blue – 1 Ryan – 18
4	KLM – 4 Blue – 0 Ryan – 9	9	KLM – 4 Blue – 0 Ryan – 14	14	KLM – 4 Blue – 0 Ryan – 16	19	KLM – 4 Blue – 1 Ryan – 19
5	KLM – 4 Blue – 0 Ryan - 9	10	KLM – 4 Blue – 0 Ryan – 14	15	KLM – 4 Blue – 0 Ryan – 16	20	KLM – 4 Blue – 1 Ryan - 21

6.4.13 The figures presented in **Table 6.6** set out just the total anticipated flights per day at the airport with no split between arrivals and departures, or time of arrivals or departures. To understand how these flights might be split between arrivals and departures data from the flights schedules of other comparable airports has been used. These airports were as follows:

- Southampton – Similar passenger numbers;
- Cardiff – Similar passenger numbers;
- Southend – Similar passenger numbers; and
- East Midlands – An airport with cargo facilities such as are proposed at Manston.

6.4.14 The data for flights into and out of these airports were extrapolated for the 2nd October 2017. The total amount of arrivals and departures for the day were collated and this presented the following:

- Southampton – 50% of total flights arrivals – 50% of total flights departures;
- Cardiff – 50% of total flights arrivals – 50% of total flights departures;
- Southend – 56% of total flights arrivals – 44% of total flights departures;
- East Midlands – 51% of total flights arrivals – 49% of total flights departures; and
- Average – 52% of total flights arrivals – 48% of total flights departures.

6.4.15 In addition to the split of arrivals and departures, the data for the comparable airports was also interrogated to understand the average profile of the arrivals and departures across the day. **Table 6.7** sets out the results of this assessment.

Table 6.7 Split of Passenger Flight Arrivals and Departures Across 24 hours

Time Period	Departures	Arrivals
06:00 - 07:00	9.8%	0.0%
07:00 - 08:00	14.1%	2.0%
08:00 - 09:00	7.4%	8.1%
09:00 - 10:00	2.5%	6.0%
10:00 - 11:00	5.5%	3.4%
11:00 - 12:00	3.7%	4.7%
12:00 - 13:00	3.1%	8.7%
13:00 - 14:00	6.7%	5.4%
14:00 - 15:00	5.5%	6.7%
15:00 - 16:00	7.4%	4.7%
16:00 - 17:00	6.7%	10.7%
17:00 - 18:00	7.4%	3.4%
18:00 - 19:00	6.1%	8.1%
19:00 - 20:00	8.0%	6.0%
20:00 - 21:00	3.1%	5.4%
21:00 - 22:00	2.5%	8.1%
22:00 - 23:00	0.6%	8.7%

6.4.16 The split between arrivals and departures as well as the 24-hour period profile have then been applied to the estimates of flights per day to understand a schedule of arrivals and departures for Manston Airport Passenger Terminal in Table 1.2 and Table 1.3 in **Appendix E** which set out the anticipated arrivals and departures.

6.4.17 With the flight times now established across the 24-hour period for all 20 years, an understanding of the amount of passengers these flights would generate was necessary. Average loads for the three carriers were provided by aviation experts which set out that for KLM on average there would be 52 passengers per flight, and for Ryanair and Blue Air the average load figure would be 170.

6.4.18 These average loads have then been applied to the flights per day to set out the following passenger movements per flight across the 24-hour period. Table 1.4 and Table 1.5 within **Appendix E** sets the arrivals and departure passenger numbers.

6.4.19 Green figures in Table 1.4 and Table 1.5 in **Appendix E** represent Ryan Air Flights, orange represents KLM and blue represents the Blue Air Flights.

6.4.20 With the passenger numbers established how these passengers would affect the local highway network was the next key issue. Because the site is proposed to be an airport, travel patterns are different to those you might expect of a work trip for example. Traditionally passengers like to arrive with plenty of time to catch a flight and as such the following assumptions were made:

- 20% of departing passengers would arrive at the airport two hours before flight departure;
- 80% of departing passengers would arrive at the airport three hours before flight departure; and
- 100% of all arriving passengers would depart the airport site one hour after flight arrives.

6.4.21 The application of these assumptions would therefore generate the following passenger movements set out in Tables 1.6 and 1.7 within **Appendix E.**

6.4.22 The passenger movements which arrive and depart the airport site would do so via differing transport modes. Aviation experts have provided estimates of the mode share and how this is anticipated to change across the 20-year programme as set out in **Table 6.8.**

Table 6.8 Passenger Mode Share Estimates (Day)

Mode of Transport	Initial	10 years	20 years
Bus	3%	6%	9%
Taxi	5%	5%	5%
Car Parked	45%	40%	35%
Car drop off	45%	40%	35%
Rail (Then Bus)	0%	5%	10%
Shared taxi	2%	4%	6%

6.4.23 It should be noted however that this passenger mode share cannot be applied uniformly across the 24-hour period as during certain times of the day mode share such as bus and rail may not be available (overnight). **Table 6.9** sets out the more appropriate overnight mode share that has also been applied in this traffic flow methodology.

Table 6.9 Passenger Mode Share Estimates (Night)

Mode of Transport	Initial	10 years	20 years
Bus	N/A	N/A	N/A
Taxi	6%	8%	10%
Car Parked	46%	43%	40%
Car drop off	46%	43%	40%
Rail (then bus)	N/A	N/A	N/A
Shared Taxi	2.8%	7%	11%

6.4.24 The initial mode shares in **Table 6.8** and **Table 6.9**, are based on those typical for smaller airports (i.e. less than 2mppa) in:

- Rural locations,
- Away from major population centres
- With functional (but not direct) trunk road access – (i.e it is accessible within a few miles on A or B class roads)
- No proximate rail station making bus and shared taxi modes
- Mainly outbound, but also with niche tourism opportunity, and
- A car parking strategy which seeks to balance the need for the airport to raise revenue and enable staff working shifts to arrive by car, with incentives to passengers and staff to use public transport along corridors offering sufficient demand where it is convenient for them to do so.

6.4.25 Newquay, Cardiff, Exeter, Inverness, Durham Tees Valley, Norwich and City of Derry are all useful potential benchmarks for the assumed 'Initial' mode split.

6.4.26 An allowance for the occupancy of each mode share has been made, as described below.

- Car Parked/Car Drop Off/Taxi – based on data from the CAA "Passenger Survey Report 2016", of all trips to UK airports 19.5% are for Business and 80.5% for leisure. The estimates for the Proposed Development are a car occupancy rate of 1.2 people per vehicle for business trips, and 2.1 people per vehicle for leisure trips.
- Shared Taxi – these have a slightly differing occupancy rate as these are services that pick passengers up from home (or hotel) and transport passengers to the airport (and vice-versa), using a high occupancy vehicles or mini bus. The average size of a UK mini bus is 16 seats and it's estimated that to make a service profitable the shared taxi service would run at a high occupancy, estimated to be 70%. As such the vehicle occupancy rate for shared taxi is 11 people per vehicle.

6.4.27 Occupancy rates are based on broader patterns for medium to long road-based journeys, and focus on those who arrive and park at the airport, rather than 'kiss and fly' passengers who are dropped off by another driver/friends.

6.4.28 A conservative set of occupancy rates have been adopted to ensure that we are not under-estimating potential trips: hence 1.4 (which is typical for business passengers in surveys undertaken at smaller airports, becomes 1.2 and 2.4 for leisure passengers becomes 2.1.)

6.4.29 Occupancy rates were not required for bus or rail (then bus) mode shares as fixed schedule of buses into and out of the site has been used to be more robust. To have applied occupancy rates may have ended up with no requirement for buses in many periods when it is actually estimated buses will run to and from the site between the hours of 06:00 – 22:00 constantly, as these services may also be used by staff and other local users.

6.4.30 The final consideration for the vehicles once they had been calculated was if these resulted in an arrival and departure to and from the site or just an arrival or departure. For example, taxi movements would generate an in and an out movements of the airport site, but someone parking a car for a departing flight would only generate an inbound trip.

6.4.31 Tables 1.8 and 1.9 within **Appendix E** set out the total daily vehicles over the 20-year programme.

Northern grass area traffic generation

6.4.32 The traffic generation methodology developed for the Northern Grass Area is based on a more traditional approach of using TRICS. The Northern Grass Area is airport related business development. To base an assessment on this area the following key development details have been established

- 105,100m^2 gross floor area (GFA);
- 75% of the development will be B8 Warehousing; and
- 25% of the development will be B1 office/light industrial.

6.4.33 The full buildout of all 105,100m^2 GFA is anticipated by year 20 with the first elements of the site opened in year 2. The wider project team has advised on the staff numbers over the 20-year programme.

6.4.34 The trip rates extracted from TRICS are as set out in **Tables 6.10** to **6.15**.

6.4.35 To understand the trip rates for each of the two land use modes, the Business Park Trip rate definition with the TRICS data base has been used for the proposed office/light industrial area and the Warehousing classification for the Warehousing area.

Business park trip rates

Table 6.10 Office/Light Industrial – Business Park – Total Vehicles

Time	Arrivals Trip Rate	Departures Trip Rate	Total Trips Rate
07:00-08:00	0.672	0.131	0.803
08:00-09:00	1.524	0.204	1.728
09:00-10:00	0.671	0.217	0.888
10:00-11:00	0.207	0.161	0.368
11:00-12:00	0.317	0.26	0.577
12:00-13:00	0.306	0.385	0.691
13:00-14:00	0.334	0.267	0.601
14:00-15:00	0.227	0.31	0.537
15:00-16:00	0.246	0.397	0.643
16:00-17:00	0.295	0.866	1.161
17:00-18:00	0.165	1.228	1.393
18:00-19:00	0.058	0.384	0.442

Table 6.11 Office/Light Industrial – Business Park - HGVs

Time	Arrivals Trip Rate	Departures Trip Rate	Total Trips Rate
07:00-08:00	0.002	0.005	0.007
08:00-09:00	0.008	0.004	0.012
09:00-10:00	0.012	0.009	0.021
10:00-11:00	0.008	0.013	0.021
11:00-12:00	0.007	0.005	0.012
12:00-13:00	0.004	0.006	0.01
13:00-14:00	0.008	0.007	0.015
14:00-15:00	0.005	0.008	0.013
15:00-16:00	0.007	0.01	0.017
16:00-17:00	0.002	0	0.007
17:00-18:00	0.003	0	0.007
18:00-19:00	0	0	0.001

Table 6.12 Office/Light Industrial – Business Park - Bus

Time	Arrivals Trip Rate	Departures Trip Rate	Total Trips Rate
07:00-08:00	0.007	0.007	0.014
08:00-09:00	0.009	0.008	0.017
09:00-10:00	0.007	0.008	0.015
10:00-11:00	0.002	0.002	0.004
11:00-12:00	0.003	0.001	0.004
12:00-13:00	0.002	0.002	0.004
13:00-14:00	0.003	0.003	0.006
14:00-15:00	0.002	0.002	0.004
15:00-16:00	0.003	0.002	0.005
16:00-17:00	0.007	0.008	0.015
17:00-18:00	0.009	0.009	0.018
18:00-19:00	0.007	0.007	0.014

Table 6.13 Warehousing – Total Vehicles

Time	Arrivals Trip Rate	Departures Trip Rate	Total Trips Rate
07:00-08:00	0.046	0.018	0.064
08:00-09:00	0.031	0.017	0.048
09:00-10:00	0.045	0.018	0.063
10:00-11:00	0.017	0.018	0.035
11:00-12:00	0.015	0.022	0.037
12:00-13:00	0.025	0.022	0.047
13:00-14:00	0.022	0.059	0.165
14:00-15:00	0.021	0.069	0.094
15:00-16:00	0.016	0.042	0.064
16:00-17:00	0.013	0.047	0.056
17:00-18:00	0	0.040	0.041
18:00-19:00	0	0.028	0

Table 6.14 Warehousing - HGVs

Time	Arrivals Trip Rate	Departures Trip Rate	Total Trips Rate
07:00-08:00	0.1	0.11	0.21
08:00-09:00	0.004	0.008	0.012

Time	Arrivals Trip Rate	Departures Trip Rate	Total Trips Rate
09:00-10:00	0.005	0.009	0.014
10:00-11:00	0.14	0.008	0.148
11:00-12:00	0.009	0.013	0.022
12:00-13:00	0.01	0.005	0.015
13:00-14:00	0.011	0.006	0.017
14:00-15:00	0.017	0.012	0.029
15:00-16:00	0.016	0.011	0.027
16:00-17:00	0.014	0.008	0.022
17:00-18:00	0.007	0.011	0.018
18:00-19:00	0.002	0.012	0.014

Table 6.15 Warehousing - Bus

Time	Arrivals Trip Rate	Departures Trip Rate	Total Trips Rate
09:00-10:00	0.001	0	0.001
10:00-11:00	0	0.001	0.001

6.4.36 The relevant land use mix and total GFA has been applied to the trip rates set out **Tables 6.10 to 6.15**. Tables 1.10 and 1.11 set out in **Appendix E** set out the resultant traffic generation also applying the build-up of development quantum from year 2 to year 20.

Fuel tanker trip generation

6.4.37 In year 20 at full operation of the airport it has been set calculated based on fuel estimates for the airport operations that per day there will be 21 deliveries of A1 tankers of fuel arriving and departing the site (42 two-way movements).

6.4.38 The fuel tanker trips have been calculated based on the average departing flight sector lengths and the typical fuel burn per aircraft/route. This has given a fuel volume that will be extracted from the onsite storage. The number of road tankers that are needed are the amount required to replenish the lost fuel from the onsite storage per day.

6.4.39 Fuel will be needed from year two onwards and detailed breakdowns of the fuel requirements per year have also been provide by aviation experts. As such using these estimates the total tanker trips per day has been pro rata down from the 42 two-way movements required in year 20.

6.4.40 These trips have then been distributed across the 24-hour period for each of the 20 years with a focus on having some trips in the peak periods to provide a robust assessment. Table 1.12 in **Appendix E** sets out the tanker traffic flows to and from the site.

Museum traffic generation

6.4.41 The museum on the Northern Grass Area will be potentially be moved or rebuilt and will be in operation within the first year of the 20-site programme. It is proposed that the museum will have 35 parking spaces, 30 for cars and 5 for buses, and as such a TRICS assessment has been undertaken based on two sites of similar size and nature which provides the results in **Table 6.16.**

Table 6.16 TRICS Assessment for a Museum

Time Period	Trips		Total	Trip Rate	
	Arrivals	Departures		Arrivals	Departures
09:00-10:00	2	1	3	0.053	0.026
10:00-11:00	13	5	18	0.362	0.130
11:00-12:00	16	4	20	0.455	0.103
12:00-13:00	14	11	25	0.404	0.321
13:00-14:00	15	13	28	0.417	0.365
14:00-15:00	12	16	28	0.336	0.455
15:00-16:00	9	18	27	0.259	0.515
16:00-17:00	8	17	25	0.227	0.479
17:00-18:00	2	7	9	0.047	0.188
18:00-19:00	0	1	1	0.000	0.026

6.4.42 These trips have been applied across these time periods at the same level across all 20 years of the programme.

Staff trip generation

6.4.43 The following section sets out the staff traffic flow generation for a number of differing jobs on the proposed development, but does not include the staff trips for the 'Northern Grass Area' to avoid double counting as these have been considered as part of the TRICS assessment for that area as set out above. This is set out in further detail below.

6.4.44 Viscount Aviation in March 2017 provided a series of estimates for jobs across the total site (known as total direct jobs) and those specific jobs that would generated by the Airport site. There were several types of jobs this data was provided for:

- Passenger terminal staff (referred to as Pax);
- Airside Freight Staff (referred to as Freight);
- Air Traffic Services (referred to as ATS);
- Rescue and Fire Fighting Services (referred to as RFFS);
- Airport Operations (referred to as Ops);
- Maintenance (referred to as Maint);
- Motor Transport (referred to as MT); and
- Airport Administration (referred to as Adm).

6.4.45 The airport site staff added together (Airport Total) has then been removed from the site wide "direct jobs" number and this provides a figure for staff elsewhere on site (non-RO) but not at the Airport. These figures include the Northern Grass Area (N Grass) so this has been removed also. The remaining staff are assumed to be staff working at the non-Airside freight element of the airport (non-AS Freight).

6.4.46 Table 1.13 in **Appendix E** shows the traffic generation by job type by year.

6.4.47 To understand the staff trips generated by the airport details on predicted mode share and likely shift patterns is required. The following section sets out the justification for how these estimates have been developed.

Mode share

6.4.48 Mode split for Staff (especially at small airports) is highly dependent on geography, shift patterns and company policy to discourage car access/encourage public transport use. The dominant geographical consideration is the context the extent to which airport employees, or those working for companies based on the airport, live in settlements within easy walking or cycling distance, or along good public transport corridors to large urban areas; there is undoubtedly a decay function with distance, but this is tempered where buses or trains are regular, run early in the morning and late at night, and provide easy and cost-effective point to point journeys.

6.4.49 The airport and its tenant companies can influence the underlying geographical and economic dynamics, either by increasing constraints (e.g. staff parking places where parking overall is in short supply) or introducing incentives (changing facilities for those walking or cycling), support for season tickets, allowances for buying cycling equipment or bonuses for non-car use.

6.4.50 Deals with taxi operators to get staff home at night or to the airport in the morning by co-ordinating the inbound and outbound journeys of airport-based taxis can also be effective.

6.4.51 The **Tables 6.17 to 6.27**, sets low initial thresholds. This will allow for initial recruitment of staff, the pattern and distribution of staff journey to work movements to become stablished, and agreements to be reached with operators and employees before company policies are rolled out. But it does set ambitious targets by comparison to other small rural airports in the medium and longer term.

Shift patterns

6.4.52 The figures set out below for anticipated splits of staff across shift patterns are a function of assumptions about rostering at the airport and the extent to which split shifts can be used to cover peak periods and the amount of night-time presence that is needed as the airport develops. Passenger service requirements are likely to run between 6.00am to 10.00pm, requiring staff to be present from 5am to 11pm. If there is a requirement for freight handling at night, this will require more staff presence in discrete areas of the airport.

6.4.53 We have therefore assumed, that once the airport has reached a level of maturity 35% of staff will be present in day time peak periods – this takes into account the requirement for:

- A split shift three roster (i.e. to increase numbers in peak periods);
- The need to allow for a seven-day week, holiday entitlement, sick leave etc;
- Maximum 12-hour shifts;
- A maximum 48-hour week 4-day week; and
- Flexibility to adjust to airline schedules (a frequent requirement at smaller airports).

6.4.54 Equally, the 20% night-time figures set out below reflects a worst-case scenario where there is substantive night time operations and for night period shift work between 10pm and 6am.

6.4.55 These figures will only become more precise and certain once operations start and the timetable and structure of activity that needs to be serviced is known more clearly. At this stage, therefore, they must be regarded as rational assumptions not empirically sourced and accurate data.

6.4.56 Based on the justification the following sections set out the shift patterns and mode share targets for each of the jobs proposed on site. Some of the types of jobs have been grouped together to take into account the fact they have the same characteristics.

Passenger terminal staff (pax)

- Three shifts – covering times of first and last flight:
  - 05:00 – 12:00;
  - 11:00 – 18:00; and
  - 15:00 – 00:00
- Assumption that per day 20% of the total staff are not onsite (day off, off shift, sickness);
- For the day time period (5am – 10pm) mode shift is proposed as follows:

Table 6.17 Passenger Terminal Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Airside cargo facility freight staff (freight)

- Staff requirements:
  - 35% of total staff on site during peak hours;
  - 20% of staff on shift during night shift; and
  - 45% of staff not on site on a particular day (day off, off shift, sickness).
- Two shifts covering the time period 05:00 – 23:00 (when flights are operating):
  - Day Shift (35% of staff) – 05:00 – 15:00; and
  - Night Shift (20% of staff) – 15:00 – 23:00.
- For the day time period (5am – 10pm) mode shift is proposed as follows:

Table 6.18 Airside Cargo Facility Freight Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Air traffic control staff

- Staff requirements:
  - 35% of total staff on site during peak hours;
  - 20% of staff on shift during night shift; and
  - 45% of staff not on site on a particular day (day off, off shift, sickness).
- Three shifts covering the time period 0:00 – 00:00:
  - Shift 1 (18% of staff) – 06:00 – 14:00;
  - Shift 2 (18% of staff) – 14:00 – 22:00; and
  - Night Shift (20% of staff) – 22:00 – 06:00
- For the day time period (5am – 10pm) mode shift is proposed as follows:

Table 6.19 Air Traffic Control Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Fire and rescue services staff

- Staff requirements:
  - 35% of total staff on site during peak hours;
  - 20% of staff on shift during night shift; and
  - 45% of staff not on site on a particular day (day off, off shift, sickness).
- Three shifts covering the time period 0:00 – 00:00:
  - Shift 1 (18% of staff) – 06:00 – 14:00;
  - Shift 2 (18% of staff) – 14:00 – 22:0; and
  - Night Shift (20% of staff) – 22:00 – 06:00.

Table 6.20 Fire and Rescue Services Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%

Mode split	Initial	10 Years	20 Years
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Operations staff (office based staff)

- Staff requirements:
  - 80% of total staff on site during peak hours; and
  - 20% of staff not on site on any particular day (day off, off shift, sickness).
- Staff are expected to be in the office for the time period 09:00 – 17:00:

Table 6.21 Operations Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Operations staff (24-hour staff)

- Staff requirements:
  - 35% of total staff on site during peak hours;
  - 20% of staff on shift during night shift; and
  - 45% of staff not on site on a particular day (day off, off shift, sickness).
- Three shifts covering the time period 0:00 – 00:00:
  - Shift 1 (18% of staff) – 06:00 – 14:00;
  - Shift 2 (18% of staff) – 14:00 – 22:00; and
  - Night Shift (20% of staff) – 22:00 – 06:00.

Table 6.22 Operations Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Maintenance staff

- Staff requirements:
  - 35% of total staff on site during peak hours;
  - 20% of staff on shift during night shift; and
  - 45% of staff not on site on a particular day (day off, off shift, sickness).
- Three shifts covering the time period 00:00 – 00:00:
  - Shift 1 (18% of staff) – 06:00 – 14:00;
  - Shift 2 (18% of staff) – 14:00 – 22:00; and
  - Night Shift (20% of staff) – 22:00 – 06:00
- For the day time period (5am – 10pm) mode shift is proposed as follows:

Table 6.23 Maintenance Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Motor transfer staff

- Staff requirements:
  - 60% of total staff on site during peak hours;
  - 20% of staff on shift during night shift;
  - 20% of staff not on site on a particular day (day off, off shift, sickness).
- Three shifts covering the time period 05:00 – 00:00:
  - Shift 1 (30% of staff) – 06:00 – 14:00;
  - Shift 2 (30% of staff) – 14:00 – 22:00; and
  - Night Shift (20% of staff) – 22:00 – 06:00.
- For the day time period (5am – 10pm) mode shift is proposed as follows:

Table 6.24 Motor Transfer Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%

Mode split	Initial	10 Years	20 Years
bBus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Security staff

- Staff requirements:
  - 35% of total staff on site during peak hours;
  - 20% of staff on shift during night shift; and
  - 45% of staff not on site on a particular day (day off, off shift, sickness)
- Three shifts covering the time period 0:00 – 00:00;
  - Shift 1 (18% of staff) – 06:00 – 14:00;
  - Shift 2 (18% of staff) – 14:00 – 22:00; and
  - Night Shift (20% of staff) – 22:00 – 06:00
- For the day time period (5am – 10pm) mode shift is proposed as follows:

Table 6.25 Security Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Administration staff

- Staff requirements:
  - 85% of total staff on site during peak hours; and
  - 15% of staff not on site on a particular day (day off, off shift, sickness).
- Staff expected to be in the office in the time period 09:00 – 17:00; and
- For the day time period (5am – 10pm) mode shift is proposed as follows:

Table 6.26 Administration Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes

Non- Airside cargo facility freight staff

- Staff Requirements:
  - 35% of total staff on site during peak hours;
  - 20% of staff on shift during night shift;
  - 45% of staff not on site on a particular day (day off, off shift, sickness).
- Three shifts covering the time period 0:00 – 00:00:
  - Shift 1 (18% of staff) – 06:00 – 14:00; and
  - Shift 2 (18% of staff) – 14:00 – 22:00;
  - Night Shift (20% of staff) – 22:00 – 06:00.
- For the day time period (6am – 10pm) mode shift is proposed as follows:

Table 6.27 Non-Airside Cargo Facility Freight Staff Mode Split

Mode split	Initial	10 Years	20 Years
Car	97%	92%	87%
Bus	2%	4%	6%
Walking or cycling	1%	2%	3%
Rail	0%	2%	4%

- For mode shift outside of the day time period its assumed all trips would be car based trips; and
- Staff would arrive for shifts in the hour before it starts and depart in the hour after it finishes.

Traffic generation summary

6.4.57 Table 1.13 in **Appendix E** shows the total traffic generation for all job types over the 20-year programme. Table 1.14 in **Appendix E** shows the hourly traffic generation over a 24-hour day for from year 1 through to year 20 when the airport is fully operational.

6.4.58 As shown in Tables 1.13 and 1.14, the peak year for traffic generation is year 20 of the programme. In summary, the Proposed Development will generate the following:

- Total Daily 24-Hour Traffic Generation;
  - Total Vehicles – 5,433 arrivals and 5,385 departures;

        - Light Vehicles – 4,988 arrivals and 4,941 departures; and
        - HGVS – 446 arrivals and 444 departures;
- Total AM Peak Traffic Generation (08:00 – 09:00);
    - Total Vehicles – 594 arrivals and 196 departures;
        - Light Vehicles – 573 arrivals and 173 departures; and
        - HGVS – 21 arrivals and 23 departures;
- Total Airport Development Peak Traffic Generation (13:00 – 14:00);
    - Total Vehicles – 680 arrivals and 347 departures;
        - Light Vehicles – 651 arrivals and 322 departures; and
        - HGVS – 29 arrivals and 25 departures;
- Total PM Peak Traffic Generation (17:00 – 18:00);
    - Total Vehicles – 107 arrivals and 480 departures;
        - Light Vehicles – 82 arrivals and 452 departures; and
        - HGVS – 24 arrivals and 28 departures;

6.5 Operational Airport Traffic Distribution

6.5.1 It is important to understand how traffic would distribute across the local highway network as part of any development and which highway link(s) would be assigned traffic.

6.5.2 To understand the distribution of trips that may be generated by the development an approach was undertaken to use a combination of gravity models and known destinations for some traffic movements for the following airport operational traffic generation;

- Passenger trips;
- Freight trips;
- Northern grass area development trips;
- New museum trips;
- Fuel farm trips;
- Staff trips – main access;
- Staff trips - cargo access; and
- Servicing trips.

Establishing a network scope

6.5.3 In order to assess the highway network around the Manston airport site an agreed network scope was established and this scope then helped to inform the external and internal locations where traffic could route to and from the proposed development.

6.5.4 The scope was agreed with KCC based the strategic highways model being developed by KCC. The scope of the junctions and links included in this assessment are set out in **Figure 6.4.**

6.5.5 Once this scope was established a series of routes and zones were developed. Routes are the points at which a trip would leave the project study area, and zones are locations of areas which would attract or generate traffic within the study area.

6.5.6 The zones are as follows:

- Z1 – Acol;
- Z2 – Esmonde Drive;
- Z3 – Manston Court Road;
- Z4 – Manston Village;
- Z5 – Cliffsend north of A299;
- Z6 – Cliffsend;
- Z7 – Newington;
- Z8 – West of A254 Ramsgate Road;
- Z9 – North of George V Avenue;
- Z10 – Garlinge;
- Z11 – Dent De-Lion Road;
- Z12 – Lymington Road Area;
- Z13 – Epple Bay Avenue;
- Z14 – South Birchington;
- Z15 – Westgate; and
- Z16 – Pegwell and Lawrence.

6.5.7 The external routes are as follows:

- A - A253;
- B – Canterbury Road West (A28);
- C – A299 Thanet Way;
- D – Potten Street Road;
- E – Station Road;
- F – Canterbury Road East (A28);
- G – Tivoli Road;
- H – Ramsgate Road (A254);
- I – College Road;
- J – A256 (towards Broadstairs);
- K – A254 Margate Road;
- L – B2014 Newington Road;
- M – Wilfred Road;
- N – A255 Park Road;
- O – A256 (towards Dover);
- P – Jutes Lane;
- Q – Cottington Link Road;

- R – Tothill Street;
- S – Willetts Hill; and
- T – Ramsgate Port/Ramsgate.

6.5.8 **Figure 6.5** sets out the locations of the routes and zones on the local highways network which has helped inform the gravity models used in this section of the TA.

6.5.9 With these zones and routes established individual elements of the project could have individual traffic distribution methodologies proposed.

Vehicular distribution for passenger trips

6.5.10 A gravity model was prepared for the distribution of passenger trips onto the highways network. The wider project team provided an initial break down as to the proposed origin/destination of passengers to and from the airport by at first a high-level approach which set out the following:

- 7.5% to the London Boroughs;
- 12.5% to West Kent;
- 50% to East Kent; and
- 30% to Mid Kent.

6.5.11 Traffic to London Boroughs had an established route to site so did not need to be broken down further and was not included in the gravity model, the figure of 7.5% of trips on a fixed route was used.

6.5.12 For trips to locations in Kent a gravity model was developed. To establish this model population was the first requirement of the calculations and to understand this for West Kent and Mid Kent these were broken down to District level as follows:

- West Kent:
  - Maidstone;
  - Tunbridge Wells;
  - Tonbridge & Malling;
  - Gravesham;
  - Dartford; and
  - Sevenoaks.
- Mid Kent:
  - Canterbury District;
  - Shepway District;
  - Ashford District; and
  - Swale District.

6.5.13 For East Kent within which the proposed site falls a more detailed breakdown of areas of population was required and these were broken down to super output areas from 2011 journey to work census data.

6.5.14 This approach results in three small gravity models for Mid Kent (30%), East Kent (50%) and West Kent (12.5%) being developed. Each population area was prescribed a journey time (based on Google Maps journey planning software) from the centre of the population mass in that district or output area. The resultant calculations of population and journey time for each of the three Kent areas and the 7.5% to the London Boroughs provided the following percentage splits set out in **Table 6.28**.

Table 6.28 Trip Distribution Passenger Trips

Gravity Model Ward/ District	Total	Gravity Model Ward/ District	Total
London Boroughs	7.5%	St Lawrence	2.35%
Maidstone District	3%	Port of Ramsgate	2.07%
Tunbridge Wells Distruct	2%	Cliffsend/Pegwell	0.95%
Tonbridge and Malling District	2%	Cliffsend North	0.34%
Gravesham District	2%	Cliffsend South	0.34%
Dartford District	2%	West Ramsgate	1.00%
Sevenoaks District	2%	Aylesham	0.65%
Margate/Northdown	1.88%	Buckland	0.74%
Northdown/Kingsgate	1.39%	Capel-le-ferne	0.20%
West Margate	1.97%	Castle	0.16%
South Margate	1.81%	Eastry	0.76%
Garlinge/West of Margate Rail Station	2.14%	Eythorne and Sheperdswell	0.49%
Dane Valley and South Area	1.51 %	Little Stour and Ashstone	1.03%
Westgate on Sea/Birchington on sea	2.87%	Lydden and Temple Ewell	0.21%
Central Birchington on Sea	0.45%	Maxton, Elms Vale and Priory	0.60%
Northwest Birchington on Sea	0.36%	Middle Deal and Sholden	0.81%
East Birchington on Sea	1.55%	Mill Hill	0.86%
Northeast Broadstairs	1.49%	North Deal	0.70%
Central Broadstairs	1.31%	Ringwould	0.16%
Northwood and Northeast Area	1.89%	**River**	0.38%
Northeast Ramsgate	1.69%	Sandwich	1.24%
Newington	3.20%	St Margarets-at-Cliffe	0.47%
Zone 2	0.43%	St Radigunds	0.46%
Acol	0.16%	Tower Hamlets	0.46%
Zone 3	0.26%	Town and Pier	0.17%
Manston Village	3.00%	Walmer	0.75%
East Minster	0.50%	Whitfield	0.57%
Monkton	0.29%	Canterbury District	16%
St Nicholas at Wade	0.25%	Shepway District	4%
Sarre	0.07%	Ashford District	3%
West Minster	0.63%	Swale District	8%

6.5.15 Each of the locations above was then attached to one of the established zones or routes and the percentages aggregated to these. The percentage distribution for passenger trips to each route is set out in **Table 6.29** and the percentage distribution to each zone is set out in **Table 6.30**. Zones or routes that don't receive any traffic because of the gravity model have been removed.

Table 6.29 Trips Distribution by Route for Passenger Trips

Route	Road	% Distribution
A	A253	0.07%
B	Canterbury Road W (A28)	0.25%
C	A299 Thanet Way	46.4%
E	Station Road	1.76%
G	Tivoli Road	2.46%
I	College Road	4.47%
J	A256 (Towards Broadstairs)	4.70%
K	A254 Margate Road	0.89%
M	Wilfred Road	0.88%
N	A255 Park Road	2.94%
O	A256 (Towards Dover)	15.40%
R	Tothill Street	1.13%
S	Willetts Hill	0.29%

Table 6.30 Trip Distribution by Zone for Passenger Trips

Zone	Location	% Distribution
Zone 1	Acol	0.16%
Zone 2	Esmonde Drive	0.43%
Zone 3	Manston Court Road	0.26%
Zone 4	Manston Village	3.00%
Zone 5	Cliffsend north of A299	0.34%
Zone 6	Cliffsend	0.34%
Zone 7	Newington	3.20%
Zone 8	West of A254 Ramsgate Road	0.41%
Zone 9	North of George V Avenue	0.30%
Zone 10	Garlinge	0.90%
Zone 11	Dent De-Lion Road (West of High Street)	0.53%
Zone 12	Lymington Road Area (south of A28)	0.55%
Zone 13	Epple Bay Avenue	0.18%
Zone 14	South Birchington	1.06%

Zone	Location	% Distribution
Zone 15	Westgate	2.40%
Zone 16	Pegwell and Lawrence	4.26%

Vehicular distribution of freight trips

6.5.16 Information provided by the wider project team detailed that it was anticipated that the majority of freight trips generated by the proposed cargo activities at Manston Airport would originate from London and the surrounding area. Alongside this, Wood have also assumed that the Dover, Folkstone and Ramsgate ports and the freight distribution sites around Ashford will also be locations freight may route to and from the airport.

6.5.17 The anticipated freight distribution is set out in **Table 6.31** with the anticipated route choice of the freight traffic. The anticipated routes for the freight movements was identified using google maps journey planning software.

Table 6.31 Trip Distribution of Freight Trips

Location	Route	% Distribution
London and the Surrounding area	C	95%
Dover and Folkstone Port	O	2%
Ashford Freight Distribution Sites	C	2%
Ramsgate Port	T	1%

Vehicular distribution of northern grass area staff trips

6.5.18 A gravity model was prepared to understand the distribution of staff to and from the Northern Grass Area. Unlike the distribution of passengers, it is considered that these vehicular tips would be more local in nature and as such this gravity model has only be based on the districts and super output areas within Mid and East Kent. These locations have also been broken down by District level for Mid Kent and supper output area for East Kent.

6.5.19 Using the same approach of population and journey time **Table 6.32** sets out the result anticipated distribution for the Northern Grass Area staff trips.

Table 6.32 Trip Distribution for Northern Grass Area Development Trips

Gravity Model Ward/ District	Total	Gravity Model Ward/ District	Total
Margate/Northdown	3.74%	Cliffsend South	0.69%
Northdown/Kingsgate	2.77%	West Ramsgate	2.00%
West Margate	3.93%	Aylesham	1.29%
South Margate	3.61%	Buckland	1.48%
Garlinge/West of Margate Rail Station	4.27%	Capel-le-ferne	0.40%
Dane Valley and South Area	3.01%	Castle	0.31%
Westgate on Sea/Birchington on sea	5.72%	Eastry	1.52%
Central Birchington on Sea	0.89%	Eythorne and Shepherdswell	0.97%

Gravity Model Ward/ District	Total	Gravity Model Ward/ District	Total
Northwest Birchington on Sea	0.73%	Little Stour and Ashstone	2.05%
East Birchington on Sea	3.09%	Lydden and Temple Ewell	0.41%
Northeast Broadstairs	2.98%	Maxton, Elms Vale and Priory	1.19%
Central Broadstairs	2.62%	Middle Deal and Sholden	1.63%
Northwood and Northeast Area	3.76%	Mill Hill	1.72%
Northeast Ramsgate	3.37%	North Deal	1.39%
Newington	6.38%	Ringwould	0.32%
Zone 2	0.85%	River	0.75%
Acol	0.31%	Sandwich	2.47%
Zone 3	0.53%	St Margarets-at-Cliffe	0.94%
Manston village	5.99%	St Radigunds	0.92%
East Minster	1.01%	Tower Hamlets	0.91%
Monkton	0.58%	Town and Pier	0.33%
St Nicholas at Wade	0.50%	Walmer	1.51%
Sarre	0.13%	Whitfield	1.13%
West Minster	1.25%	Canterbury District	0.06%
St Lawrence	4.69%	Shepway District	0.06%
Port of Ramsgate	4.14%	Ashford District	0.05%
Cliffsend/Pegwell	1.90%	Swale District	0.02%
Cliffsend North	0.69%		

6.5.20 Each of the locations above was then attached to one of the established zones or routes and the percentages aggregated. The percentage distribution for passenger trips to each route is set out in **Table 6.33** and the percentage distribution to each zone is set out in **Table 6.34.** Routes and zones that received no traffic as a result of the gravity model calculations have been removed

6.5.21 It should be noted that the northern grass area has two accesses proposed, and each of these has a slightly different set of distributions when routes are applied. The figures presented in **Table 6.33 and 6.34** are for the West Access off Manston Road. A narrative of the differences in the percentages when using the south access off B2050 Manston Road is set out below the tables.

Table 6.33 Trip Distribution of Northern Grass Area Trips by Route – West Access

Route	Road	% Distribution
A	A253	0.13%
B	Canterbury Road W (A28)	0.50%
C	A299 Thanet Way	0.10%
E	Station Road	2.11%
F	Canterbury Road East (A28)	0.60%
G	Tivoli Road	6.47%

Route	Road	% Distribution
I	College Road	5.80%
J	A256 (Towards Broadstairs)	10.18%
K	A254 Margate Road	2.53%
M	Wilfred Road	1%
N	A255 Park Road	5.07%
O	A256 (Towards Dover)	23.70%
R	Tothill Street	2.26%
S	Willetts Hill	0.58%

Table 6.34 Trip Distribution of Northern Grass Area Trips by Zone – West Access

Zone	Location	% Distribution
Zone 1	Acol	0.31%
Zone 2	Esmonde Drive	0.85%
Zone 3	Manston Court Road	0.53%
Zone 4	Manston Village	5.99%
Zone 5	Cliffsend north of A299	0.69%
Zone 6	Cliffsend	0.69%
Zone 7	Newington	6.38%
Zone 8	West of A254 Ramsgate Road	2.44%
Zone 9	North of George V Avenue	0.94%
Zone 10	Garlinge	0.85%
Zone 11	Dent De-Lion Road (West of High Street)	1.05%
Zone 12	Lymington Road Area (south of A28)	2.61%
Zone 13	Epple Bay Avenue	0.37%
Zone 14	South Birchington	3.51%
Zone 15	Westgate	3.27%
Zone 16	Pegwell and Lawrence	8.51%

6.5.22 When calculating the distribution for south access onto the B2050 Manston Road there is a slight change in some routes which results in a difference in some percentages.

6.5.23 To get to the Northern Grass area from North of Broadstairs, the route to the west access would be north and onto Manston Road directly, while to the south access it would be south and via the B2050 Manston Road. This results in the following small percentage change:

- Route J – 10.23 (+0.05%); and
- Route N – 5.01% (-0.05%).

6.5.24 A similar situation occurs for some areas north of Margate which results in the following small percentage change.

- Route J – 10.23 (+0.05%); and
- Route N – 5.01% (-0.05%).

6.5.25 These are very minor percentage differences due to the difference in routeing to the site accesses but all other total percentages remain the same between the two accesses although the local routing in and around the access will differ slightly. It was considered that for a robust estimate that of the total traffic for this element 50% would go to each access as the final build and layout of this area is not known.

Vehicular distribution of northern grass area HGV trips

6.5.26 The distribution of the HGVs generated by the 'Northern Grass Area' development is proposed to be the same traffic distribution methodology as for freight trips.

Vehicular distribution of museum trips

6.5.27 To understand the trip distribution of the museum trips it has been concluded that this would match broadly the patterns for the staff trips for the northern grass area for the West access as trips are likely to be local in nature.

Vehicular distribution of fuel farm trips

6.5.28 The distribution of fuel farm trips has been developed by considering the location of the oil refineries that will likely supply the Manston Site. It has been identified that two oil refineries exist in locations which are considered to be appropriate to serve Manston Airport. These are as follows;

- Isle of Grain terminal, Kent
- Coryton Refinery, Essex

6.5.29 The Isle of Grain terminal is located at a distance of approximately 60 miles from Manston Airport and Google Maps journey panning software has identified travel time to be approximately one hour and four minutes.

6.5.30 Coryton Refinery is located at a distance of approximately 72 miles from the Manston site and Google Maps journey planning software has identified travel time to be approximately one hour and forty-two minutes.

6.5.31 It has been considered that 50% of fuel farm trips will be generated by the Isle of Grain site and 50% will be generated by the Coryton Refinery. However, both sites would use the same route into and out of the project scope area on route C (A229) so it's proposed that 100% of fuel farm trips would use this route and follow the A299 to Canterbury Road West and the existing fuel farm access.

Vehicular distribution of airport site staff trips

6.5.32 The airport site includes all staff trips into and out of both the cargo access and passenger terminal access.

6.5.33 The gravity model approach for staff trips to the Northern Grass Area has also been applied for all staff trips on the airport site. As with the Northern Grass area there are multiple accesses into the site and as such the following has been used;

- Staff trips to the main airport access use the same distribution methodology as the Northern Grass Area South Access; and

- Staff trips to the Cargo access use the same distribution methodology as the Northern Grass Area South Access.

Vehicular distribution of servicing trips

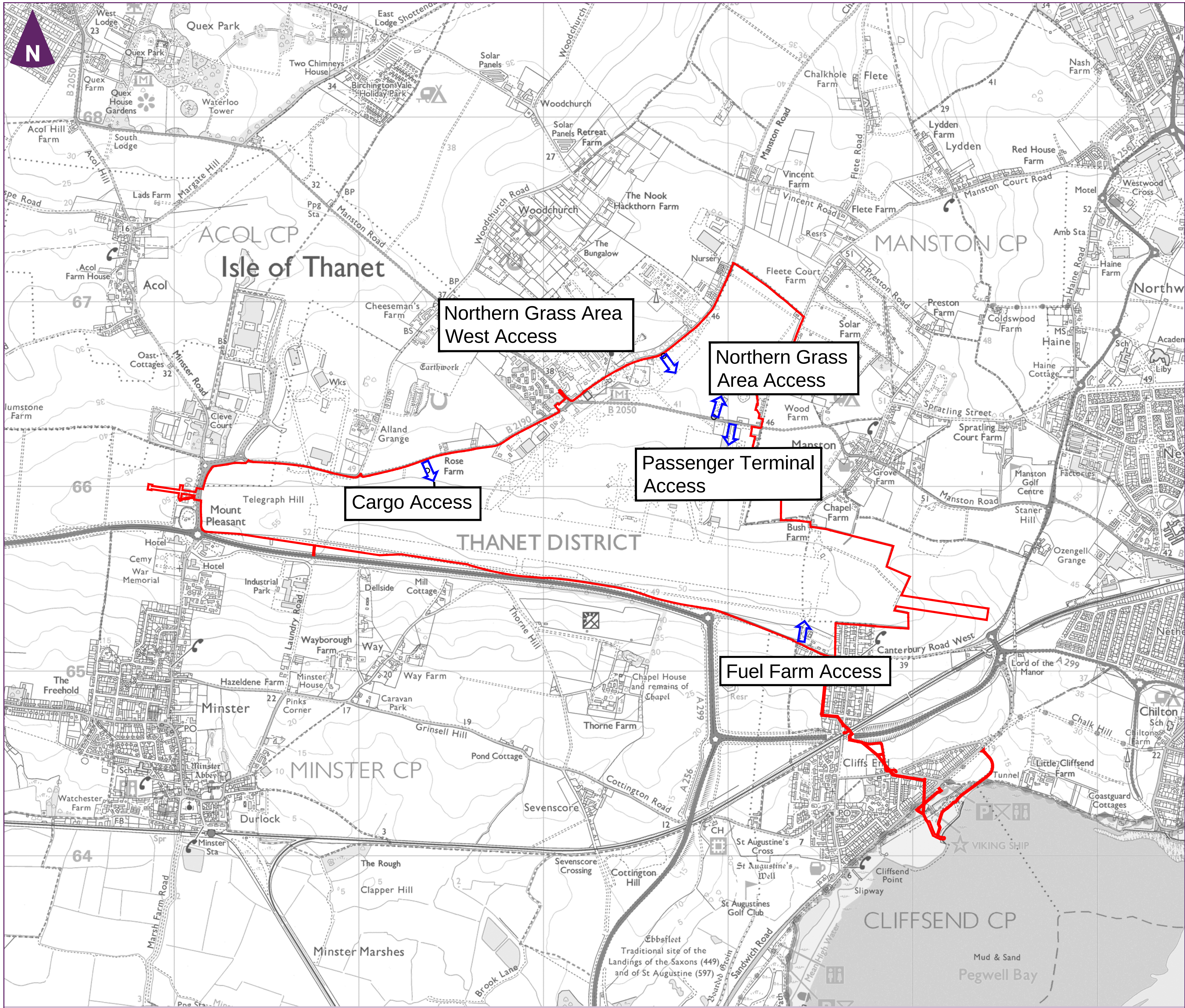
6.5.34 Vehicular distribution of servicing trips has been based on the assumption that 100% of servicing trip HGVs will use Route C the A229. These servicing trips are then split locally between the three sites as follows:

- Cargo Access – 33% of trips;
- Main Airport Access – 33% of trips; and
- Northern Grass Area – 33% of trips.

6.6 Operational Traffic Network Traffic Diagrams

6.6.1 The sections above have provided the methodology of the traffic generation and generation for the proposed development. The proposed traffic generation has been distributed across the network based on the distribution that has been calculated and the following figures are provided to set out the traffic flow network diagrams for the separate elements of the airport and then the overall airport;

- **Figure 6.6 to 6.8** – Passenger Traffic Generation – AM, PM and Airport Peak;
- **Figure 6.9 to 6.11** – Freight Traffic Generation – AM, PM and Airport Peak;
- **Figure 6.12 to 6.14** – Northern Grass Area – West Access – AM, PM and Airport Peak;
- **Figure 6.15 to 6.17** – Northern Grass Area – South Access – AM, PM and Airport Peak;
- **Figure 6.18 to 6.20 –** Fuel Farm Traffic Generation – AM, PM and Airport Peak;
- **Figure 6.21 to 6.23** – Airport Staff Traffic Generation – AM, PM and Airport Peak;
- **Figure 6.24 to 6.26** – HGV Servicing – AM, PM and Airport Peak; and
- **Figure 6.27 to 6.29** – Total Development Traffic AM, PM and Airport Peak.



Key

Order Limits

Proposed Access Locations

Client

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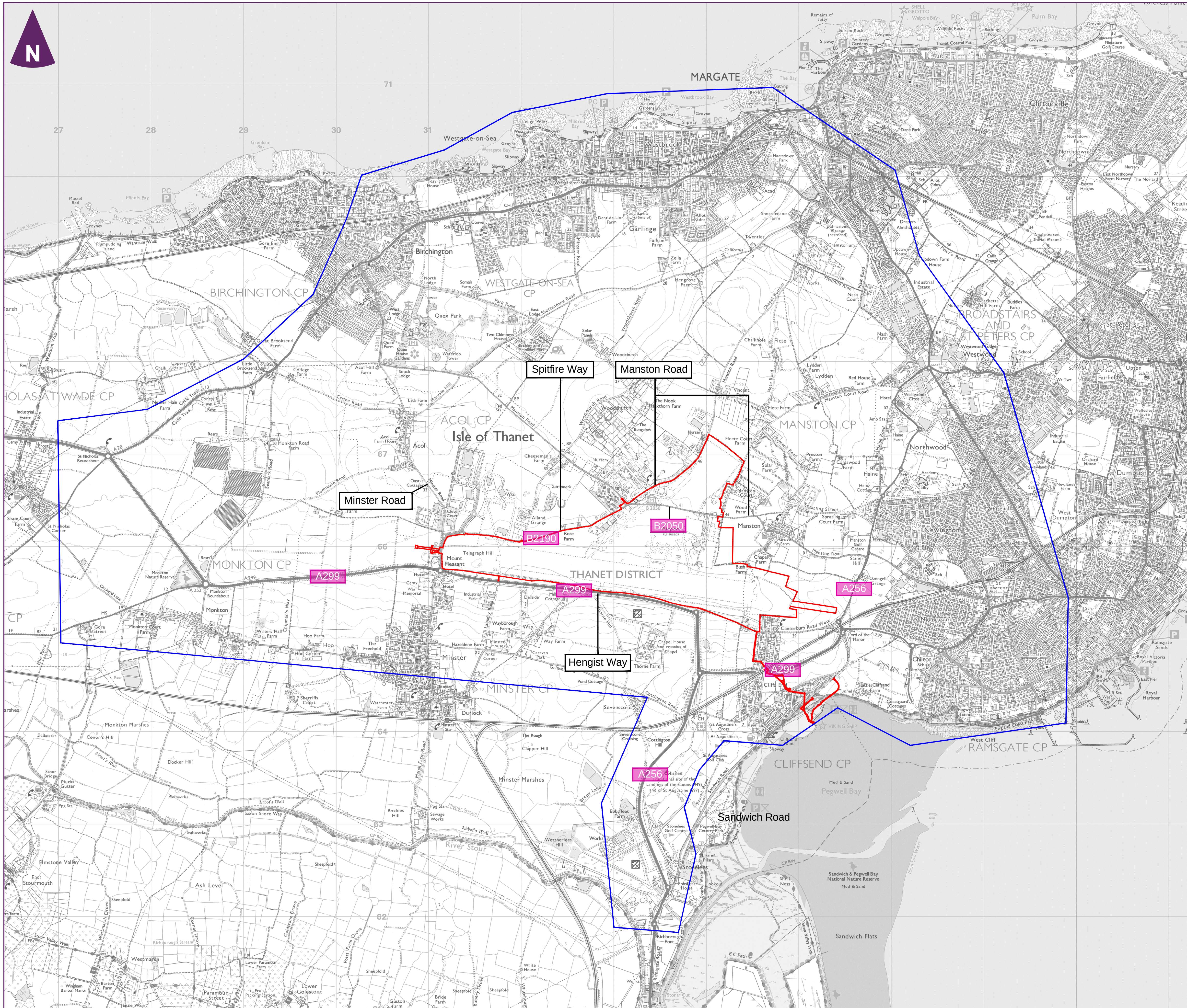
Figure 6.3
Proposed Access Locations



Key

- Order Limits
- Network Scope for Distribution

0 m 1000 m 2000 m

Scale 1:40000 @ A3

Client

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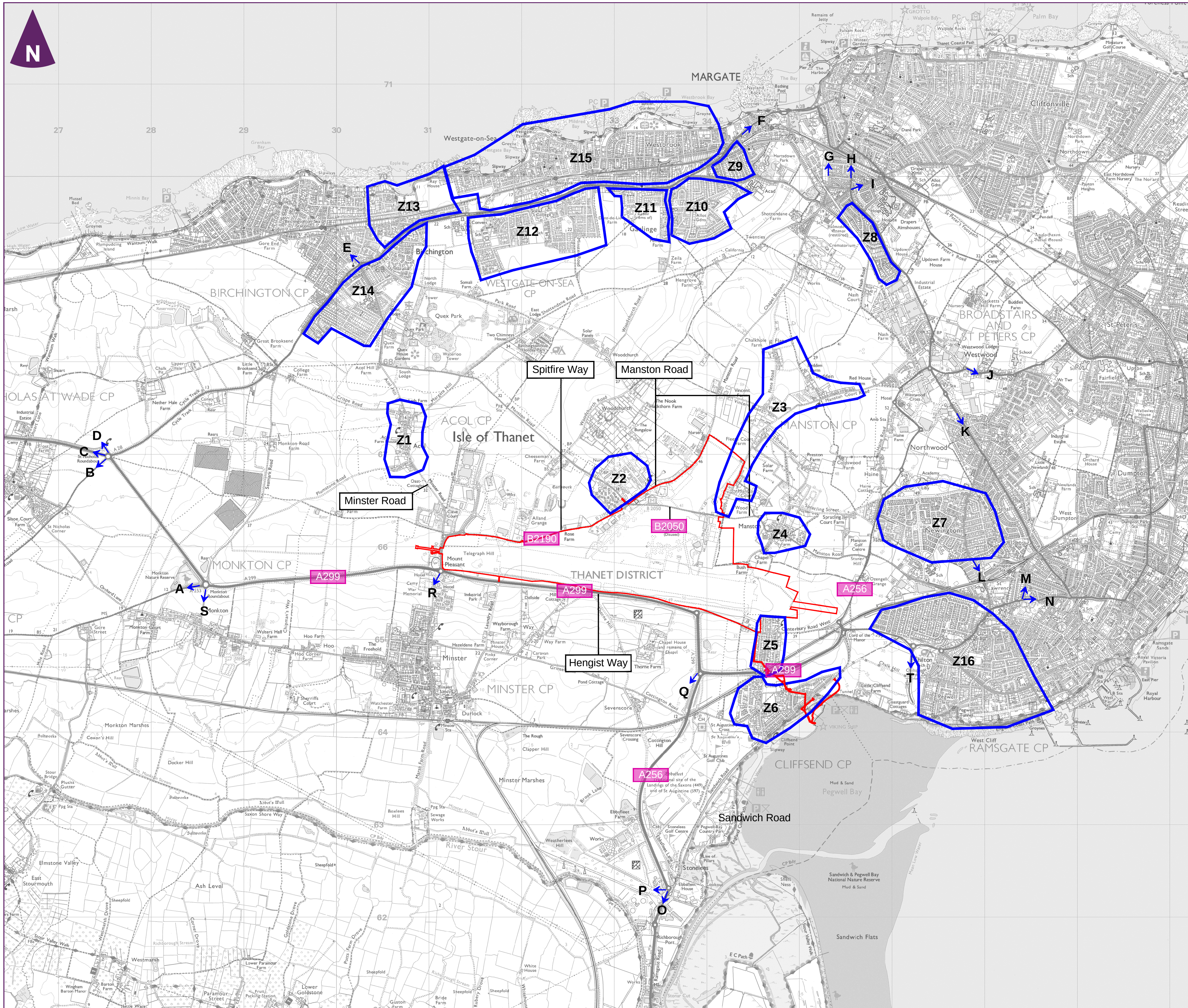
Figure 6.4
Network scope for distribution

March 2018

38199-Lon505.dwg guya



Key

Order Limits

Z1 Internal zones

Network exit points

0 m 1000 m 2000 m

Scale 1:40000 @ A3

Client

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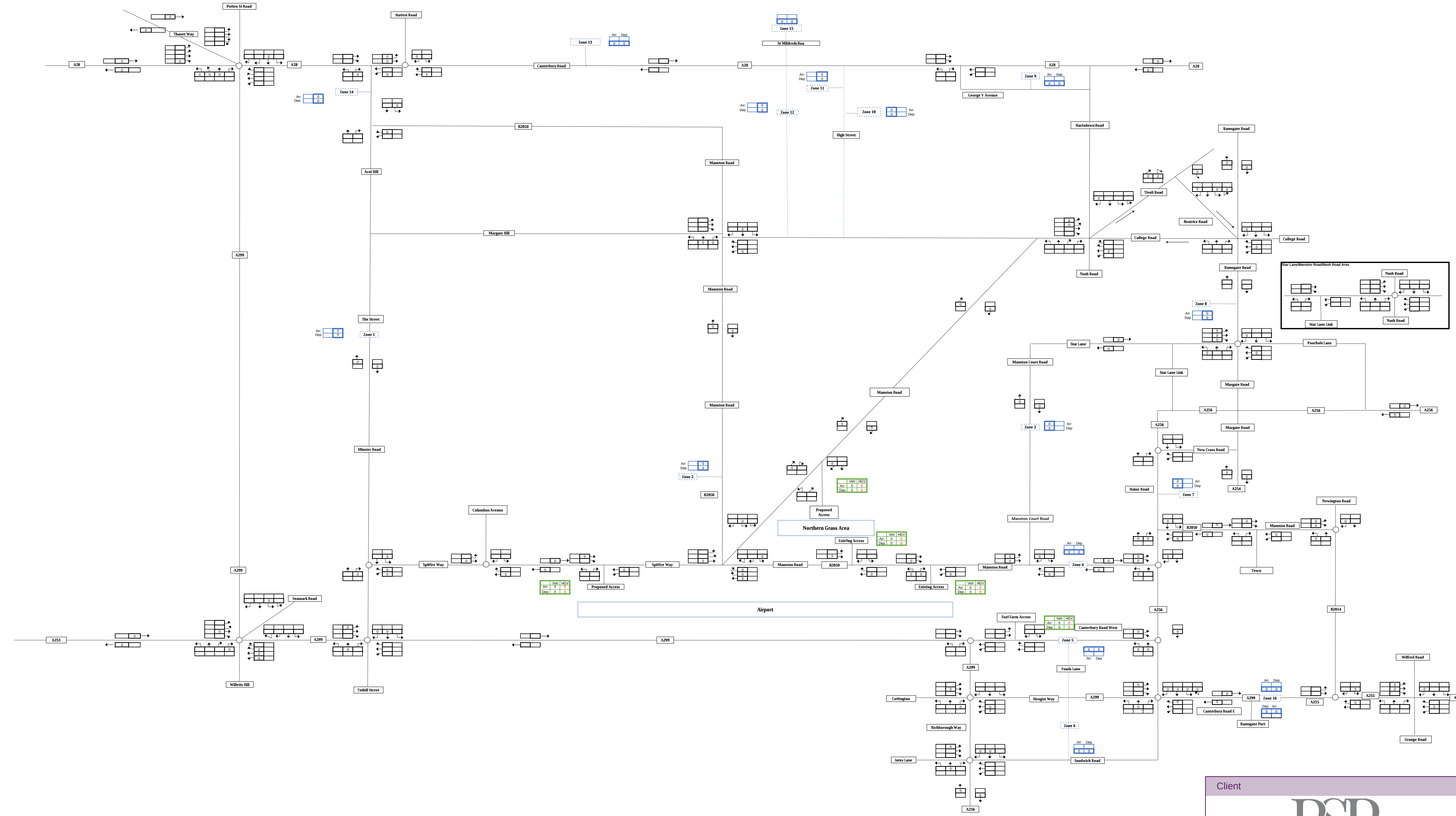
Figure 6.5
Routes and Zones for trip distribution

March 2018

38199-Lon506.dwg guya



228	Total Vehicles
4	HGV

Client

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Figure 6.6
Passenger Traffic Generation - AM Peak

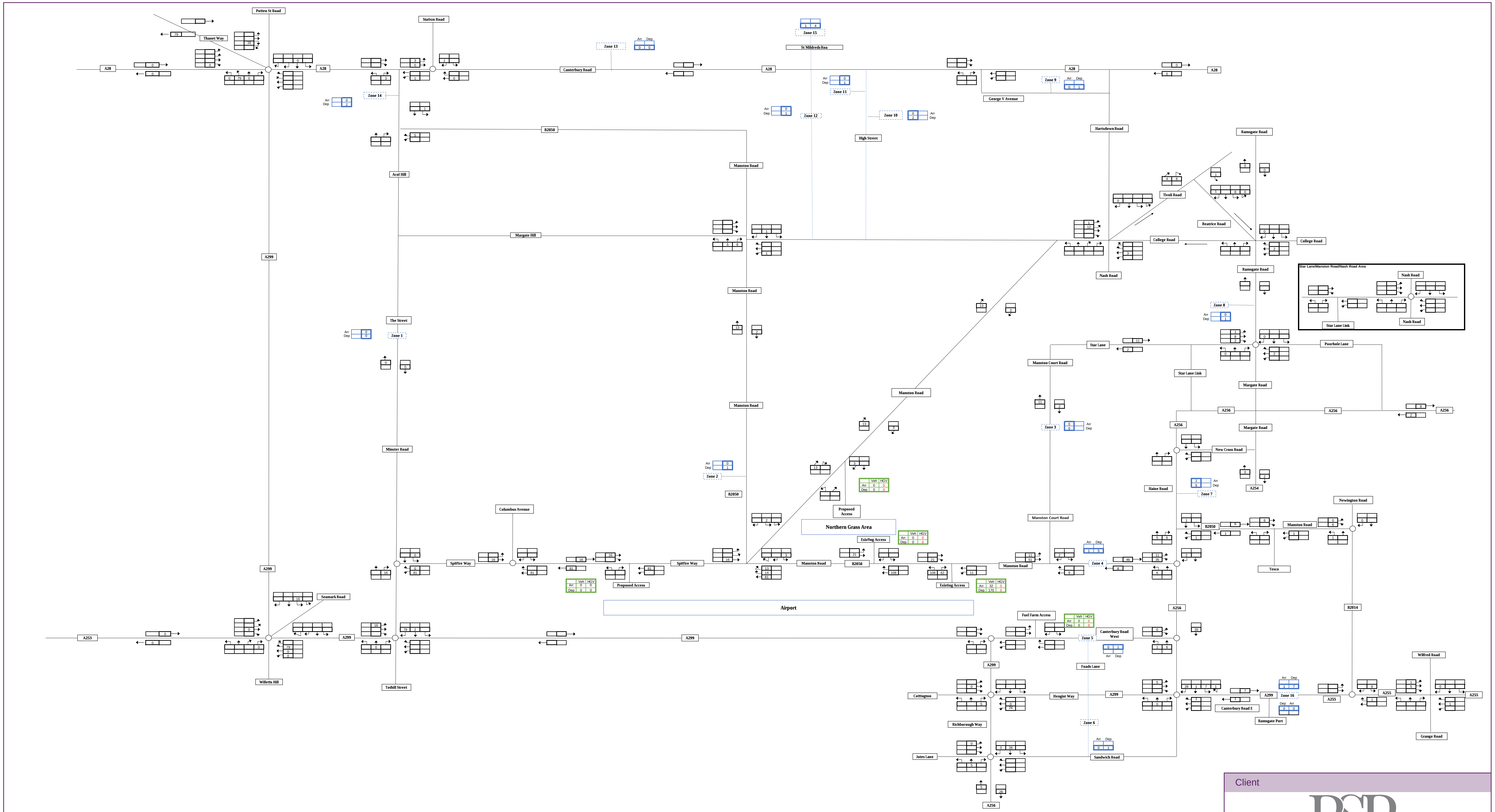

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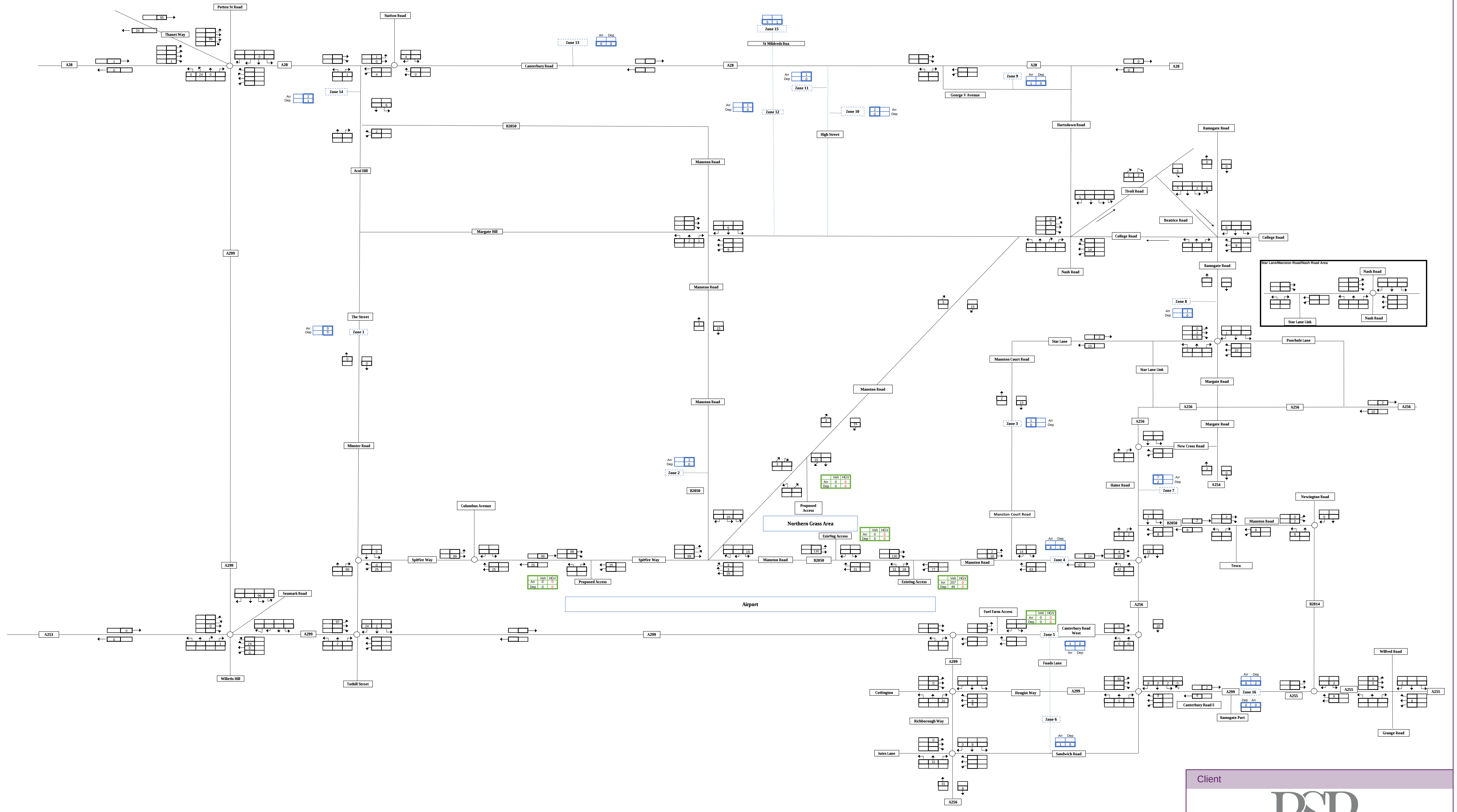
Figure 6.7
Passenger Traffic Generation - PM Peak

228	Total Vehicles
4	HGV



228	Total Vehicles
4	HGV

Client

RSP

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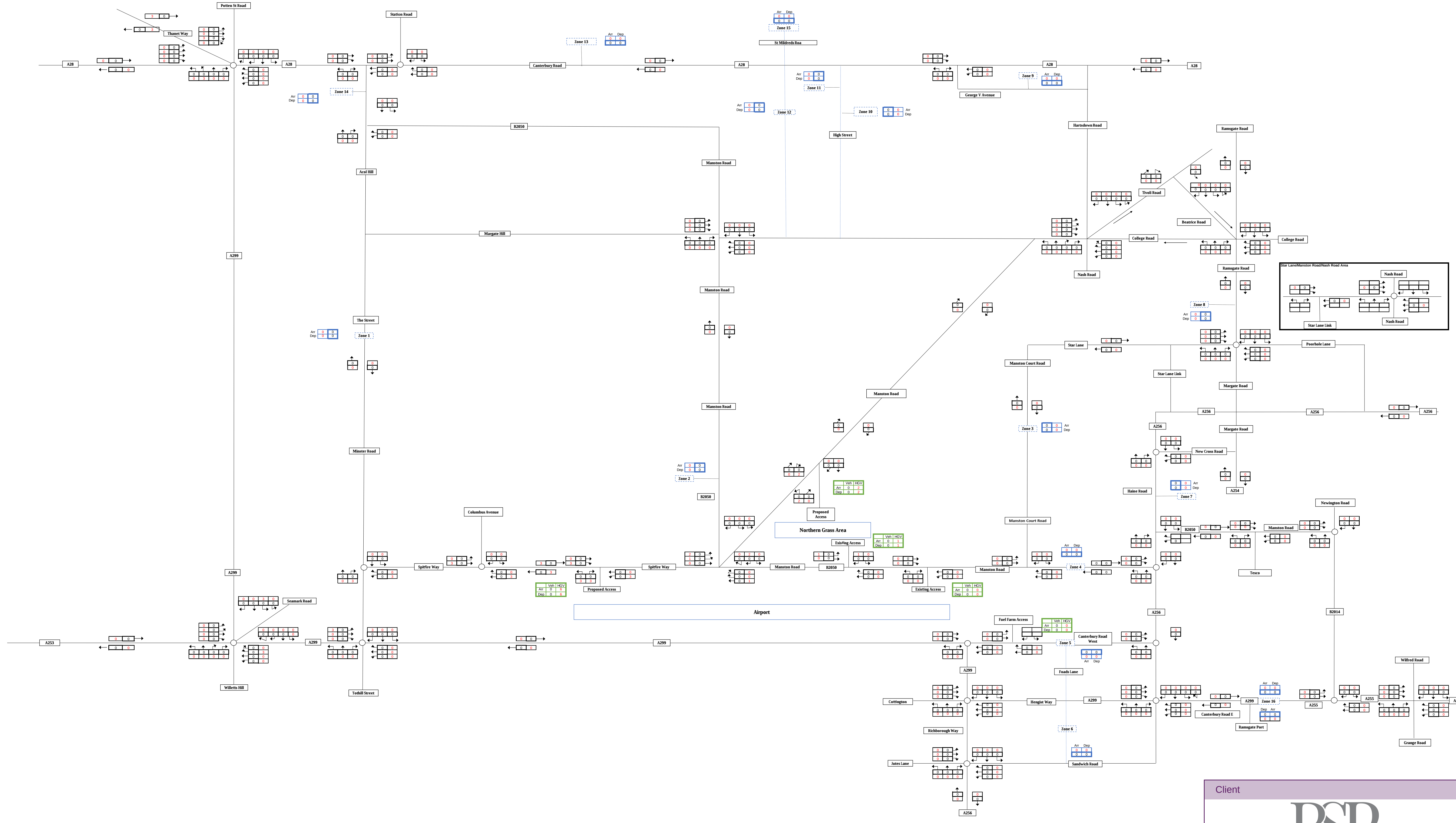
Figure 6.8
Passenger Traffic Generation - Airport Peak



228 Total Vehicles
4 HGV

Client

RSP

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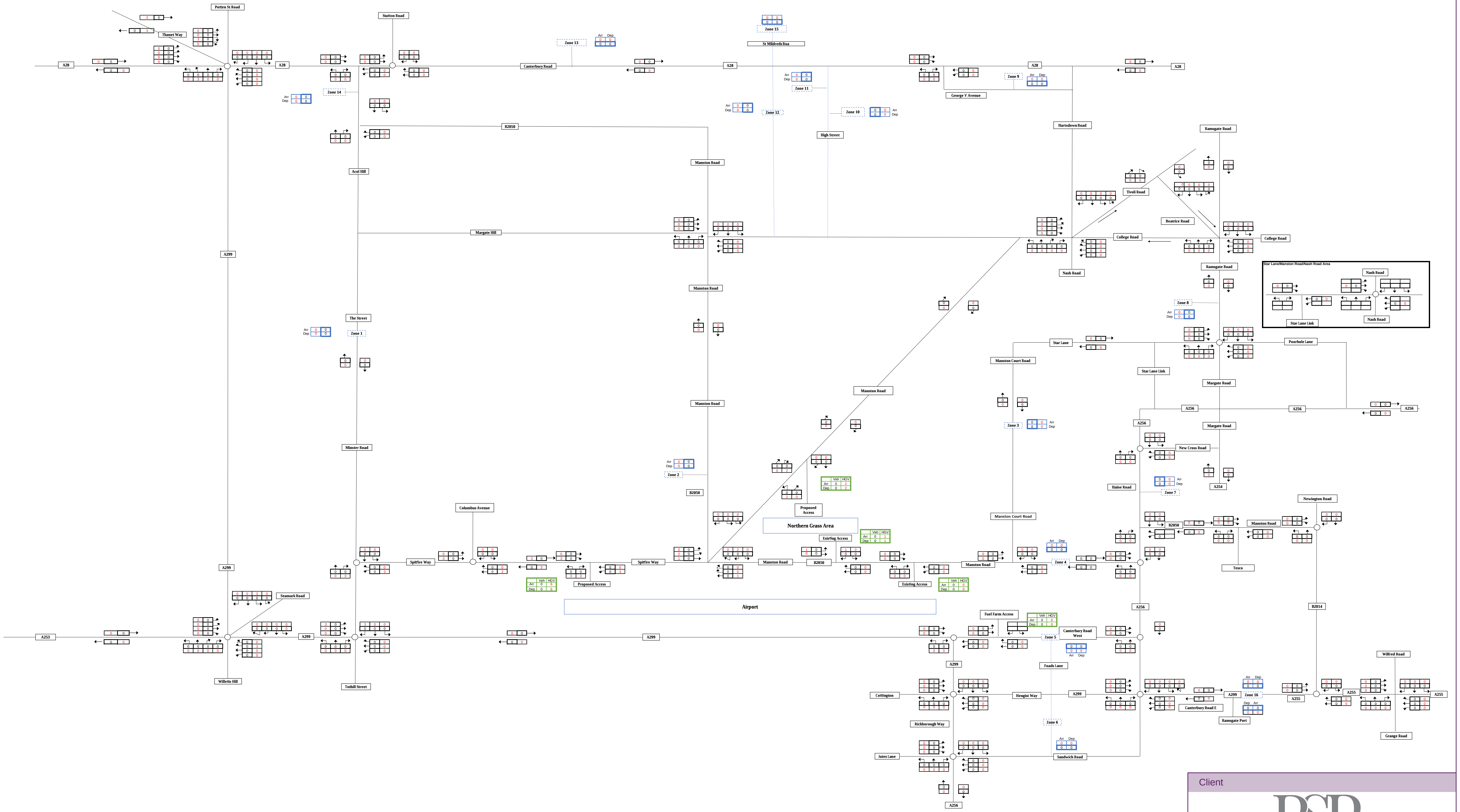
Figure 6.9
Freight Traffic Generation - AM Peak



228 Total Vehicles

4 HGV

Client

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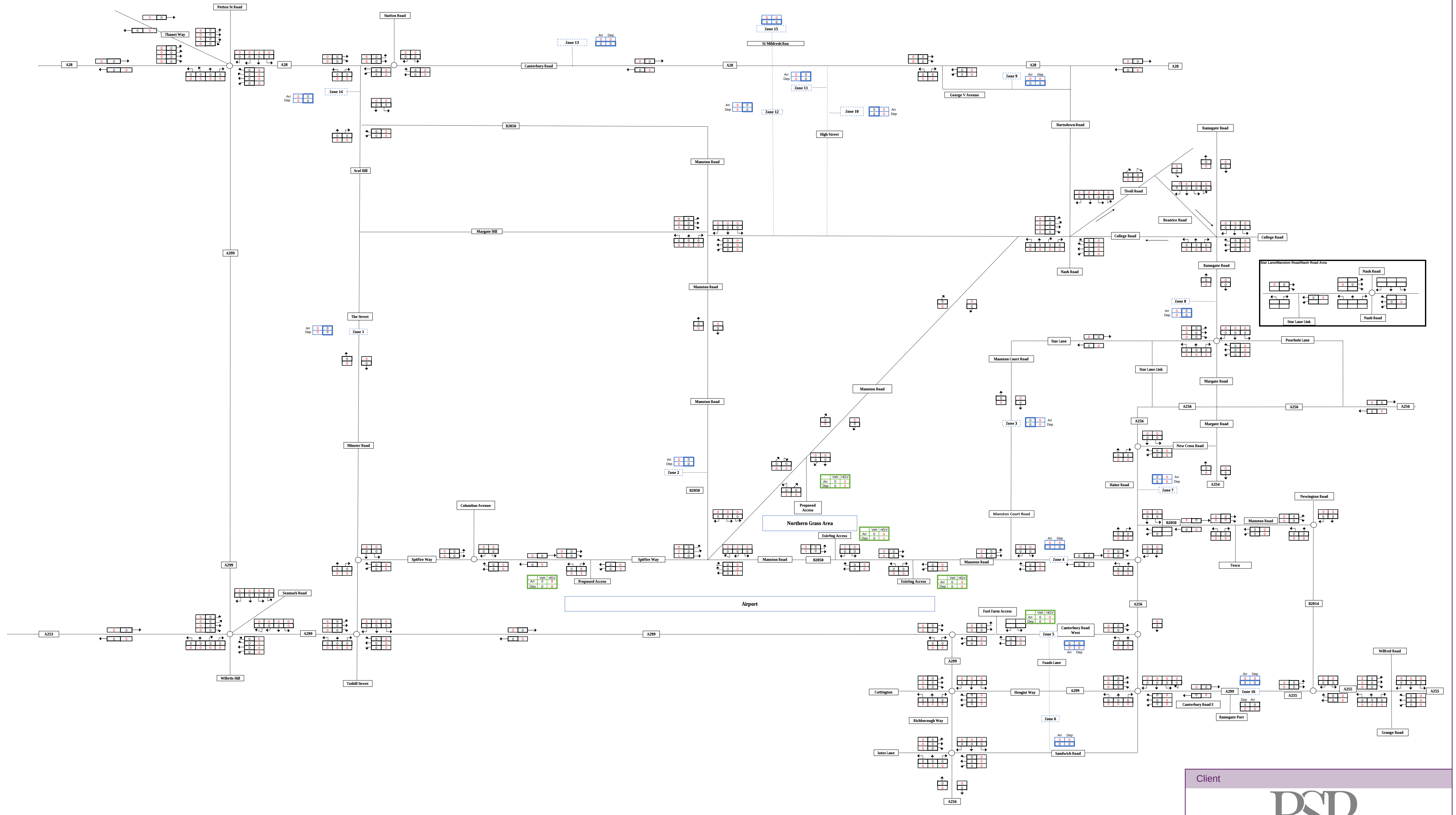
Figure 6.10
Freight Traffic Generation - PM Peak

March 2018

38199-Lon514.ai bernb



228 Total Vehicles

4 HGV

Client

RSP

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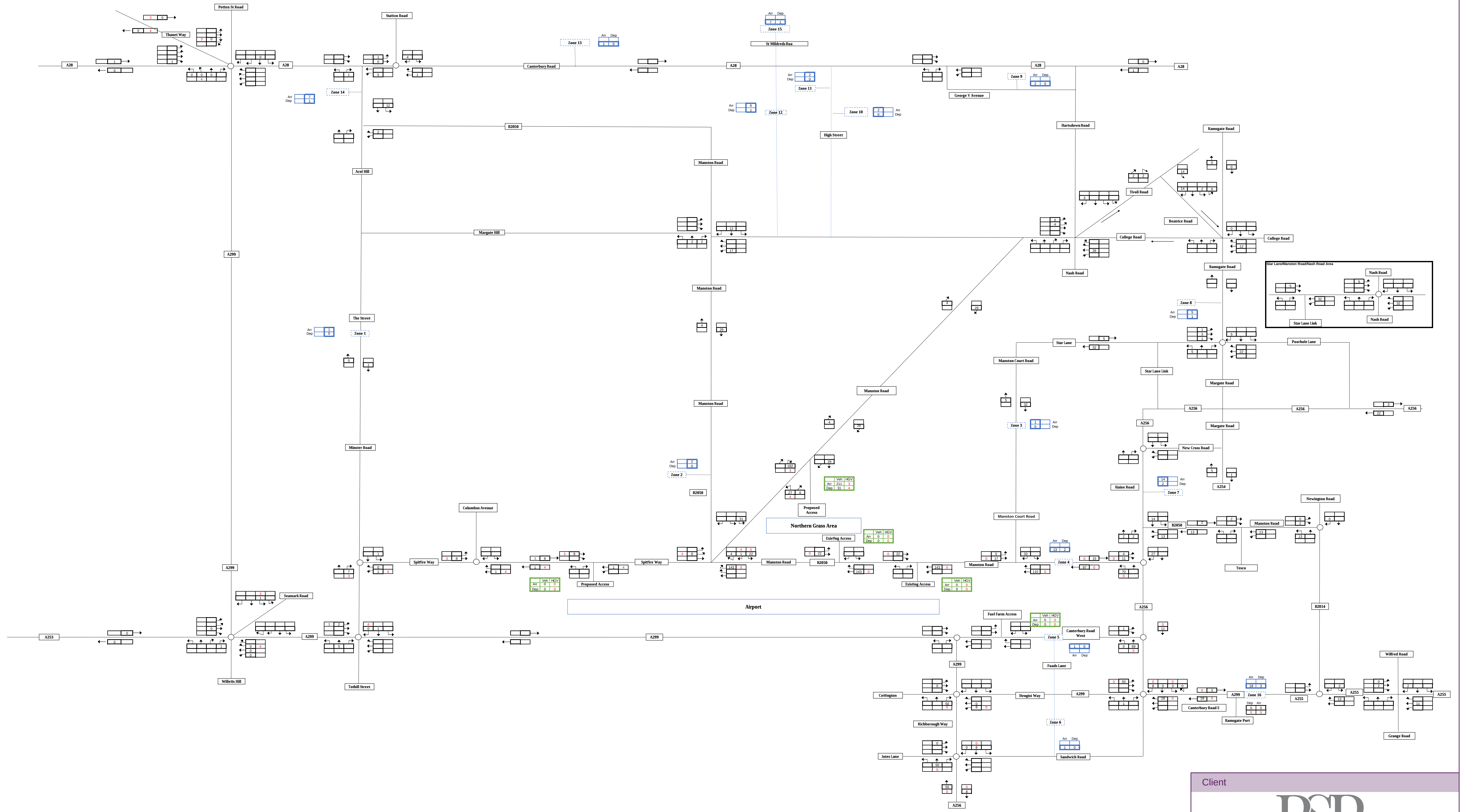
Figure 6.11
Freight Traffic Generation - Airport Peak



228	Total Vehicles
4	HGV

Client

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Figure 6.12
Northern Grass Area Traffic Generation - West Access - AM Peak

March 2018

38199-Lon516.ai bernb

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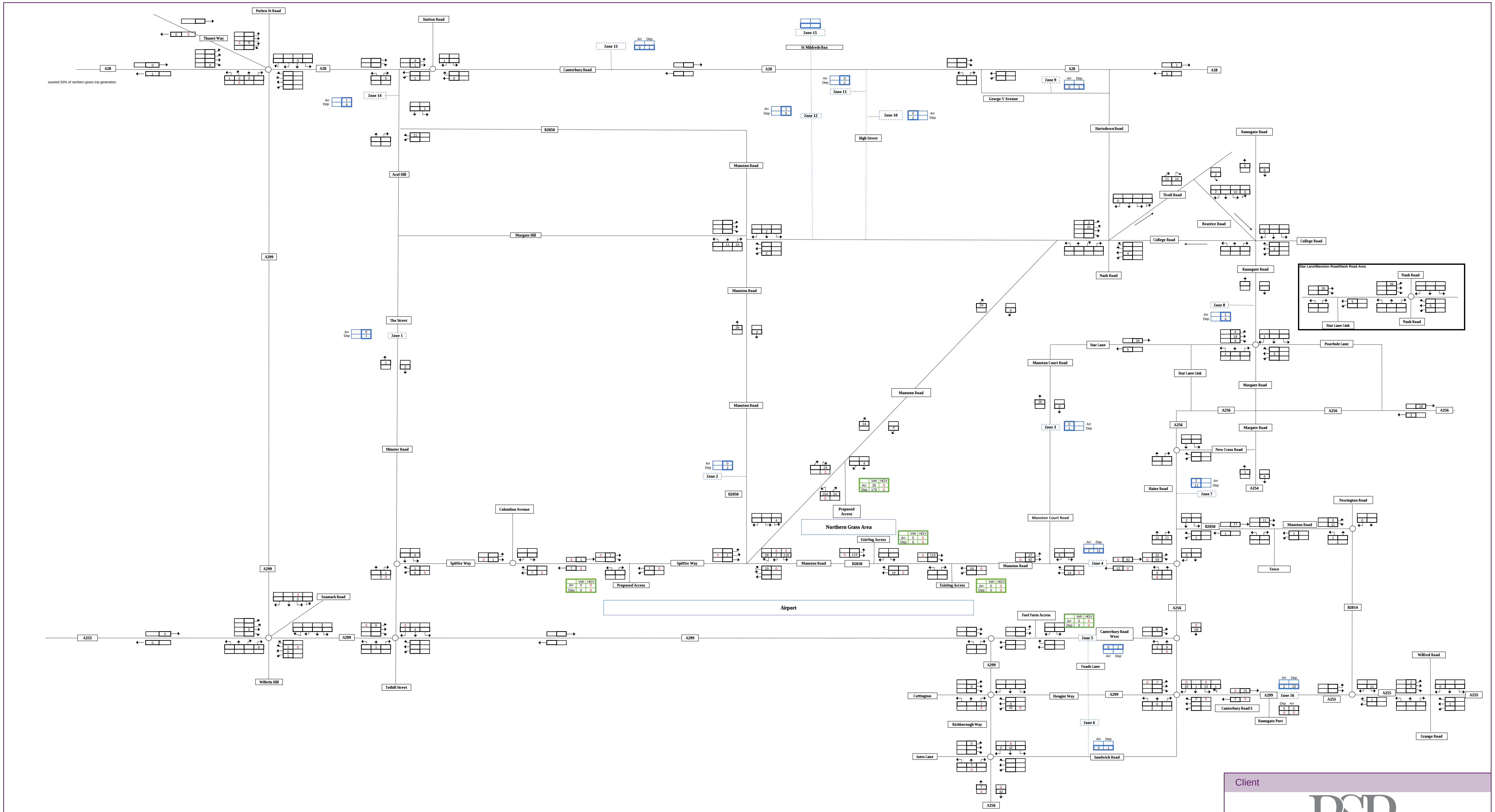

228 Total Vehicles
4 HGV

Client

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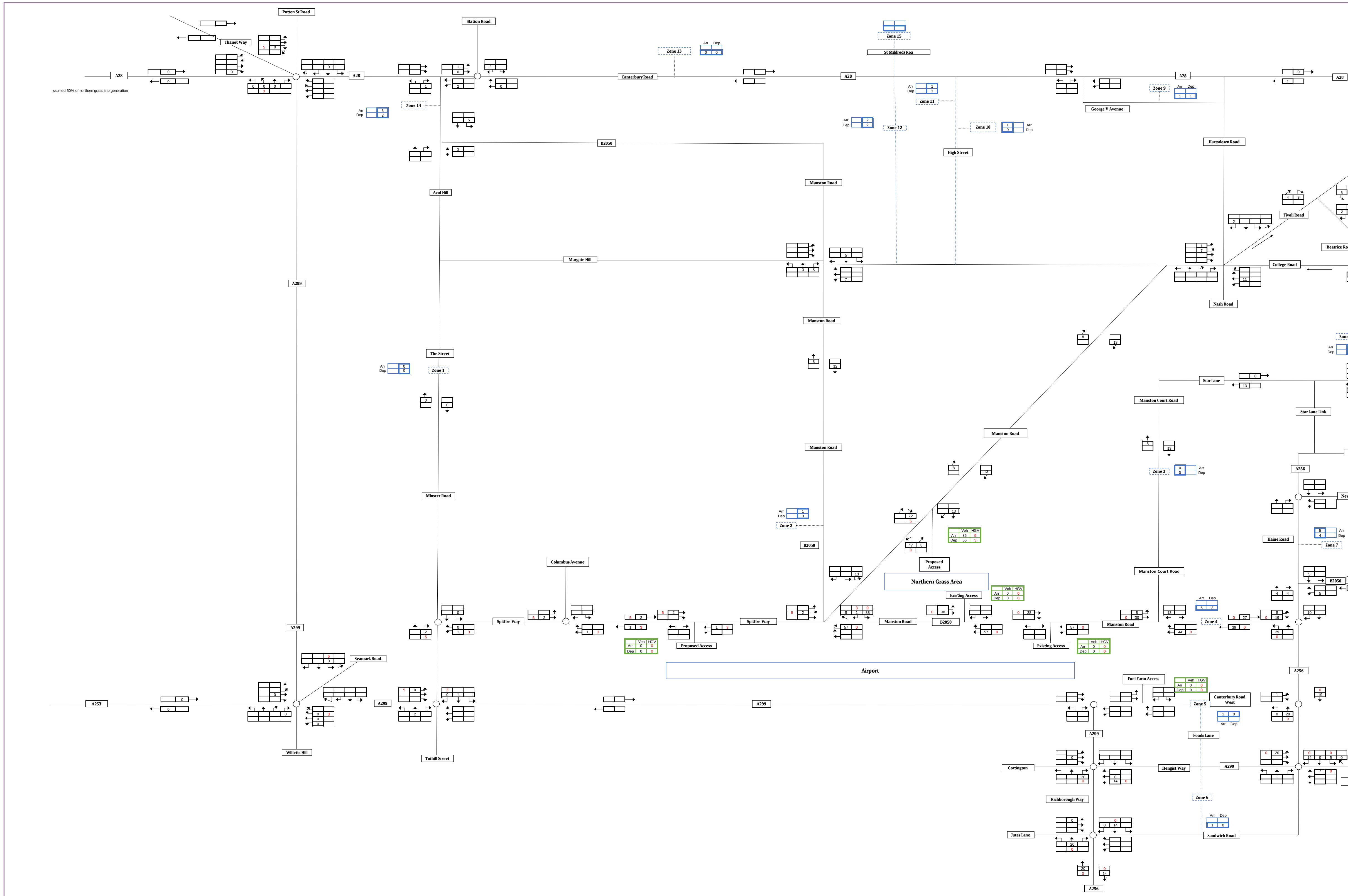
Figure 6.13
Northern Grass Area Traffic Generation - West Access - PM Peak



228	Total Vehicles
4	HGV

Client

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Figure 6.14
Northern Grass Area Traffic Generation - West Access - Airport Peak

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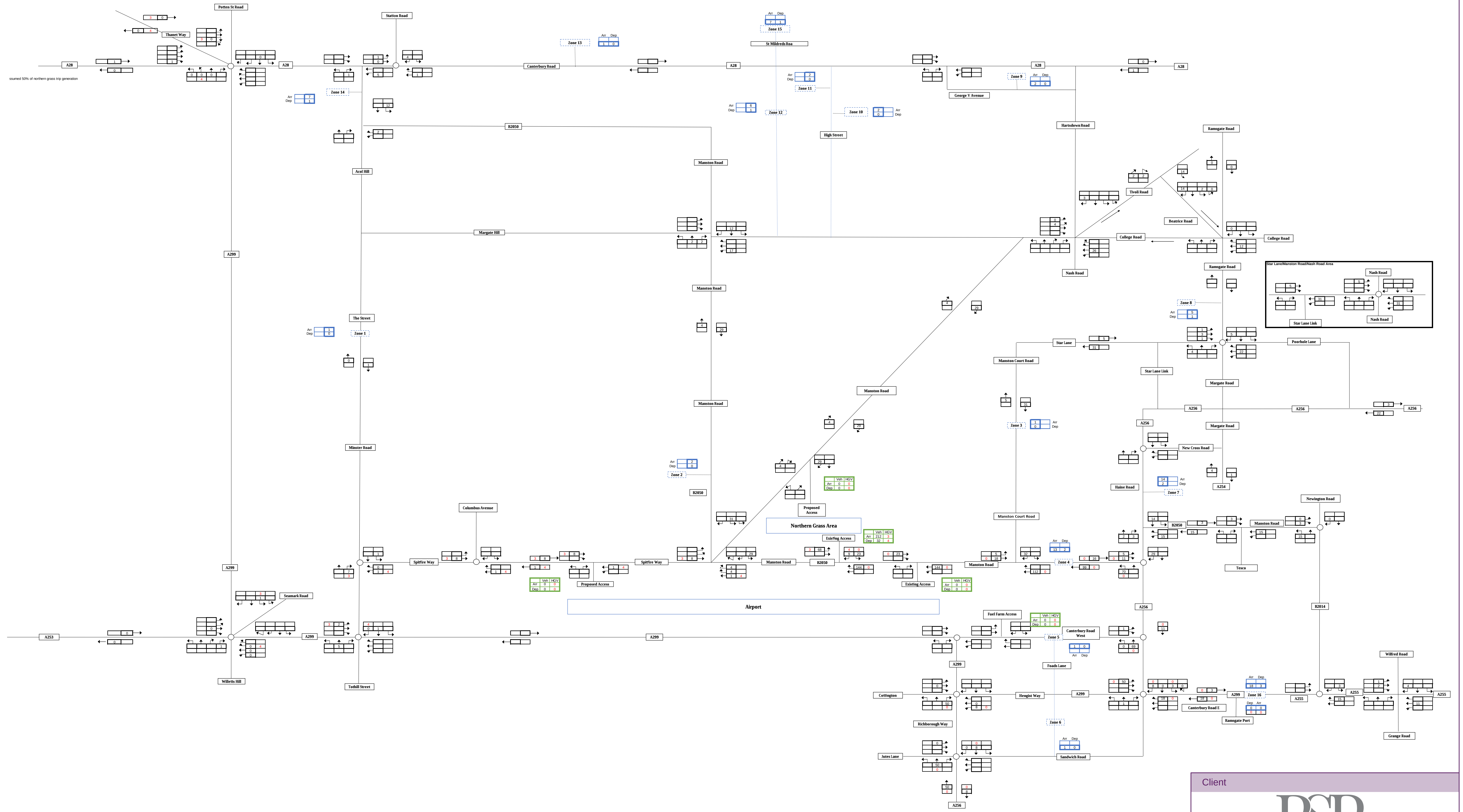

228 Total Vehicles

4 HGV

Client

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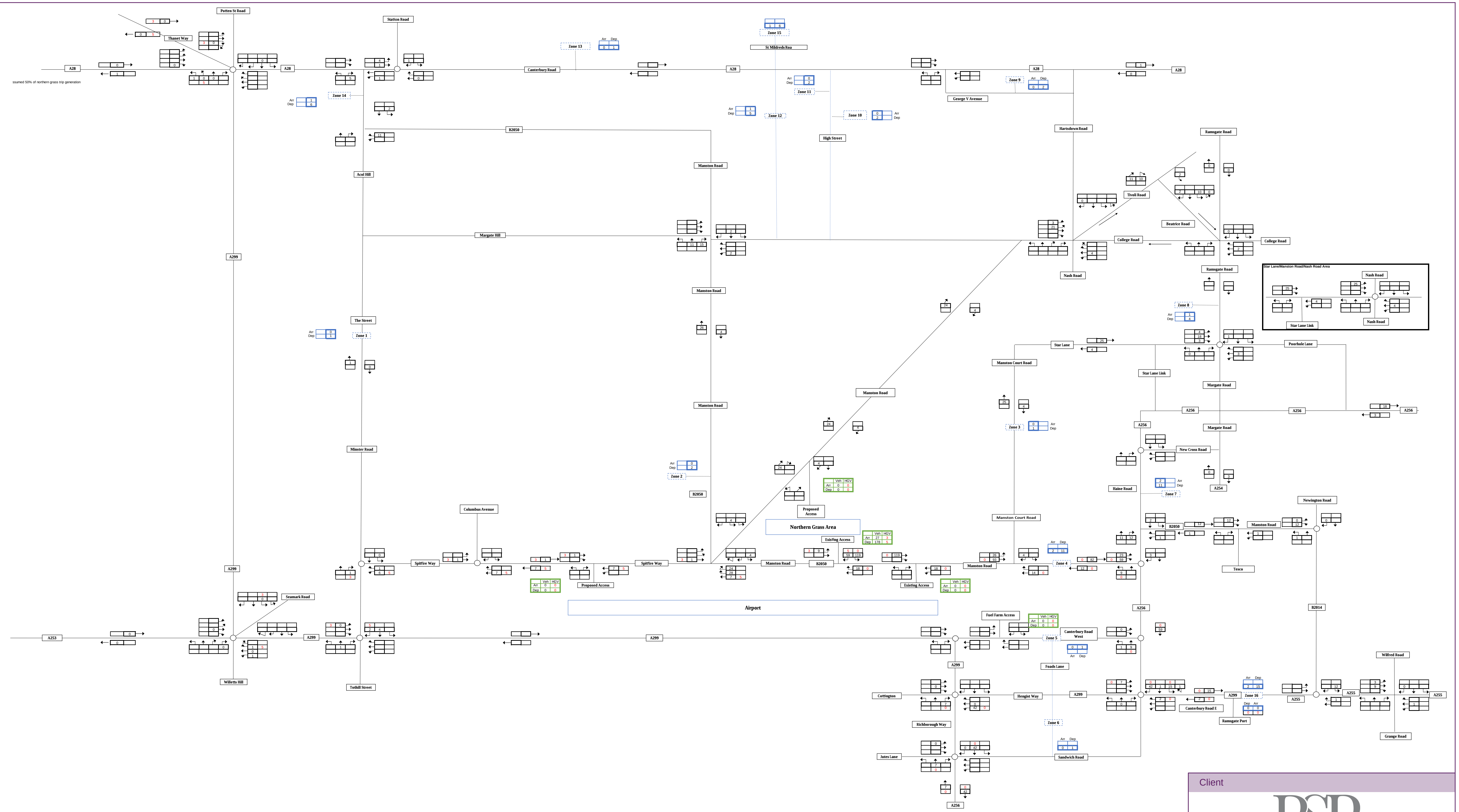
Figure 6.15
Northern Grass Area Traffic Generation- South Access - AM Peak



228 Total Vehicles

4 HGV

Client

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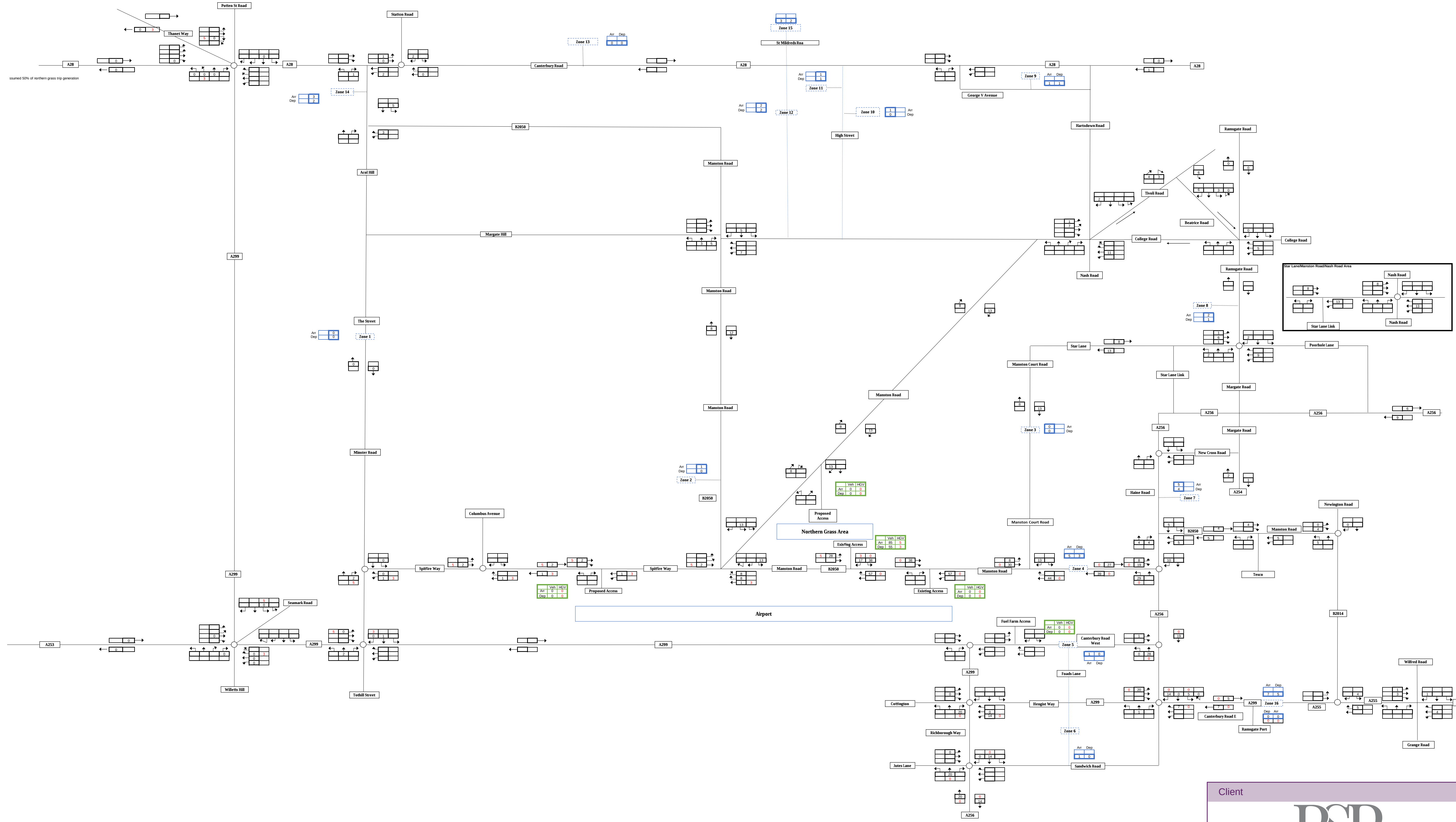
Figure 6.16
Northern Grass Area Traffic Generation- South Access - PM Peak



228	Total Vehicles
4	HGV

Client

RSP

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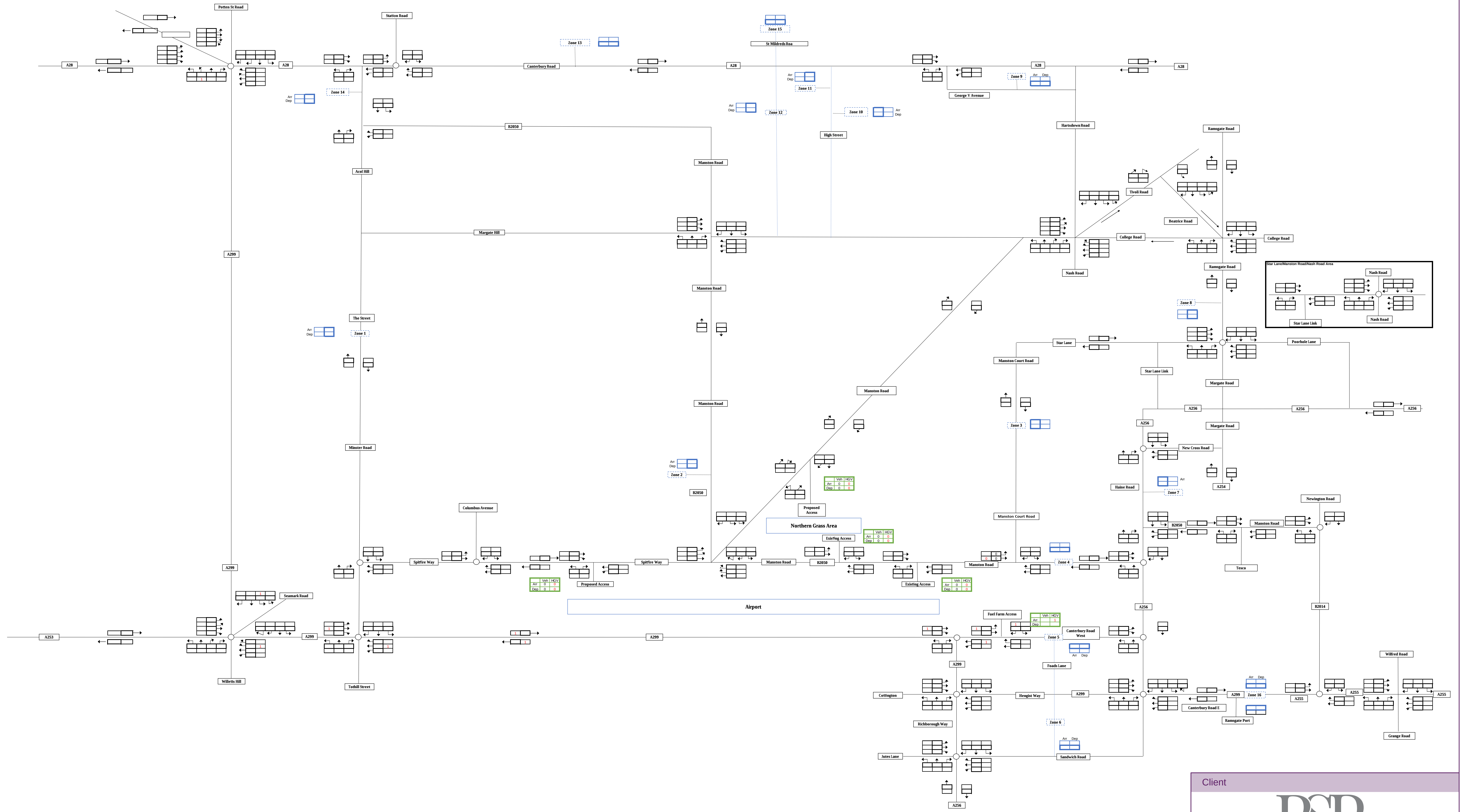
Figure 6.17
Northern Grass Area Traffic Generation - South Access - Airport Peak



228	Total Vehicles
4	HGV

Client

RSP

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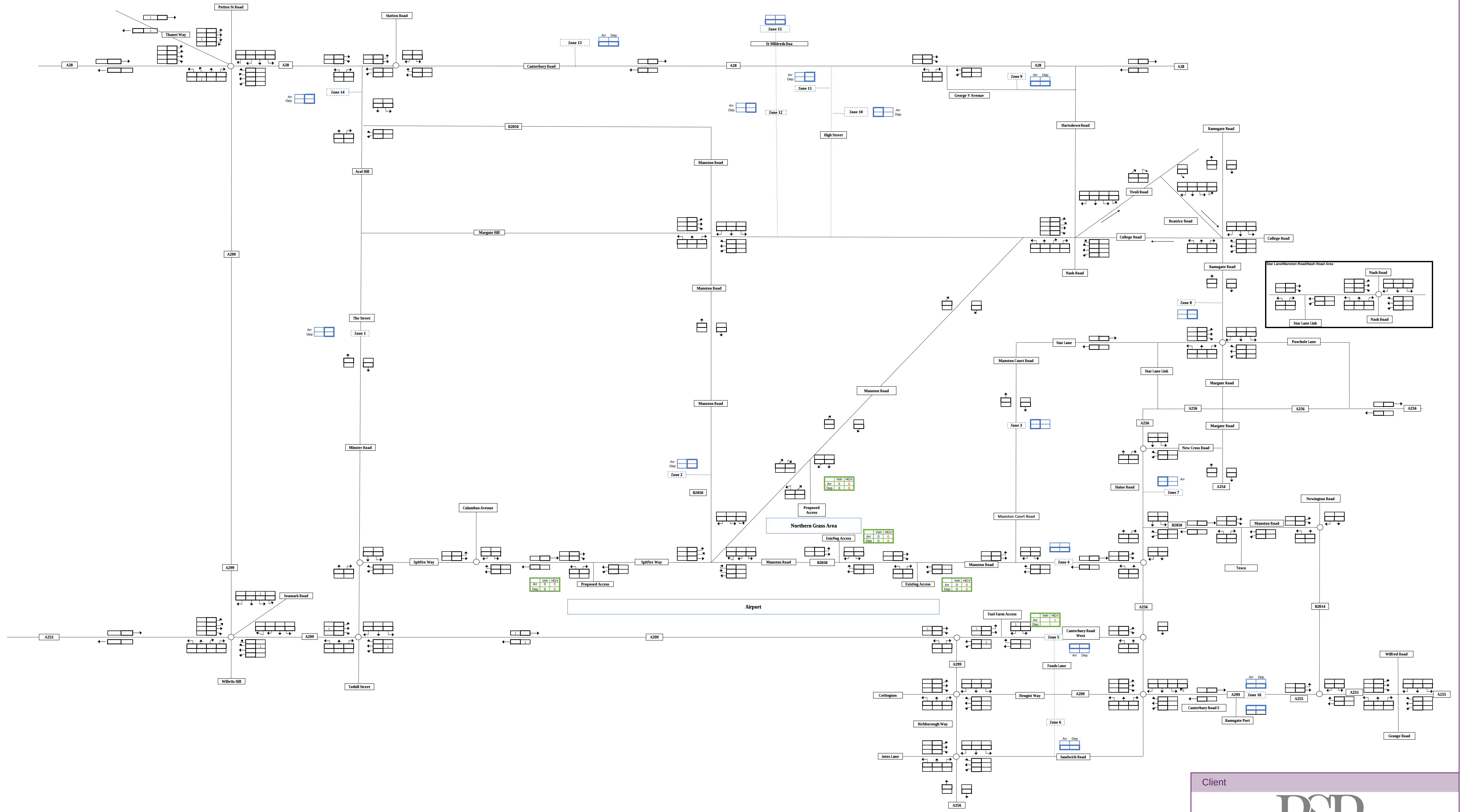
Figure 6.18
Fuel Farm Traffic Generation - AM Peak



228 Total Vehicles
4 HGV

Client

RSP

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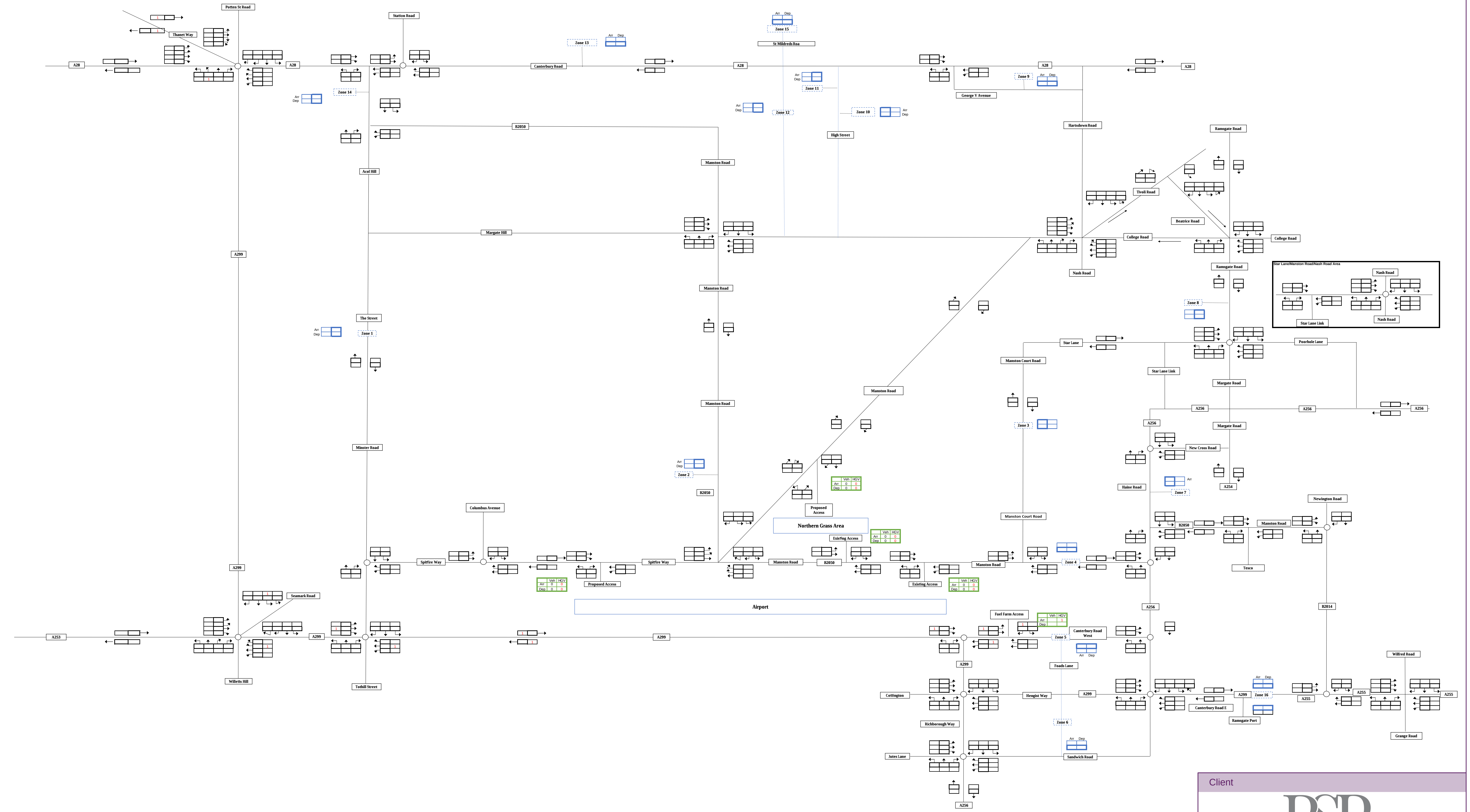
Figure 6.19
Fuel Farm Traffic Generation - PM Peak



228 Total Vehicles
4 HGV

Client

RSP

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Figure 6.20
Fuel Farm Traffic Generation - Airport Peak

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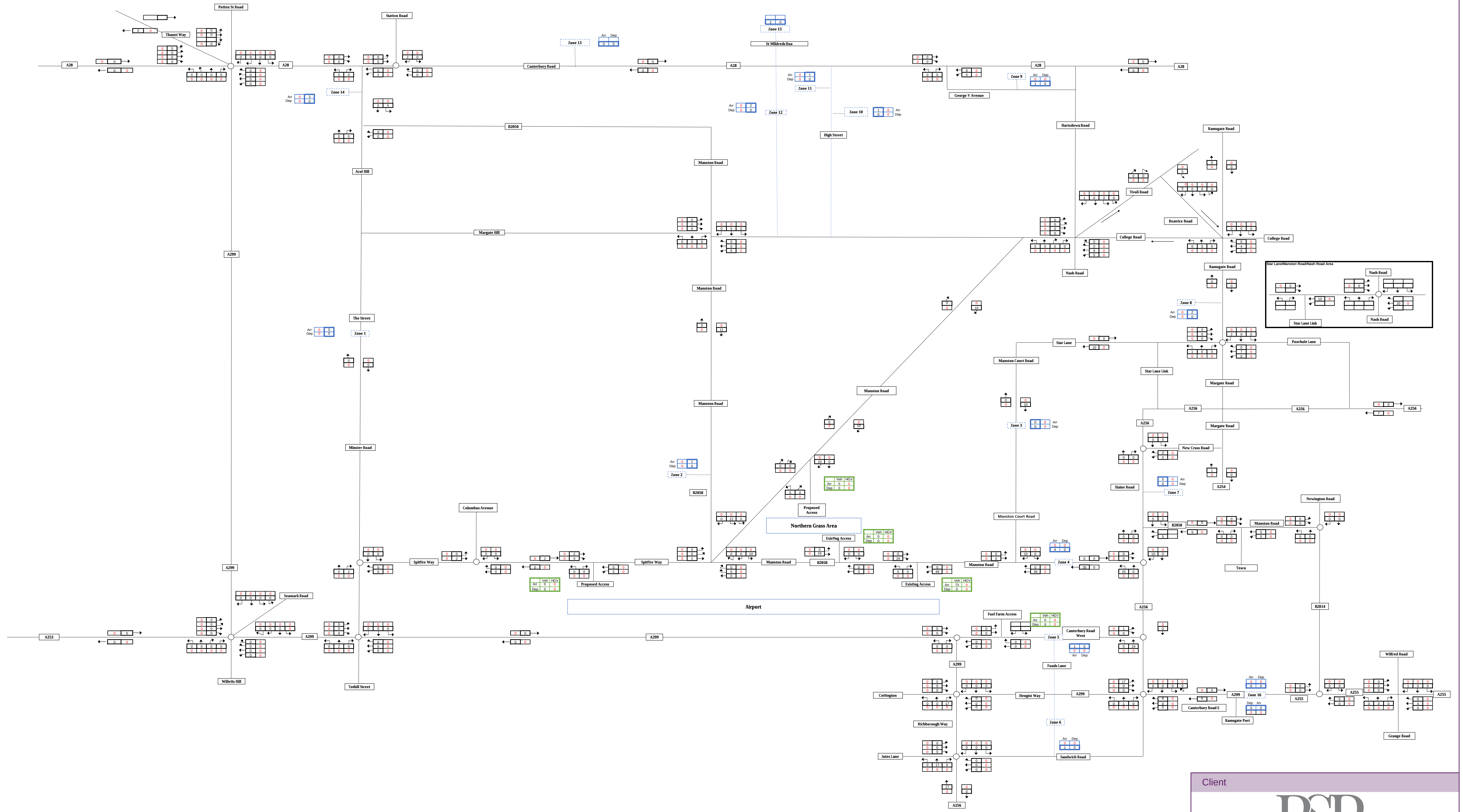

228	Total Vehicles
4	HGV

Client

RSP

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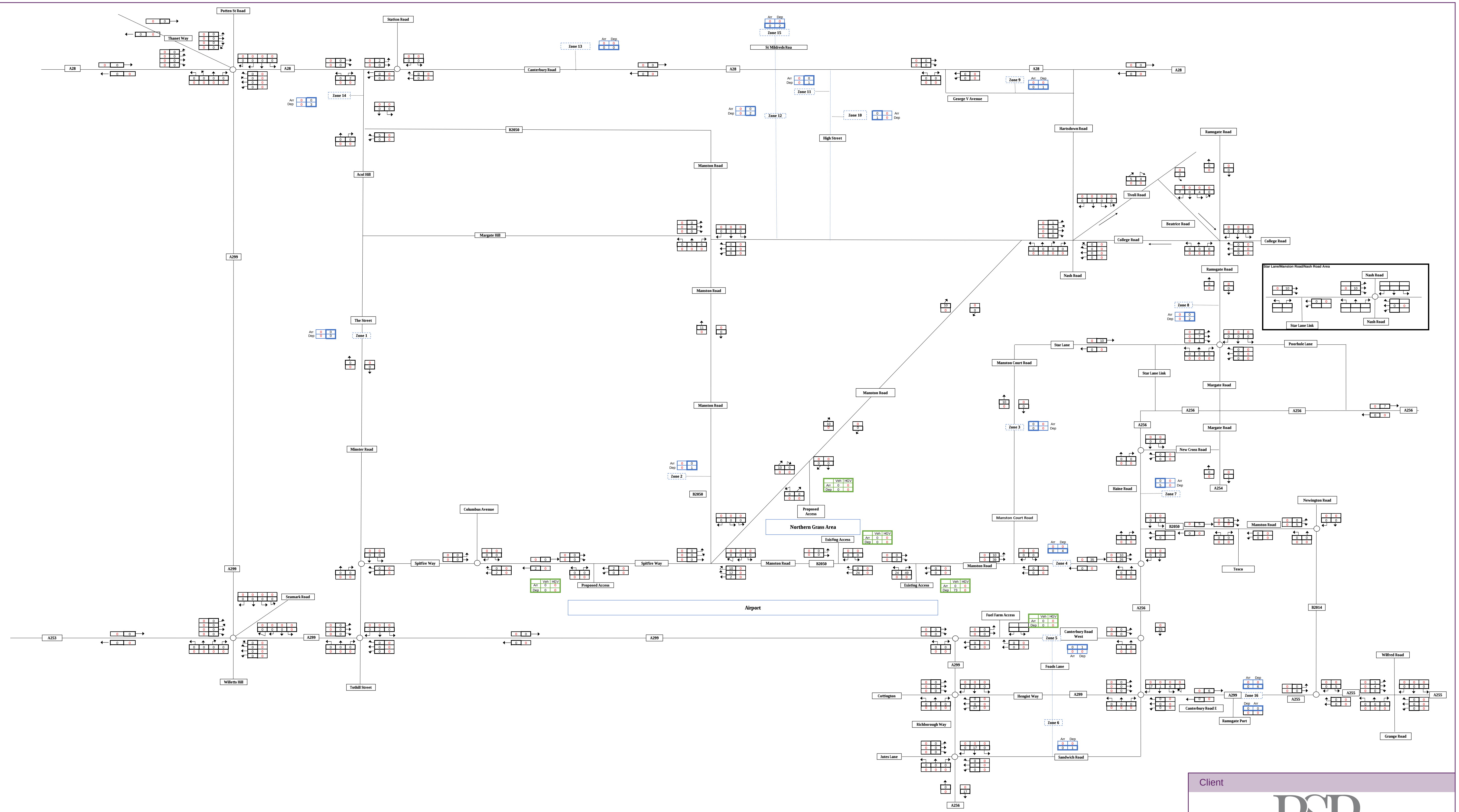
Transport Assessment

amec foster wheeler

Figure 6.21
Staff Traffic Generation - AM Peak



228 Total Vehicles
4 HGV

Client

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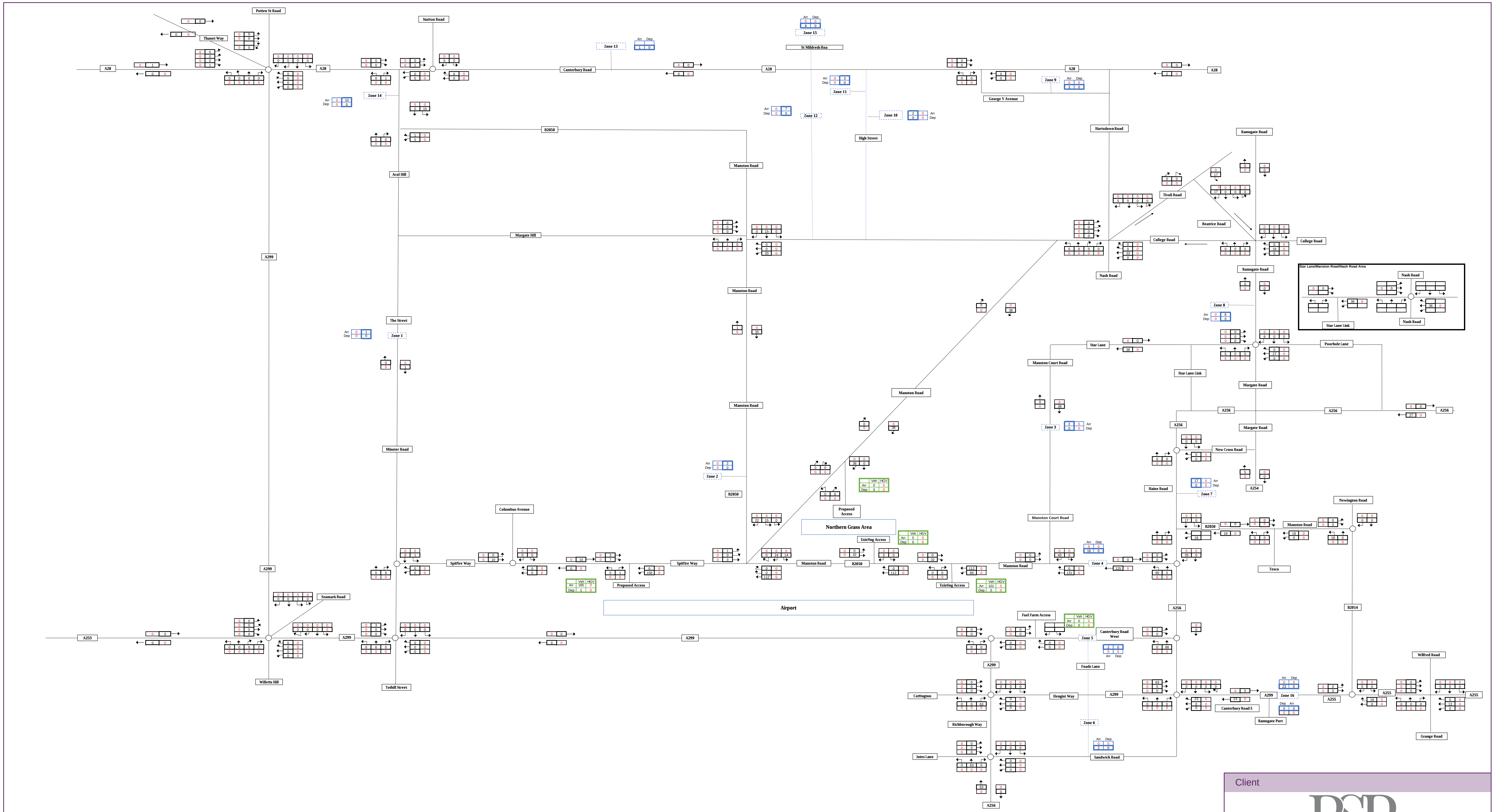
Figure 6.22
Staff Traffic Generation - PM Peak



228	Total Vehicles
4	HGV

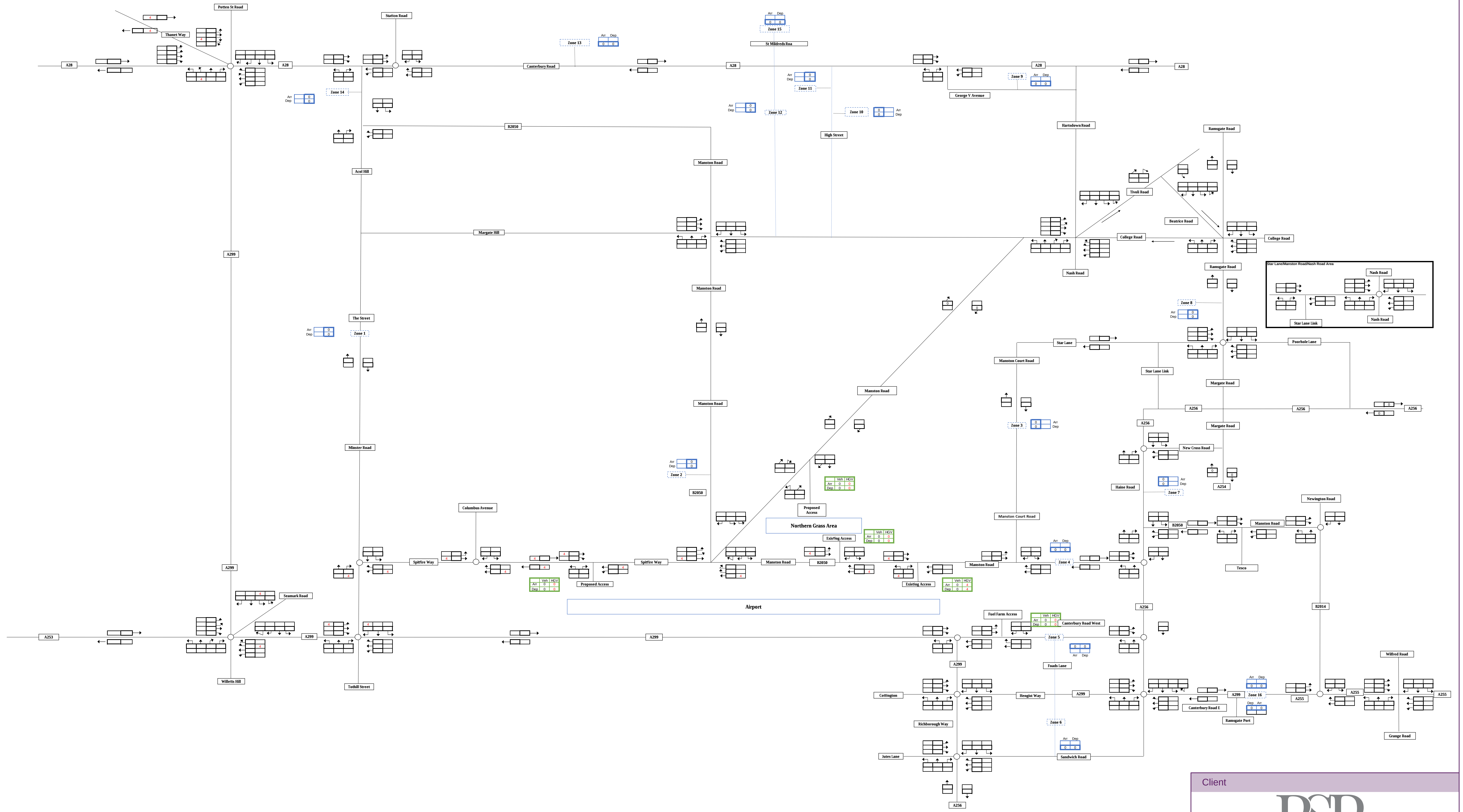
Client

RSP

Manston Airport DCO
Transport Assessment

amec foster wheeler

Figure 6.23
Staff Traffic Generation - Airport Peak



228 Total Vehicles
4 HGV

Client

RSP

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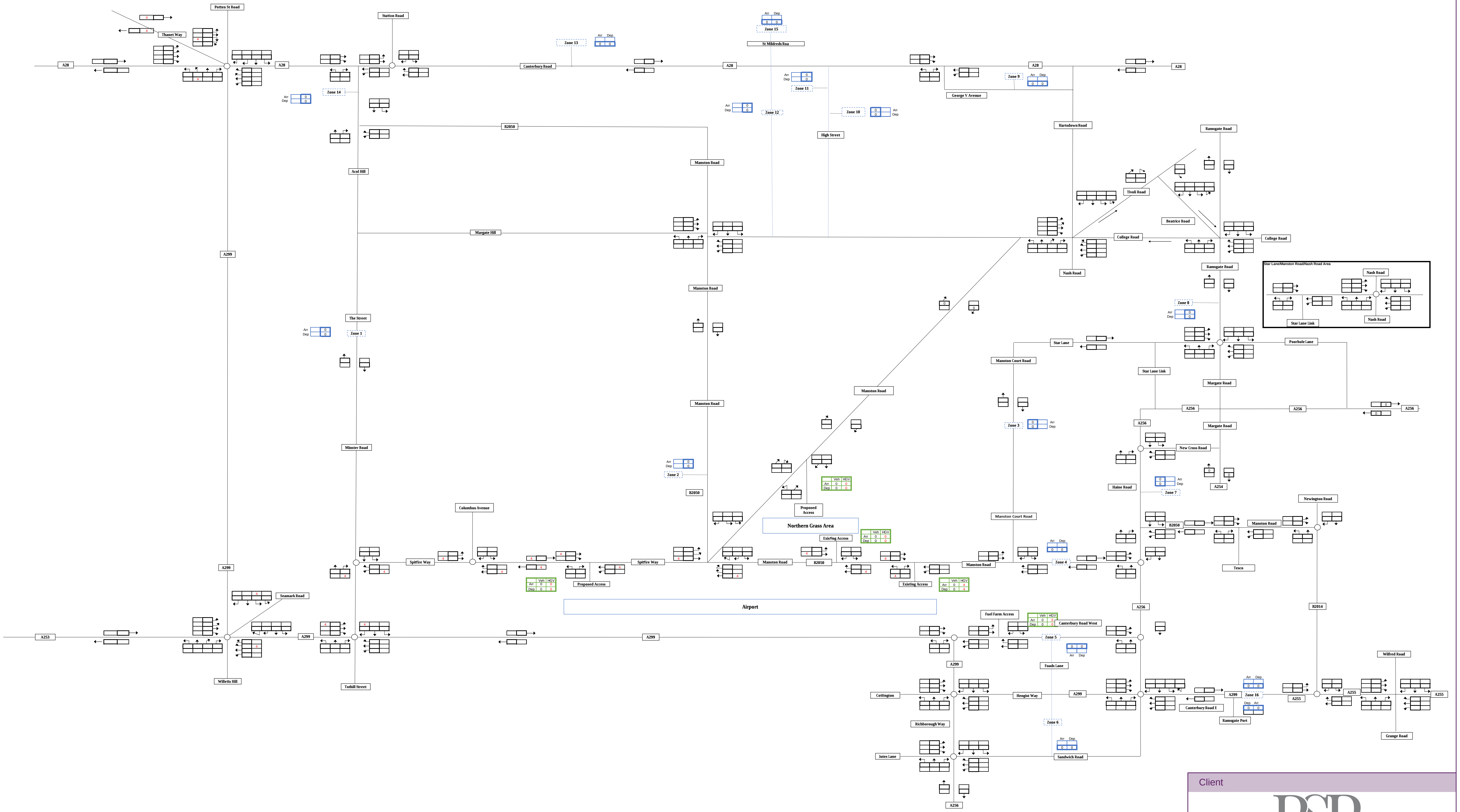
Figure 6.24
HGV Servicing Traffic Generation - AM Peak



228	Total Vehicles
4	HGV

Client

RSP

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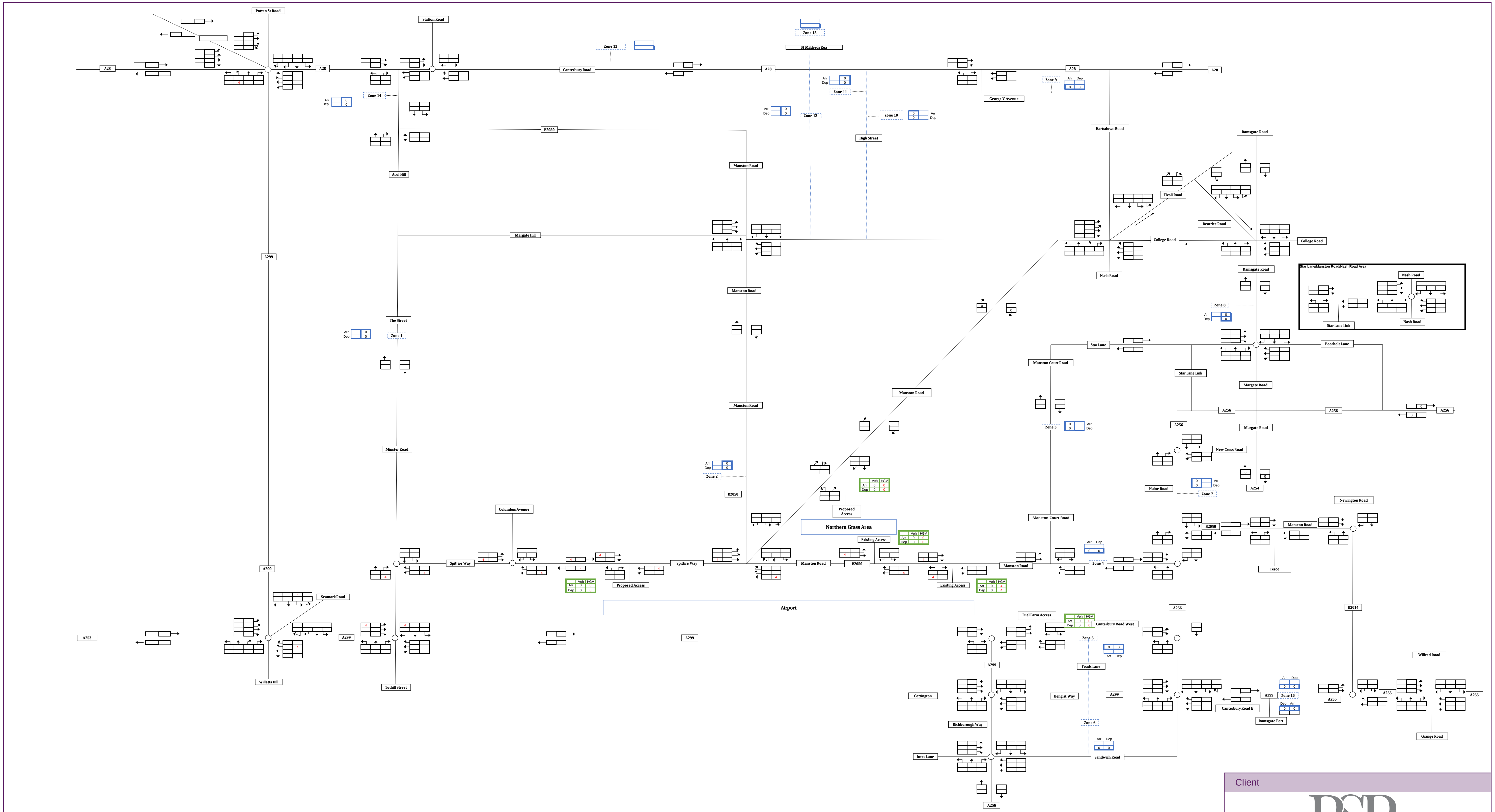
Figure 6.25
HGV Servicing Traffic Generation - PM Peak



228	Total Vehicles
4	HGV

Client

RSP

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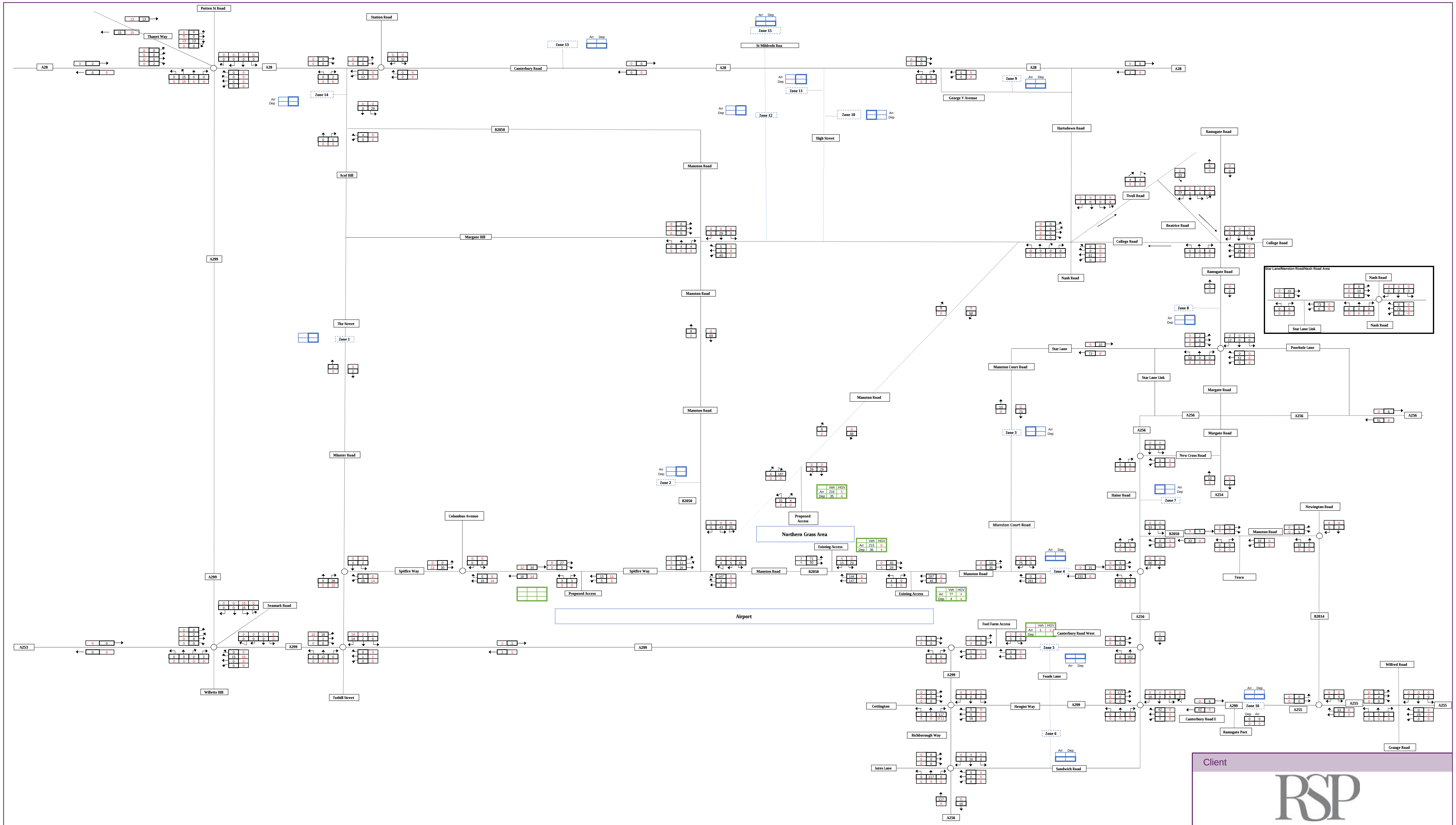
Figure 6.26
HGV Servicing Traffic Generation - Airport Peak



228	Total Vehicles
4	HGV

Client

RSP

Manston Airport DCO
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Figure 6.27
Overall development traffic generation - AM Peak

March 2018 38199-Lon548.ai parkj

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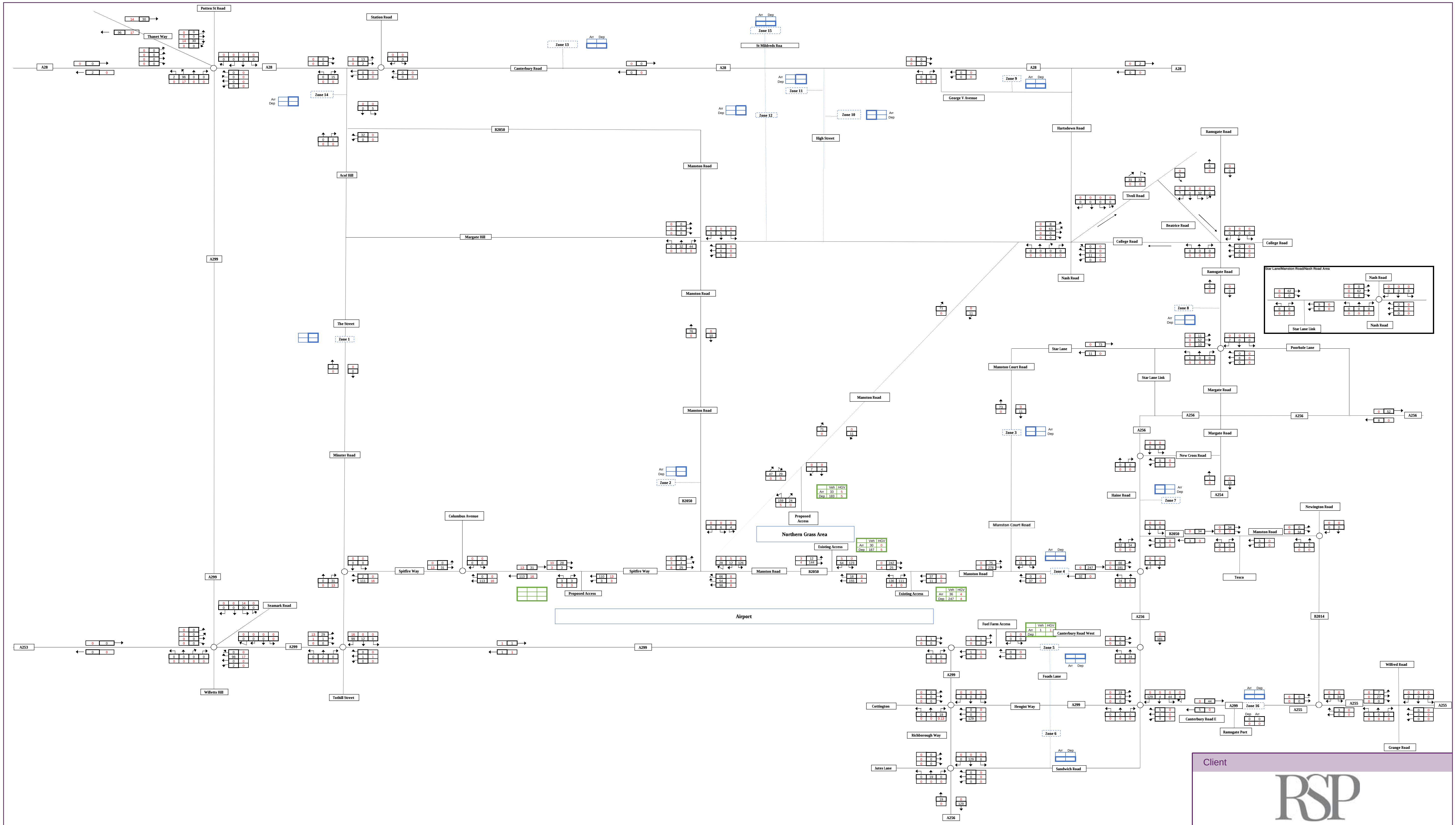

228	Total Vehicles
4	HGV

Client

RSP

Manston Airport DCO
Transport Assessment

amec foster wheeler

Figure 6.28
Overall development traffic generation - PM Peak

March 2018 38199-Lon549.ai parkj

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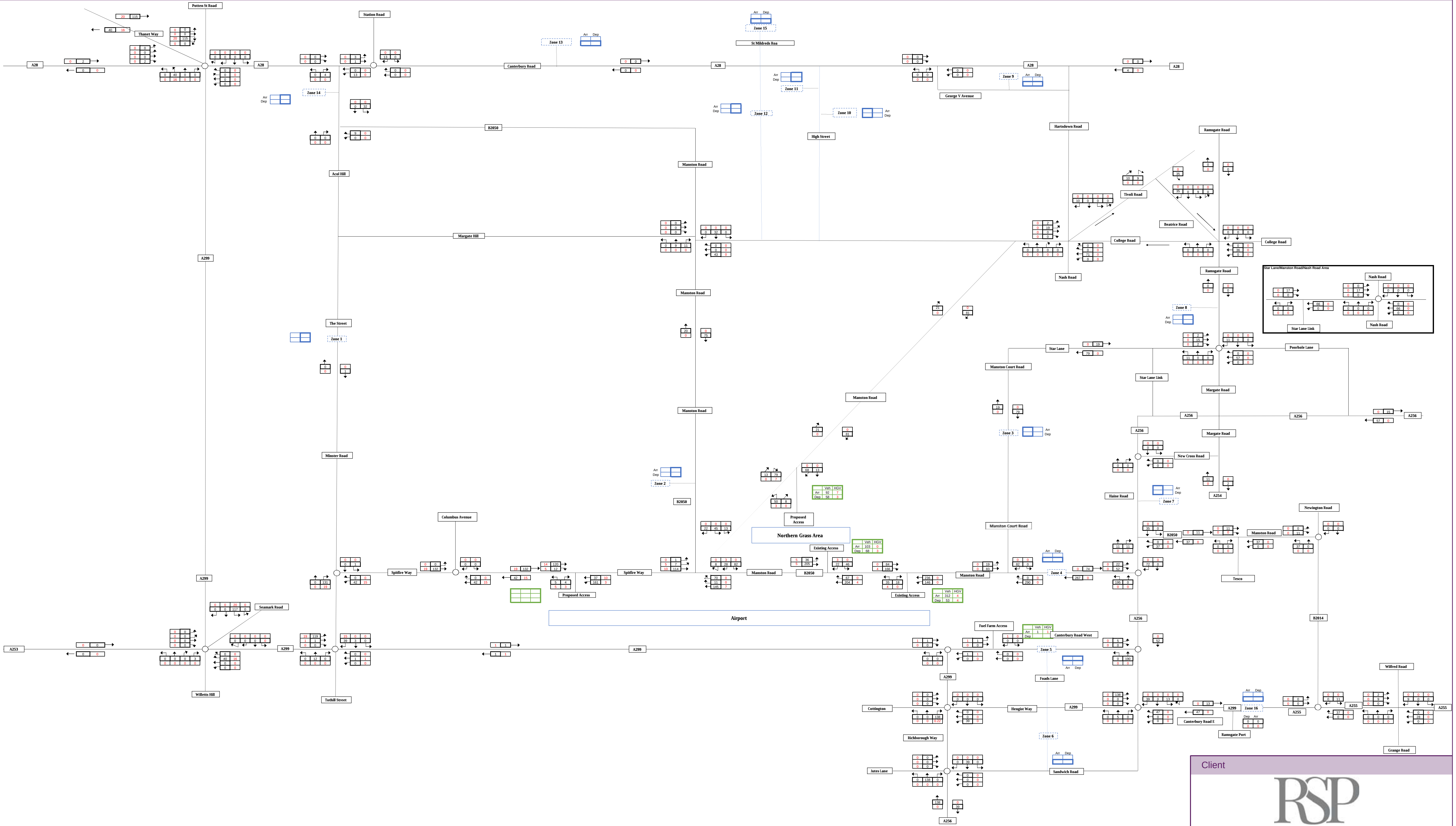


228	Total Vehicles
4	HGV

Client

RSP

Manston Airport DCO
Transport Assessment

amec foster wheeler

Figure 6.29
Overall development traffic generation - Airport Peak

7. Traffic Impact Assessment

7.1 Introduction

7.1.1 The traffic impact of the Proposed Development has been undertaken based on junction assessments using the validated base models, comparing the future baseline scenario results with those of future baseline scenario plus development flows. The impact of the development traffic and need for mitigation has been based upon two conditions:

- Does the impact of the development traffic result in the RFC exceeding the standard threshold of 0.85 at roundabouts and priority junctions, or 90% DoS for signalised junctions, and if so to what extent; and
- If the ratio of RFC is in excess of 0.85 at priority junctions or roundabouts, or 90% DoS saturation at signal junctions, does the development make the situation ***significantly*** worse.

7.1.2 The key issue is the need to ensure that development proposals strive to achieve **nil detriment** ('no worse off') to the road network in the assessment year(s).

7.2 Assessment Scenarios

7.2.1 As set out in paragraph 6.3.44, the peak traffic generation will be in year 20. For the purpose of the traffic impact assessment, the future year modelling is therefore 2039 which is year 20 of the Proposed Development. In addition to the existing 2017 baseline, two future year scenarios have been tested:

- Scenario 1 – 2039 Baseline – with background traffic growth; and
- Scenario 2 – 2039 Baseline + Proposed Development traffic.

7.2.2 It is appreciated that this is a long-term horizon, and further assessment work would need to be undertaken to identify when the need for mitigation would be triggered. It is anticipated that this would be undertaken in the post DCO submission period to help inform the SoCG with KCC regarding mitigation requirements.

7.2.3 Three time periods have been assessed within the two scenarios:

- AM peak hour (07:45 – 08:45);
- PM peak hour (16:45 – 17:45); and
- the Airport peak hour (13:00 – 14:00).

7.3 Traffic Growth Assumptions

7.3.1 The future assessment years should consider traffic generation from all committed developments (development sites that have extant planning permission) as well as development plan allocations in an adopted or approved Local Plan where they would impact significantly on the road network used by the Proposed Development traffic within the forecast year period.

7.3.2 The draft Thanet Local Plan 2015 identified four strategic sites and a number of non-strategic sites for residential development providing for 12,000 additional homes over the 20-year period from 2011 to 2031. The revised Local Plan from 2017 identified 17,140 homes.

7.3.3 It is noted that some of these residential sites already have planning permission, and have been completed, are being built out, such as Westwood, or about to start construction, such as Manston Green. The Manston Green development has also recently been allocated £2.5 million funding for road infrastructure which includes improvements to the A256 Haine Road/Manston Road roundabout.

7.3.4 Under Policy SP02, a minimum of 5,000 additional jobs is planned for Thanet between 2011 and 2031, to be located in four strategic sites for employment and a number of non-strategic sites. It is noted that the Manston Airfield site was included in these calculations.

7.3.5 In view of the uncertainty over the Local Plan, and the complexity of development phasing delivery, the approach towards traffic growth has been to take a robust growth factor that can be applied across the wider network. To undertake this the growth rates for the Thanet area have been calculated using the National Trip End Model (NTEM) which are presented in the DfT's Trip End Model Presentation Programme (TEMPRO) 7.2 software. These have been adjusted to take into account the planned growth in households and employment, as identified in the draft Local Plan.

7.3.6 At the time of undertaking the assessment work, revised Local Plan was coming forward for approval by the Council, and in order to present a robust approach, the growth calculations accounted for:

- 17,140 new homes (including all committed and allocated sites); and
- 5,000 new jobs.

7.3.7 To calculate the growth factor for 2039 future base year which is year 20 of the development, it is anticipated that the household growth per annum is 857 units. As the household growth shown in TEMPro is considerably less than this, adjustments were made to allow for this level of growth. The number of jobs growth per annum included in TEMPro is more aligned to the Local Plan and therefore did not require adjustment.

7.3.8 The traffic growth factor for light vehicles is considered as the average of origin and destination growth factor. Growth factor for HGV is considered from NTM AF 15 dataset.

7.3.9 The growth factor for AM and PM peak is considered directly from TEMPro AM peak period (07:00 – 10:00) and PM peak period (16:00 – 19:00) while Airport peak is considered to be the inter peak period (10:00 – 16:00) from TEMPro 7.2 as no specific hour for the airport peak can be selected in TEMPro

7.3.10 The growth factors are set out in Table 7.1. These have been applied to the 2017 baseline traffic data to derive the 2039 traffic flows.

Table 7.1 Traffic Growth Factors – 2017 - 2039

Vehicle Type	AM Peak	PM Peak	Inter-peak
Light Vehicles	1.248	1.259	1.332
HGVs	1.312	1.324	1.399

7.3.11 The detailed junction modelling reports are contained within **Appendix F**, with the traffic flows summarised in **Appendix G**. All proposed mitigation scheme designs are highlighted as figures during this section of the TA.

7.3.12 The following section sets out the junction capacity assessments for each of the junctions.

7.4 Junction Capacity Assessments

7.4.1 The following sections set out for the junctions being assessed the 2017 base model performance, the 2039 (year 20 of the development proposals) baseline and the 2029 + Development scenario. From this the impact in the future year of 2039 of the development can be presented. If mitigation is required at these junctions the section will continue to set out the results of the junction with the mitigation applied.

7.4.2 It should be noted that for all tables of junction model outputs in this TA, red text indicates a result that has been produced that is above the capacity thresholds acceptable when assessing junction models.

7.5 Junction 1: A256 / Sandwich Rd (Four-Arm Standard Roundabout)

7.5.1 The results of the validated model for the 2017 Base scenario results are summarised in **Table 7.2.**

Table 7.2 Junction 1 – 2017 Base Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Sandwich Rd	3	0.73	1	0.43	1	0.36
A256 (South)	2	0.61	3	0.77	1	0.43
Jutes Ln	0	0.11	0	0.18	0	0.07
A256 (North)	7	0.89	2	0.64	1	0.45

7.5.2 The validated base model results show that the A256 North arm is performing at its theoretical capacity with an RFC in excess of 0.85 during the AM peak hour in the 2017 existing baseline.

Table 7.3 Junction 1 – 2039 Baseline Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Sandwich Rd	21	1.11	2	0.64	1	0.50
A256 (South)	3	0.74	12	0.93	1	0.57
Jutes Ln	0	0.22	24	21.77	0	0.12
A256 (North)	124	1.12	4	0.82	2	0.61

7.5.3 It is evidenced that in the 2039 Baseline, the junction will experience significant queues and delay in both AM and PM peaks with the largest queues on the A256 North.

Table 7.4 Junction 1 – 2039 Base + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Sandwich Rd	21	1.11	2	0.71	1	0.51
A256 (South)	4 (-1)	0.78	13 (+1)	0.94	2 (+1)	0.63
Jutes Ln	0	0.27	26 (+2)	****	0	0.14
A256 (North)	133 (+9)	1.13	8 (+4)	0.89	2	0.63

* RFC value for Jutes Lane in PM peak shows exponential increment. (Difference with 2039 baseline results are shown in brackets)

7.5.4 The addition of the development trips results in the largest queue increase during the AM peak hour of 11 vehicles. During the PM peak hour there is a queue increase of 7 vehicles reported.

During the Airport Peak hour, the increase in notably lower at 1. A nil detriment improvement scheme is proposed to mitigate the impact of the proposed development.

Mitigation proposal – Junction 1

7.5.5 The proposed improvement scheme involves minor localised widening on approach to the roundabout to maximise its capacity with the results summarised in **Table 7.5**. The Scheme Drawing is provided as **Figure 7.1**.

Table 7.5 Junction 1 – Mitigation Results Summary – 2039 Base + Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Sandwich Rd	14 (-7)	1.04	2	0.63	1	0.46
A256 (South)	4 (+1)	0.78	13 (+1)	0.94	2 (+1)	0.63
Jutes Ln	0	0.24	17 (-7)	3.38	0	0.14
A256 (North)	90 (-34)	1.08	6 (+2)	0.86	2	0.60
Total Difference	-42		-5		+1	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.5.6 The results in the **table 7.5** indicate that the proposed mitigation provides more than a nil detriment improvement scheme and would mitigate the impact of the proposed development trips.

7.6 Junction 2: A299 / A256 / Cottington Link Rd (Four-Arm Standard Roundabout)

7.6.1 The validated base model for Junction 2 uses the lane simulation option within Junctions 9 / ARCADY to more closely reflect unequal lane usage. As a consequence, the RFC value is not available. Average modelled queues are taken into consideration for comparing future scenario impact with results summarised in **Table 7.6.**

Table 7.6 Junction 2 - 2017 Base - Peak Hour Modelling Results

	AM Peak	**PM Peak**	**Airport Peak**
	Average Queue	**Average Queue**	**Average Queue**
A299 Hengist Way (E)	9	3	2
A256	10	27	2
Cottington Link Rd	7	4	0
A299 Hengist Way (N)	2	1	1

7.6.2 The junction evidences minimal queues during the Airport Peak. During the AM peak queues are considered to be at a reasonable level, with the A256 queues building in the PM peak hour to 27 vehicles.

Table 7.7 Junction 2 – 2039 Baseline Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	Average Queue	Average Queue
A299 Hengist Way (E)	102	7	3
A256	97	182	4
Cottington Link Rd	89	59	1
A299 Hengist Way (N)	3	1	1

7.6.3 Queues are shown to significantly increase as a result of the traffic growth to 2039, with only the Airport Peak experiencing minimal queuing.

Table 7.8 Junction 2 – 2039 Base + Proposed Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	Average Queue	Average Queue
A299 Hengist Way (E)	115 (+13)	12 (+5)	3 (+/-0)
A256	172 (+75)	204 (+22)	12 (+8)
Cottington Link Rd	97 (+8)	58 (-1)	2 (+1)
A299 Hengist Way (N)	3 (+/-0)	1 (+/-0)	1 (+/-0)

(Difference with 2039 baseline results are shown in brackets)

7.6.4 With the inclusion of the proposed development trips a significant increase in queue numbers is noted on the A256 approach and a mitigation scheme is required.

Mitigation proposal – Junction 2

7.6.5 The proposed mitigation scheme comprises widening on the eastern arm and associated white line marking to enable a flared approach. White lining amendments to the gyratory and southern and western approaches are also proposed to maximise the capacity of the junction. The proposed line markings ensure that equal lane usage can occur and as such lane simulation is not required to test the performance of the model. The mitigation scheme is set out as **Figure 7.2**. The results of the traffic modelling are summarised in **Table 7.9.**

Table 7.9 Junction 2 – Mitigation Results Summary – 2039 Base Proposed Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	Average Queue	Average Queue
A299 Hengist Way (E)	18 (-84)	3 (-4)	1 (+2)
A256	22 (-75)	76 (-106)	2 (+2)
Cottington Link Rd	80 (-9)	64 (+6)	1 (+/- 0)
A299 Hengist Way (N)	3 (+/- 0)	1 (+/- 0)	1 (+/- 0)
Total Difference	-168	-104	+4

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.6.6 The results in the table 7.9 indicates that the proposed mitigation is considered to provide a nil detriment improvement scheme which would mitigate the impact of the Proposed Development.

7.7 Junction 3: A299 / Canterbury Rd / Hengist Way (Three-Arm Standard Roundabout)

7.7.1 The results of the validated model for the 2017 Base scenario are summarised in **Table 7.10**.

Table 7.10 Junction 3 - 2017 Base Line Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Canterbury Rd	0	0.29	0	0.21	0	0.09
A299 Hengist Way (S)	2	0.64	2	0.63	1	0.40
A299 Hengist Way (W)	1	0.58	2	0.67	1	0.36

7.7.2 The base model output shows the junction operates with minimal queueing and delays during the peak hour periods with all approaches evidencing RFCs well below the threshold value of 0.85.

Table 7.11 Junction 3 – 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Canterbury Rd	1	0.45	1	0.34	0	0.13
A299 Hengist Way (S)	5	0.83	4	0.81	1	0.54
A299 Hengist Way (W)	3	0.73	5	0.85	1	0.49

7.7.3 In the 2039 base plus committed developments scenario, Junction 3 continues to operate with minimal queues and delays with all arms exhibiting RFCs below the 0.85 threshold.

Table 7.12 Junction 3 – 2039 Base + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Canterbury Rd	1 (+/- 0)	0.46	1 (+/- 0)	0.35	0 (+/- 0)	0.14
A299 Hengist Way (S)	5 (+/- 0)	0.83	4 (+/- 0)	0.81	1 (+/- 0)	0.54
A299 Hengist Way (W)	3 (+/- 0)	0.73	5 (+/- 0)	0.85	1 (+/- 0)	0.49

(Difference with 2039 Baseline results is shown in brackets)

7.7.4 With the inclusion of the proposed development flows Junction 3 continues to operate within theoretical capacity with minimal queues and delays. It is concluded that no physical mitigation works are required at this junction.

7.8 Junction 4: A299 / B2190 (Four-Arm Standard Roundabout)

7.8.1 The results of the validated model for the 2017 Baseline scenario are summarised in **Table 7.13**.

Table 7.13 Junction 4 - 2017 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Hengist Way (E)	9	0.91	9	0.91	2	0.61
Tothill Street	9	0.94	9	0.93	2	0.64
A299 (W)	12	0.94	12	0.94	1	0.57
B2190 (N)	13	0.96	18	0.99	1	0.40

7.8.2 The base model shows queues and delays on all approaches with RFCs exceeding the theoretical threshold of 0.85 in both the AM and PM peaks.

Table 7.14 Junction 4 – 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Hengist Way (E)	119	1.15	143	1.21	6	0.87
Tothill Street	94	1.34	113	1.39	31	1.09
A299 (W)	152	1.18	168	1.18	3	0.76
B2190 (N)	119	1.24	163	1.30	2	0.60

7.8.3 In the 2039 baseline scenario the junction operates above at its theoretical capacity with significant queues and delays in all peak periods modelled.

Table 7.15 Junction 4 – 2039 Base + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Hengist Way (E)	128 (+9)	1.16	155 (+12)	1.22	7 (+1)	0.89
Tothill Street	111 (+17)	1.39	131 (+18)	1.45	48 (+17)	1.18
A299 (W)	173 (+21)	1.20	188 (+20)	1.20	4 (+1)	0.83
B2190 (N)	135 (+16)	1.26	270 (+107)	1.44	2 (+/-0)	0.65

(Difference with 2039 baseline results is shown in brackets)

7.8.4 With the inclusion of the development trips the junction is shown to operate above capacity with significant queues and delays. The impact of the Proposed Development therefore requires mitigation.

Mitigation proposal – Junction 4

7.8.5 The proposed mitigation includes for a widening of the eastern arm to enable a flared approach. Improved white lining on the gyratory, entry and exits arms maximises the effective capacity of the roundabout with the results summarised in **Table 7.16**. The migration scheme us set out in **Figure 7.3**.

Table 7.16 Junction 4 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Hengist Way (E)	110 (-9)	1.14	46 (-97)	1.04	3 (-3)	0.75
Tothill Street	56 (-38)	1.19	39 (-74)	1.12	4 (-27)	0.80
A299 (W)	99 (-53)	1.11	199 (-31)	1.21	4 (-1)	0.80
B2190 (N)	73 (-46)	1.14	242 (-79)	1.38	2 (+/- 0)	0.60
Total Difference	-146		-281		-31	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.8.6 The results in the **Table 7.16** indicate that the proposed mitigation is considered to provide more than a nil detriment improvement scheme and would mitigate the impact of the proposed development trips.

7.9 Junction 5: B2190 / Minster Rd (Three-Arm Standard Roundabout)

7.9.1 The results of the validated model for the 2017 Baseline scenario are summarised **Table 7.17**.

Table 7.17 Junction 5 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC

B2190 (East)	0	0.26	1	0.35	-	-
B2190 (South)	1	0.37	1	0.34	-	-
Minster Rd	1	0.33	0	0.24	-	-

7.9.2 The validated base model shows that the junction operates with minimal queueing and delays during the peak hour periods with all RFCs well below the 0.85 threshold value.

Table 7.18 Junction 5 – 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
B2190 (East)	1	0.33	1	0.45	0	0.24
B2190 (South)	1	0.46	1	0.43	1	0.35
Minster Rd	1	0.45	1	0.32	0	0.17

7.9.3 In the 2039 base plus committed traffic, the junction continues to operate with minimal queues and delays with all arms exhibiting RFCs below the 0.85 threshold.

Table 7.19 Junction 5 – 2039 Base + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
B2190 (East)	1 (+/- 0)	0.34	1 (+/- 0)	0.51	0 (+/- 0)	0.27
B2190 (South)	1 (+/- 0)	0.48	1 (+/- 0)	0.46	1 (+/- 0)	0.42
Minster Rd	1 (+/- 0)	0.46	1 (+/- 0)	0.33	0 (+/- 0)	0.19

(Difference with 2039 baseline results shown in brackets)

7.9.4 With the addition of the development traffic the junction continues to operate with minimal queues and delays on all approaches, with RFCs less than 0.85 and no mitigation measures is needed.

Junction 6: A299 / Seamark Rd / A253 / Willetts Hill (five-arm standard roundabout)

7.9.5 The results of the validated model for the 2017 Baseline scenario are summarised in **Table 7.20**.

Table 7.20 Junction 6 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A299 (East)	4	0.79	4	0.79	1	0.51
Willetts Hill	0	0.13	0	0.08	0	0.06
A253 Canterbury Rd	4	0.81	6	0.88	2	0.63
A299 (North)	8	0.90	9	0.91	1	0.52

Seamark Rd	0	0.09	0	0.11	0	0.04

7.9.6 The base model indicates that the A299 (North) approach starts to experience queues during the AM peak hour. During the PM peak both the A253 Canterbury Road and A299 North approaches are operating at capacity with queues and delays starting be apparent.

Table 7.21 Junction 6 – 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A299 (East)	32	1.01	32	1.00	2	0.69
Willetts Hill	0	0.20	0	0.11	0	0.10
A253 Canterbury Rd	29	1.14	66	1.23	8	0.93
A299 (North)	101	1.15	115	1.16	3	0.72
Seamark Rd	0	0.12	0	0.15	0	0.07

7.9.7 In the growthed 2039 Baseline scenario the junction is shown to operate with significant queues and delays, particularly on the A299 (North) and A253 Canterbury Road.

Table 7.22 Junction 6 – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A299 (East)	39 (+7)	1.02	78 (+46)	1.07	3 (+1)	0.73
Willetts Hill	0 (+/- 0)	0.20	0 (+/- 0)	0.11	0 (+/- 0)	0.10
A253 Canterbury Rd	30 (+1)	1.15	74 (+8)	1.26	9 (+1)	0.95
A299 (North)	115 (+14)	1.18	136 (+21)	1.19	5 (2)	0.84
Seamark Rd	0 (+/- 0)	0.12	0 (+/- 0)	0.15	0 (+/- 0)	0.07

(Difference with 2039 baseline results are shown in brackets)

7.9.8 With the addition of the development traffic, queues and delay increase and the junction performance worsens. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – Junction 6

7.9.9 The proposal involves minor physical works to enable a formal marking of the white lining both on approach and exit to the roundabout as well as the critical circulatory. The scheme drawing is provided as **Figure 7.4**. This formalisation acts to maximise the capacity at the junction with the results summarised in **Table 7.23**.

Table 7.23 Junction 6 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak

	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
A299 (East)	8 (-24)	0.90	13 (-19)	0.94	2 (+/- 0)	0.64
Willetts Hill	0 (+/- 0)	0.21	0 (+/- 0)	0.12	0 (+/- 0)	0.10
A253 Canterbury Rd	25 (-4)	1.11	68 (+2)	1.91	7 (1 1)	0.91
A299 (North)	15 (-86)	0.96	17 (-98)	1.02	2 (1 1)	0.68
Seamark Rd	0 (+/- 0)	0.13	0 (+/- 0)	0.15	0 (+/- 0)	0.07
Total Difference	-114		-115		-2	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.9.10 The results in the **Table 7.23** indicate that the proposed mitigation is considered to provide a nil detriment improvement scheme which would mitigate the impact of the proposed development trips.

7.10 Junction 7: A299 / A28 (Five-Arm Standard Roundabout)

7.10.1 The validated base model utilises the lane simulation option of ARCADY with lane usage adjustments to reflect the unequal lane usage and as such only reports queues and not RFCs. The results of the 2017 baseline scenarios are set out in **Table 7.24.**

Table 7.24 Junction 7 - 2017 Base Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 (East)	14	2	1
A299 (South)	8	5	1
Canterbury Rd	1	14	1
A299 (West)	7	17	2
Potten Street Rd	0	0	0

7.10.2 The validated base model shows relatively light levels of queuing on all approaches.

Table 7.25 Junction 7 – 2039 Baseline - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 (East)	155	5	3
A299 (South)	52	25	4
Canterbury Rd	4	100	3
A299 (West)	56	179	5
Potten Street Rd	0	0	0

7.10.3 The 2029 baseline scenario indicates queues and delays are shown to be longer on various approaches in the AM and PM hour periods when compared to the 2017 results, except for on Potten Street Road. During the Airport Peak the junction performs well with minimal queues and delays.

Table 7.26 Junction 7 – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 (East)	160 (+5)	5 (+/- 0)	3 (+/- 0)
A299 (South)	56 (+4)	52 (+27)	4 (+/- 0)
Canterbury Rd	4 (+/- 0)	113 (+13)	4 (+1)
A299 (West)	69 (+13)	197 (+18)	8 (+3)
Potten Street Rd	0 (+/- 0)	0 (+/- 0)	0 (+/- 0)

(Difference with 2039 baseline traffic is shown in brackets)

7.10.4 With the addition of the development traffic queues and delay increase and the junction performance worsens. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – Junction 7

7.10.5 On site observations and queue video surveys have shown that despite equal lane usage being possible on approach to the junction users of this roundabout do not equally use all lanes resulting in larger queues in the flow dominant lane. In order to address this inefficient driver behaviour, it is proposed that advanced information to drivers is provided in the form of both on carriageway markings and highway signage. This should enable drivers the confidence to fully utilise both lanes and as such return the junction capacity to its full potential. The scheme design is provided as **Figure 7.5**.

7.10.6 The results of the junction operating with equal lane usage due to the proposed markings / signage is set out in **Table 7.27.**

Table 7.27 Junction 7 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 (East)	180 (+25)	5 0 (+/- 0)	3 0 (+/- 0)
A299 (South)	5 (-47)	5 (-20)	2 (-2)
Canterbury Rd	2 (-2)	19 (-81)	1 (-2)
A299 (West)	18 (-38)	227 (-46)	5 0 (+/- 0)
Potten Street Rd	0 (+/- 0)	0 (+/- 0)	0 (+/- 0)
Total Difference	-62	-147	-4

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.10.7 The results in the **Table 7.27** indicate that the proposed mitigation is considered to provide a nil detriment improvement scheme which would mitigate the impact of the proposed development trips.

7.11 Junction 8: A28 / Park Ln / Station Rd (Three-Arm Mini Roundabout and Left in/Left out Priority Junction)

7.11.1 The results of the validated model for the 2017 Baseline scenario are split into a three-arm roundabout (8a) and the priority junction (8b) which together form Junction 8.

Junction 8a

Table 7.28 Junction 8(a) – Mini Roundabout - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
A28 East	14	0.96	5	0.84	3	0.72
A28 South	3	0.75	9	0.92	4	0.82
Station Rd	19	1.02	6	0.88	2	0.70

7.11.2 The junction is operating at capacity in both the AM and PM peak hours with queues and delays beginning to develop.

Table 7.29 Junction 8(a) – Mini roundabout - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
A28 East	93	1.17	49	1.08	26	1.02
A28 South	11	0.94	107	1.18	95	1.23
Station Rd	138	1.50	49	1.18	12	0.96

7.11.3 The junction experiences significant queueing in all peaks in the growthed 2039 scenario.

Table 7.30 Junction 8(a) – Mini Roundabout - 2039 Baseline+ Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
A28 East	94 (+1)	1.18	50 (+1)	1.08	28 (+2)	1.03
A28 South	12 (+1)	0.94	116 (+9)	1.20	96 (+1)	1.24
Station Rd	144 (+6)	1.52	48 (-1)	1.17	15 (+3)	0.98
Total Difference	+8		+9		+6	

(Difference with 2039 baseline traffic shown in brackets)

7.11.4 The inclusion of the proposed development trips marginally increases queuing at the junction, but it is noted that the vast increase in queues can be attributed to the without development scenario.

Junction 8b

Table 7.31 Junction 8(b) – Left in / Left out Priority Junction - 2017 Baseline - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 North	0	0	0
Park Ln	3	7	2
A28 South	2	1	1

7.11.5 Only minimal queues are recorded during the 2017 Baseline scenario.

Table 7.32 Junction 8(b) – Left in / Left out Priority Junction - 2039 Baseline - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 North	0	0	0
Park Ln	50	57	15
A28 South	5	2	1

7.11.6 The 2039 baseline scenario results indicate a large increase in queues and associated delays, particularly on Park Lane.

Table 7.33 Junction 8(b) – Left in / Left out Priority Junction – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 North	0 (+/- 0)	0 (+/- 0)	0 (+/- 0)
Park Ln	52 (+2)	70 (+13)	16 (+1)
A28 South	6 (+1)	2 (+/- 0)	1 (+/- 0)
Total Difference	+3	+13	+1

(Difference with 2039 baseline traffic is shown in brackets)

7.11.7 The inclusion of the proposed development flows results in relatively low increases in queues at both Junctions 8b which is also what was observed at junction 8A. Given the low level of traffic that is proposed to route through this junction as a result of this development it is not considered reasonable or proportional for the development to provide for a mitigation scheme in this location.

7.12 Junction 9: Park Ln / Manston Rd / Acol Hill (Left in/Left out Priority Junction)

7.12.1 The results of the validated model for the 2017 Baseline scenario are summarised in **Table 7.34**

Table 7.34 Junction 9 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Manston Rd – all movement	1	0.36	1	0.31	1	0.33
Acol Hill – all movement	0	0.00	0	0.04	0	0.01

7.12.2 The 2017 base model is shown to operate with minimal queues and delays during the peak hour periods, performing well within the theoretical capacity of 0.85 RFC.

Table 7.35 Junction 9 – 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Manston Rd – all movement	1	0.48	1	0.42	1	0.47
Acol Hill – all movement	0	0.00	0	0.06	0	0.01

7.12.3 The junction is shown to operate with minimal queues and delays performing well within the theoretical capacity of 0.85 RFC in the future year scenario of 2039.

Table 7.36 Junction 9 – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Manston Rd – all movement	1 (+/- 0)	0.49	1 (+/- 0)	0.50	1 (+/- 0)	0.49
Acol Hill – all movement	0 (+/- 0)	0.01	0 (+/- 0)	0.06	0 (+/- 0)	0.01

(Difference with 2039 Baseline traffic shown in brackets)

7.12.4 The junction is shown to operate with minimal queues and delays during the future peak hour periods, performing well within the theoretical capacity of 0.85 RFC. It is, thus, concluded that no physical mitigation works are required at this junction to address the impact of the proposed development.

7.13 Junction 10: Shottendane Rd / Manston Rd / Margate Hill (Four-Arm Staggered Junction)

7.13.1 The results of the validated model for the 2017 Baseline scenario are summarised in **Table 7.37**.

Table 7.37 Junction 10 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Margate Hill – all movement	1	0.38	6	0.88	0	0.29
Manston Rd (East) – all movement	0	0.25	1	0.31	0	0.17
Shottendane Rd to Manston Rd (East)	4	0.93	0	0.15	0	0.12
Shottendane Rd to Margate Hill & Manston Rd (West)	8	0.93	1	0.40	0	0.26

7.13.2 The base model shows that the junction is experiencing queues and delays in its Shottendane Road approach during the AM peak hour, with RFCs exceeding the junction's theoretical capacity of 0.85 RFC.

Table 7.38 Junction 10 – 2039 Baseline – Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Margate Hill – all movement	1	0.53	53	1.17	1	0.42
Manston Rd (East) – all movement	1	0.34	1	0.47	0	0.24
Shottendane Rd to Manston Rd (East)	19	1.25	0	0.26	0	0.18
Shottendane Rd to Margate Hill & Manston Rd (West)	58	1.27	1	0.60	1	0.38

7.13.3 The 2039 future year assessment indicates that the junction is proposed to generate significant queues and delays beyond those in the 2017 scenario. The junction is considered to operate at just over capacity with only the Manston Road arm evidencing RFC below the 0.85 threshold.

Table 7.39 Junction 10 – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Margate Hill – all movement	1 (+/- 0)	0.54	59 (+ 6)	1.20	1 (+/- 0)	0.43
Manston Rd (East) – all movement	1 (+/- 0)	0.35	2 (+ 1)	0.61	1 (+ 1)	0.27
Shottendane Rd to Manston Rd (East)	30 (+ 11)	1.32	0 (+/- 0)	0.30	0 (+/- 0)	0.28
Shottendane Rd to Margate Hill & Manston Rd (West)	71 (+ 13)	1.34	2 (+ 1)	0.66	1 (+/- 0)	0.36

(Difference with 2039 Baseline Scenario is shown in brackets)

7.13.4 With the addition of the proposed development traffic the junction it is shown to operate with increased queues and delays and is considered to operate above capacity with a particular worsening of the junction performance in the AM Peak on the Shottendane Road arms. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – Junction 10

7.13.5 In order to add more capacity to the northern arm minor widening and a readjustment of the white lining is proposed to maximise the capacity. In addition, the southern arm is proposed to be widened to smooth the entry approach and maximise the effective capacity. The scheme design is provided as **Figure 7.6**. The effect of the proposed mitigation is detailed in **Table 7.40**.

Table 7.40 Junction 10 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Margate Hill – all movement	1 (+/- 0)	0.52	52 (-1)	1.17	1 (+/- 0)	0.42
Manston Rd (East) – all movement	1 (+/- 0)	0.35	2 (+1)	0.60	1 (+1)	0.27
Shottendane Rd to Manston Rd (East)	23 (+4)	1.25	0 (+/- 0)	0.30	0 (+/- 0)	0.29
Shottendane Rd to Margate Hill & Manston Rd (West)	52 (-6)	1.24	2 (+1)	0.63	1 (+/- 0)	0.40
Total Difference	-2		+1		+1	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.13.6 The results in the **Table 7.40** indicate that the proposed mitigation is considered to provide a nil detriment improvement scheme which would mitigate the impact of the proposed development trips.

7.14 Junction 11: Columbus Avenue / Spitfire Way (Three-Arm Standard Roundabout)

7.14.1 The results of the validated model for the 2017 Baseline scenario are summarised in **Table 7.41**.

Table 7.41 Junction 11 - 2017 Base Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Spitfire Way	1	0.38	1	0.40	0	0.23
B2190 Columbus Avenue West	0	0.26	0	0.18	0	0.17
B2190 Columbus Avenue North	0	0.03	0	0.15	0	0.05

7.14.2 The 2017 validated base model is shown to operate with minimal queues and delays during the peak hour periods, performing well within the theoretical capacity of 0.85 RFC.

Table 7.42 Junction 11 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Spitfire Way	1	0.48	1	0.51	0	0.31
B2190 Columbus Avenue West	1	0.32	0	0.22	0	0.23
B2190 Columbus Avenue North	0	0.04	0	0.19	0	0.08

7.14.3 The Baseline scenario indicates that the junction will continue to operate with minimal queues and delays performing well within the theoretical capacity of 0.85 RFC.

Table 7.43 Junction 11 - 2039 Baseline + Development Traffic - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Spitfire Way	1 (+/- 0)	0.50	2 (+ 1)	0.61	1 (+ 1)	0.35
B2190 Columbus Avenue West	1 (+/- 0)	0.34	0 (+/- 0)	0.25	0 (+/- 0)	0.30
B2190 Columbus Avenue North	0 (+/- 0)	0.04	0 (+/- 0)	0.20	0 (+/- 0)	0.08

(Difference with 2039 Baseline is shown in brackets)

7.14.4 With the addition of the development traffic the junction is shown to continue to operate within its theoretical capacity with minimal queues and delays. No mitigation works are required at this junction.

7.15 Junction 12: Manston Road / B2050 / Spitfire Way (Four-Arm Staggered Priority Junction)

7.15.1 The validated 2017 base model results are presented in **Table 7.44**.

Table 7.44 Junction 12 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Spitfire Way to B2050 (West)	1	0.92	1	1.16	0	0.05
Spitfire Way to B2050 (East) / Manston Road (North)	8	0.93	40	1.15	2	0.70
B2050 (East)	1	0.18	0	0.09	0	0.12
Manston Road (North) to B2050 (East)	0	0.18	0	0.21	0	0.12
Manston Road (North) to Spitfire Way / B2050 (West)	4	0.81	3	0.80	1	0.46
B2050 (West)	0	0.08	0	0.02	0	0.02

7.15.2 The validated base model shows that the junction is experiencing queues and delays on the Spitfire Way approach, in particularly during the PM peak.

Table 7.45 Junction 12 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Spitfire Way to B2050 (West)	3	1.11	3	1.37	2	1.05
Spitfire Way to B2050 (East) / Manston Road (North)	68	1.36	175	1.65	19	1.05
B2050 (East)	1	0.32	1	0.17	1	0.21
Manston Road (North) to B2050 (East)	6	1.36	11	1.56	1	0.34
Manston Road (North) to Spitfire Way / B2050 (West)	44	1.48	62	1.67	3	0.79
B2050 (West)	0	0.12	0	0.03	0	0.04

7.15.3 The junction is predicted to experience significant queues and delays during the 2039 baseline scenario with numerous RFCs exceeding the 0.85 theoretical capacity threshold.

Table 7.46 Junction 12 – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Spitfire Way to B2050 (West)	5 (+ 2)	1.46	5 (+ 2)	1.80	5 (+ 3)	1.42
Spitfire Way to B2050 (East) / Manston Road (North)	143 (+ 75)	1.72	300 (+ 125)	2.12	141 (+ 122)	1.62
B2050 (East)	71 (+ 70)	1.18	14 (+ 13)	0.86	8 (+ 7)	0.78
Manston Road (North) to B2050 (East)	64 (+ 58)	4.67	125 (+ 114)	4.73	52 (+ 51)	2.20
Manston Road (North) to Spitfire Way / B2050 (West)	174 (+ 130)	4.75	216 (+ 154)	4.77	80 (+ 77)	2.20
B2050 (West)	0 (+/- 0)	0.16	0 (+/- 0)	0.04	0 (+/- 0)	0.12

(Difference with 2039 Baseline is shown in brackets)

7.15.4 With the addition of the proposed development traffic the junction is shown to operate with increased queues and delays. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – Junction 12

7.15.5 The proposed mitigation scheme is in the form of a fully signalled junction with integrated pedestrian crossing facilities. The pedestrian facilities on the eastern and southern are signalled, whilst the northern and western arm benefit from courtesy crossings. The scheme design is provided as **Figure 7.7**.

7.15.6 The results are summarised in **Table 7.47**.

Table 7.47 Junction 12 – Mitigation Results Summary – 2039 Base + Committed + Proposed Development Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Spitfire Way (1/1+1/2)	10 (-61)	71.4%	11 (-167)	71.3%	13 (-8)	87.6%
Manston Road East (B2050) (4/1+4/2)	14 (+13)	77.8%	12 (+11)	71.2%	20 (+19)	87.8%
Manston Road North (3/1)	14 (-46)	76.5	14 (-59)	70.2%	17 (+13)	78.6%
Manston Road West B2050 (2/1)	14 (+14)	70.3%	12 (+12)	71.3%	8 (+8)	46.6%
Total Difference	-80		-203		+32	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.15.7 The improvement scheme shows large reductions in total queues during the busiest AM and PM peak hours on some arms with smaller increases on some other arms. This is as a result of the nature of the signalised junction "balancing" the delay and queues across all arms. However, the overall performance of the junction with the new mitigation scheme in the AM and PM is proposed be better than that in the 2039 Baseline scenario with the existing layout.

7.15.8 Whilst queues and the overall junction performance are shown to increase during the Airport Peak these queues discharge every cycle and as such are transient in nature. It is also noted that the current airport peak is the middle of the afternoon when low traffic flows are currently experienced and existing queues are low. The nature of the airport construction will mean a significant increase in traffic in this time period, but one that with this will be accommodated within acceptable capacity thresholds.

7.15.9 The results in the **Table 7.47** indicate that the proposed mitigation is considered to provide a nil detriment improvement scheme in the AM and PM peak which would mitigate the impact of the proposed development trips. It also provides a junction layout that can accommodate the proposed development traffic in 2039 within capacity thresholds.

7.16 Junction 13: Manston Court Road / B2050 (Three-Arm Priority Junction)

7.16.1 The validated 2017 base model results are presented in **Table 7.48.**

Table 7.48 Junction 13 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Manston Court Road	2	0.67	3	0.75	1	0.40
B2050	0	0.02	0	0.03	0	0.02

7.16.2 The validated base model is shown to operate with minimal queues and delays during the 2017 base scenario.

Table 7.49 Junction 13 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Manston Court Road	13	1.08	22	1.20	2	0.67
B2050	0	0.03	0	0.05	0	0.02

7.16.3 The 2039 Baseline scenario indicates queues will increase on Manston Court Road.

Table 7.50 Junction 13 - 2039 + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Manston Court Road	106 (+93)	2.48	88 (+66)	2.63	63 (+61)	1.89
B2050	0 (+/- 0)	0.04	0 (+/- 0)	0.07	0 (+/- 0)	0.03

(Difference with 2039 Baseline is shown in brackets)

7.16.4 With the addition of the proposed development traffic at the junction is shown to operate with significantly increased queues and delays on Manston Court Road. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – junction 13

7.16.5 The mitigation proposed for this junction is to fully signalise junction and link it to the main airport access which is also proposed a signalised junction. The scheme design is provided as **Figure 7.8.**

Table 7.51 Junction 13 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	DoS	MMQ	DoS	MMQ	DoS
Manston Court Road	10 (-3)	83.3%	7 (-15)	70.4%	9 (+7)	81.0%
B2050 (W/B)	0 (+/- 0)	43.2%	5 (+5)	63.4%	1 (+1)	41.0%
B2050 (E/B)	22 (+22)	75.4%	11 (+11)	50.6%	18 (+18)	67.0%
Total Difference	+19		+1		+26	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.16.6 Whilst there is a queue increase noted in queues (principally in the AM and Airport Peaks) at this junction these queues dissipate every cycle and as such the junction is considered to provide sufficient capacity to accommodate the proposed development trips with no material impact on the highway or perceived difference to drivers using this junction. The proposed mitigation scheme is therefore considered acceptable.

7.17 Junction 15: Manston Rd / Hartsdown Rd / Tivoli Rd / College Rd / Nash Rd (Five-Arm Signalised Junction)

7.17.1 The validated 2017 base model results are presented in **Table 7.52.**

Table 7.52 Junction 15 - 2017 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
College Rd Lane 1 (3/1) **College Rd Lane 2 (3/2)**	19	88.9%	21	89.0%	11	70.8%
Nash Rd (2/1)	8	53.6%	23	99.8%	8	58.2%
Manston Rd Lane 1 (1/1) **Manston Rd Lane 2 (1/2)**	15	89.4%	24	98.8%	10	70.0%
Hartsdown Rd (4/1)	18	89.0%	14	86.4%	10	68.9%
PRC	0.7%		-10.9%		27.1%	

7.17.2 The junction already has queues and delays beyond the theoretical capacity in the PM peak.

Table 7.53 Junction 15 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
College Rd Lane 1 (3/1) **College Rd Lane 2 (3/2)**	72	111.3%	105	119.4%	25	94.6%
Nash Rd (2/1)	11	73.3%	65	119.7%	13	77.4%
Manston Rd Lane 1 (1/1) **Manston Rd Lane 2 (1/2)**	53	112.0%	74	117.7%	19	93.8%
Hartsdown Rd (4/1)	55	111.5%	31	105.0%	17	91.7%
PRC	-24.4%		-33.0%		-5.1%	

7.17.3 During the future year scenario of 2039 the queues and delays are proposed to increase significantly. The junction is considered to be beyond is theoretical operating capacity.

Table 7.54 Junction 15 - 2039 Baseline Development -Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
College Rd Lane 1 (3/1) **College Rd Lane 2 (3/2)**	99 (+17)	117.5%	125 (+20)	125.4%	44 (+19)	102.3%

	AM Peak		PM Peak		Airport Peak	
Nash Rd (2/1)	11 (+/- 0)	72.6%	73 (+8)	124.3%	13 (+/- 0)	80.2%
Manston Rd Lane 1 (1/1) / Manston Rd Lane 2 (1/2)	67 (+15)	117.3%	96 (+22)	122.6%	28 (+9)	101.6%
Hartsdown Rd (4/1)	69 (+14)	117.3%	37 (+6)	109.1%	24 (+7)	100.4%
PRC	-30.6%		-39.4%		-13.6%	

(Difference with 2039 Baseline is shown in brackets)

7.17.4 With the addition of the development traffic the queues and delays increase and the junction performance worsens. A mitigation scheme has been proposed, as discussed next, to address the impact of the proposed development trips. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – Junction 15

7.17.5 This junction benefits from a new signal head and stage sequence, as well as new white lining, to maximise the capacity at this junction. The scheme drawing is provided as **Figure 7.9**.

7.17.6 The results are summarised in **Table 7.55.**

Table 7.55 Junction 15 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
College Rd Lane 1 (3/1) / **College Rd Lane 2 (3/2)**	23 (-49)	88.2%	53 (-52)	104.0%	15 (-10)	72.9%
Nash Rd (2/1)	10 (-1)	68.6%	38 (-27)	105.6%	11 (-2)	62.9%
Manston Rd Lane 1 (1/1) / **Manston Rd Lane 2 (1/2)**	14 (-39)	72.3%	18 (-56)	76.6%	11 (-8)	57.3%
Hartsdown Rd (4/1)	22 (-33)	89.6%	18 (-13)	91.5%	13 (-4)	74.7%
Total Difference	-122		-148		-15	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.17.7 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the growthed 2039 baseline and as such considered to provide more than a nil detriment solution.

7.18 Junction 16: Ramsgate Rd / College Rd / A254 / Beatrice Rd (Five-Arm Signalised Junction)

7.18.1 The validated 2017 base model results are presented in **Table 7.56.**

Table 7.56 Junction 16 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	DoS	MMQ	DoS	MMQ	DoS
A254 (SB) Ramsgate Road (9/1)	14	70.7%	10	55.6%	10	55.6%
A254 (SB) Ramsgate Road (9/2)		93.0%		96.3%		63.3%
College Road B2052 (WB) (6/1)	25	98.9%	20	96.0%	16	88.3%
A254 Ramsgate Road (NB) (1/1)	20	90.0%	28	94.8%	22	88.9%
A254 Ramsgate Road (NB) (1/2)						
Beatrice Rd (4/1)	23	97.8%	21	97.8%	12	87.2%
Beatrice Rd (4/2)						
Slip to College Rd (5/1)	0	3.5%	0	3.3%	0	1.7%
PRC	-9.9%		-8.7%		1.3%	

7.18.2 The junction is shown to operate with queues and Degrees of Saturation at the operational capacity limits during the 2017 base scenario in both the AM and PM peak periods.

Table 7.57 Junction 16 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	DoS	MMQ	DoS	MMQ	DoS
A254 (SB) Ramsgate Road (9/1)	42	106.8%	20	71.0%	20	75.8%
A254 (SB) Ramsgate Road (9/2)		116.1%		119.8%		117.5%
College Road B2052 (WB) (6/1)	62	118.8%	62	121.0%	59	119.1%
A254 Ramsgate Road (NB) (1/1)	63	117.9%	109	122.3%	105	121.5%
A254 Ramsgate Road (NB) (1/2)						
Beatrice Rd (4/1)	62	113.3%	92	122.3%	67	116.3%
Beatrice Rd (4/2)						
Slip to College Rd (5/1)	0	3.8%	0	3.4%	0	2.0%
PRC	-32.0%		-35.9%		-35.0%	

7.18.3 In the 2039 Baseline scenario the junction modelling indicates that significant queues and delays would be present on all arms across all three-time periods.

Table 7.58 Junction 16 - 2039 Baseline+ Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	DoS	MMQ	DoS	MMQ	DoS
A254 (SB) Ramsgate Road (9/1)	33 (+9)	98.5%	20 (+/- 0)	71.0%	23 (+3)	77.8%

	AM Peak		PM Peak		Airport Peak	
A254 (SB) Ramsgate Road (9/2)		123.7%		119.8%		123.9%
College Road B2052 (WB) (6/1)	81 (+19)	125.8%	65 (+3)	122.4%	69 (+10)	122.2%
A254 Ramsgate Road (NB) (1/1) A254 Ramsgate Road (NB) (1/2)	100 (+37)	128.2%	109 (+/- 0)	122.3%	116 (+11)	124.7%
Beatrice Rd (4/1) Beatrice Rd (4/2)	107 (+45)	126.0%	102 (+10)	124.0%	100 (+33)	126.1%
Slip to College Rd (5/1)	0 (+/- 0)	4.7%	0 (+/- 0)	3.5%	0 (+/- 0)	3.2%
PRC	-42.4%		-37.8%		-40.1%	

(Difference with 2039 Baseline is shown in brackets)

7.18.4 The addition of the development traffic results in increases in queueing and a worsening of the total junction performance. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – junction 16

7.18.5 The mitigation proposal utilises new stop lines, signal head and pedestrian crossings to enable a more efficient stage sequence to be operated. The scheme drawing is provided as **Figure 7.10**.

7.18.6 The results of the mitigation scheme are provided in **Table 7.59.**

Table 7.59 Junction 16 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	DoS	MMQ	DoS	MMQ	DoS
A254 (SB) Ramsgate Road (9/1) A254 (SB) Ramsgate Road (9/2)	14 (-28)	84.4% 84.4%	12 (-8)	63.8% 63.8%	13 (-7)	69.7% 69.7%
College Road B2052 (WB) (6/1)	14 (-48)	74.6%	44 (-18)	110.3	46 (-13)	109.7%
A254 Ramsgate Road (NB) (1/1) A254 Ramsgate Road (NB) (1/2)	56 (-6)	109.2%	72 (-37)	110.3	77 (-28)	111.9%
Beatrice Rd (4/1) Beatrice Rd (4/2)	61 (-1)	108.9%	63 (-29)	109.0	70 (-35)	111.6%
Slip to College Rd (5/1)	0 (+/- 0)	5.4%	0 (+/- 0)	4.0	0 (+/- 0)	3.6%
Total Difference	-83		-92		-83	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.18.7 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the growthed 2039 baseline and as such considered to provide more than a nil detriment solution.

7.19 Junction 17: Ramsgate Road / Poorhole Lane / Margate Road / Star Lane (Four-Arm Roundabout)

7.19.1 The validated base model has been used to test the future year scenarios with the results summarised in **Table 7.60**. As noted previously the model is validated using the lane simulation option of ARCADY to reflect the unequal lane usage evidenced on street. As a consequence, the RFC value is not available and a reliance on the average modelled queues is taken instead.

Table 7.60 Junction 17 - 2017 Base - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
Poorhole Lane	2	3	2
Margate Road	3	8	5
Star Lane	4	3	2
Ramsgate Road	5	8	4

7.19.2 The 2017 base model indicates the junction would operate with minimal queues in all periods.

Table 7.61 Junction 17 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
Poorhole Lane	4	11	5
Margate Road	19	83	75
Star Lane	34	13	11
Ramsgate Road	27	73	30

7.19.3 The 2039 baseline model indicates that junction is proposed to experience large queues on all the approaches.

Table 7.62 Junction 17 – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
Poorhole Lane	10 (+6)	11 (0)	14 (+9)
Margate Road	29 (+10)	83 (0)	96 (+21)
Star Lane	34 (0)	38 (+25)	11 (0)
Ramsgate Road	31 (+4)	84 (+11)	39 (+9)

(Difference with 2039 Baseline results shown in brackets)

7.19.4 With the addition of the development traffic the queues and delays at the junction increase. The total increase in of queues during the AM peak hour is 20, whist a 36 increase is noted in the PM peak and 39 during the Airport peak. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – junction 17

7.19.5 The proposed mitigation scheme at Junction 17 is limited in terms of options which can delivered within the existing highways constraints. The proposed scheme is to provide minor widening and updated white lining to maximise the available capacity. The Scheme design is provided as **Figure 7.11**.

Table 7.63 Junction 17 – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	Average Queue	Average Queue	Average Queue
Poorhole Lane	8 (+4)	11 (+/- 0)	11 (+6)
Margate Road	20 (+1)	64 (-19)	75 (+/- 0)
Star Lane	18 (-16)	22 (+9)	6 (-5)
Ramsgate Road	19 (-8)	63 (-10)	23 (-7)
Total Difference	-19	-20	-6

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout)

7.19.6 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the growthed 2039 baseline and as such considered to provide more than a nil detriment solution.

7.20 Junction 20A: A256 (North) / Manston Road (East) (Three-Arm Priority Junction)

7.20.1 As set out in the baseline validation junction 20A is made up of three priority T junctions and as such this junction has been split into three elements and considered as part 1 and parts 2 and 3.

7.20.2 It is acknowledged that as part of the Manston Green development, this junction would be replaced through the realignment of the Manston Road to join the A256/Haine Road roundabout to the south, and that Haine Road would likely be downgraded. It is understood that £82 million has recently been awarded to the South East Local Enterprise Partnership (SELEP) from the Government's Housing Infrastructure Fund (HIF), and the Manston Green scheme will receive a grant of more than £2.5 million to create a new roundabout and associated road connections to the existing network. For the purpose of this assessment, junction modelling has been based on the existing road network and junction configuration, and a mitigation scheme identified. However, it is recognised that the impact of the Proposed Development traffic on the Manston Green junction scheme will need to be fully assessed. An indicative capacity assessment has been undertaken as part of this TA and is reported on in Section 7.21.

Part 1 – A256 (north) to Manston Road (east)

7.20.3 The validated 2017 base model results are presented in Table 7.64.

Table 7.64 Junction 20A - 2017 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A256 (North) to Manston Rd (East) (Left – B-AC)	0	0.23	1	0.34	0	0.30

7.20.4 The junction is shown to operate within its theoretical capacity with minimal queues or delays.

Table 7.65 Junction 20A - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A256 (North) to Manston Rd (East)	0	0.30	1	0.45	1	0.42

7.20.5 The 2039 Baseline scenario sets out that the junction is shown to continue to operate within its theoretical capacity with minimal queues or delays.

Table 7.66 Junction 20A - 2039 Baseline + Development Traffic Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A256 (North) to Manston Rd (East)	0 (+/- 0)	0.30	1 (+/- 0)	0.45	1 (+/- 0)	0.42

(Difference with 2039 Baseline traffic is shown in brackets)

7.20.6 With the addition of the development traffic at the junction indicates that it would continue to operate within its theoretical capacity with minimal queues or delays. Therefore, no mitigation measures are therefore proposed for this element of the junction.

Part 2 – A256 (S) to Manston Road East and Manston Road East to A256 (S)

7.20.7 This validated base junction has been used to test the future year scenarios with the results summarised in **Table 7.67.**

Table 7.67 Junction 20A - 2017 Base Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A256 (S) to Manston Road East (Right Turn C-AB)	4	0.82	6	0.87	2	0.69
Manston Road East to A256 (S) (Left Turn B-AC)	9	0.92	17	1.01	5	0.84

7.20.8 The base 2017 scenario model is shown to operate with queues and delays on both approaches, with RFCs exceeding the theoretical capacity threshold of 0.85.

Table 7.68 Junction 20A - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
A256 (S) to Manston Road East (Right Turn C-AB)	49	1.22	75	1.43	36	1.15
Manston Road East to A256 (S) (Left Turn B-AC)	102	1.30	142	1.58	97	1.37

7.20.9 The growthed 2039 baseline scenario shows significant increases in queues and delays on all approaches.

Table 7.69 Junction 20A - 2039 Base + Committed + Development Traffic Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
A256 (S) to Manston Road East (Right Turn C-AB)	57 (+8)	1.27	148 (+73)	1.55	47 (+11)	1.22
Manston Road East to A256 (S) (Left Turn B-AC)	131 (+29)	1.39	147 (+5)	1.60	135 (+38)	1.49

(Difference with 2039 committed trips is shown in brackets)

7.20.10 With the additional of the development traffic, the junction has significant increases in total queues of 38 (AM), 75 (PM) and 36 (Airport). In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

7.20.11 However, as all three priority junctions (1,2 and 3 – 20A) are interlinked with a roundabout (20B) to the south, a single mitigation proposal has been considered as set out in the next section.

7.21 Junction 20B: A256 / Manston Road (Three-Arm Standard Roundabout)

7.21.1 As identified in Section 7.22, the Manston Green development scheme includes road infrastructure proposals which will result in realignment of Manston Road onto this roundabout junction, creating a fourth arm and the likely downgrading of Haine Road to the south. For the purpose of this assessment, junction modelling has been based on the existing road network and junction configuration, and a mitigation scheme has been identified. However, and indicative assessment of the impact of the Proposed Development traffic on the Manston Green junction scheme has also been undertaken.

7.21.2 The validated 2017 base model has been used to test the future year scenarios. As noted previously the assessment has utilised the lane simulation model within ARCADY to ensure the unequal lane usage was captured and as such the review focuses on queues, with no RFC values available for discussion.

Table 7.70 Junction 20B - 2017 Base - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	Average Queue	Average Queue
A256 North	3	4	3

	AM Peak	PM Peak	Airport Peak
A256 South	9	10	2
Manston Road West	4	4	1

7.21.3 The 2017 base model shows to operate with minimal queues and delays to all the approach roads.

Table 7.71 Junction 20B – 2039 Baseline - Traffic Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 North	9	26	12
A256 South	134	136	7
Manston Road West	30	27	5

7.21.4 The 2039 growthed future year model sets out that queues will increase significantly from the 2017 base scenario.

Table 7.72 Junction 20B - 2039 Baseline + Development - Traffic Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 North	12 (+3)	38 (+12)	16 (+4)
A256 South	323 (+189)	160 (+24)	69 (+62)
Manston Road West	12 (-18)	244 (+217)	7 (+2)

(Difference with 2039 baseline results shown in brackets)

7.21.5 With the addition of the development, traffic queues increase significantly when compared to the baseline 2039 scenario. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

7.21.6 As set out in **Table 7.72**, a comprehensive improvement scheme incorporating all elements of junction 20 is required and is set out in the next section.

Mitigation proposal – junction 20A + B

7.21.7 The proposed mitigation scheme is for a fully signalled junction covering all the traffic movements of junction 20 and is provided as **Figure 7.12**.

7.21.8 The result of the mitigation scheme in the 2039 growthed scenario with the proposed development traffic are set out in **Table 7.73.**

Table 7.73 Junction 20 – Mitigation Results Summary – 2039 Baseline + Development - Peak Hour Modelling Results

		AM Peak		PM Peak		Airport Peak	
		Average Queue	DoS	Average Queue	DoS	Average Queue	DoS
21A	A256 (S) to Manston Road East (Right Turn C-AB)	31 (-18)	89.0%	43 (-32)	92.4%	24 (-12)	72.9%
	Manston Road East to A256 (S) (Left Turn B-AC)	6 (-96)	59.0%	11 (-131)	61.4%	7 (-90)	65.3%
	A256 (North) to Manston Rd (East)	12 (+12)	78.0%	9 (+8)	55.1%	11 (+10)	61.9%
21B	A256 North	7 (-2)	92.9%	7 (-19)	89.9%	7 (-5)	75.7%
	A256 South	36 (-98)	93.2%	41 (-95)	91.9%	21 (-14)	77.0%
	Manston Road West	5 (-25)	68.4%	14 (-13)	92.1%	5 (+/- 0)	71.1%
	Total Difference	-227		-282		-111	

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout) results

7.21.9 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the growthed 2039 baseline and as such considered to provide more than a nil detriment solution.

7.21.10 As set out previously, the Manston Green development includes reconfiguration of this junction into a four-arm roundabout through the realignment of Manston Road to the east. An indicative assessment has been undertaken based on the junction design shown in Drawing 14A which forms part of the application documents (planning reference (OL/TH/14/0050). As the Manston Green TA is not included within the list of documents, it has not been possible to appreciate the assumptions regarding traffic turning movements at the junction. The junction assessment has therefore been based on the traffic flows for Junctions 20A and 20B (**Appendix G**). A summary of the queue results is presented in **Table 7.74** and shows that in the AM peak, with the Manston Green roundabout scheme, the queues in the 'with development' scenario would be comparable to the 2039 Baseline with the existing junction geometry. In the PM peak, with the Manston Green roundabout scheme, the queues in the 'with development' scenario would be much lower than the 2039 Baseline with the existing junction geometry. The signal scheme proposed within this TA shows the best results.

Table 7.74 Junction 21B – Manston Green Junction Queue Results and Comparison

	AM Peak Hour			PM Peak Hour		
	Existing layout	Manston Green Roundabout	Proposed signal scheme	Existing layout	Manston Green Roundabout	Proposed signal scheme
2039 Baseline	339.4	163.1	-	415.5	179.4	-
2039 Baseline + Dev	558.4	332.2	97.9	748.7	266.8	122.1

7.22 Junction 21A: Canterbury Road / Haine Road (Three-Arm Standard Roundabout)

7.22.1 The validated 2017 base model has been used to test the future year scenarios. As noted previously the assessment has utilised the lane simulation model within ARCADY to ensure the unequal lane usage was captured and as such the review focuses on queues, with no RFC values available for discussion.

Table 7.75 Junction 21A - 2017 Base - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 Haine Road	3	6	2
A256 Canterbury Road	1	2	1
Canterbury Road West	2	8	1

7.22.2 The 2017 base model shows to operate with minimal number of queues and delays for all the peak hour periods.

Table 7.76 Junction 21A - 2039 Baseline - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 Haine Road	7	63	5
A256 Canterbury Road	1	2	1
Canterbury Road West	11	86	2

7.22.3 The 2039 baseline model scenario sets out significant queues and delays during the PM peak hour on both A256 Haine Road and Canterbury Road West.

Table 7.77 Junction 21A – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 Haine Road	7 (+/- 0)	162 (+99)	5 (+/- 0)
A256 Canterbury Road	2 (+ 1)	2 (+/- 0)	1 (+/- 0)
Canterbury Road West	25 (+14)	89 (+3)	5 (+3)

(Difference with 2039 Baseline results is shown in brackets)

7.22.4 The addition of the proposed development traffic results in large increases in queueing during the PM peak, particularly on Haine Road and more modest increases in the AM peak hour. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – junction 21A

7.22.5 Localised widening to increase the flare length and entry widths is proposed to mitigate the impact of the proposed development at Junction 21A and the scheme is provided **Figure 7.13**.

Table 7.78 Junction 20A – Mitigation Results Summary – 2039 Baseline + Proposed Development - Peak Hour Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 Haine Road	4 (-3)	57 (+6)	4 (-1)
A256 Canterbury Road	2 (+1)	2 (+/- 0)	1 (+/- 0)
Canterbury Road West	6 (-5)	41 (-45)	2 (+/- 0)
Total Difference	-7	-39	-1

Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout) results

7.22.6 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the growthed 2039 baseline and as such considered to provide more than a nil detriment solution.

7.23 Junction 21B: A299 / A256 / Sandwich Rd / Canterbury Rd E (Four-Arm Signal Junction)

7.23.1 The validated 2017 base model results are presented in table 7.79.

Table 7.79 Junction 21B – 2017 Base Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
A256 Lane 1 (5/1)	14	77.9%	15	73.5%	10	64.0%
A256 Lane 2 (5/2)	13	75.9%	14	70.3%	10	61.2%
Canterbury Rd East Lane 1 (7/1)	14	76.1%	10	68.8%	7	45.0%
Canterbury Rd East Lane 2 (7/2)	14	76.0%	10	68.6%	7	45.0%
Sandwich Rd (3/1)	4	85.1%	8	96.0%	2	65.3%
Hengist Way Lane 1 (1/1)	9	50.3%	13	62.3%	6	38.6%
Hengist Way Lane 2 (1/2)	4	26.0%	9	55.2%	4	23.7%
Hengist Way Lane 3 (1/3)	4	27.1%	9	54.2%	4	24.9%
PRC	5.8%		-6.7%		37.8%	

7.23.2 The 2017 base model shows that the junction performs with minimal queues or delays on approaches. It is noted that a small queue is reported on Sandwich Road, evidencing a DoS exceeding 90%, but it is considered that this level of queueing is not significant.

Table 7.80 Junction 21B – 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
A256 Lane 1 (5/1)	16	76.5%	101	121.3%	11	58.2%
A256 Lane 2 (5/2)	15	73.9%	85	117.7%	10	55.9%
Canterbury Rd East Lane 1 (7/1)	101	123.9%	70	125.8%	32	106.2%
Canterbury Rd East Lane 2 (7/2)	101	123.7%	70	125.5%	31	106.0%
Sandwich Rd (3/1)	33	126.3%	46	125.6%	23	105.9%
Hengist Way Lane 1 (1/1)	12	61.0%	22	81.3%	9	48.7%
Hengist Way Lane 2 (1/2)	4	30.7%	6	39.7%	4	29.5%
Hengist Way Lane 3 (1/3)	5	34.6%	7	43.6%	5	31.7%
PRC	-40.4%		-39.8%		-18.0%	

7.23.3 The 2039 baseline scenario sets out the junction is predicted to exhibit large queues on Canterbury Road East, A256 and Sandwich Road way in excess of those in the 2018 baseline scenario.

Table 7.81 Junction 21B - 2039 Base + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
A256 Lane 1 (5/1)	16 (+/- 0)	77.9%	106 (+5)	119.4%	48 (+37)	108.1%
A256 Lane 2 (5/2)	15 (+/- 0)	75.3%	91 (+6)	116.1%	36 (+26)	104.2%
Canterbury Rd East Lane 1 (7/1)	113 (+12)	127.4%	82 (+12)	132.9%	33 (+1)	106.5%
Canterbury Rd East Lane 2 (7/2)	112 (+11)	127.2%	82 (+12)	132.9%	33 (+2)	106.5%
Sandwich Rd (3/1)	36 (+3)	130.4%	51 (+5)	132.8%	30 (+7)	110.7%
Hengist Way Lane 1 (1/1)	16 (+4)	72.1%	21 (-1)	80.0%	9 (+/- 0)	50.2%
Hengist Way Lane 2 (1/2)	5 (+1)	31.6%	6 (+/- 0)	38.4%	3 (+1)	24.4%
Hengist Way Lane 3 (1/3)	6 (+1)	35.9%	7 (+/- 0)	42.1%	4 (-1)	26.0%
PRC	-44.9%		-47.7%		-23.0%	

(Difference with 2039 baseline results are shown in brackets)

7.23.4 The addition of the development traffic results in additional queues and delays. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – junction 21B

7.23.5 In order to mitigate the impact of the proposed development at this junction no physical changes are proposed. The signal staging has been altered as detailed within the LinSig output to maximise capacity at this junction with the results summarised in **Table 7.82**.

Table 7.82 Junction 21B – Mitigation Results Summary – 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	DoS	Average Queue	DoS	Average Queue	DoS
A256 Lane 1 (5/1)	42 (+26)	107.3%	106 (+5)	118.0%	15 (+4)	91.3%
A256 Lane 2 (5/2)	36 (+21)	105.3%	102 (+17)	117.5%	13 (+3)	88.8%
Canterbury Rd East Lane 1 (7/1)	51 (-50)	108.7%	12 (-58)	66.8%	9 (-23)	78.1%
Canterbury Rd East Lane 2 (7/2)	51 (-50)	108.5%	12 (-58)	66.8%	9 (-22)	78.1%
Sandwich Rd (3/1)	18 (-15)	105.7%	42 (-4)	117.2%	8 (-15)	92.7%
Hengist Way Lane 1 (1/1)	59 (+47)	108.0%	120 (+98)	118.6%	15 (+6)	90.3%
Hengist Way Lane 2 (1/2)	6 (+2)	50.7%	12 (+6)	59.7%	5 (+1)	45.1%
Hengist Way Lane 3 (1/3)	6 (+1)	50.4%	12 (+5)	59.6%	5 (+/- 0)	45.5%
Total Difference	-18		+11		-46	

*Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout) results

7.23.6 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the growthed 2039 baseline and as such considered to provide more than a nil detriment solution.

7.24 Junction 23: Star Lane / Star Lane Link (Three-Arm Priority Junction)

7.24.1 The validated 2017 base model results are presented in **Table 7.83.**

Table 7.83 Junction 23 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Star Lane West to Star Lane East	0	0.24	0	0.25	0	0.14
Star Lane West to Star Lane Link	0	0.24	0	0.27	0	0.16
Star Lane East – all movement	1	0.24	1	0.44	1	0.24

7.24.2 The base 2017 model shows the junction performs with minimal queues and delays and max RFC values are well below the theoretical threshold of 0.85.

Table 7.84 Junction 23 - 2039 Baseline - Traffic Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Star Lane West to Star Lane East	1	0.33	1	0.36	0	0.20

	AM Peak		PM Peak		Airport Peak	
Star Lane West to Star Lane Link	1	0.34	1	0.41	0	0.25
Star Lane East – all movement	1	0.32	3	0.62	1	0.37

7.24.3 In the 2029 baseline scenario the junction continues to perform within its theoretical capacity with minimal queues or delays.

Table 7.85 Junction 23 - 2039 Baseline + Development - Traffic Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Star Lane West to Star Lane East	1 (+/- 0)	0.35	1 (+/- 0)	0.50	0 (+/- 0)	0.23
Star Lane West to Star Lane Link	1 (+/- 0)	0.37	1 (+/- 0)	0.45	0 (+/- 0)	0.27
Star Lane East – all movement	2 (+ 1)	0.52	3 (+/- 0)	0.65	2 (+ 1)	0.55

(Difference with 2039 Baseline results are shown in brackets)

7.24.4 With the inclusion of the development traffic the junction continues to perform within its theoretical capacity with minimal queues or delays. It is concluded that no physical mitigation is required at this junction to address the development impact.

7.25 Junction 24: Star Lane / Nash Road (Four-Arm Standard Roundabout)

7.25.1 7.21.1 The validated 2017 base model results are presented in **Table 7.86.**

Table 7.86 Junction 24 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Star Lane East	1	0.33	1	0.48	1	0.32
Nash Road South	0	0.14	0	0.23	0	0.16
Star Lane West	0	0.29	1	0.40	0	0.30
Nash Road North	3	0.73	1	0.52	1	0.45

7.25.2 The base 2017 model sets out the junction would operate with minimal queues and delays with no capacity issues present.

Table 7.87 Junction 24 - 2039 Baseline - Traffic - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**

	AM Peak		PM Peak		Airport Peak	
Star Lane East	1	0.43	2	0.62	1	0.44
Nash Road South	0	0.18	1	0.32	0	0.23
Star Lane West	1	0.37	1	0.52	1	0.41
Nash Road North	11	0.95	2	0.68	2	0.64

7.25.3 The 2039 baseline scenario assessment shows the junction to be at capacity on Nash Road North during the AM peak hour period with and RFC just above capacity thresholds. During the PM and Airport Peak hour the junction continues to operate with minimal queues and delays and can be stated to be within its theoretical capacity.

Table 7.88 Junction 24 - 2039 Baseline + Development Traffic - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Star Lane East	1 (+/- 0)	0.51	2 (+/- 0)	0.63	1 (+/- 0)	0.51
Nash Road South	0 (+/- 0)	0.19	1 (+/- 0)	0.32	0 (+/- 0)	0.24
Star Lane West	1 (+/- 0)	0.38	1 (+/- 0)	0.57	1 (+/- 0)	0.42
Nash Road North	11 (+/- 0)	0.95	2 (+/- 0)	0.70	2 (+/- 0)	0.64

(Difference with 2039 baseline results are shown in brackets)

7.25.4 With the addition of the development traffic, the junction is shown to be as in the 2039 baseline scenario with no changes in RFC or queues. As such there is no perceivable impact at the junction as a result of the development traffic and as such no physical mitigation is required.

7.26 Junction 25: Tesco Access Roundabout (Three-Arm Standard Roundabout)

7.26.1 The validated 2017 base model results are presented in **Table 7.89**.

Table 7.89 Junction 25 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
B2050 Manston Road East	1	0.38	1	0.31	-	-
Tesco Access	0	0.11	0	0.17	-	-
B2050 Manston Road West	1	0.56	3	0.75	-	-

7.26.2 The 2017 base model junction model assessment indicates that the junction will operate with minimal queues and delays with RFCs well below the theoretical capacity threshold of 0.85.

Table 7.90 Junction 25 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
B2050 Manston Road East	1	0.48	1	0.40	1	0.45
Tesco Access	0	0.15	0	0.22	0	0.26
B2050 Manston Road West	2	0.71	14	0.97	3	0.77

7.26.3 The 2039 Baseline scenario assessment sets out that the junction continues to operate within the theoretical capacity during the AM and Airport Peak hours. During the PM Peak hour the junction begins to develop queues and delays on B2050 Manston Road West with a max RFC of 0.97.

Table 7.91 Junction 25 - 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
B2050 Manston Road East	1 (+/- 0)	0.50	1 (+/- 0)	0.40	1 (+/- 0)	0.48
Tesco Access	0 (+/- 0)	0.15	0 (+/- 0)	0.22	0 (+/- 0)	0.26
B2050 Manston Road West	3 (+1)	0.72	23 (+ 9)	1.02	3 (+/- 0)	0.78

(Difference with 2039 baseline results are shown in brackets)

7.26.4 With the addition of the development traffic queues are only recorded as increasing on the B2050 Manston Road West approach and then only during the PM peak hour periods. Given the level of queue increase and it is not considered that the impact at this junction can be considered to be significant and as such no physical mitigation is proposed.

7.27 Junction 26: Newington Road / Manston Road (Three-Arm Mini Roundabout)

7.27.1 The validated 2017 base model results are presented In **Table 7.92**.

Table 7.92 Junction 26 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Newington Road North	3	0.76	16	1.03	21	1.05
Newington Road South	4	0.80	2	0.70	2	0.67
Manston Road	5	0.86	17	1.01	3	0.77

7.27.2 The 2017 base model shows that the junction will operate with queues and delays developing at Newington Road North and Manston Road. All peaks have arms with RFCs in excess of the 0.85 threshold.

Table 7.93 Junction 26 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Newington Road North	13	0.97	71	1.26	139	1.46
Newington Road South	28	1.02	7	0.88	7	0.89
Manston Road	51	1.19	123	1.43	47	1.17

7.27.3 The assessment of the 2039 Baseline scenario shows that the junction experiences significant queues and delays in all peak periods.

Table 7.94 Junction 26 - 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Newington Road North	14 (+1)	0.97	74 (+3)	1.27	143 (+4)	1.47
Newington Road South	41 (+13)	1.06	7 (+/- 0)	0.89	10 (+3)	0.93
Manston Road	51 (+/- 0)	1.19	156 (+33)	1.51	53 (+6)	1.19

(Difference with 2039 committed trips is shown in brackets)

7.27.4 With the addition of the development traffic the queues and delays increase. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required.

Mitigation proposal – junction 26

7.27.5 The current mini roundabout is proposed to be upgraded to signals due to the lack of space to improve increase the scale of the roundabout. The proposed signals run as a two-staged junction and includes for a signalled pedestrian crossing along the minor arm and retention of the courtesy crossing point on the eastern approach. The scheme design is provided as **Figure 7.14.**

Table 7.95 Junction 26 – Mitigation Results Summary – 2039 Baseline+ Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**DoS**	**Average Queue**	**DoS**	**Average Queue**	**DoS**
Newington Road North	12 (-1)	88.0%	12 (-59)	81.1%	13 (-126)	82.6%
Newington Road South	20 (-8)	87.7%	27 (+20)	87.1%	24 (+17)	82.3%
Manston Road	14 (-37)	88.6%	23 (-100)	86.8%	18 (-29)	80.8%
Total Difference	-49		-139		-138	

***Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout) results**

7.27.6 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the 2039 baseline and provides more than a nil detriment solution.

7.28 Junction 27: Newington Road / High Street (Three-Arm Mini Roundabout)

7.28.1 The validated 2017 base model results are presented in **Table 7.96.**

Table 7.96 Junction 27 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Newington Road North	9	0.92	12	0.96	4	0.78
High Street East	12	0.95	9	0.92	3	0.75
High Street South	8	0.91	11	0.94	2	0.70

7.28.2 The base 2017 model sets out that the junction operates with relatively small queues and delays on all approaches, however all approaches exceed the theoretical capacity threshold of 0.85 during the AM and PM peak hour.

Table 7.97 Junction 27 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Newington Road North	80	1.22	103	1.25	64	1.17
High Street East	105	1.20	87	1.17	29	1.03
High Street South	81	1.17	119	1.22	22	1.01

7.28.3 The 2039 baseline scenario shows that the junction queues and delays have increased a significant amount from the 2017 base scenario across all three-time periods. All approaches now exceeding 0.85 in all peak periods.

Table 7.98 Junction 27 - 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Newington Road North	80 (+/- 0)	1.21	129 (+26)	1.30	68 (+4)	1.18
High Street East	129 (+ 24)	1.24	85 (+2)	1.16	44 (+15)	1.07
High Street South	88 (+7)	1.18	121 (+2)	1.22	27 (+5)	1.03

(Difference with 2039 committed trips is shown in brackets)

7.28.4 With the addition of the development traffic, the queues and delays increase and the junction continues to operate at capacity. In order to address the impact of the proposed development trips at this junction a mitigation scheme is required

Mitigation proposal – junction 27

7.28.5 The proposed improvement is in the form of minor road widening by the removal of existing splitter islands on the southern and western arm and additional lane markings. The scheme design is provided as **Figure 7.15**.

Table 7.99 Junction 27 – Mitigation Results Summary – 2039 Baseline - Proposed Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Newington Road North	41 (-39)	1.08	64 (-39)	1.14	30 (-32)	1.05
High Street East	107 (+2)	1.20	71 (-16)	1.13	32 (+3)	1.04
High Street South	71 (-10)	1.14	99 (-20)	1.18	18 (-4)	0.99
Total Difference	-47		-75		-33	

***Figures in brackets are the difference between the 2039 baseline (existing layout) and 2039 + Development (mitigation layout) results**

7.28.6 The junction is shown to operate with less queues and delays with the mitigation measure in place than the existing layout in the growthed 2039 baseline and as such considered to provide more than a nil detriment solution.

7.29 Junction 28: Wilfred Rd / A255 / Grange Rd (Four-Arm Signalised Roundabout)

7.29.1 The validated 2017 base model results are presented in Table 7.100.

Table 7.100 Junction 28 - 2017 Base - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Wilfred Rd	9	62.0%	10	74.1%	6	46.9%
A255 Park Rd	10	49.2%	8	43.2%	8	40.6%
Grange Rd	5	62.7%	5	69.1%	3	47.3%
A255 High Street	15	63.2%	19	75.5%	10	46.6%
PRC	42.3%		19.2%		90.3%	

7.29.2 The 2017 base model scenario sets out the junction performs within capacity with DoS below 90%, positive PRCs and minimal queues or delays.

Table 7.101 Junction 28 - 2039 Baseline - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Wilfred Rd	12	80.6%	17	94.0%	8	62.9%
A255 Park Rd	14	60.4%	11	54.4%	12	55.1%

	AM Peak		PM Peak		Airport Peak	
Grange Rd	7	78.7%	7	88.0%	5	59.1%
A255 High Street	23	80.8%	33	95.2%	15	63.2%
PRC	11.4%		-5.8%		42.4%	

7.29.3 The 2039 baseline scenario assessment sets out that delays begin to build on A255 High Street, with a negative PRC evident during the PM peak hour and DoS exceeding 90% on Wilfred Road and Grange Road.

Table 7.102 Junction 28 - 2039 Baseline + Development - Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Wilfred Rd	13 (+1)	82.3%	20 (+3)	97.9%	8 (+/- 0)	62.8%
A255 Park Rd	15 (+1)	63.3%	11 (+/- 0)	53.7%	13 (+1)	58.1%
Grange Rd	7 (+/- 0)	78.7%	7 (+/- 0)	88.0%	5 (+/- 0)	63.7%
A255 High Street	23 (+/- 0)	81.3%	36 (+3)	97.0%	16 (+1)	64.4%
PRC	9.3%		-8.8%		39.8%	

(Difference with 2039 baseline results are shown in brackets)

7.29.4 The addition of the development trips has a minimal effect in terms of additional queues and delays at the junction. It could be argued that the impact could not be perceived by a driver using this junction and as such given the wider improvements at other junctions no mitigation measure is proposed in this location.

7.30 Mitigation Summary

Results summary

7.30.1 While it is common practice to look at the developments impact at each point in the network for smaller development schemes, the impact on the wider network also needs reflecting to ensure that the level of mitigation proposed is reasonable and proportional to the level of impact. A summary of the effect of the mitigation measures in terms of queueing on all of the junctions modelled within the local highway network is provided in **Table 7.103**. The junctions where no mitigation is required are marked with an "✗". Junctions that require mitigation are marked with a "✓". Junctions where mitigation could be delivered but is deemed not necessary due to overall network performance improvements delivered by the mitigation measures already in place are noted as "✓".

Table 7.103 Mitigation Summary – Existing Junction Performance - Resultant Queues

Junction	**AM Peak Queue**	**PM Peak Queue**	**Airport Peak Queue**	**Mitigation**
1	-42	-5	+1	✓
2	-168	-104	+4	✓
3	0	0	0	✗
4	-146	-281	-31	✓

Junction	AM Peak Queue	PM Peak Queue	Airport Peak Queue	Mitigation
5	0	0	0	✘
6	-144	-115	-2	✓
7	-62	-147	-4	✓
8a+8b	+11	+22	+7	✘
9	0	+0	0	✘
10	-2	+1	+1	✓
11	0	+1	+1	✘
12	-80	-203	+32	✓
13	+19	+1	+26	✓
15	-122	-148	-15	✓
16	-83	-92	-83	✓
17	-19	-20	-6	✓
20A+B	-227	-282	-111	✓
21A	-7	-39	-1	✓
21B	-18	+11	-46	✓
23	+1	0	+1	✘
24	0	0	0	✘
25	+1	+9	0	✘
26	-49	-139	-138	✓
27	-47	-75	-33	✓
28	+2	+6	+2	✘
All mitigation measures identified - Total Queue Difference Network Wide (✓ + ✓)	-1197	-1637	-406	
Proposed Mitigation Package - Total Queue Difference Network Wide (✓)	-1038	-1399	-231	

7.30.2 It is important at this stage to consider the developments impact over the entire network when considering a reasonable and proportional scale of mitigation measures.

7.30.3 It is clear that the individual mitigation schemes proposed, when collated together, mitigate the impact of the proposed development during the future 2039 + Proposed development traffic scenario and in doing so result in a significant reduction in queues when looked at over the network as a whole.

7.30.4 The net impact of the proposed development when totalled across the wider highway network in terms of queues on the total network impact can be summarised as a reduction of 1197 queues during the AM peak hour, a reduction of 1637 queues during the PM peak hour and a reduction of 406 queues in the Airport Peak Hour. This level of mitigation is considered to reflect significant benefit to the wider highway network over and above what could be considered as mil detriment.

7.30.5 Therefore, consideration has been taken of junction mitigation schemes that have been identified for junctions which are impacted by a low level of additional queueing and as such the impact could be argued as not being severe and thus not requiring mitigation, given the wider network benefits reported.

7.30.6 On this basis it is proposed to not offer mitigation packages for junctions 1, 10, 17, 26 and 27. This ensures that the overall mitigation package can be considered as both reasonable and proportional whilst still ensuring that the network performance is returned to a nil detriment status (or betterment) with the committed mitigation packages provided.

7.30.7 It is therefore proposed to provide mitigation schemes at Junctions 2,4,6,7,12,13,15,16,20A+B,21A and 21B as well as the provision of the site access junctions.

7.30.8 The committed package of mitigation measures leads to a reduction of 1038 less queues in the AM, a reduction of 1399 queues in the PM and a reduction of 231 queues in the Airport Peak compared to the 2039 Baseline + development traffic network performance.

7.30.9 We invite discussions with the local highway authorities to enable reasonable and proportional discussions on a network wide basis to focus the proposed mitigation schemes to be delivered by the applicant and begin talks regarding delivery mechanisms.

Mitigation design summaries

7.30.10 The modelling undertaken to define mitigation schemes has set out the requirement for mitigation schemes at 10 local junctions and the mitigation proposed as follows;

- Junction 2: A299 / A256 / Cottington Link Rd
  - Widening of the eastern arm, improvements to junction road markings with aim of equal lane usage
- Junction 4: A299 / B2190
  - Widening the eastern arm and providing a flared approach as well as improvements to the road markings at the junction
- Junction 6: A299 / Seamark Rd / A253 / Willetts Hill
  - Minor physical improvements as well as improvements to the road markings at the junction
- Junction 7: A299 / A28
  - Improvements to signage and carriageway markings
- Junction 12: Manston Road / B2050 / Spitfire Way
  - Provision of a new four arm signalised junction with pedestrian crossing facilities
- Junction 13: Manston Court Road / B2050
  - Provision of a new three arm signalised junction with pedestrian crossing facilities linked to the signalised junction proposals for the main airport terminal access
- Junction 15: Manston Rd / Hartsdown Rd / Tivoli Rd / College Rd / Nash Rd
  - Provision of new signal head locations and revised stage sequence operation. Also proposals to change the road markings at the junction
- Junction 16: Ramsgate Rd / College Rd / A254 / Beatrice Rd
  - Provision of new stop line and signal head locations as well as a revised stage sequence operation. Scheme also includes proposals to change the road markings at the junction
- Junction 20: A256 (N) / A256 (S) / Manston Road
  - Provision of a large new 4 arm signalised junction arrangement with relevant pedestrian crossings, although noting that this would be unnecessary as the Manston Green development scheme has recently secured a £2.5 million grant towards the delivery of the roundabout improvement and road infrastructure. Testing of the proposed roundabout design will be required.

- Junction 21: A299 / A256 / Sandwich Rd / Canterbury Rd E /Haine Road
  - Increase in flare length on approach to the junction and increase to entry widths. Also, proposals for revised signal stage timings and staging

7.30.11 The scheme designs for the 10 mitigation schemes are provided as Figures 7.1 to 7.15

7.30.12 It should be noted that one of the junction improvement schemes set out above is included in the masterplan for the proposed development as follows;

- Junction 12: Manston Road / B2050 / Spitfire Way.

7.30.13 These junctions are considered to therefore to be “on site”, with the remaining 9 junctions “offsite”.

7.30.14 As these are the “offside” junctions that require mitigation by the year of full operation, the extent and timing of work will be agreed with KCC as Highways Authority and procured via agreements under S278 of the Highways Act 1980.

7.31 Highways Safety Mitigation Proposals

7.31.1 As set out in section 4.7 within the accident record assessment, three junctions were noted as having highways safety considerations that needed to be addressed in the form of a mitigation scheme as follows;

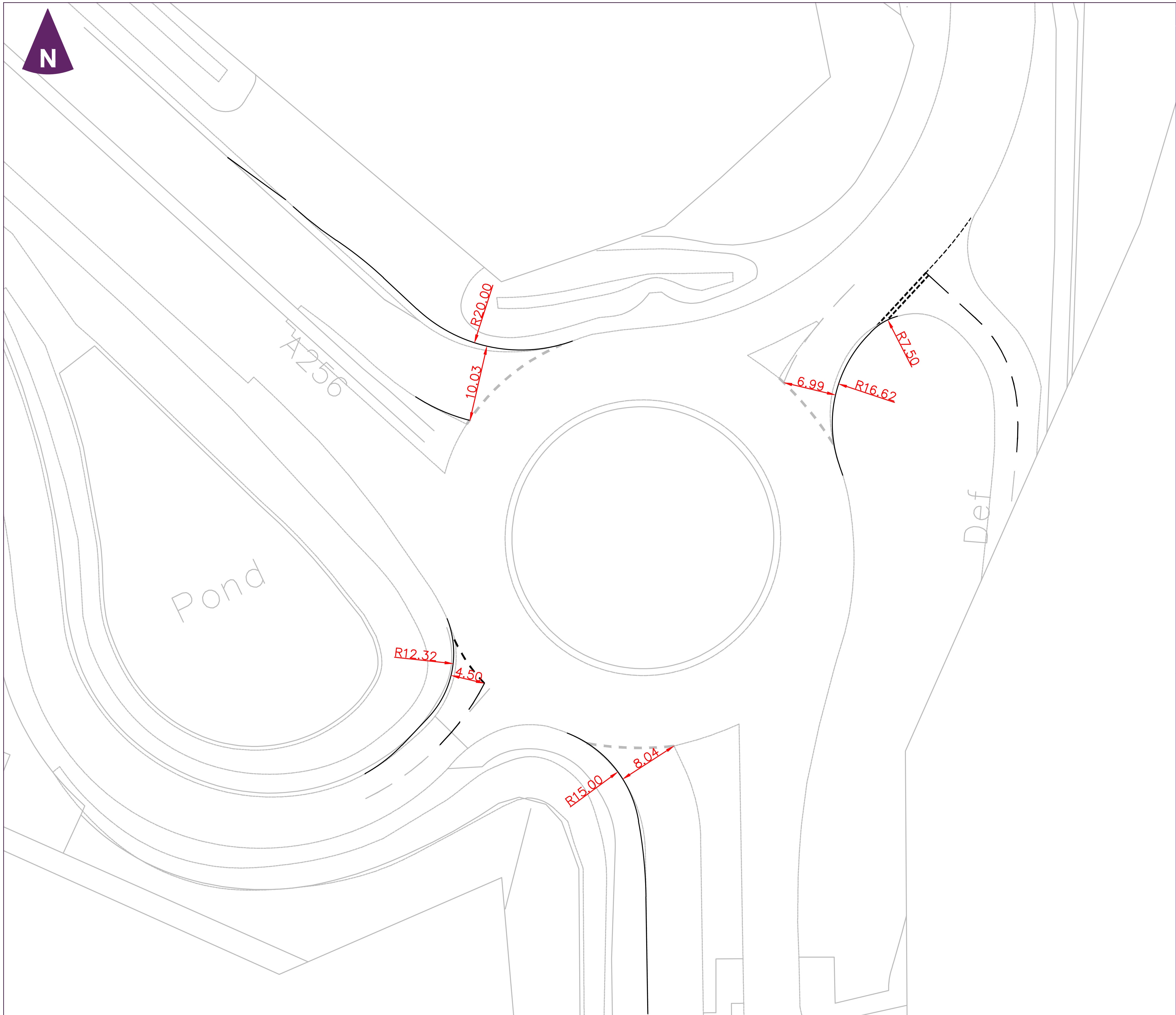
- Spitfire Way/Alland Grange Lane;
- Spitfire Way/ B2050 Manston Road; and
- B5020 Manston Road/Manston Court Road.

7.31.2 Of these three junctions two of them have been improved as a result of the capacity assessment modelling and mitigation scheme development. Both the Spitfire Way/B2050 Manston Road junctions and B2050 Manston Road/Manston Court Road will both be converted to fully signalised junctions which is a vast step up in safety from the current priority junctions arrangements. These junctions will also be provided with safe controlled pedestrian crossing points on the key links and improved pedestrian routes around the edges of the junctions. It is considered therefore that the highways safety issues raised in this report are addressed though these mitigation schemes.

7.31.3 As a result, only one further junction requires a scheme to alleviate the highways safety issues raised in the assessment earlier in this TA at the Spitfire Way/Allend Grange Lane junction.

7.31.4 The issue at this junction was noted to be a lack of visibility from the Allend Grange Road minor arm and as such an improvement scheme, as set out in **Figure 7.16** is proposed to provide for a clearer visibility splay from the junctions. This scheme is in conjunction with the proposals to widen Spitfire Way to a 7.3 carriageway and provide further signage warning users of Spitfire Way of the presence of this minor arm.

7.31.5 This junction is also considered an offsite junction and the works required will be secured outside of this DCO.



Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:500

Drawing Title

Manston Airport DCO EIA

Figure 7.1 Jct 1 A256 Sandwich Road Mitigation proposal

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

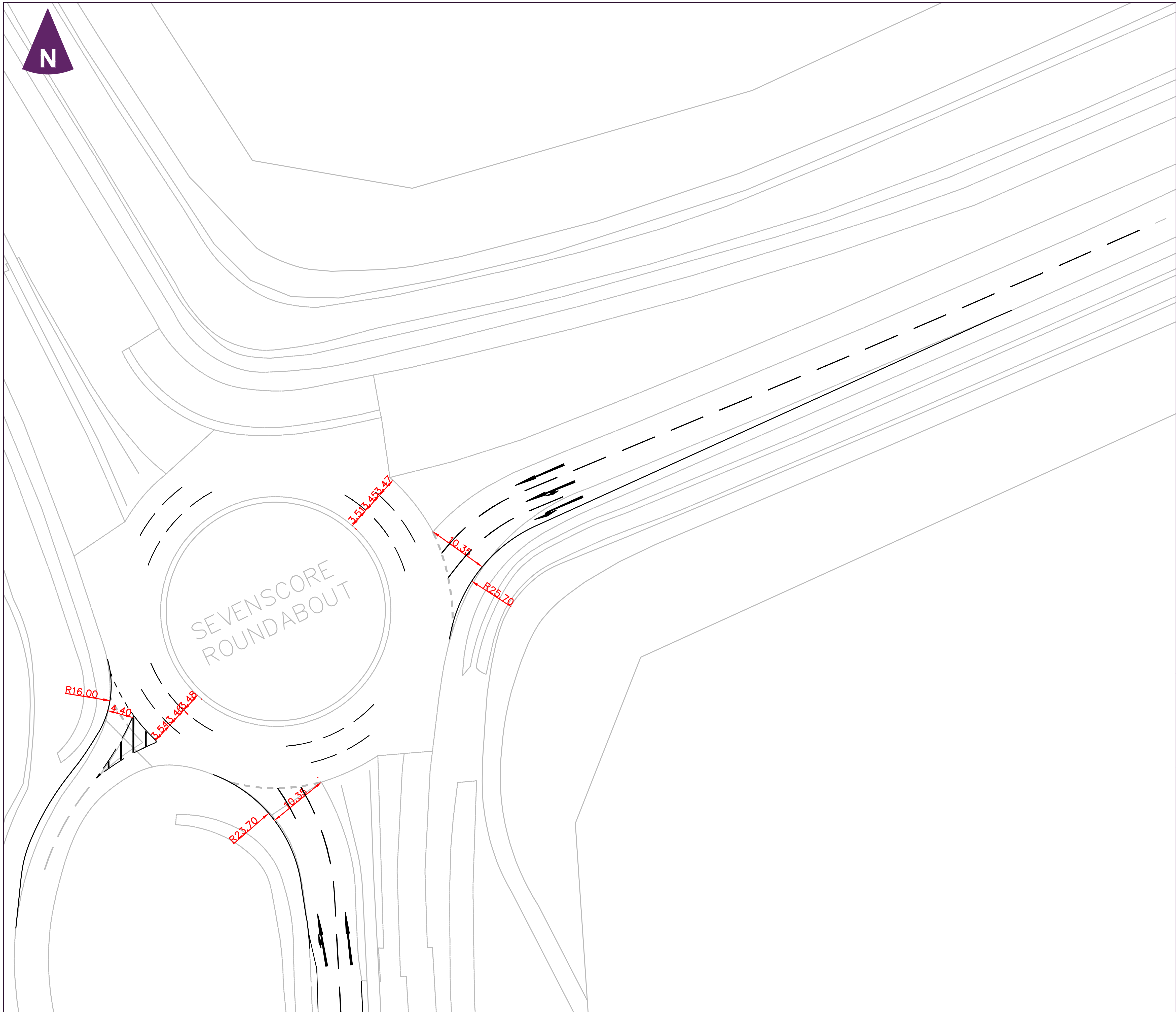
amec foster wheeler

Drawing Number 38199- Lon338

Revision -

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon338.dwg



Date of 1st Issue	Description	Drawn by	Checked by
02/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:650

Drawing Title

Manston Airport DCO EIA

Figure 7.2 Jct 2 A56/A299
Mitigation proposal

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

Drawing Number: 38199- Lon347

Revision: –

user name: guy, adam

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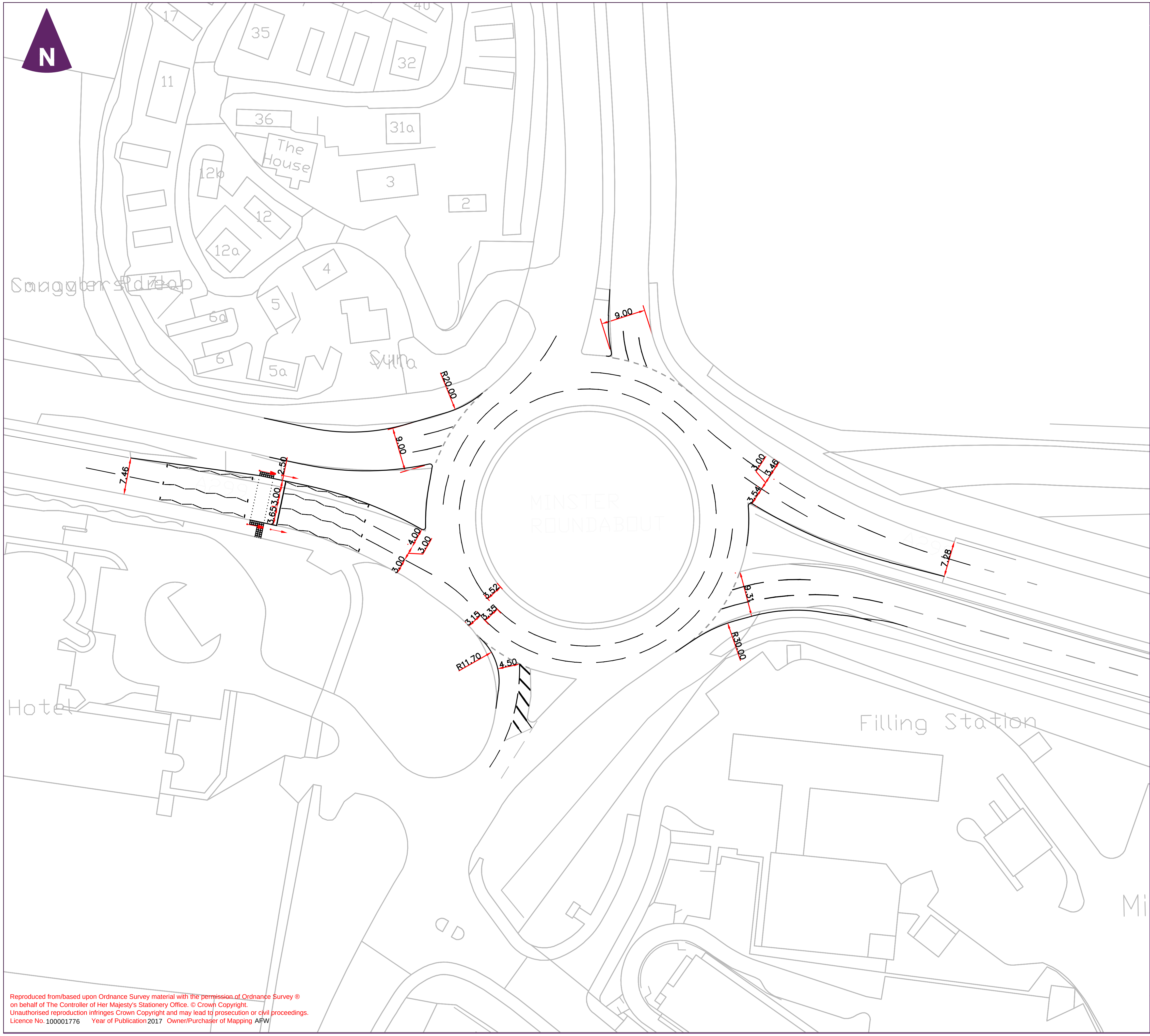


Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed tactile paving surface
- Proposed traffic signal head

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:750

Drawing Title
Manston Airport DCO EIA

Figure 7.3 Jct4 A256/B2190
Mitigation proposal

Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

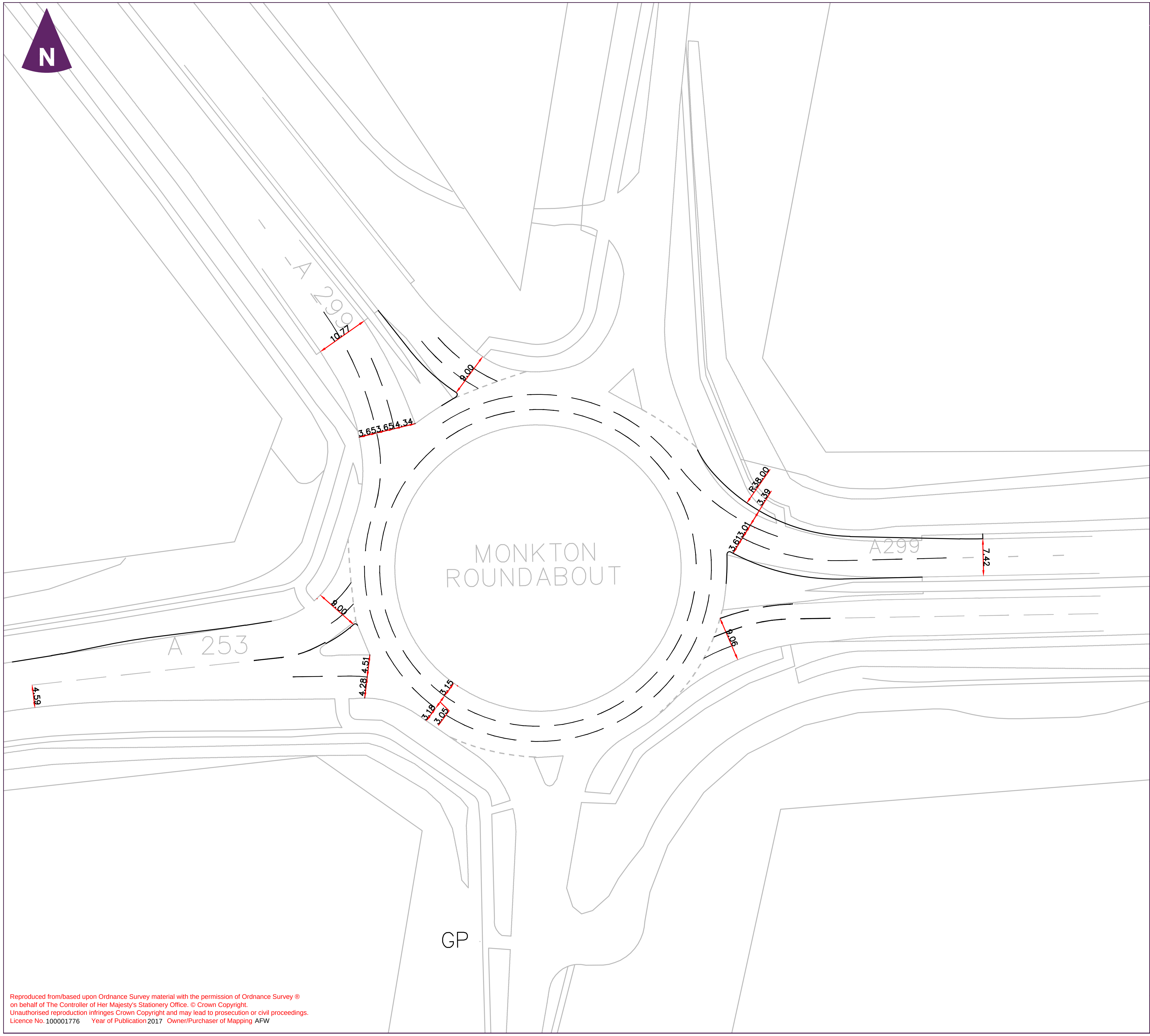
amec foster wheeler

Drawing Number
38199- Lon317

Revision
-

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon317.dwg



Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE
1:750

Drawing Title
Manston Airport DCO EIA

Figure 7.4 Jct 6 A253/A299
Mitigation proposal

Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

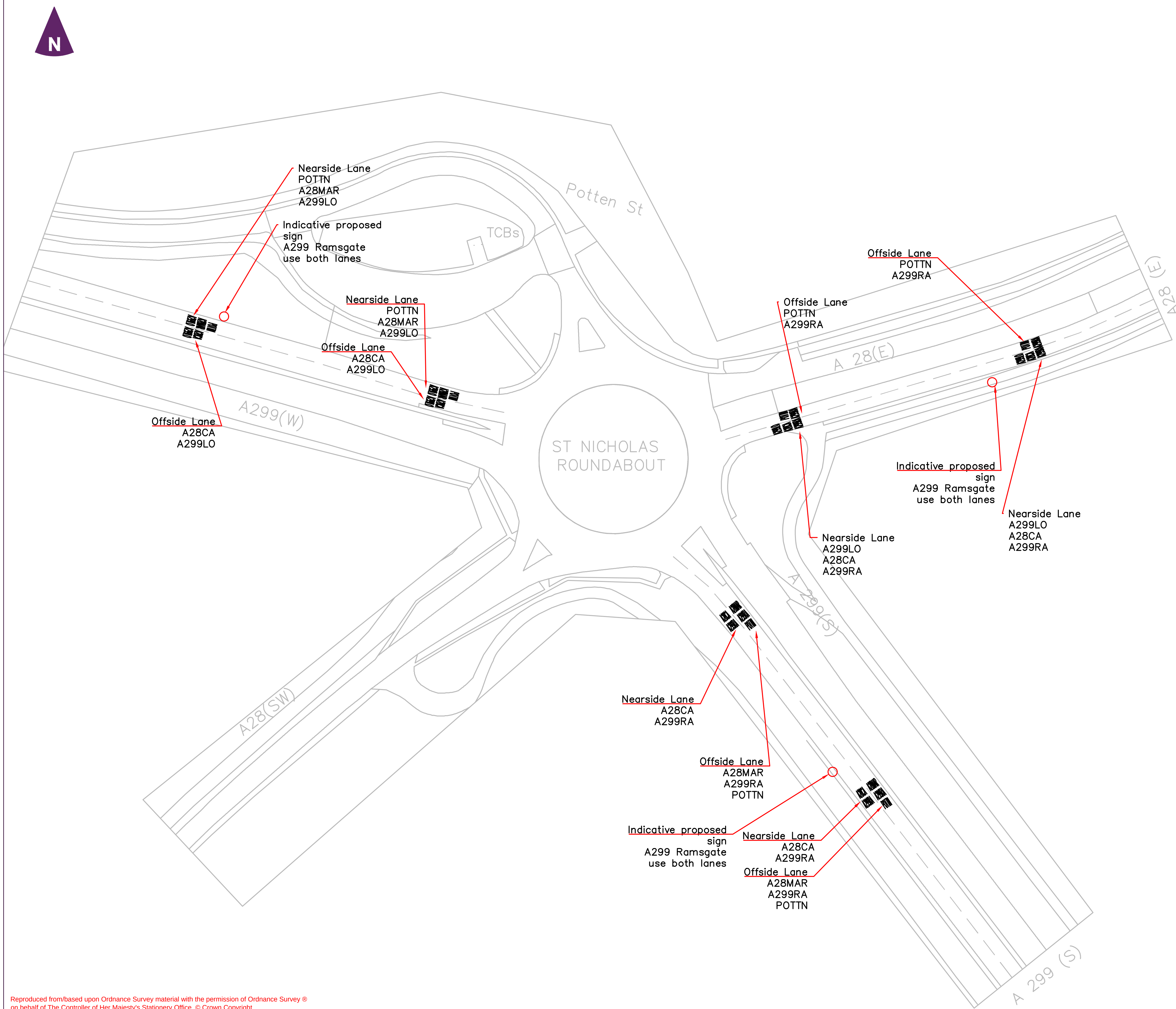
amec foster wheeler

Drawing Number
38199- Lon318

Revision
-

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon318.dwg



Date of 1st Issue	Description	Drawn by	Checked by
12/02/2018	FIRST ISSUE	FOUDA	MORRC

Key

- Existing based on Ordnance Survey map
- Proposed road markings
- Indicative proposed sign

Notes

1. This drawing is not to be used for construction.
2. Additional traffic signs will be provided in the next stage of the design to reinforce the information shown on the carriageway.

A3 SCALE 1:1250

Drawing Title

Manston Airport DCO EIA

Figure 7.5 Jct 7 A299/A28 Mitigation proposal

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

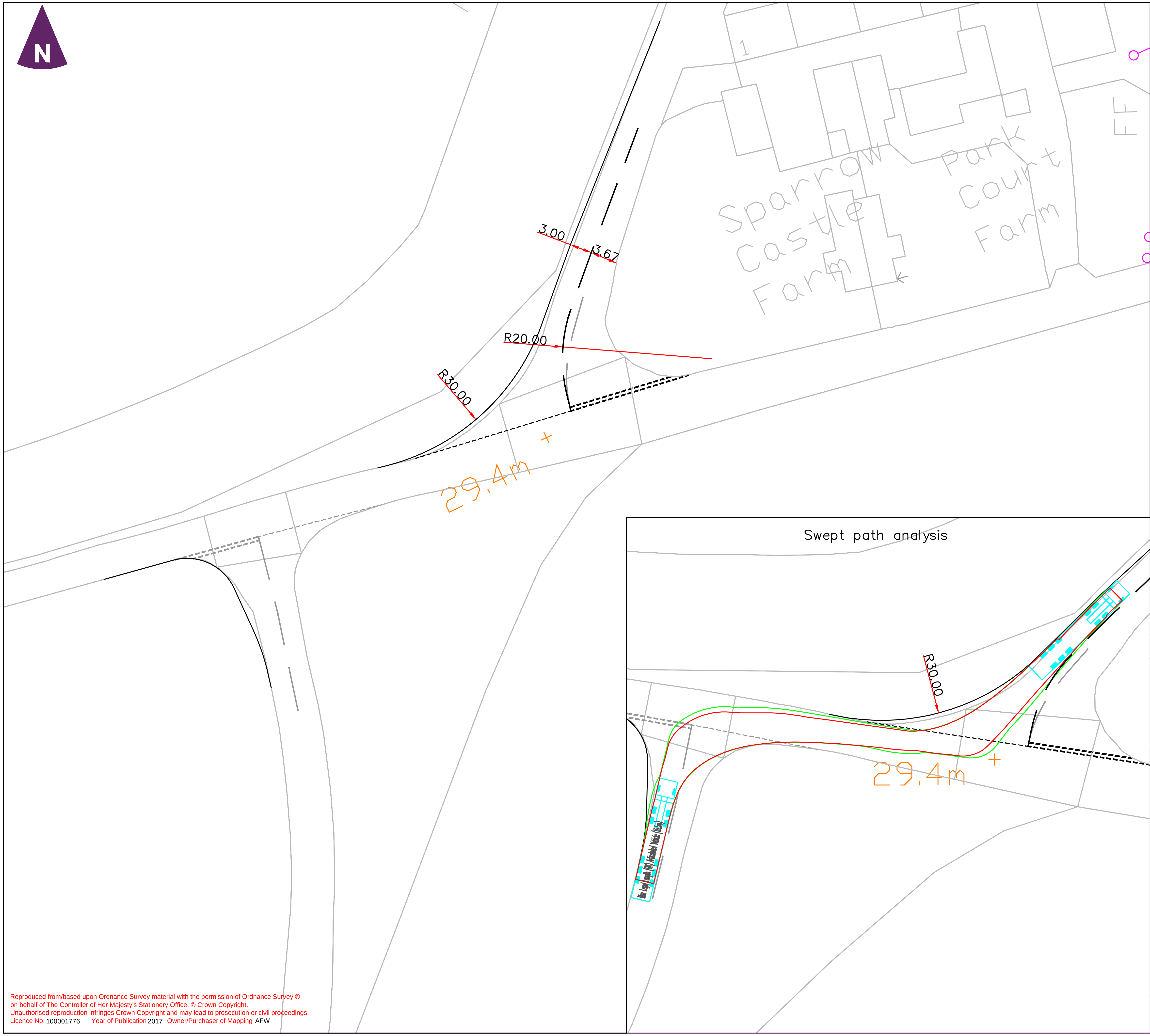
amec foster wheeler

Drawing Number 38199- Lon367

Revision -

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon367_r1.dwg



Date of 1st Issue	Description	Drawn by	Checked by
24/01/2018	FIRST ISSUE	FOUDA	MORRC

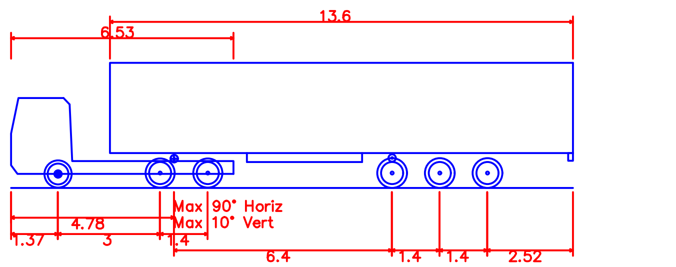
Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

Swept path vehicle profile



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

Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.681m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	6.530m

A3 SCALE
1:500

Drawing Title
Manston Airport DCO EIA

Figure 7.6 Jct 10 B2050/Margate Hill
Mitigation proposal

Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

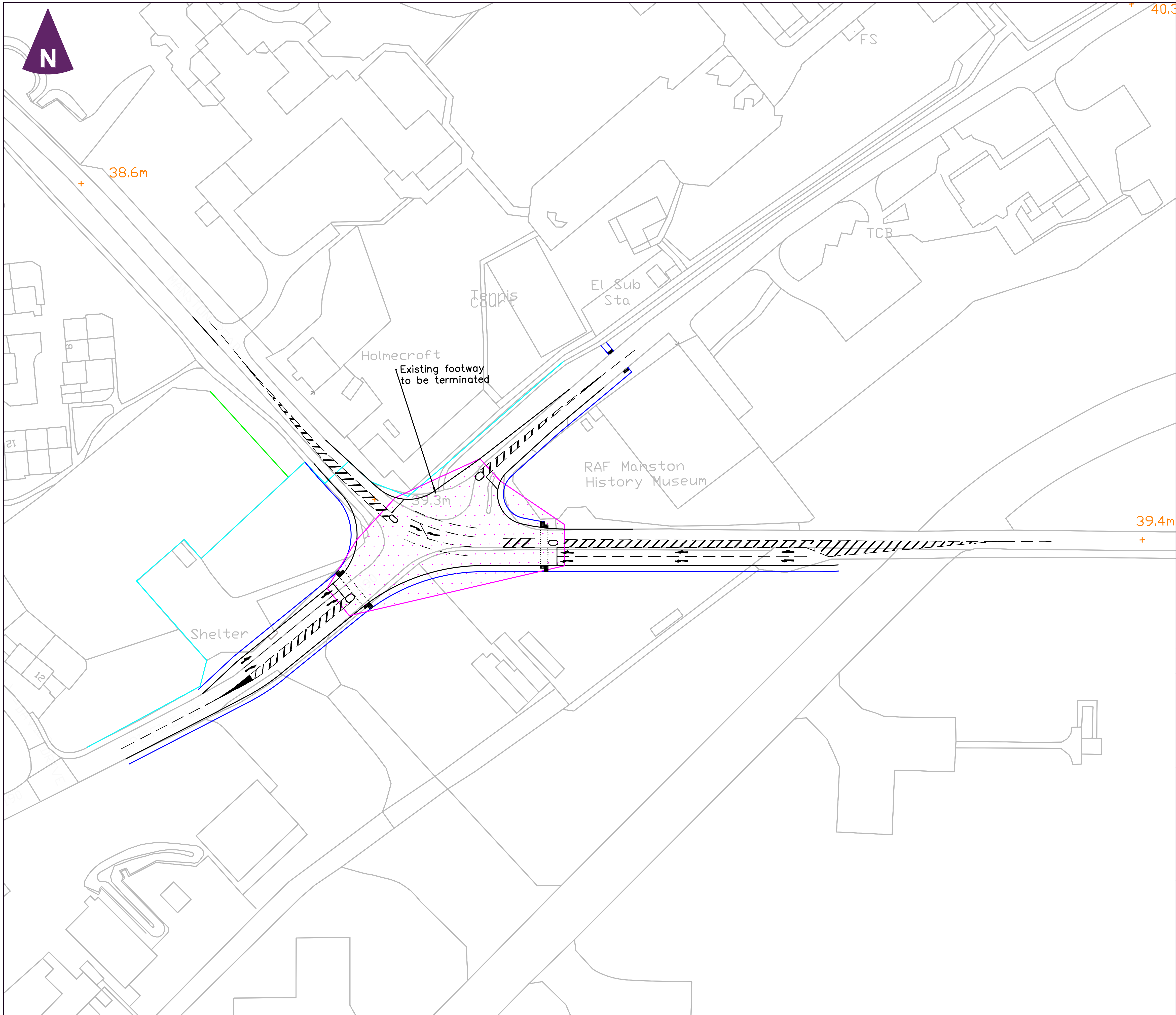
amec foster wheeler

Drawing Number
38199- Lon341

Revision
-

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon341.dwg



Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed footway
- Proposed road marking
- Intervisibility Zone
- Assumed highway boundary
- Development boundary

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:1250

Drawing Title

Manston Airport DCO EIA

Figure 7.7 Jct 12 Manston Road/Spitfire Way Mitigation proposal

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

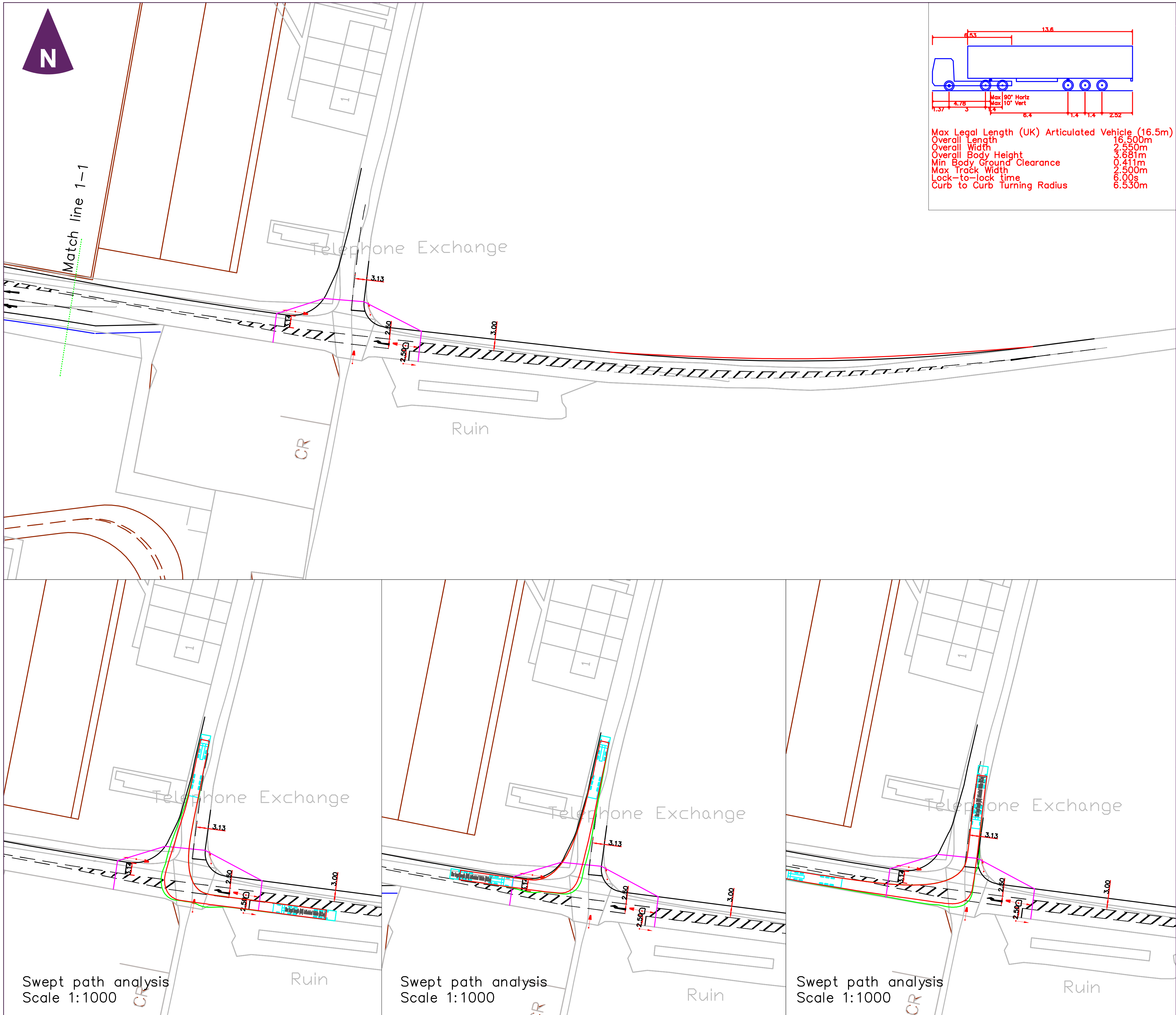
amec foster wheeler

Drawing Number 38199- Lon155

Revision –

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon155a.dwg



Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Proposed masterplan
- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed tactile paving surface
- Proposed primary signal head
- Proposed secondary signal head
- Proposed signal head with additional green arrow signal
- Proposed signal head with substitute green arrow
- Junction intervisibility boundary
- Proposed footway edge
- Extent of visibility requirements

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).
4. Junctions' intervisibility zones need to be kept clear from obstructions to maintain visibility.

A3 SCALE 1:1000

Drawing Title
Manston Airport DCO EIA

Figure 7.8 Jct 13 B2050 Manston Road /Manston Court Road Mitigation proposal

Client
RSP

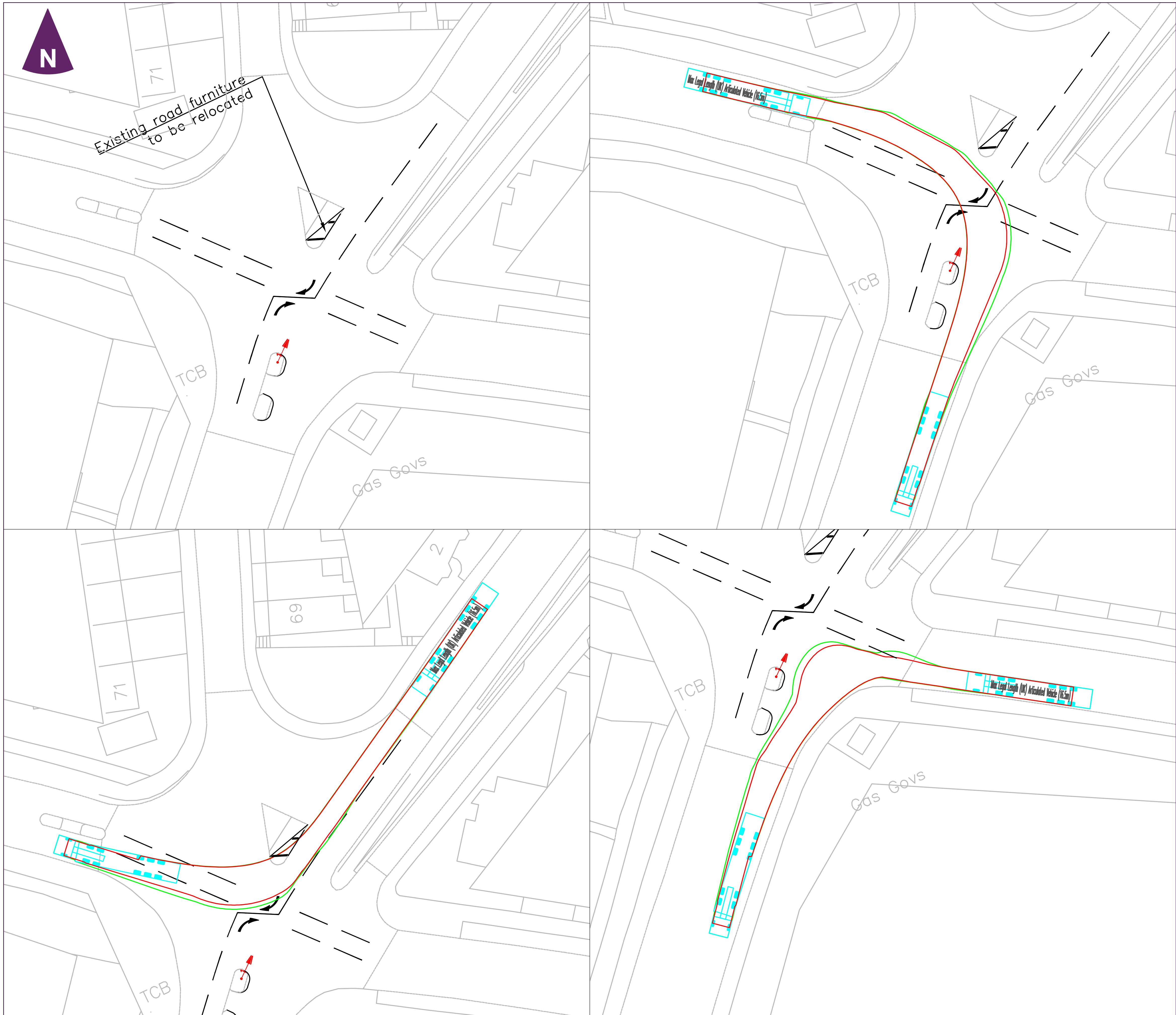
Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000
amec foster wheeler

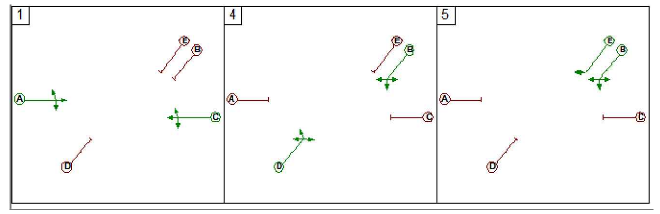
Drawing Number 38199– Lon142 | Revision –

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon142b.dwg

user name: guy, adam



Date of 1st Issue	Description	Drawn by	Checked by
11/01/2018	FIRST ISSUE	FOUDA	MORRC



Stages Sequence

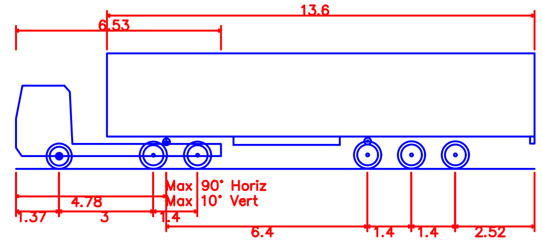
Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed secondary signal head with right turn indicative arrow

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB), Manual for Streets and Traffic Signs Regulations and General Directions (TSRGD).

Swept path vehicle profile



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

Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.681m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	6.530m

A3 SCALE 1:500

Drawing Title

Manston Airport DCO EIA

Figure 7.9 Jct 15 B2052 Nash Rd/ Shottendane Rd Mitigation proposal

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

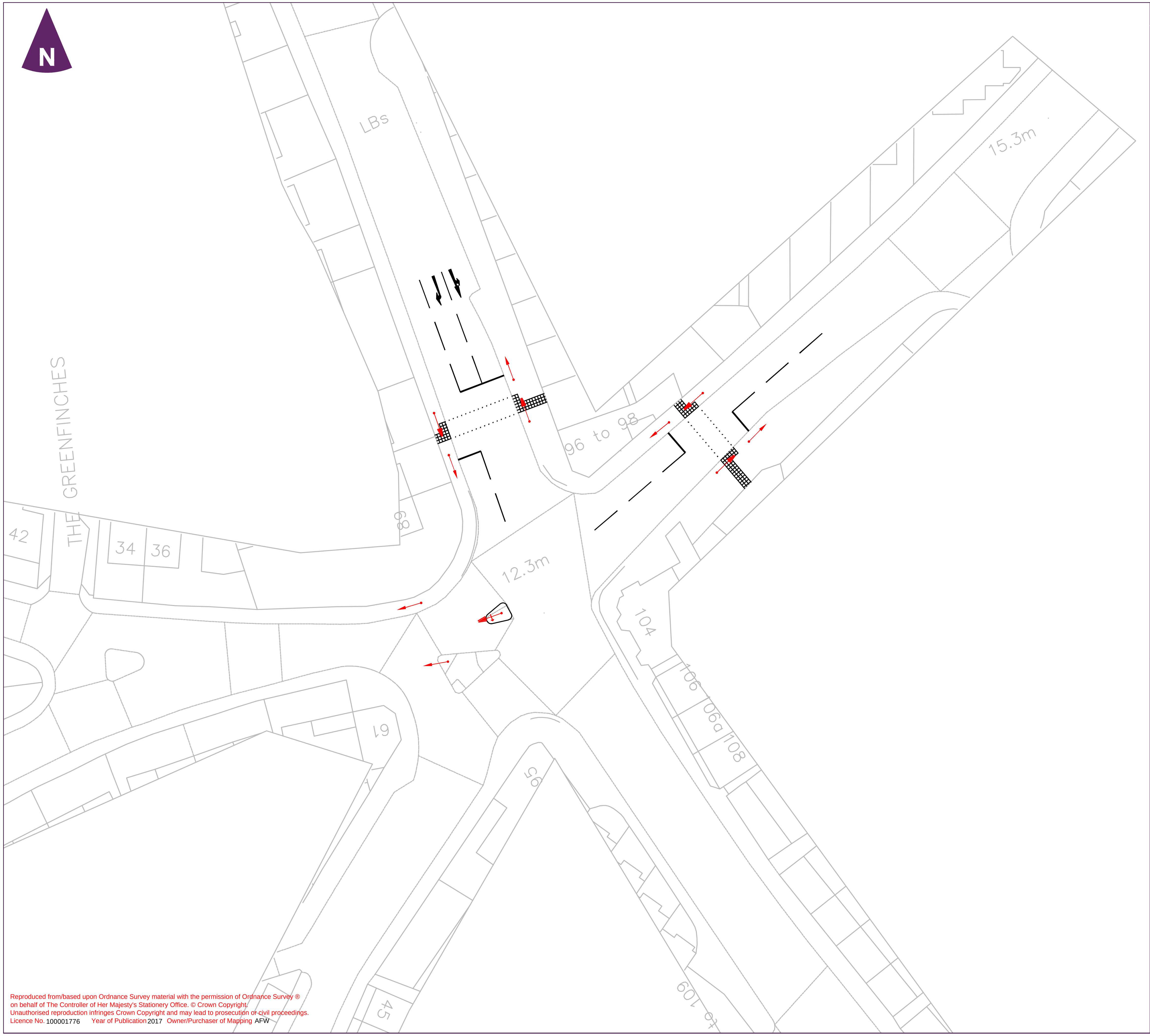
amec foster wheeler

Drawing Number: 38199- Lon310

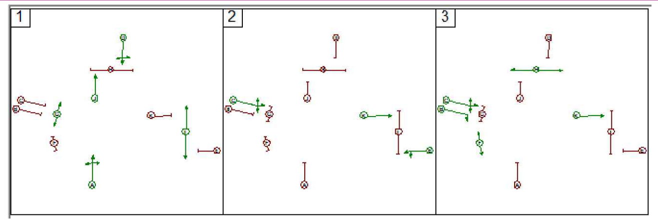
Revision: -

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon310.dwg



Date of 1st Issue	Description	Drawn by	Checked by
12/01/2018	FIRST ISSUE	FOUDA	MORRC



Stages Sequence

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed signal head
- Proposed signal head with right turn indicative arrow
- Proposed tactile paving surface

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB), Manual for Streets and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE
1:500

Drawing Title
Manston Airport DCO EIA

Figure 7.10 Jct 16 A254/B2052
Mitigation proposal

Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

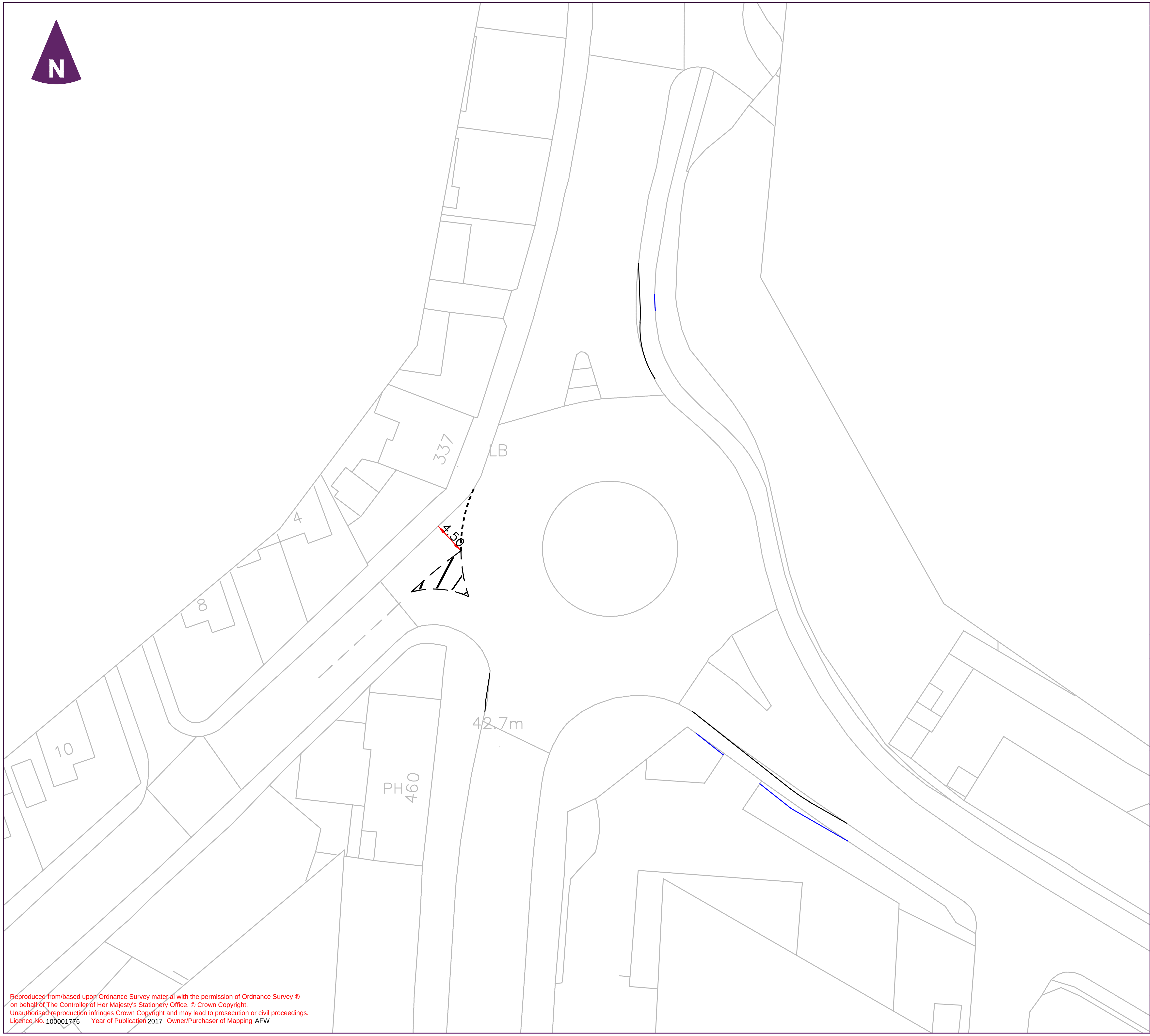
Drawing Number
38199- Lon311

Revision
–

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon311.dwg

Date of 1st Issue	Description	Drawn by	Checked by
13/02/2018	FIRST ISSUE	FOUDA	MORRC



Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed footway edge

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed work is designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:500

Drawing Title

Manston Airport DCO EIA

Figure 7.11 Jct 17 Ramsgate Rd/Poorhole Ln
Mitigation proposal

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

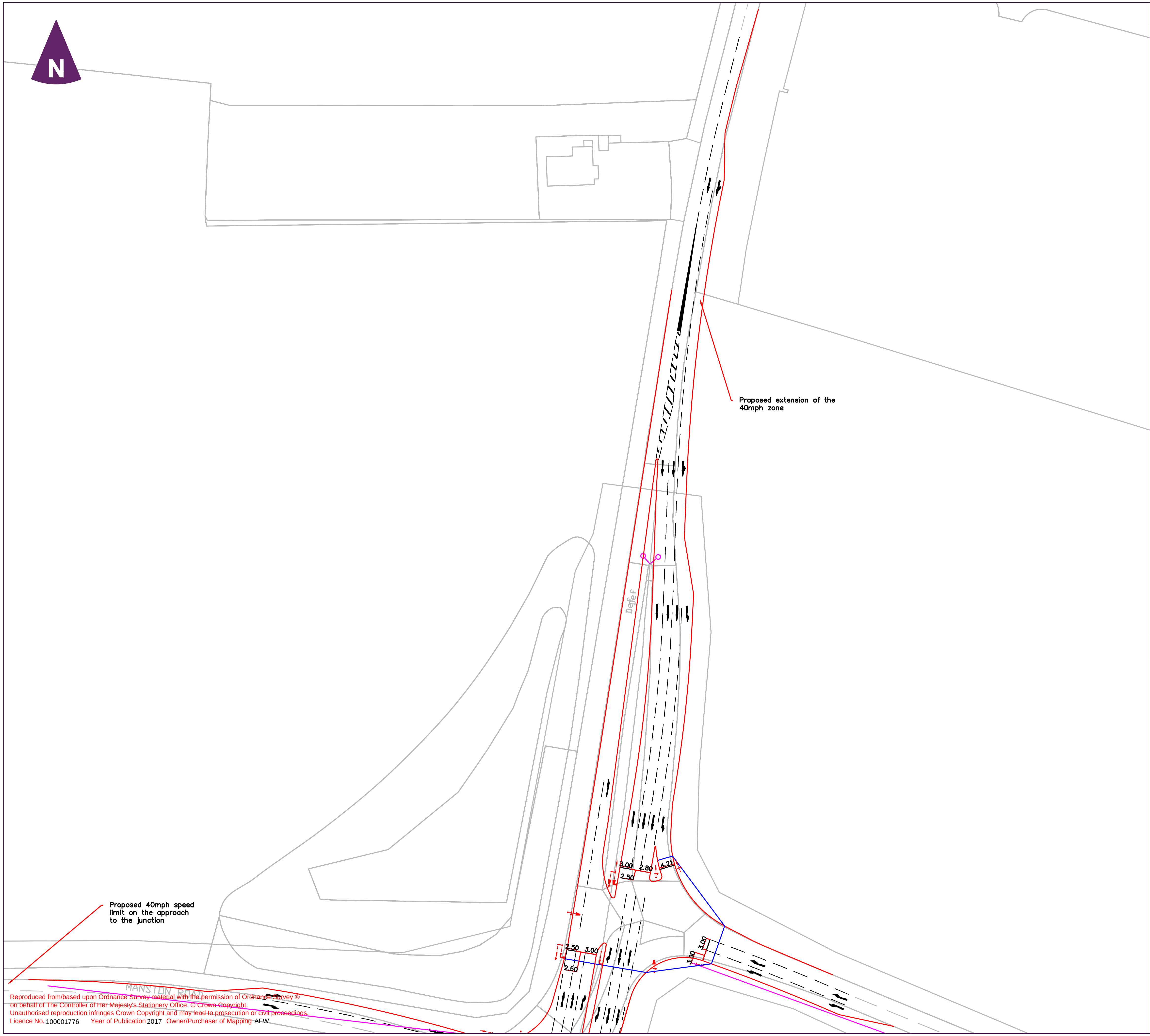
amec foster wheeler

Drawing Number: 38199- Lon371

Revision: -

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199- lon371.dwg



Date of 1st Issue	Description	Drawn by	Checked by
13/02/2018	FIRST ISSUE	FOUDA	MORRC

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed footway edge

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed work is designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:500

Drawing Title
Manston Airport DCO EIA

Figure 7.11 Jct 17 Ramsgate Rd/Poorhole Ln
Mitigation proposal – Sheet 1

Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

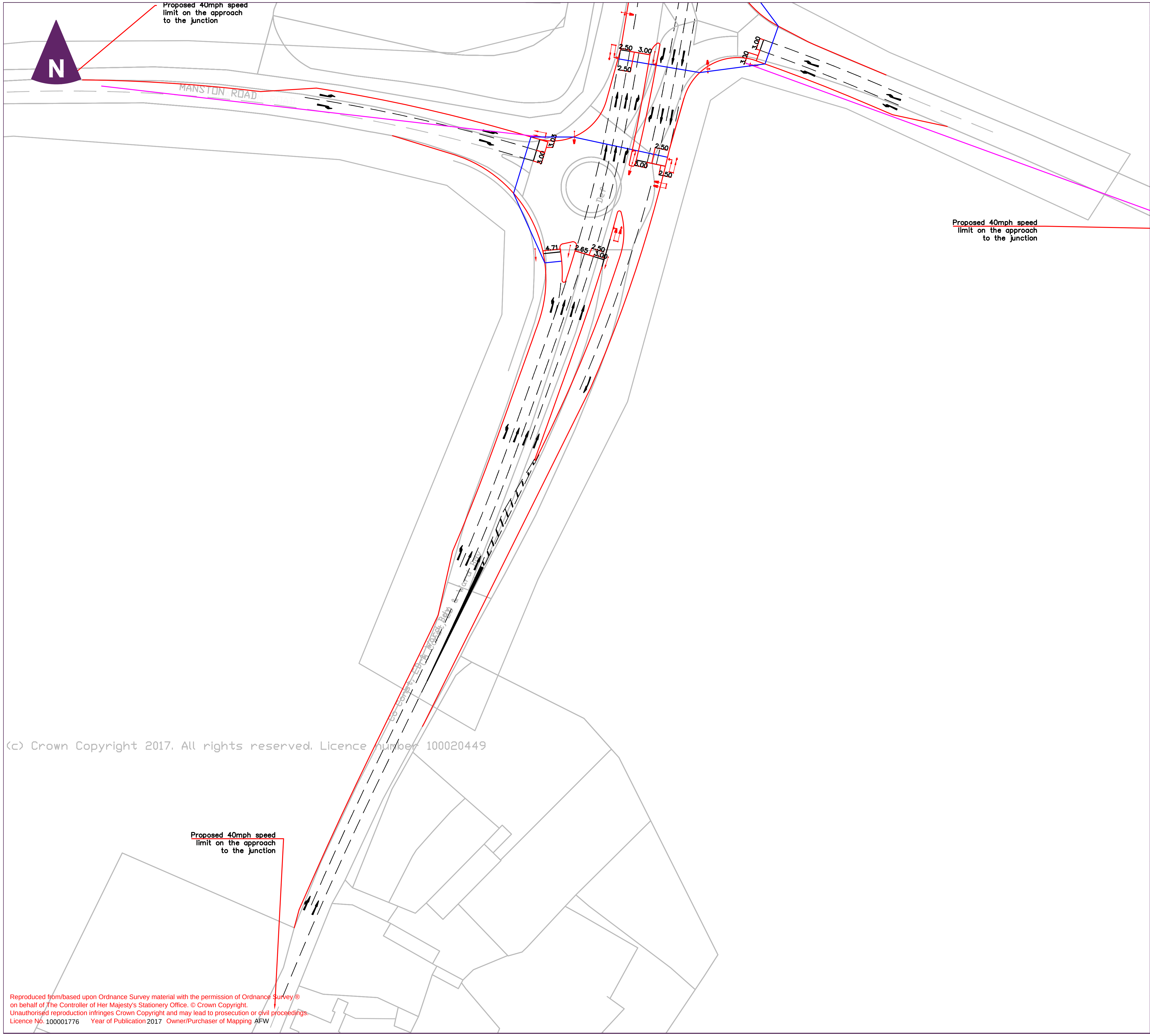
amec foster wheeler

Drawing Number: 38199– Lon371

Revision: –

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon348.dwg



Date of 1st Issue	Description	Drawn by	Checked by
13/02/2018	FIRST ISSUE	FOUDA	MORRC

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed footway edge

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed work is designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:500

Drawing Title

Manston Airport DCO EIA

Figure 7.11 Jct 17 Ramsgate Rd/Poorhole Ln Mitigation proposal- Sheet 2

Client

RSP

Drawing Status

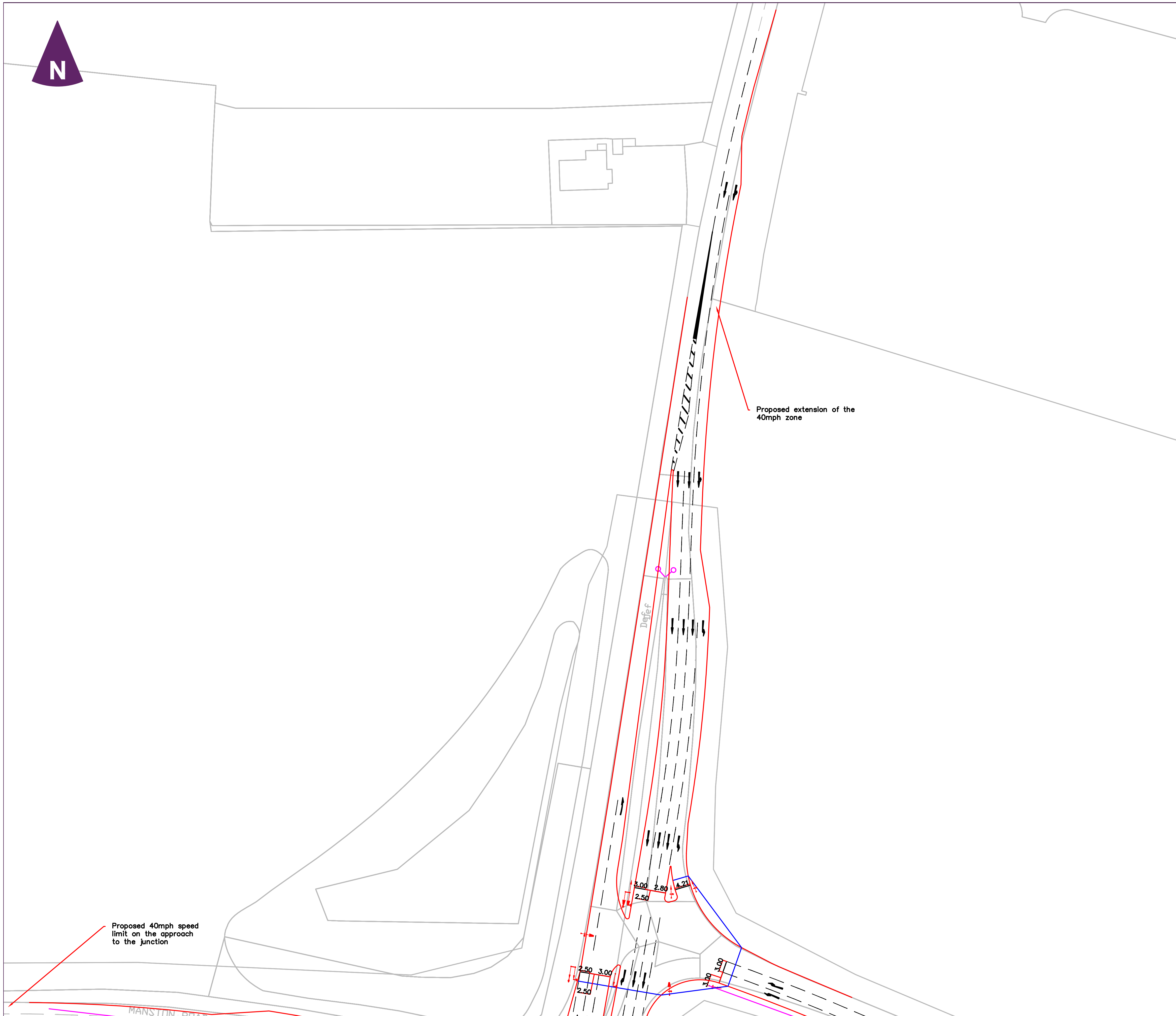
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

Drawing Number: 38199- Lon371

Revision: -



Date of 1st Issue	Description	Drawn by	Checked by
13/02/2018	Revision	FOUDA	MORRC

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed footway edge

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed work is designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:500

Drawing Title

Manston Airport DCO EIA

Figure 7.12 Jct 20 B2050 Manston Rd/A256 Mitigation proposal – Sheet 1

C

RSP

Drawing Status: Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

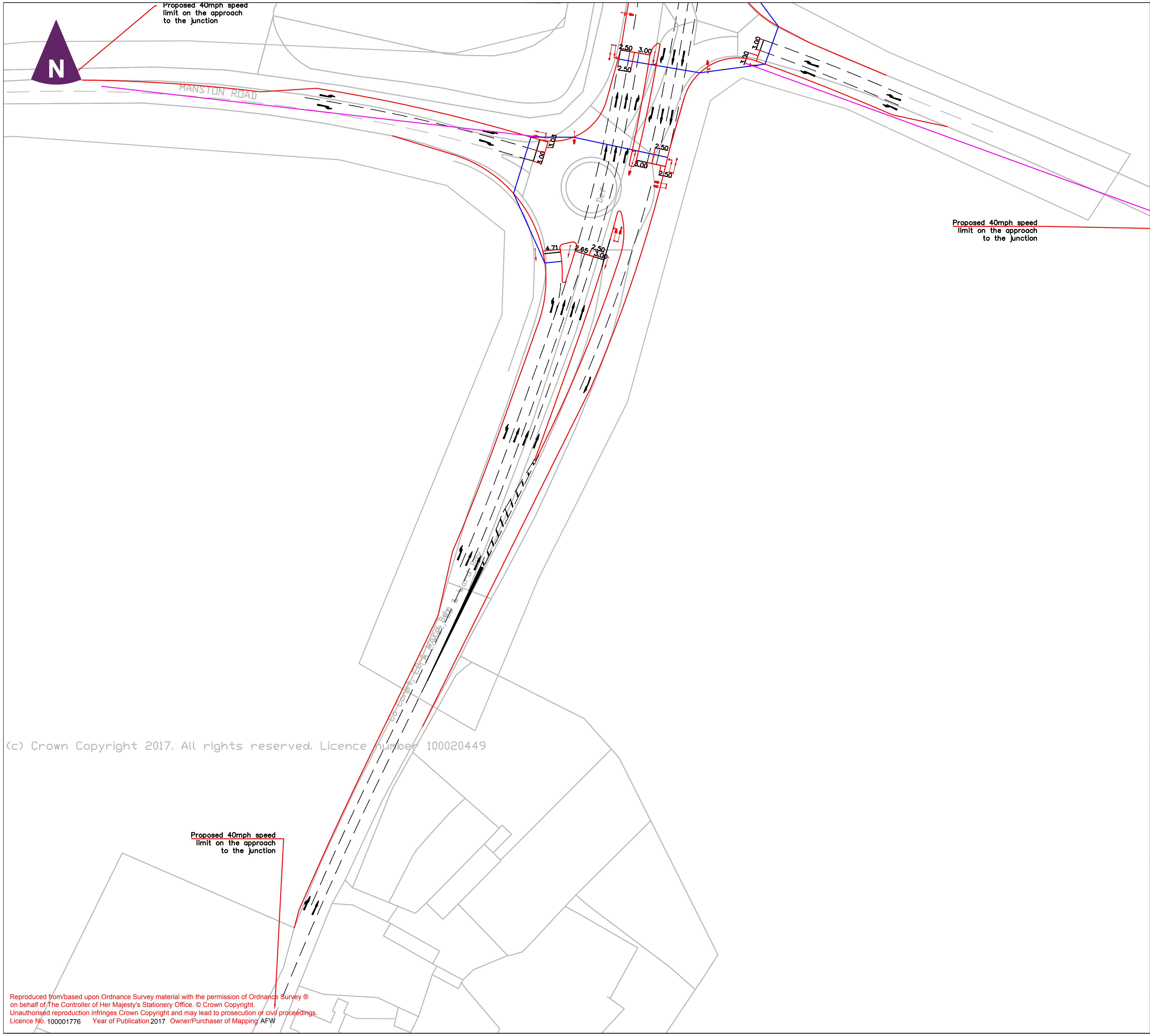
amec foster wheeler

Drawing Number: 38199– Lon371

Revision: –

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199–lon348.dwg



Date of 1st Issue	Description	Drawn by	Checked by
13/02/2018	Revision	FOUDA	MORRC

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed footway edge

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed work is designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:500

Drawing Title
Manston Airport DCO EIA

Figure 7.12 Jct 20 B2050 Manston Road/A256 Mitigation proposal- Sheet 2

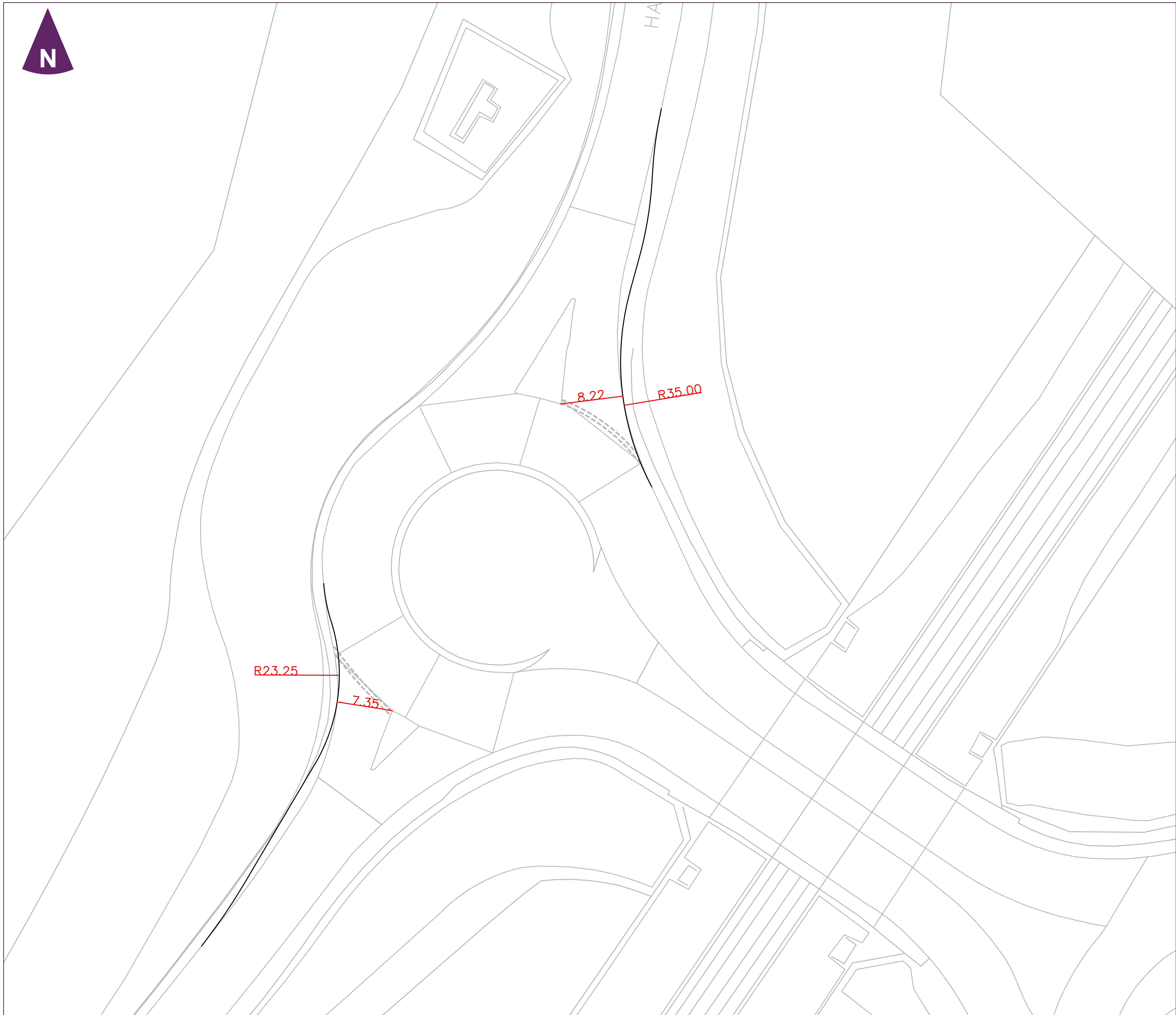
Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

Drawing Number 38199- Lon371
Revision –



Date of 1st Issue	Description	Drawn by	Checked by
06/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE
1:500

Drawing Title
Manston Airport DCO EIA

Figure 7.13 Jct 21A A256/Canterbury Rd
Mitigation proposal

Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

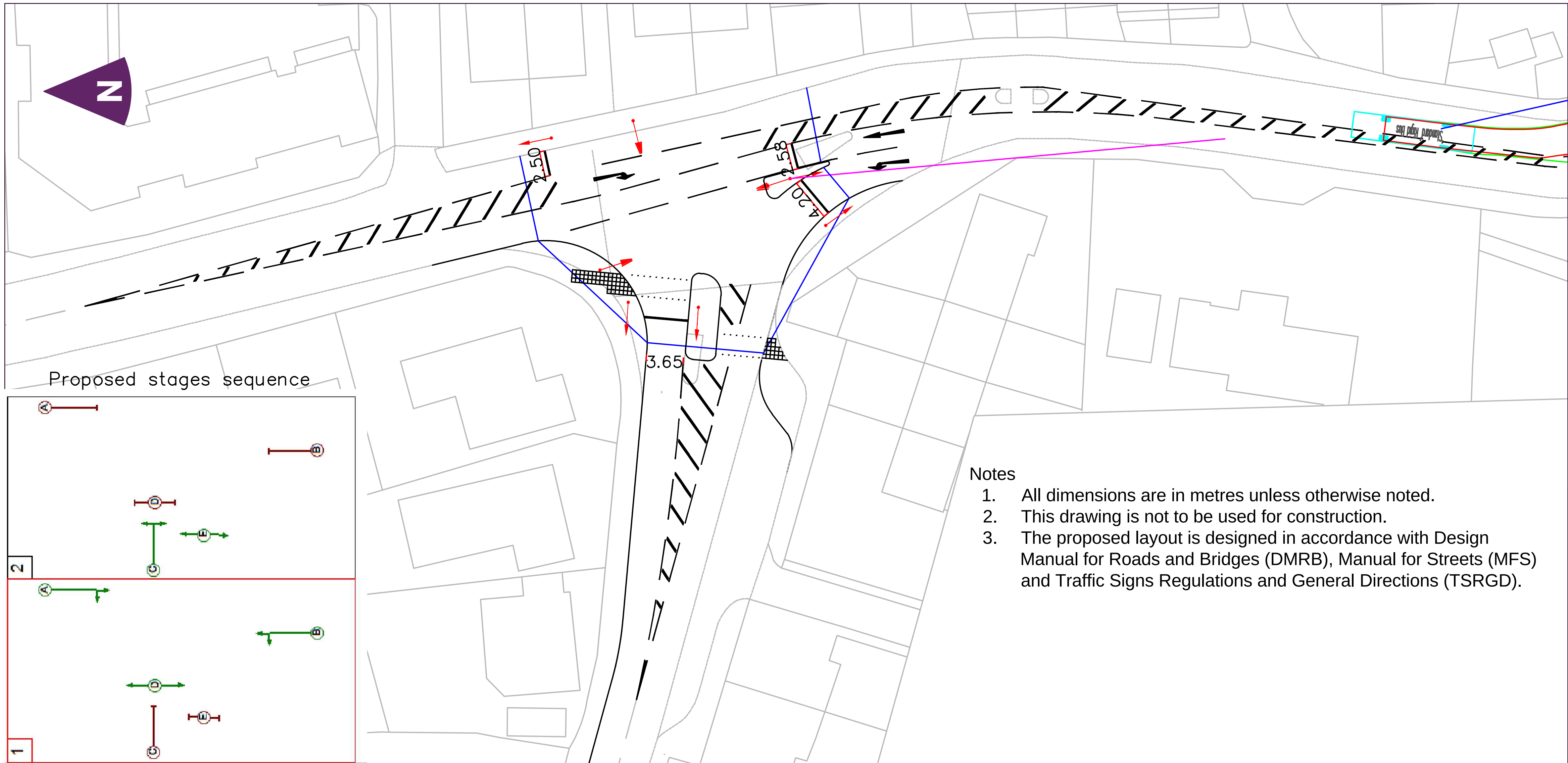
Drawing Number
38199- Lon365

Revision
-

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon365.dwg

Date of 1st Issue	Description	Drawn by	Checked by
02/02/2018	FIRST ISSUE	FOUDA	MORRC

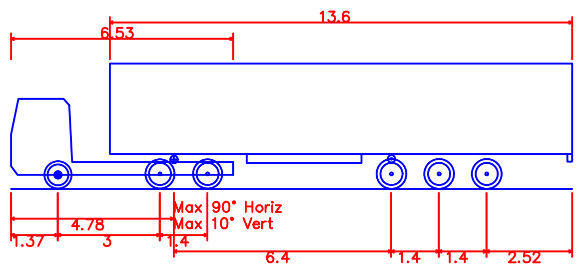


Notes
1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed layout is designed in accordance with Design Manual for Roads and Bridges (DMRB), Manual for Streets (MFS) and Traffic Signs Regulations and General Directions (TSRGD).

Key

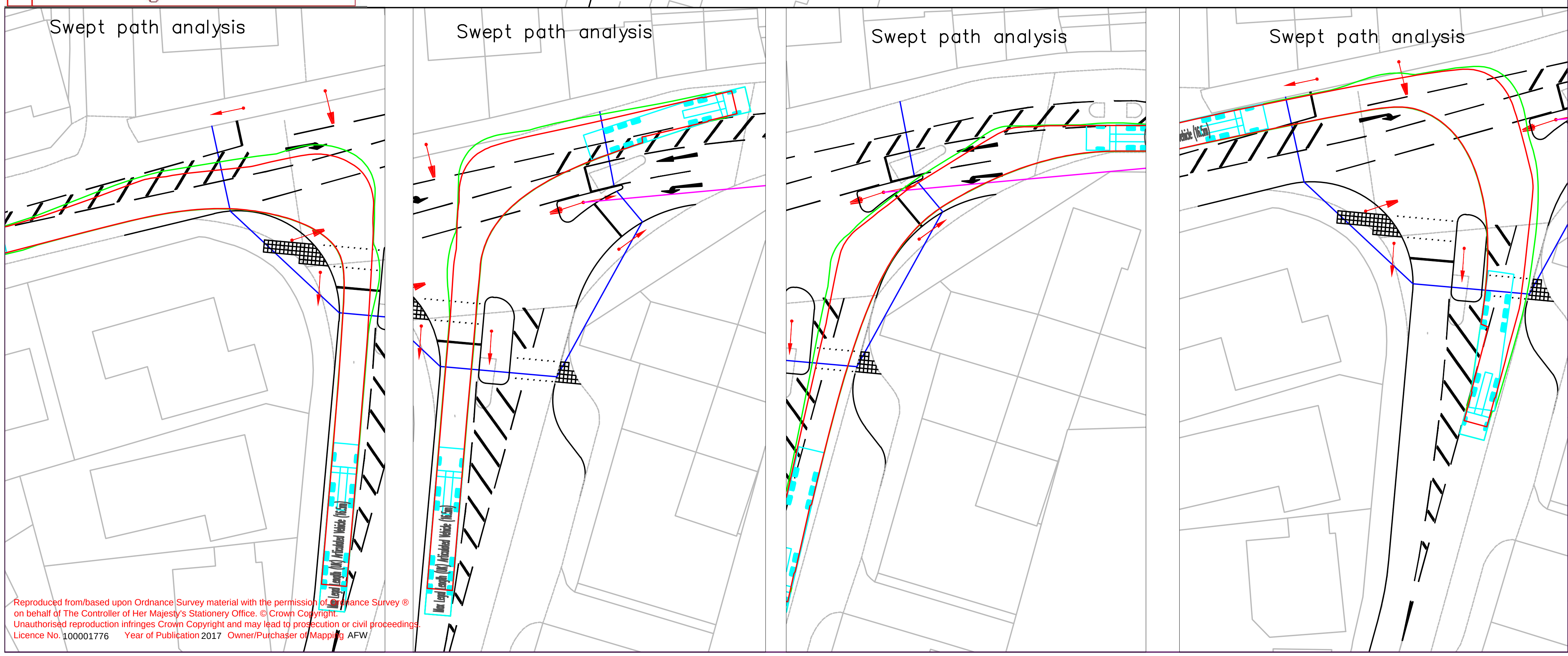
- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed tactile paving surface
- Proposed signal head
- Extent of Junction intervisibility zone
- Stopping sight distance of 43 metres based on 30mph speed following Manual for Streets (MFS) guidance

Swept path vehicle profile



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

Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.681m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	6.530m



A3 SCALE 1:500

Drawing Title
Manston Airport DCO EIA

Figure 7.14 Jct 26 Manston Rd/B2014 Mitigation Proposal

Client
RSP

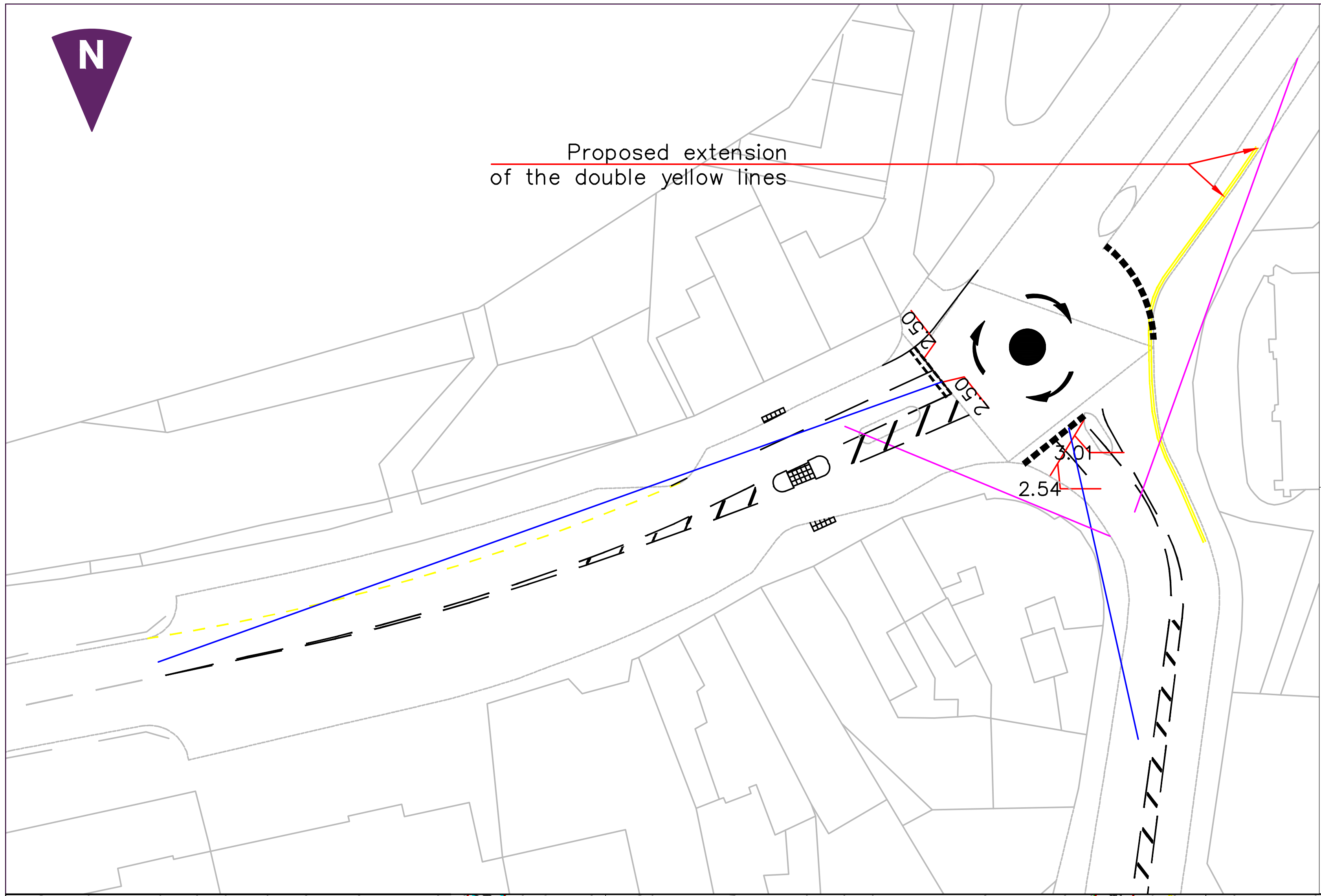
Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

Drawing Number	Revision
38199- Lon349	-

Date of 1st Issue	Description	Drawn by	Checked by
12/02/2018	FIRST ISSUE	FOUDA	MORRC



Key

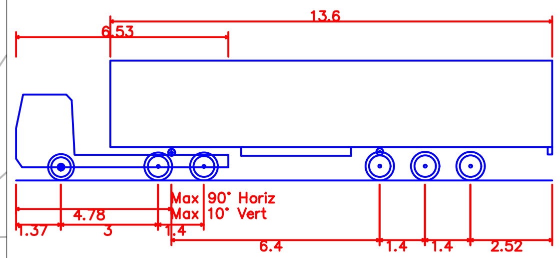
- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed tactile paving surface
- Stopping sight distance
- Visibility to the right

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed layout is designed in accordance with Design Manual for Roads and Bridges (DMRB), Manual for Streets (MFS) and Traffic Signs Regulations and General Directions (TSRGD).

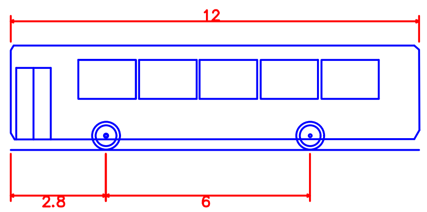
4.The visibility to the right at High Street Western arm is not meeting DMRB standards due to the inherent footprint of the junction. Similarly, the visibility to the right and stopping sight distance at Newington Road are not achieved.

Swept path vehicle profile



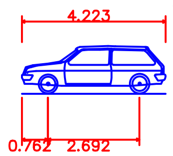
Max Legal Length (UK) Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.681m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	6.530m

Swept Path Vehicle Profile

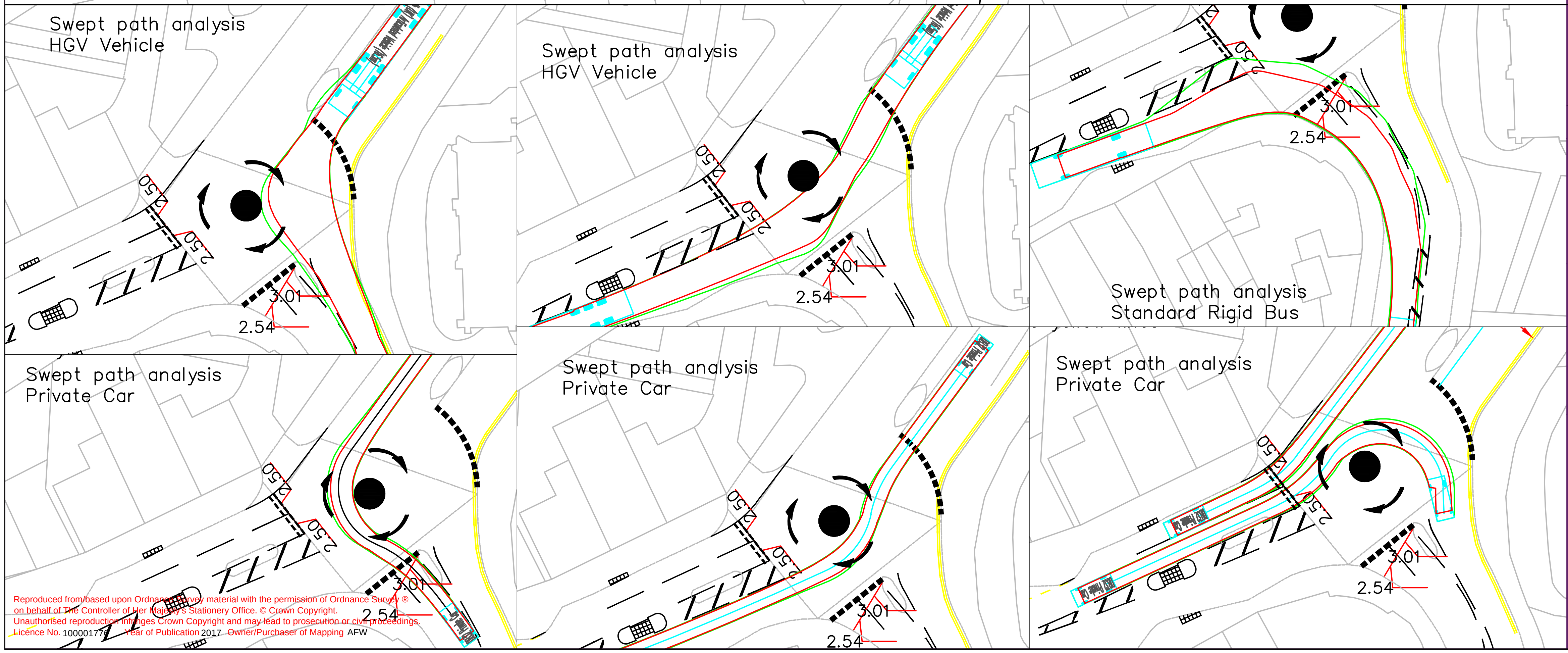


'Standard' Rigid Bus	
Overall Length	12.000m
Overall Width	2.550m
Overall Body Height	3.069m
Min Body Ground Clearance	0.309m
Track Width	2.350m
Lock-to-lock time	4.00s
Wall to Wall Turning Radius	10.771m

Swept Path Vehicle Profile



DB32 Private Car	
Overall Length	4.223m
Overall Width	1.715m
Overall Body Height	1.392m
Min Body Ground Clearance	0.233m
Max Track Width	1.629m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	5.780m



A3 SCALE 1:500

Drawing Title
Manston Airport DCO EIA
Figure 7.15 Jct 27 B2014/A255 Mitigation Proposal

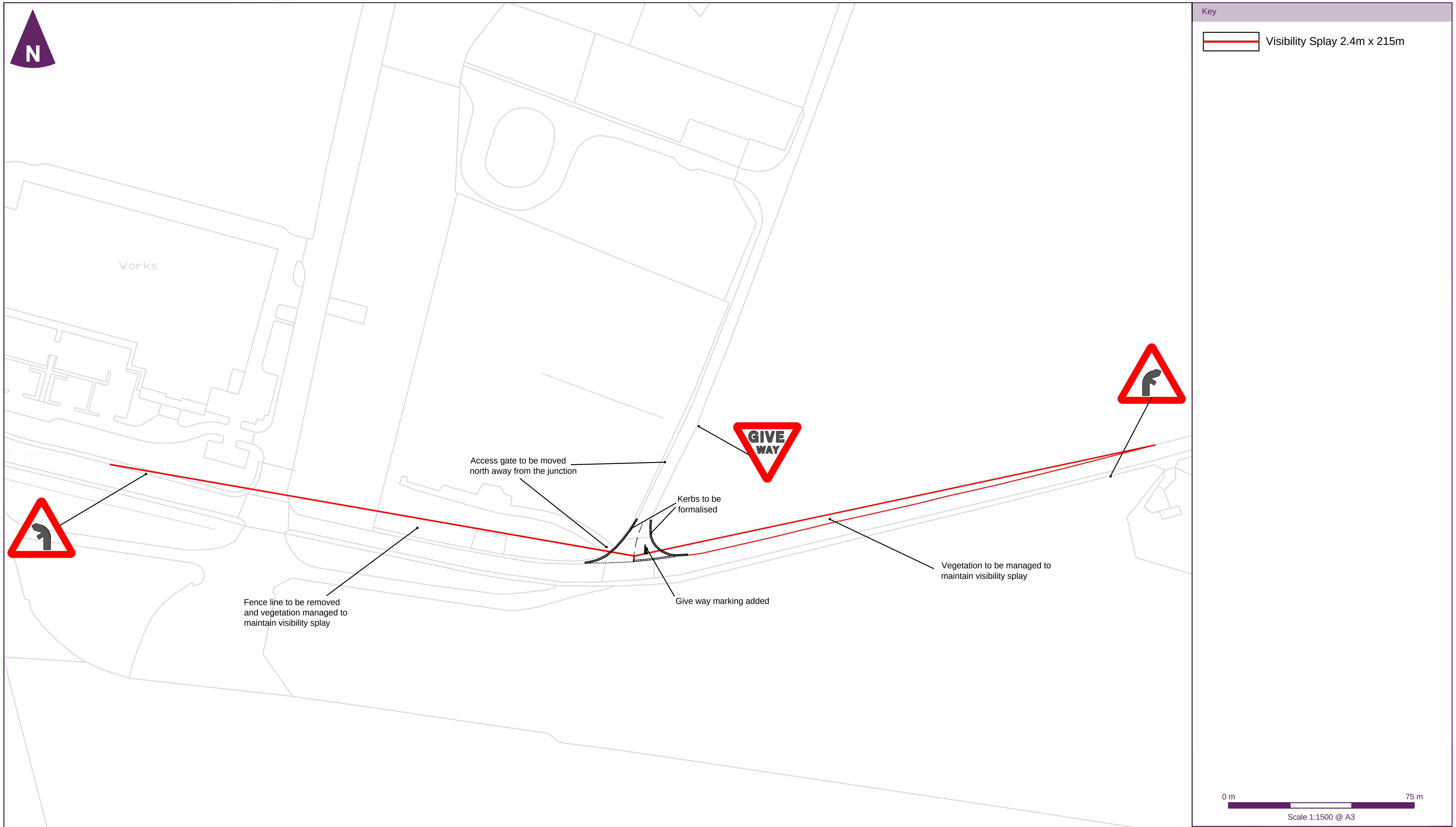
Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

Drawing Number: 38199- Lon370
Revision: -



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Transport Assessment

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Figure 7.16
Alland Grange Road/Spitfire Way mitigation scheme

March 2018

38199-Lon507.dwg guya

8. Highways England Network Impacts

8.1.1 In addition to the local impacts and mitigation required set out in this TA, it was agreed following a meeting with HE that assessment would be required to understand the potential impact of Manston Airport development traffic on the wider strategic HE network, which comprises the following:

- A2 from Dover to the M2 junction 7;
- M2 from the A2 at Junction 7 to the A2 at junction 1;
- A2 from the A282(M25) to junction 1 M2;
- M25; and
- M20.

8.1.2 The HE strategic network in the south east of England as well as the proposed Manston Airport site is set out in **Figure 8.1**.

8.1.3 As set out in the traffic generation and distribution methodology the HE strategic network will be potentially impacted by trips generated by airport users including;

- Staff trips;
- Air Passenger trips;
- Freight trips;
- Northern Grass Area development trips;
- Fuel delivery trips; and
- HGV Servicing Trips.

8.1.4 This section of the TA will set out the wider distribution of airport related traffic southside of the agreed local scope and set out anticipated traffic numbers that will affect the HE network.

8.2 Wider Manston Airport Trip Distribution

8.2.1 The distribution for staff and passenger trips have been calculated from the distribution gravity model developed for the project. Further interrogation of this model above and beyond the local impacts has helped to identify what trips would enter elements of the HE strategic road network.

8.2.2 For staff trips this has resulted in the distribution as set out in **Table 8.1**.

Table 8.1 Staff Trips Distribution

Area	%	Routes from Manston
Shepway	0.5%	A299 – A256 – **A20 – M20**
Ashford	0.1%	A299 – **M2** – A251
Swale	0.0%	A229 – **M2** – A251
Dover	23.6%	A229 – A256

8.2.3 For passenger trips this has resulted in the distribution as set out in **Table 8.2** which sets out the area trips are proposed to route to, the percentage of the total trips and the routes proposed including elements of the strategic Highways network in **bold**. All routes would start from the airport along Manston Road – Spitfire Way – Minster Road and onto the A299

Table 8.2 Passenger Trips Distribution

Area	%	Routes from Manston
London via A2	7.5%	A299 – **M2 – A2**
Shepway	3.6%	A299 – A256 – **A20 – M20**
Ashford	2.9%	A299 – **M2** – A251
Swale	7.6%	A229 – **M2** – A251
Dover	11.8%	A229 – A256
Maidstone	3.2%	A299 – **M2** – A249
Tunbridge	1.6%	A299 – **M2** – A249 – **M20 –** A228
Tonbridge	2.2%	A299 – **M2** – A249 – **M20** – A228
Gravesend	1.7%	A299 – **M2 – A2** – Valley Drive
Dartford	1.9%	A299 – **M2 – A2 – A282** – A255
Sevenoaks	1.9%	A299 – **M2** – A249 – **M20** – **M26 –** A20

8.2.4 For freight and servicing HGV trips, distribution assumptions have been applied based on the applied to likely routing of HGVs from centres where warehousing and other industries would have an operational interest in the Manston airport site which is in keeping with the traffic and transport methodology underpinning this section of the TA. **Table 8.3** and **Table 8.4** set out the freight/northern grass development and servicing percentage distributions.

Table 8.3 Freight/Northern Grass Area HGV Distribution

Area	%	Routes from Manston
East London (South of Thames)	60%	A299 – **M2 – A2**
North and East London (North of Thames)	17.5%	A299 – **M2 – A2 – A282 – M25 (N)**
West and South London	17.5%	A299 – **M2 – A2 - A282 – M25 (S)**
Dover and Folkestone port	2.0%	A299 – A256 – **A20 – M20**
Ashford freight distribution sites	2.0%	A299 – **M2** – A251

Table 8.4 Servicing HGVs Distribution

Area	%	Routes from Manston
East London (South of Thames)	50%	A299 – **M2 – A2**
North and East London (North of Thames)	25%	A299 – **M2 – A2 – A282 – M25 (N)**
West and South London	25%	A299 – **M2 – A2 - A282 – M25 (S)**

8.2.5 Fuel farm trip distribution has been derived from the location of local oil refineries and the likely route to the Manston site from these locations. Two oil refineries have been identified as being suitable with regards to location to supply the Manston site, these are the Coryton oil refinery located in Essex and Isle of Grain refinery located in Kent. An assumption has been made that there will be a 50% split of fuel farm deliveries between the two sites. **Table 8.4** sets out the wider fuel farm traffic distribution.

Table 8.5 Fuel Farm Distribution

Area	%	Routes from Manston
Isle of Grain	50%	A299 – **M2 – A289**
Coryton	50%	A299 – **M2 – A2 – A282** – A13

8.3 Trip Generation

8.3.1 To understand the traffic generation that will potentially affect the HE network the distribution details have been applied to the total development traffic for each development activity. This has been done for four-time periods for the AM peak hour 8:00-9:00, the Airport peak hour 13:00-14:00, the PM peak hour 17:00-18:00 and finally for a 24-hour period. This assessment, in keeping with the rest of the TA, has been calculated for the worst case full operational phase which is year 20, 2039. **Table 8.6** set out the trip generation on the HE network to the various locations.

Table 8.6 Trip Generation – Trips Effecting the Wider Highways England Network

Trip Type	Destination	Route	**AM Peak**		**PM Peak**		**AP Peak**		**24 Hour**	
			Arr	**Deps**	**Arr**	**Deps**	**Arr**	**Deps**	**Arr**	**Deps**
Staff	Shepway	A299–A256–**A20–M20**	0	0	0	0	1	0	5	5
Staff	Ashford	A299–**M2**–A251	0	0	0	0	0	0	1	1
Staff	Swale	A229–**M2**–A251	0	0	0	0	0	0	0	0
Staff	Dover	A229–A256	17	17	0	17	63	0	263	263
Passenger	London via A2	A299–**M2–A2**	6	8	2	1	15	14	162	162
Passenger	Shepway	A299–A256–A**20– M20**	3	4	1	1	7	7	77	77
Passenger	Ashford	A299–**M2**–A251	2	3	1	1	6	6	62	62
Passenger	Swale	A229–**M2**–A251	6	8	2	1	15	15	164	164
Passenger	Dover	A229–A256	9	13	3	2	24	23	256	255
Passenger	Maidstone	A299–**M2**–A249	2	3	1	1	6	6	70	70
Passenger	Tunbridge	A299–**M2**–A249–**M20–**A228	1	2	0	0	3	3	34	34
Passenger	Tonbridge	A299–**M2**–A249–**M20–**A228	2	2	1	0	4	4	47	47

Trip Type	Destination	Route	AM Peak		PM Peak		AP Peak		24 Hour	
			Arr	**Deps**	**Arr**	**Deps**	**Arr**	**Deps**	**Arr**	**Deps**
Passenger	Gravesend	A299–**M2–A2**–Valley Drive	1	2	0	0	3	3	36	36
Passenger	Dartford	A299–**M2–A2–A282**–A255	1	2	0	0	4	4	40	40
Passenger	Sevenoaks	A299–**M2**–A249–**M20–M26**–A20	1	2	0	0	4	4	42	42
Freight / Northern Grass	East London (South of Thames)	A299–**M2–A2**	6	7	7	9	10	7	148	146
Freight / Northern Grass	North and East London (North of Thames)	A299–**M2–A2–A282-M25 (N)**	2	2	2	3	3	2	43	43
Freight / Northern Grass	West and South London	A299–**M2–A2–A282-M25 (S)**	2	2	2	3	3	2	43	43
Freight / Northern Grass	Dover and Folkestone port	A299–A256–**A20–M20**	0	0	0	0	0	0	2	2
Freight / Northern Grass	Ashford freight distribution sites	A299–**M2**–A251	0	0	0	0	0	0	2	2
Fuel	Isle of Grain	A299 – **M2 – A289**	1	1	1	1	1	1	11	11
Fuel	Coryton	A299–**M2–A2–A282**–A13	1	1	1	1	1	1	11	11
Servicing	East London (South of Thames)	A299–**M2–A2**	2	2	2	2	2	2	42	42
Servicing	North and East London (North of Thames)	A299–**M2–A2–A282–M25 (N)**	1	1	1	1	1	1	21	21
Servicing	West and South London	A299–**M2–A2-A282–M25 (S)**	1	1	1	1	1	1	21	21

8.3.2 A spreadsheet model was created to distribute the traffic across the HE network, including;

- A2 from Dover to the M2 junction 7;
- M2 from the A2 at Junction 7 to the A2 at junction 1;
- A2 from the A282(M25) to junction 1 M2;
- M25;
- M20;
- A229; and
- A256.

8.3.3 **Figures 8.1** to **8.4** set out the AM, PM, AP and 24-hour development traffic flows across this network model for the 2039 worst case development traffic.

8.4 Highways England Network Assessment Points

8.4.1 To understand impacts on the HE network a series of assessment points were requited across the various roads. The following locations were selected

- A2 – Between the Henshurt Road/Hever Court Road/Valley Drive junction and A227 Junction;
- A20 – North of Junction 13 of the M20;
- M2 – Between Junctions 5 and 6;
- A2 – West of the M25;
- A282 – North of the A2;
- M25 – South of the A2;
- M2 – West of the A2/A299; and
- M20 – Between junctions 6 and 7.

8.4.2 Traffic data for these links has been derived from the DfT traffic count website, which is available as Annual Average Daily Flow (AADF) which is for the 24-hour period in 2016 (last full year of data collection). The baseline traffic for these locations is set out in **Table 8.7**.

Table 8.7 2017 Baseline Traffic at Highways England Assessment Locations

Location	2016 Baseline Total Vehicles	2016 Baseline HGVs
A2 – Between the Henshurt Road/Hever Court Road/Valley Drive junction and A227 Junction;	144826	11279
A20 – North of Junction 13 of the M20;	40593	5401
M2 – Between Junctions 5 and 6;	62028	5014
A2 – West of the M25;	103307	4699
A282 – North of the A2;	131949	20751
M25 – South of the A2;	141726	16062
M2 – West of the A2/A299; and	59975	5411
M20 – Between junctions 6 and 7.	117034	12600

8.5 Future Year Assessment

8.5.1 To understand the future year assessment in year 20 the Highways England 2016 baseline traffic would need to be growthed. The following growth rates have been used

- Total Vehicles – 1.2726; and
- HGVs - 1.337

8.5.2 **Table 8.8** sets out the Base, Future 2039 and Future 2039 plus development traffic at the three count locations.

Table 8.8 Future 2039 and Future 2039 plus Development Two Way Flows

Location	2039 Baseline		2039 Baseline + Proposed Development Traffic		Percentage Impact	
Road section	Total Veh	HGVs	Total Veh	HGVs	Total Veh	HGVs
A2 – between Henshurt Road/Hever Court Road/Valley Drive and A227	184,306	15,080	185,366	15,736	0.6%	4.3%
A20 – North of Junction 13 of the M20	51,659	7,221	51,822	7,221	0.3%	0.0%
M2 – Between Junctions 5 and 6	78,937	6,704	80,477	7,381	2.0%	10.1%
A2 – West of the M25	131,468	6,283	132,171	6,661	0.5%	6.0%
A282 – North of the A2	167,918	27,744	168,148	27,893	0.1%	0.5%
M25 – South of the A2	180,361	21,475	180,489	21,603	0.1%	0.6%
M2 – West of the A2/A299	76,324	7,235	78,323	7,916	2.6%	9.4%
M20 – Between junctions 6 and 7	148,937	16,846	149,021	16,846	0.1%	0.0%

8.5.3 The table shows that the worst increase is 2.6% (M2 – West of the A2/A299), which is not considered to be a significant impact.

8.5.4 For HGVs there is an impact of 10.1% on the M2 (Between junctions 5 and 6) which is also not considered to be a significant impact.

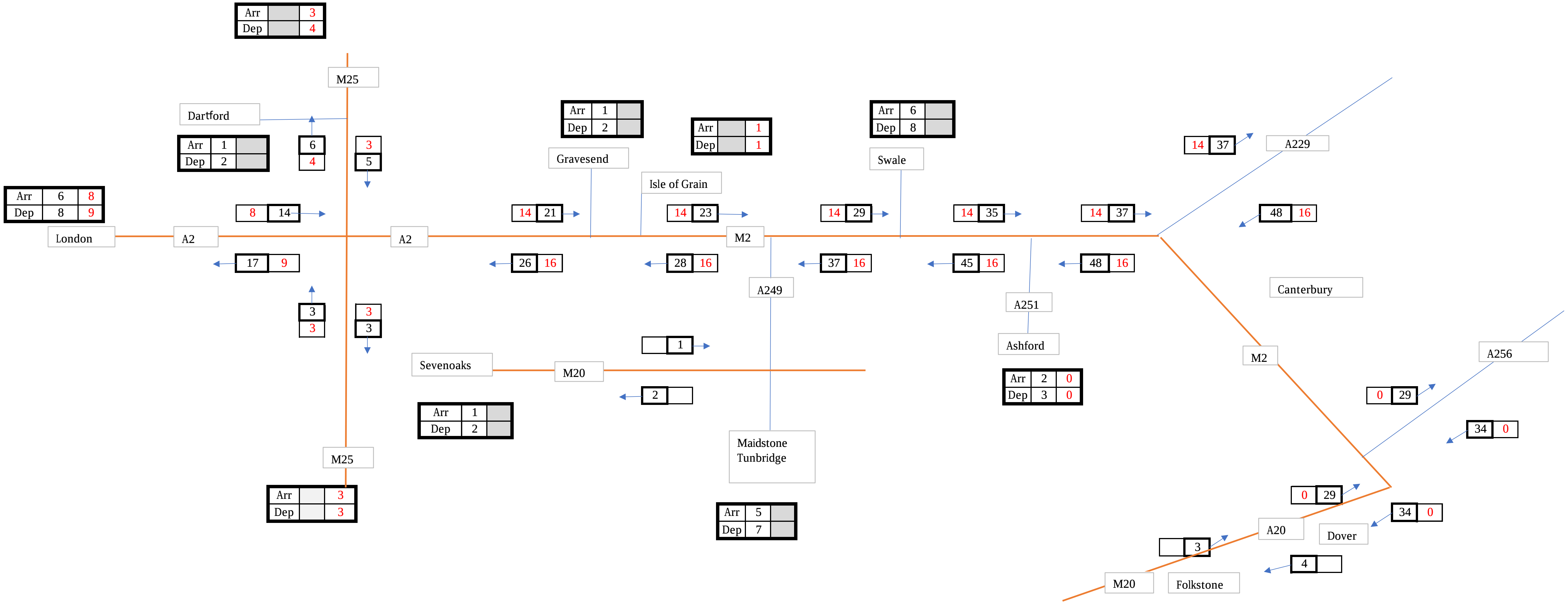

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Figure 8.1
Highways England Network Traffic Impacts - AM Peak

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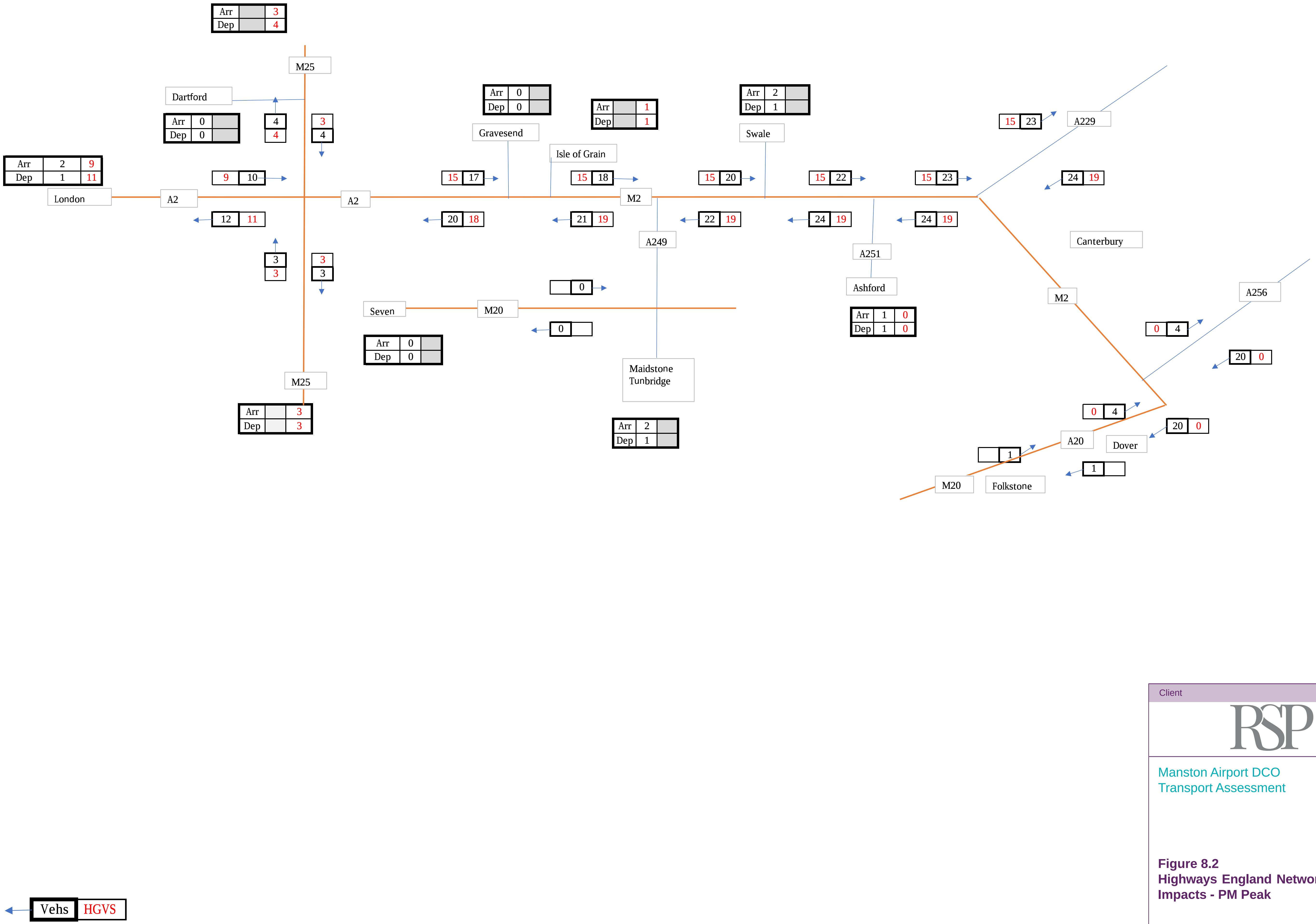

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Figure 8.2
Highways England Network Traffic Impacts - PM Peak

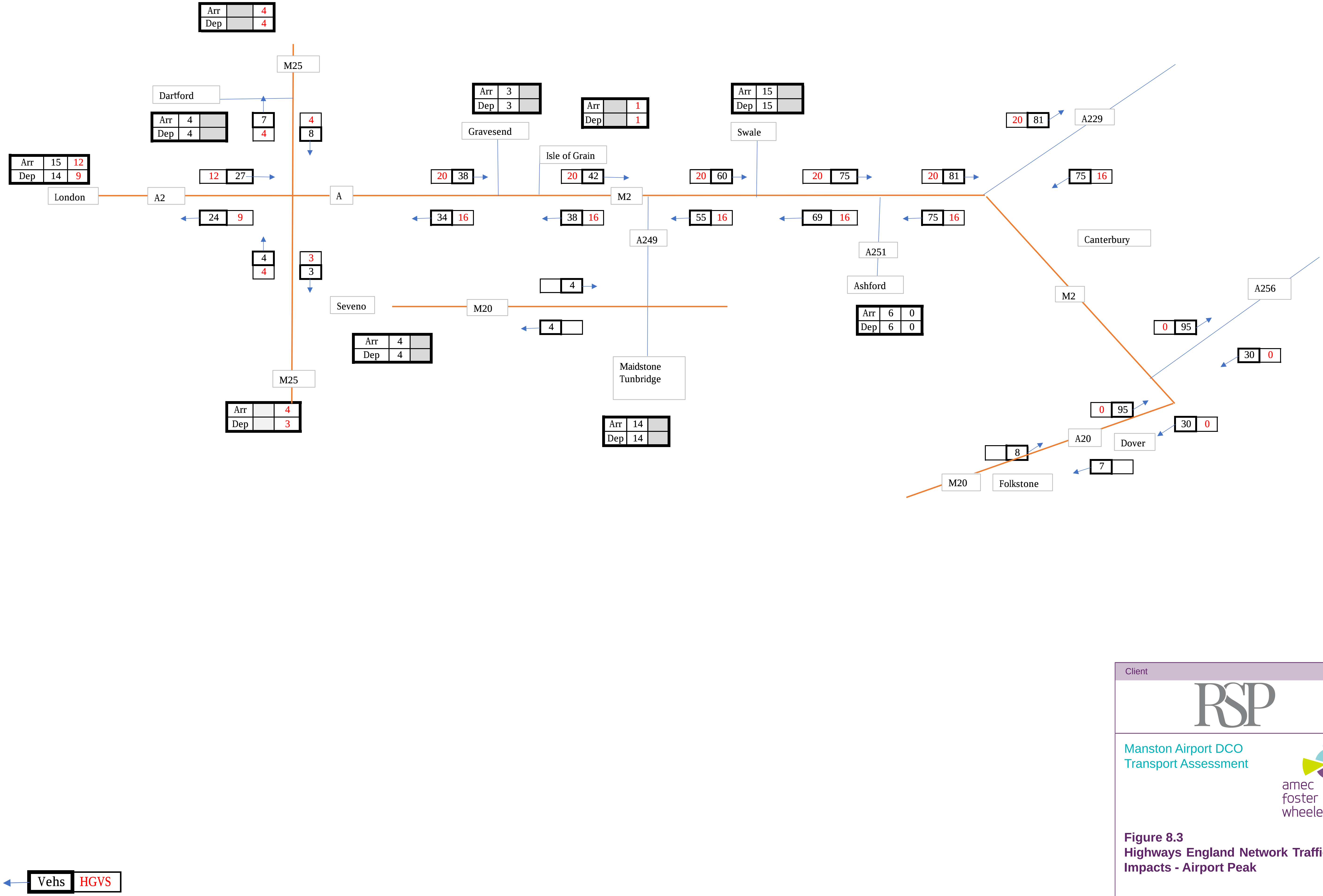

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Figure 8.3
Highways England Network Traffic Impacts - Airport Peak

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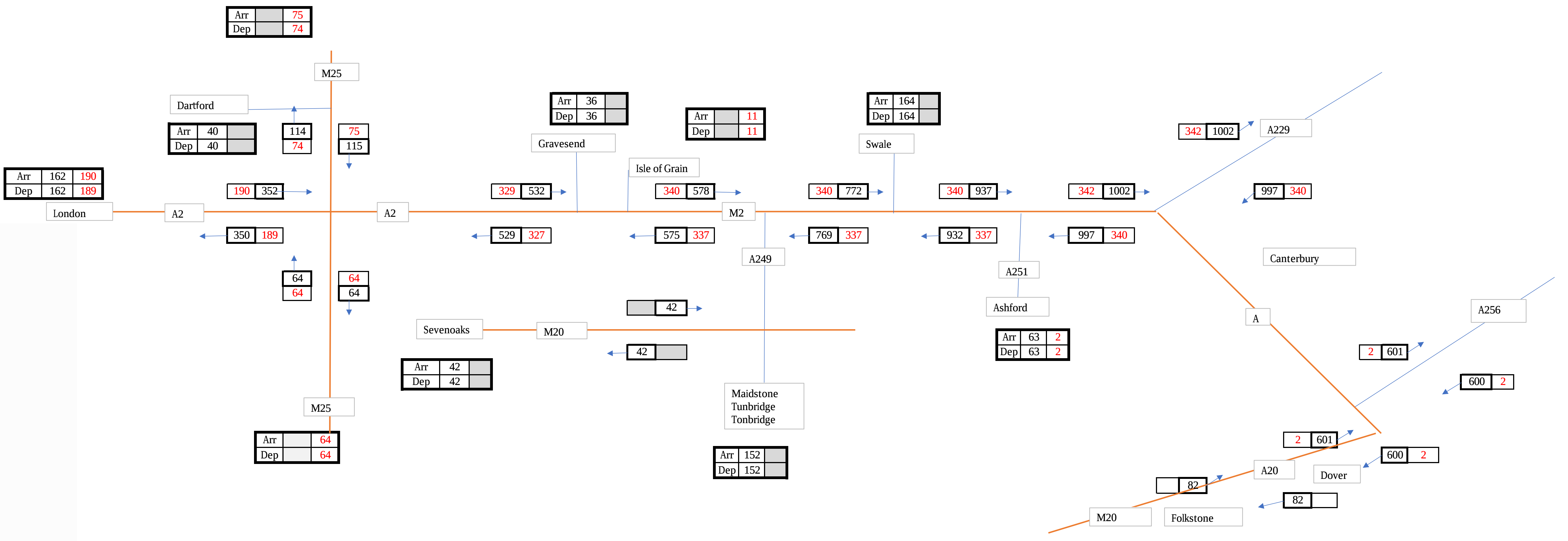

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Figure 8.4
Highways England Network Traffic Impacts - 24 hour

9. Onsite Infrastructure Improvements

9.1 Introduction

9.1.1 Following on from the assessment of the offsite junctions there are also proposals to improve links and junctions on the local network around the site within the site boundary of the site.

9.1.2 One of these onsite accesses has been considered in Section 7 (Manston Road/Spitfire Way) but there are numerous other onsite elements to be considered;

- Spitfire Way/Cargo Access (Site Access 1);
- Manston Road/Northern Grass Area West Access (Site Access 2);
- B2050 Manston Road/Northern Grass Area South Access (Site Access 3);
- B2050 Manston Road/Passenger Terminal Access (Site Access 4);
- Canterbury Road East/Fuel Farm Access (Site Access 5);
- Infrastructure Improvements to Spitfire Way;
- Infrastructure Improvements to B5025 Manston Road; and
- Associated pedestrian improvements.

9.1.3 This section sets out the details of the proposed improvements which are included within the masterplan and where appropriate the results of detailed junction modelling.

9.2 Onsite Junction Assessment – Site Accesses

9.2.1 As shown in the masterplan, the following access points are proposed:

- Cargo Facility Access – New Access onto Spitfire Way;
- Northern Grass Area (West Access) – New Access onto Manston Road;
- Northern Grass Area (South Access) – New Access onto B5025 (Manston Road);
- Passenger Terminal Access – Existing Access Improved onto B5025 (Manston Road); and
- Fuel Farm Access – Existing Access to Canterbury Road West

9.2.2 The accesses have been designed in accordance with the national design standards set out in DMRB and have been based on junction modelling to ensure that the design has capacity to accommodate the full development and future traffic flows. The following sets out the details of the proposed accesses. Details of the proposed site accesses are set out as follows;

- Cargo Facility Access with Spitfire Way
  - The Cargo Facility, ATC tower, security and other ancillary parts of the airport and associated vehicle parking for HGVs and staff will be served by one access which will be a new junction off Spitfire Way. This is proposed to be a three-arm roundabout;
  - The proposed scheme is a new offset three arm roundabout to the south of the Spitfire Way. The scheme design for this junction is set out in **Figure 9.1**.
- Northern Grass Area Western Access with Manston Road
  - The Western access to the Northern Grass area will be from Manston Road which is proposed to access the western elements of the Northern grass area and will be provided with a link through to the Southern Northern Grass Area access;

    - The junction is proposed to a three-arm ghost right turn priority junction with informal pedestrian crossing facilities. The scheme design for this junction is set out in **Figure 9.2.**
- Northern Grass Areas Southern Access with Manston Road
    - The Southern access to the Northern Grass area will be from the B2050 Manston Road which is proposed to access the southern elements of the Northern Grass Area and will provided with a link though to the Western Northern Grass Area Access;
    - The junction is proposed to be a new signalised junction linked with the adjacent access (passenger terminal access) to the east;
    - The junction has been designed to incorporate pedestrian crossing facilities across the access arm and across Manston Road. The scheme design for this junction is set out in **Figure 9.3**.
- Passenger Terminal Access with Manston Road
    - The Passenger Terminal and associated car parking for passengers and staff will be served by one access, which is in the same location as the existing access to the former terminal building and car park.
    - The junction will be upgraded to a fully signalised junction, linked with a second new junction to the west (‘Northern Grass’ area Southern Access);
    - The junction has been designed to incorporate pedestrian crossing facilities across the Airport access arm and across Manston Road. The scheme design for this junction is set out in **Figure 9.4**.
- Fuel Farm Access
    - The existing access to the fuel farm off Canterbury Road West is not proposed to be amended, since it is an established access to the facility that has been designed to accommodate large tankers.

9.2.3 The site accesses have been assessed in the 2039 future year plus development traffic scenario to highlight that these scheme designs are appropriate and will be able to operate with acceptable queueing and delay. The detailed model outputs fort the results set out below are presented in **Appendix H.**

9.2.4 **Figure 9.5** sets out the locations of the 5 access junctions.

Site access 1 – cargo access

9.2.5 Based on the anticipated traffic flows along Spitfire Way and the proposed traffic into and out of the Cargo Access and with respect with the with the land available in the proposed access location a roundabout junction has been proposed. The proposed scheme design is provided as 38199-Lon137A. The results of the modelling are shown in **Table 9.1**.

Table 9.1 Site Access 1 - Cargo Access – 2039 Baseline + Development - Junction Capacity Results.t

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Arm 1 – Spitfire Way (E)	1	0.43	1	0.44	1	0.43
Arm 2 – Airport Access	0	0.01	0	0.01	1	0.34
Arm 1 – Spitfire Way (W)	1	0.32	1	0.32	1	0.38

9.2.6 The cargo access is shown to operate with minimal queues or delays in the 2039 + development scenario and as such is proposed as the form of junction to serve the Airport at this location.

Site access 2 – western access to Northern Grass Area

9.2.7 For access from Manston Road into the Northern Grass Area to the west a priority junction has been proposed the scheme drawing is provided as Figure 9.2. The results of the modelling are shown in **Table 9.2.**

Table 9.2 Site Access 2 - 2039 Baseline + Development - Junction Capacity Results.

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Arm 1 – Manston Road (NE)	0	0.06	0	0.28	0	0.09
Arm 2 – Airport Access	0	0.01	0	0.07	0	0.02
Arm 1 – Manston Road (SW)	1	0.35	0	0.06	0	0.16

9.2.8 This airport access is shown to operate with minimal queues or delays in the future year scenario and as such is proposed as the form of junction to serve the Airport at this location.

Site access 3 & 4 – southern access to Northern Grass Area and access to passenger terminal

9.2.9 The access to the proposed passenger terminal and the southern access to the Northern Grass Area are adjacent to each other and as such a linked signalised junction layout is proposed. The proposed scheme design is provided on drawing number 39082-Lea142B and the modelling results are set out in **Table 9.3.**

Table 9.3 Site Access 2 & 3 - 2039 Baseline Proposed Development Junction Capacity Results

		AM Peak		**PM Peak**		**Airport Peak**	
		MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Junction 3	Manston Road (EB)	18	68.4%	19	69.4%	20	71.1%
	Northern Access	1	7.7%	5	37.1%	2	14.8%
	Manston Road (W/B)	2	49.6%	2	38.5%	1	38.3%
Junction 4	Manston Road (EB)	0	53.3%	0	67.3%	3	71.3%
	Southern Access	0	0.6%	3	37.6%	1	7.7%
	Manston Road (W/B)	34	95.4%	8	68.2%	10	79.9%

9.2.10 The combined signalled junction is shown to operate with minimal internal queues and the queues that do develop on the external approach arms are noted to discharge every cycle. It is therefore considered that the junction can be considered of sufficient capacity to serve the Airport traffic demand.

9.3 Other Improvements to the Local Highways Network

9.3.1 In addition to the “offsite” and “onsite” junction mitigation and the proposed access designs there are other improvements to the local highways network proposed to allow for safe and convenient access

Road widening

9.3.2 A key aspect of the proposals for improvements to the local highway network is the proposal included on the development masterplan to widen two local roads as follows;

- Spitfire Way – Between Columbus Avenue and B2050 Manston Road; and
- B2050 Manston Road – Between Spitfire Way and the Passenger Terminal Access junction;

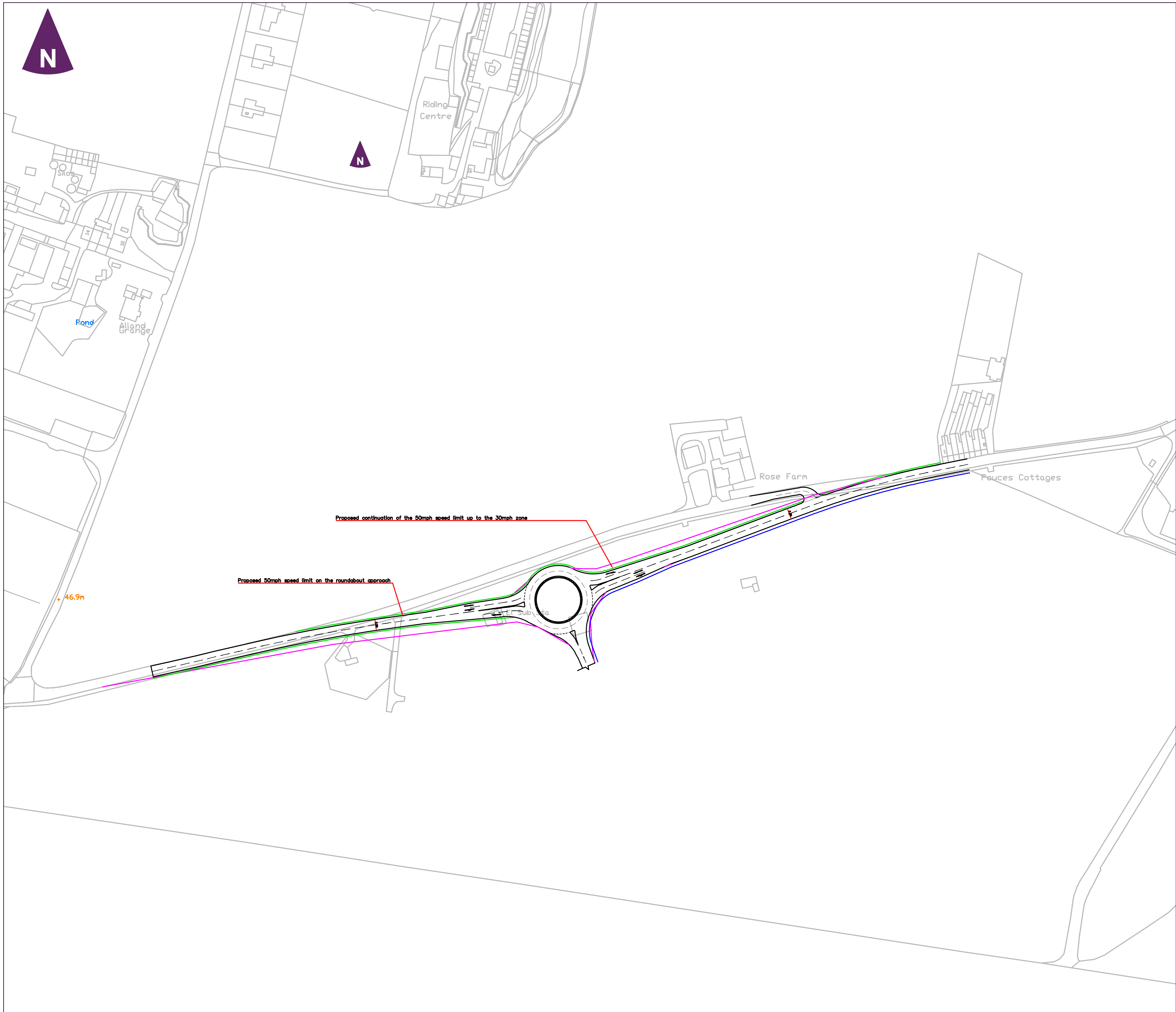
9.3.3 It is proposed to widen both carriageways to a standard 7.3m width which predominantly focused on providing a more appropriate route for the increased numbers of total vehicles and particularly the HGVs.

9.3.4 The surface of the entire route from the Columbus avenue to the airport terminal access will be replayed and if necessary reinforced for the conveyance of regular HGV flow.

Pedestrian infrastructure improvements

9.3.5 With the widening of Manston Road and Spitfire Way between the Cargo Access and the Passenger Terminal it is also proposed to provide a pedestrian footway along these roads. Currently there are no footpaths on these sections of road and as such this is a significant pedestrian safety improvement. This will allow walking access between the major accesses of the site and link into new safe signalised crossing points at the various proposed signalised junctions on Manston Road.

9.3.6 The Proposals are for a 2m wide footway consistently along the links adjacent to the carriageway.



Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

REVISIONS

Mark	Revision	Drawn	Date	Chkd

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE 1:500

Drawing Title

Manston Airport DCO EIA

Figure 9.1 Proposed cargo facility access design

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

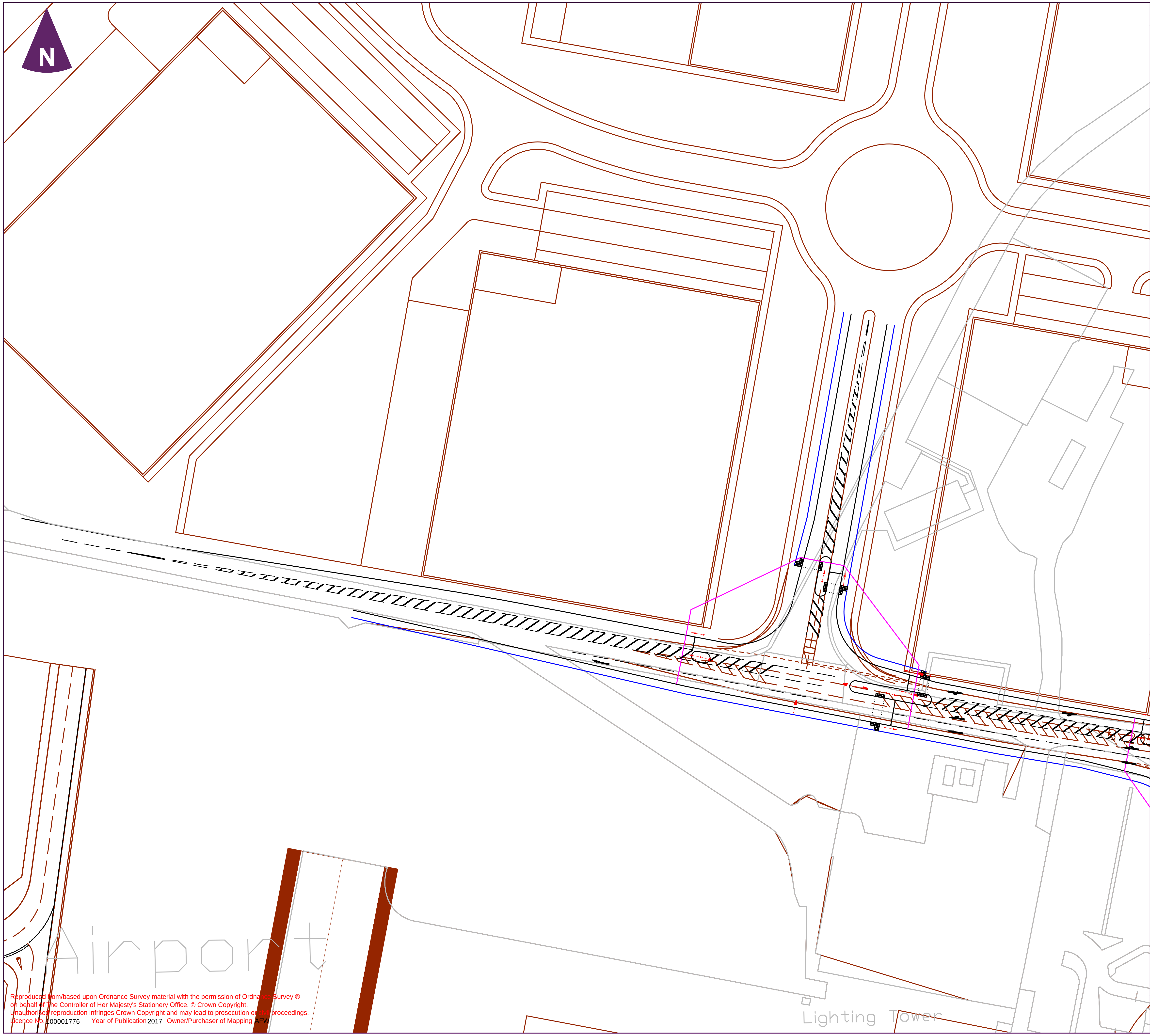
amec foster wheeler

Drawing Number: 38199- Lon338

Revision: –

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon137b.dwg



Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Proposed masterplan
- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed tactile paving surface
- Proposed primary signal head
- Proposed secondary signal head
- Proposed signal head with additional green arrow signal
- Proposed signal head with substitute green arrow
- Junction intervisibility boundary
- Proposed footway edge
- Extent of visibility requirements

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).
4. Junctions' intervisibility zones need to be kept clear from obstructions to maintain visibility.

A3 SCALE 1:1000

Drawing Title

Manston Airport DCO EIA

Figure 9.2 Northern grass south access priority junction design

Client

RSP

Drawing Status

Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

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Drawing Number: 38199- Lon142

Revision: -

user name: guy, adam

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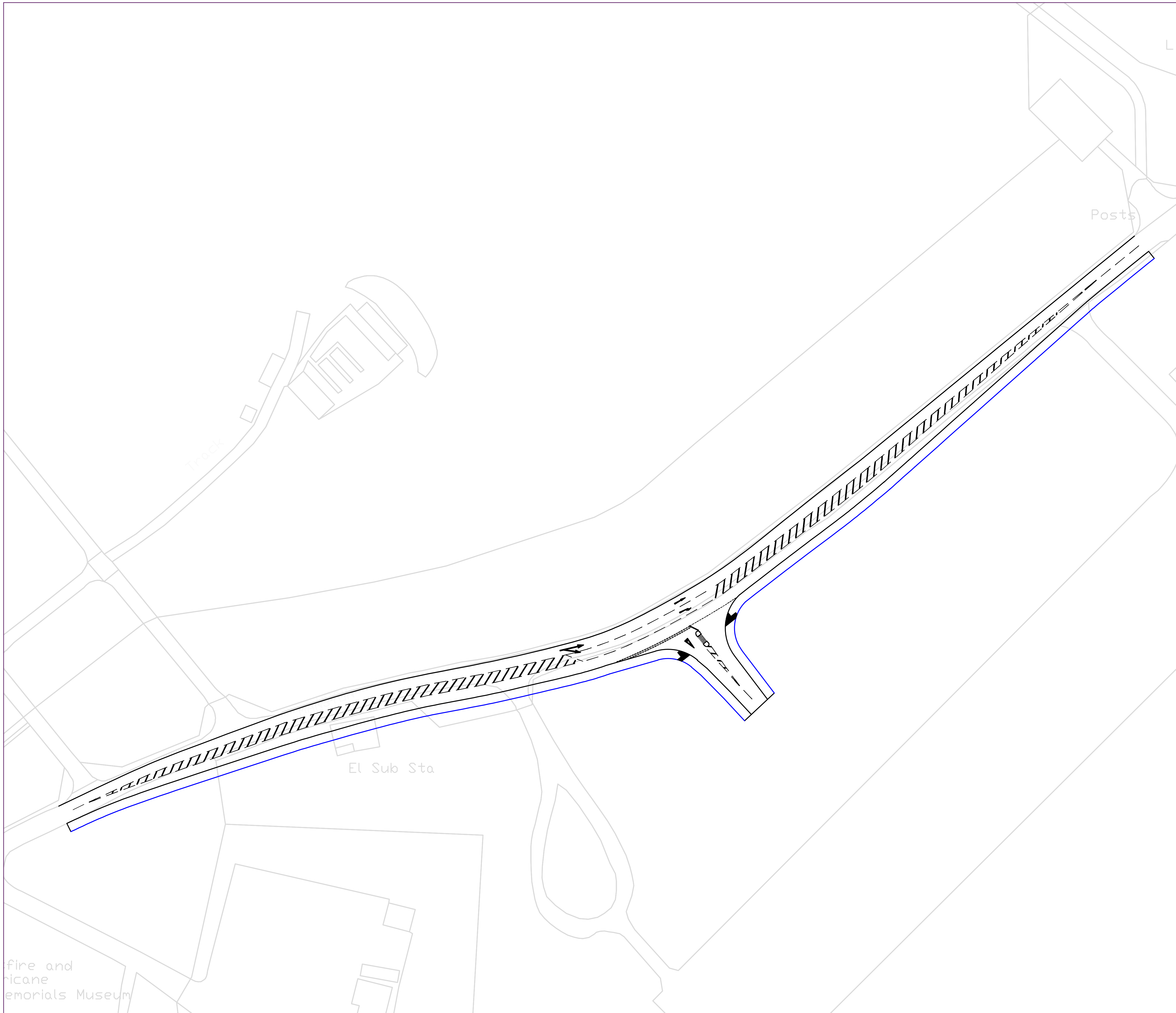


Date of 1st Issue	Description	Drawn by	Checked by
13/02/2018	FIRST ISSUE	YADAP	PRICG

Key

- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed footway edge

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed work is designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).

A3 SCALE
1:1250

Drawing Title
Manston Airport DCO EIA

Figure 9.3 Northern grass area priority junction design

Client
RSP

Drawing Status
Preliminary Design

LEAMINGTON SPA
GABLES HOUSE, KENILWORTH
ROAD, LEAMINGTON SPA,
WARWICKSHIRE CV32 6JX
01926 439000

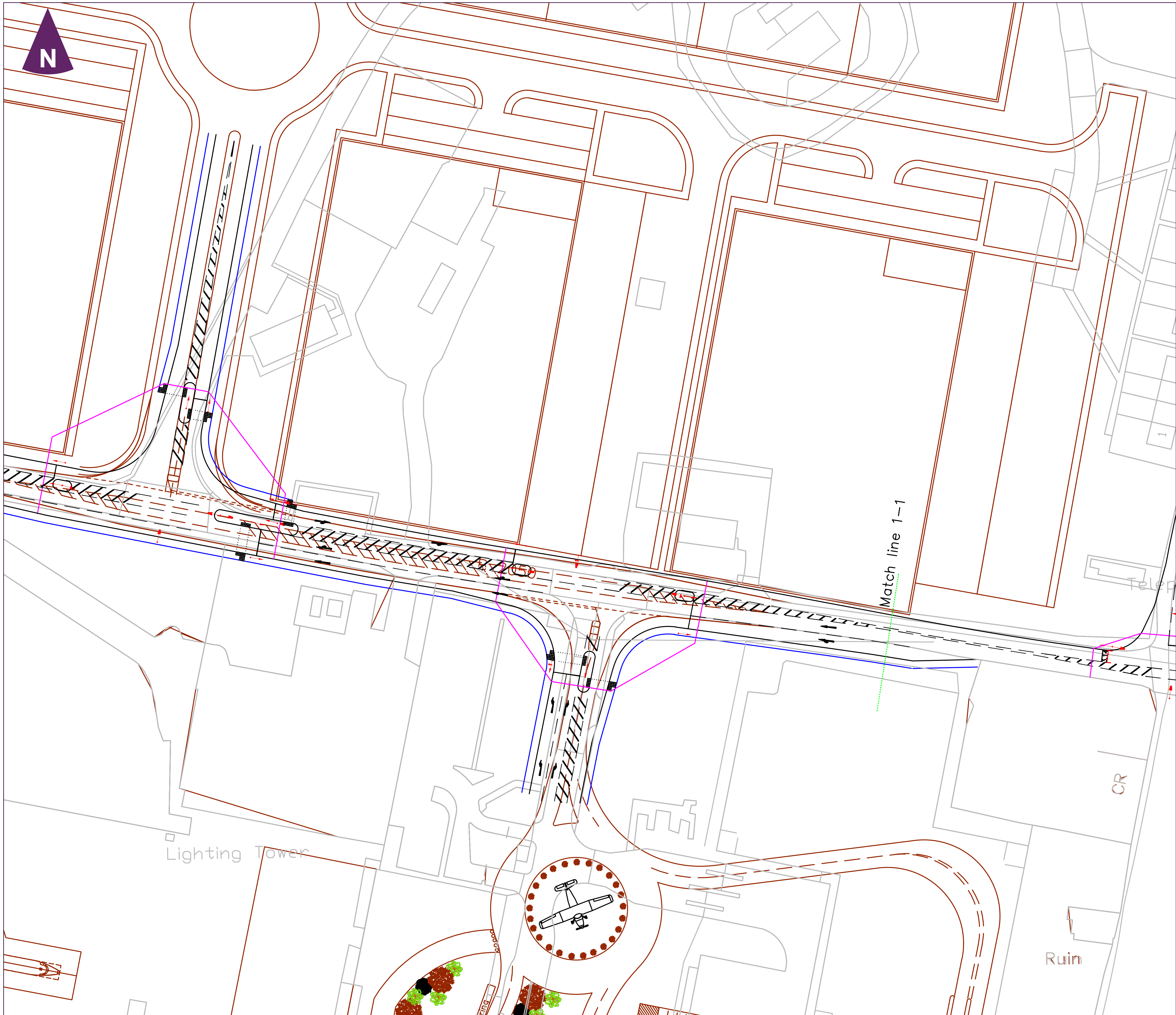
amec foster wheeler

Drawing Number
38199- Lon371

Revision
–

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199-lon141.dwg



Date of 1st Issue	Description	Drawn by	Checked by
05/02/2018	FIRST ISSUE	HUDAF	FOUDA

Key

- Proposed masterplan
- Existing based on Ordnance Survey map
- Proposed kerbline
- Proposed road marking
- Proposed tactile paving surface
- Proposed primary signal head
- Proposed secondary signal head
- Proposed signal head with additional green arrow signal
- Proposed signal head with substitute green arrow
- Junction intervisibility boundary
- Proposed footway edge
- Extent of visibility requirements

Notes

1. All dimensions are in metres unless otherwise noted.
2. This drawing is not to be used for construction.
3. The proposed roads are designed in accordance with Design Manual for Roads and Bridges (DMRB) and Traffic Signs Regulations and General Directions (TSRGD).
4. Junctions' intervisibility zones need to be kept clear from obstructions to maintain visibility.

A3 SCALE 1:1000

Drawing Title
Manston Airport DCO EIA

Figure 9.4 Airport Terminal access design

Client
RSP

Drawing Status
Preliminary Design

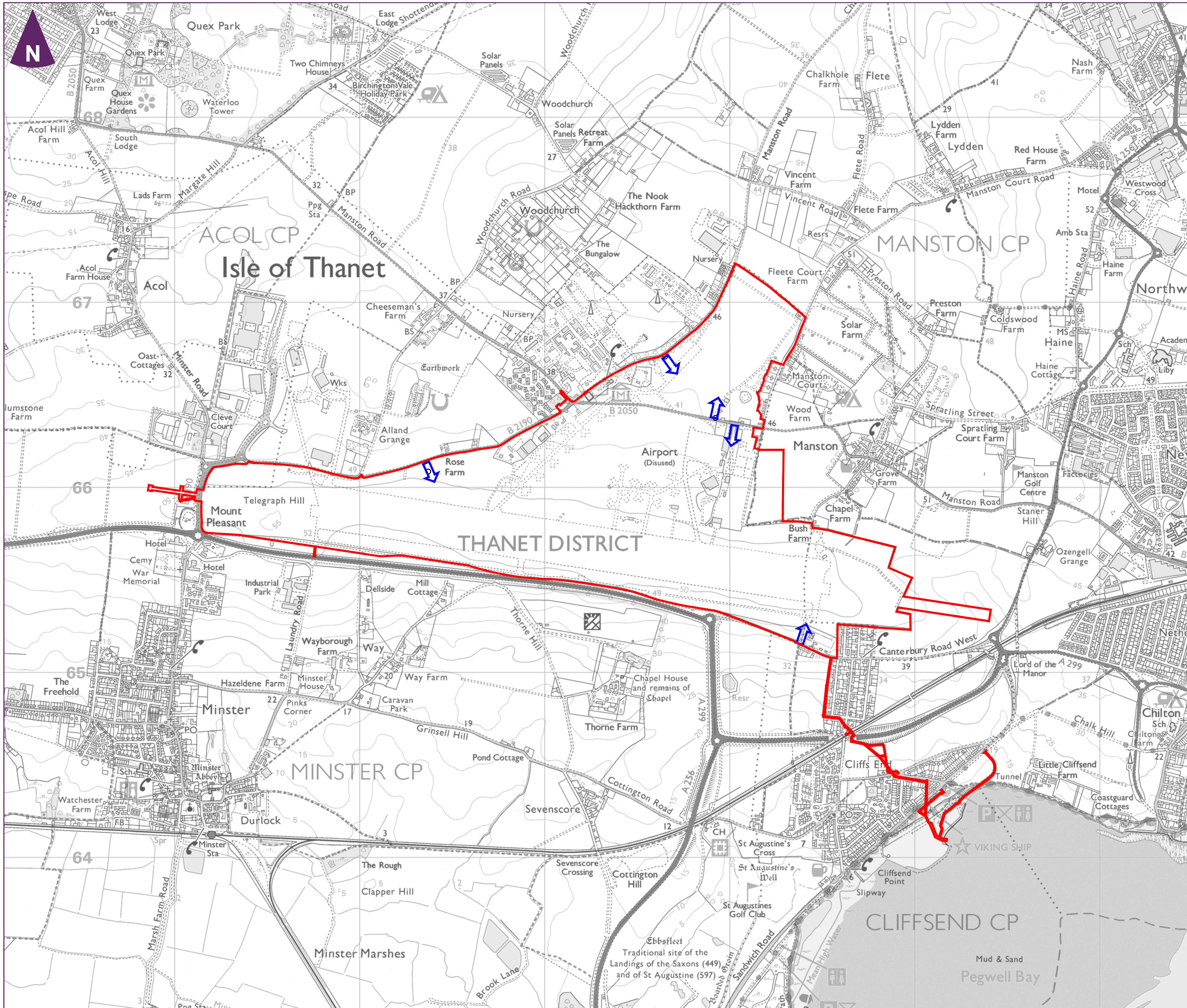
LEAMINGTON SPA
GABLES HOUSE, KENILWORTH ROAD, LEAMINGTON SPA, WARWICKSHIRE CV32 6JX
01926 439000

amec foster wheeler

Drawing Number 38199– Lon142 | Revision –

user name: guy, adam

File Location: r:\projects\38199 manston airport dco eia\4 design\autocad\38199–lon142b.dwg



Key

Order limits

Proposed access locations

Client

RSP

Manston Airport DCO
Transport Assessment

amec foster wheeler

Figure 9.5
Proposed access locations

March 2018 38199-Lon508.dwg guya

10. Sensitivity Test

10.1 Introduction

10.1.1 In recognition of the proposed improvements to the road network in Thanet that might be proposed in the future as part of the Thanet District Transport Strategy 2015 – 2031 (acknowledging the potential revisions this plan might require as a result of the rejection of the Local Plan in January 2018) and as discussed during scoping with KCC, a sensitivity test has been undertaken of these schemes with the inclusion of the Proposed Development traffic.

10.1.2 Based on the limited information of the road connections and improvements included in the draft Thanet District Transport Strategy, the following assumptions have been made.

Proposed new road layout:

- Connecting Columbus Avenue roundabout with Manston Road / Shottendane Road / Margate Hill crossroad junction;
- Connecting Park Lane / Manston Road / Acol Hill priority junction to Minnis Road via A28 Canterbury Road on the western side of Park Lane and Station Road;
- Connecting Manston Court Road / Valley Road priority junction to A256 / Haine Road / New Haine Road roundabout, and
- Connecting Shottendane Road to Nash Road via Manston Road.

Proposed road widening:

- Manston Road – Shottendane Road corridor starting from Park Lane – Manston Road – Acol Hill junction to new proposed road connecting Shottendane Road to Manston Road;
- Nash Rd from Star Lane – Nash Road roundabout to new proposed road connecting Nash Road to Manston Road;
- Spitfire way – Manston Rd – Manston Court Road starting from Spitfire Way / Columbus Avenue roundabout to Manston Court Road / Valley Road priority T junction, and
- Unnamed road connecting A256 to A254 to the west of Tesco superstore and A254 to Millennium Way to the south of Tesco superstore.

Committed / delivered road improvements:

- Star Lane – Star Lane Link road connecting A256 / Star Lane Link roundabout to Nash Road / Star Lane roundabout;
- Poorhole Lane starting from Ramsgate Road / Poorhole Lane / Margate Road / Star Lane roundabout to Westwood Road / A256 / Poorhole Lane roundabout;
- New Cross Road and an unnamed road connecting A256 to A254 to the east of Westwood Cross.
- Proposed one-way flow from B2050 Park Lane to A28 Canterbury Road; and
- Traffic routing from Shottendane Road to Tivoli Road / Hartsdown Road / Nash Road will be diverted through Manston Road via new proposed road due to proposed stopping up of traffic on Shottendane Road.
- The proposed strategic routes are presented in **Appendix I** (strategic route picture) and referred to within this report as the Sensitivity Test (ST) network.

10.2 Route Analysis and Traffic Distribution

10.2.1 Based on the strategic road network ST proposals, alternative route choice options and traffic distributions have been investigated to as best as practical try to capture the change in flows on the network which are likely to occur due to the numerous changes to the surrounding highway network. All of the detailed routing options associated with traffic distribution percentages are contained detailed drawings setting out elements considered are available on request.

- **Route 1(D) – 1(A):** Traffic routing from / to B2190 to / from Shottendane Rd via Minster Rd and Margate Hill will divert through new proposed road connecting Columbus Ave. It is assumed that 50% traffic will follow the existing route and 50% will take the diversion.
- **Route 2(D) – 2(A):** Traffic routing from / to Acol Hill to / from A28 Canterbury Rd (south of Canterbury Rd / Park Ln priority T-junction) via Park Ln will divert via new proposed road. It is assumed that 50% traffic will take the new route while 50% will continue through the existing route.
- **Route 3(D):** Traffic routing from B2050 Manston Rd to A28 Canterbury Rd (south of Canterbury Rd / Park Ln priority T-junction) via Park Lane will take the new proposed road as a diversion. Traffic distribution is assumed to be 50%.
- **Route 3(A-1):** Traffic routing from A28 Canterbury Rd (south of Canterbury Rd / Park Ln priority T-junction) to B2050 Manston Rd (west of Margate Hill – Shottendane Rd – Manston Rd crossroad junction) via Park Ln will take the diversion through new proposed road and then continue via B2050 Manston Rd. 100% traffic is assumed to take the diversion route as Park Ln is proposed for one-way flow.
- **Route 3(A-2, A-3):** Traffic routing from A28 Canterbury Rd (south of Canterbury Rd / Park Ln priority T-junction) to Shottendane Rd via Park Ln has to options for diversion. Firstly, traffic can divert through new proposed road and then continue via Manston Rd to reach Shottendane Rd (Route – 3(A-2)). Secondly, traffic can route via Park Rd which connects A28 Canterbury Rd to Shottendane Rd (Route – 3(A-3). Distribution is assumed to be 50% for both the routing options.
- **Route 4(D):** Traffic routing from Acol Hill to Station Rd via Park Ln will use the diversion route of proposed new road connecting Park Ln / Manston Rd / Acol Hill priority junction to A28 Canterbury Rd. Traffic distribution for the diversion is assumed as 50%.
- **Route 4(A-1, A-2):** Traffic routing from Station Rd to Acol Hill via Park Ln has two options for probable diversion. Firstly, traffic from Station Rd will use Minnis Rd and then continue through proposed new road to reach Acol Hill as possible diversion route (Route – 4(A-1)). Secondly, traffic from Station Rd will take right turn to the A28 Canterbury Rd to continue via the proposed new road to reach Acol Hill (Route – 4(A-2)). Traffic distribution is considered to be 50% for both the options.
- **Route 5(D):** Traffic routing from B2050 Manston Rd via Park Ln to Station Rd will take the new proposed road for possible diversion route. Traffic distribution is assumed to be 50% for this diversion.
- **Route 5(A-1, A-2):** Traffic routing from Station Rd to B2050 Manston Rd (west of Manston Rd / Shottendane Rd / Margate Hill crossroad junction) via Park Ln has two diversion options. Firstly, traffic from Station Rd will take left-turn to Minnis Rd and then continue towards the proposed new road to reach B2050 Manston Rd (Route – 5(A-1)). Secondly, traffic from Station Rd will take right turn to the A28 Canterbury Rd to continue via the proposed new road to reach B2050 Manston Rd (Route – 5(A-2)). In both cases, traffic distribution is assumed to be 50%.
- **Route 5(A-3, A-4, A-5):** Traffic routing from Station Rd to Shottendane Rd via Park Ln will consider three diversion routes. Firstly, traffic from Station Rd will take left-turn to Minnis Rd and then continue towards the proposed new road to reach Shottendane Rd (Route – 5(A-3)). Traffic distribution for this option is considered as 25%. Secondly, traffic from Station Rd will take right turn to the A28 Canterbury Rd to continue via the proposed new road to reach

Shottendane Rd (Route – 5(A-4)). Traffic distribution is considered as 25% for this option. And finally, traffic from Station Rd will take a left-turn to A28 Canterbury Rd to continue towards Park Rd and then towards Shottendane Rd (Route – 5(A-5)). Traffic distribution is considered as 50% for this routing option.

- **Route 6(A-1, A-2):** Traffic routing from A28 Canterbury Rd (north of Station Rd mini roundabout junction) to B2050 Manston Rd via Park Ln will consider two diversion route options. Firstly, traffic will continue through A28 Canterbury Rd to reach the new proposed road and then access the B2050 Manston Rd (Route – 6(A-1)). Traffic distribution for this routing option is considered to be 70%. Secondly, traffic will use Park Rd to access Shottendane Rd and then continues towards B2050 Manston Rd (Route – 6(A-2)). Traffic distribution for this option is assumed to be 30%.
- **Route 6(A-3):** Traffic routing from A28 Canterbury Rd (North of Station Rd mini roundabout junction) to Acol Hill via Park Ln will consider taking A28 Canterbury Rd South (south of The priority T-junction with Park Ln) and then turn left to access the new proposed road to head towards Acol Hill. Traffic distribution is assumed to be 100% in this route scenario.
- **Route 7(D):** Traffic routing through A28 Canterbury Rd (ahead of A299 / Thanet Way roundabout) to Station Rd will take the diversion by proposed new road which connects Canterbury Rd to Minnis Rd. Traffic will take this diversion to access the nearby destinations. Traffic distribution is assumed to be 65% for this routing option.
- **Route 8(D):** Traffic routing from Thanet Way to Station Rd will take the diversion through proposed new road connecting A28 Canterbury Rd to Minnis Rd to access the nearby destinations. Traffic distribution for this diversion is considered to be 65%. Rest 35% will continue the existing route.
- **Route 9(D):** Traffic routing from A299 North to Station Rd will take the diversion through proposed new road connecting A28 Canterbury Rd to Minnis Rd to access the nearby destinations. Traffic distribution for this diversion is considered to be 65%. Rest 35% will continue the existing route.
- **Route 7 – 8 – 9(A):** Traffic from Station Rd nearby locations routing through Station Rd – A28 Canterbury Rd towards A28 Canterbury Rd / Potten St Rd / Thanet Rd / A299 roundabout will follow the diversion route which continue as Station Rd – Minnis Rd – New Proposed Rd – A28 Canterbury Rd. It is considered that 65% traffic will take the diversion route while 35% will continue through the existing route;
- **Route 10(D**): Traffic routing through Shottendane Rd towards Tivoli Rd / Hartsdown Rd / Shottendane Rd / Nash Rd junction will take right turn towards the new proposed road which connects Shottendane Rd to Manston Rd. Due to proposed stopping up on the Shottendane Rd circa 150m ahead of the junction, 100% traffic will follow this diversion route. Apart from above, there is also another new road proposed which connects Manston Rd to Nash Rd It is assumed that 100% traffic previously routing from Shottendane Rd to Nash Rd through the aforementioned junction will now use the proposed new road to access Nash Rd;
- **Route 10(A):** Traffic routing from Nash road to Shottendane Rd via Tivoli Rd / Hartsdown Rd / Shottendane Rd / Nash Rd junction will take the new proposed road to access Shottendane Rd via Manston Rd. It is assumed that 100% traffic will follow the new diversion route;
- **Route 11(D) – 11(A):** Traffic routing from / to Manston Court Rd to / from Star Lane Link road via the Star Lane road will take the diversion through new proposed road connecting Manston Court Rd to Star Lane Link. Assumed traffic percentage to follow the proposed diversion is 50%;
- **Route 12:** Due to the proposed road widening proposal on Shottendane Rd and new proposed roads connecting Nash Rd to Manston Rd, Manston Rd to Shottendane Rd, Park Ln / Acol Hill / Manston Rd priority junction to A28 Canterbury Rd, traffic now routing through A28 Canterbury Rd – Hartsdown Rd - Nash Rd will follow A28 Canterbury Rd – Proposed New Road – Manston Rd – Shottendane Rd – Proposed New Road – Manston Rd – Proposed new Road – Nash

Road routing option. It is assumed that the proposed diversion will attract 50% traffic to shift from existing route choice;

- **Route 13(D) – 13(A):** Traffic following the route A253 – A299 Hengist Way – A256 Hengist Way – A256 Haine Rd will now shift towards A253 – B2190 Spitfire Way – B2050 Manston Rd – Manston Court Rd. This new route will attract 85% traffic to shift from the existing routing option;
- **Route 14(D):** Traffic following the route Shottendane Rd – Tivoli Rd – Beatrice Rd – Ramsgate Rd will shift towards Shottendane Rd – Proposed New Rd – Manston Rd – Proposed New Rd – Nash Rd route as an alternative to the existing which will attract 50% traffic;
- **Route 14(A):-** Traffic following the route Ramsgate Rd – College Rd – Shottendane Rd will tend to shift towards Nash Rd – Proposed New Rd – Manston Rd – Proposed New Rd – Shottendane Rd route option. The proposed diversion will attract 50% traffic;
- **Route 15(D): -** Traffic following the route Hartsdown Rd - Tivoli Rd – Beatrice Rd – Ramsgate Rd will shift towards Hartsdown Rd – Nash Rd route as an alternative to the existing which will attract 50% traffic; and
- **Route 15(A): -** Traffic currently following the route Ramsgate Rd – College Rd – Hartsdown Rd will tend to shift towards Nash Rd – Hartsdown Rd routing option. The proposed diversion will attract 50% traffic.

10.2.2 Considering all these routing options together, the net change in traffic flow for 2039 future base plus committed plus development traffic scenario is assessed for all three peak hours, AM, PM and Airport peak. The resultant traffic turning flow counts (Net Traffic Flow) have then been used. These traffic flows are available on request.

10.3 Traffic Impact Assessment

10.3.1 The impact of the Sensitivity Test network has been assessed with the results summarised in **Table 10.1.**

Table 10.1 Comparison of Traffic Flow Sensitivity Tests (2039 Base + Committed + Development Flows)

	AM Peak Hour			PM Peak Hour			Airport Peak Hour		
Junction Number	**Existing Network**	**Sensitivity Network**	**Change (+/-)**	**Existing Network**	**Sensitivity Network**	**Change (+/-)**	**Existing Network**	**Sensitivity Network**	**Change (+/-)**
Junction 2	4394	4272	-122	4165	4053	-112	2779	2676	-103
Junction 3	2961	2755	-206	3268	3028	-240	1877	1739	-138
Junction 4	4732	4732	0	4909	4909	0	3247	3247	0
Junction 5	1926	2131	+205	2158	2397	+239	1441	1579	+138
Junction 8	4971	3561	-1410	4798	3513	-1285	4129	2955	-1174
Junction 11	1429	1855	+426	1631	2037	+406	1171	1394	+223
Junction 12	2135	2340	+205	2221	2461	+240	1996	2135	+139
Junction 13	1654	1859	+205	1639	1878	+239	1527	1665	+138
Junction 15	2330	2230	-100	2488	2356	-132	2030	1885	-145
Junction 16	2641	2395	-246	2686	2396	-290	2601	2344	-257
Junction 17	2778	2571	-207	3083	2835	-248	2895	2676	-219

Junction Number	AM Peak Hour Existing Network	AM Peak Hour Sensitivity Network	AM Peak Hour Change (+/-)	PM Peak Hour Existing Network	PM Peak Hour Sensitivity Network	PM Peak Hour Change (+/-)	Airport Peak Hour Existing Network	Airport Peak Hour Sensitivity Network	Airport Peak Hour Change (+/-)
Junction 20A	5012	4807	-205	5002	4762	-240	4459	4320	-139
Junction 20B	4027	3822	-205	4095	3856	-239	3600	3462	-138
Junction 21A	2911	2706	-205	3663	3424	-239	2599	2460	-139
Junction 21B	4667	4462	-205	5097	4857	-240	3629	3490	-139
Junction 23	1204	1311	+107	1538	1625	+87	1197	1252	+55
Junction 24	1623	1869	+246	1956	2247	+291	1577	1833	+256
Site Access 1	1089	1294	+205	1148	1387	+239	1147	1286	+139
Site Access 4	1715	1921	+206	1765	2005	+240	1616	1755	+139
Site Access 5	1681	1887	+206	1811	2051	+240	1721	1860	+139

10.3.2 **Table 10.1** indicates that junction 4 has no change in traffic flow as a result of the Sensitivity Test network changes while junction 5, 11, 12, 13, 23, 24 and site access junction 1, 4, and 5 have seen an increase of traffic flow. This is due to the proposed road widening proposal on Manston Road - Spitfire Way corridor and Nash Road. Junction 2, 3, 8, 15, 16, 17, 20A, 20B, 21A and 21B have seen significant decrease in the level of traffic flow due to proposed new road layout.

10.3.3 In order to gauge the level of impact that the traffic flow changes have on the existing and mitigation proposals the sensitivity test flows have been run through both models (where they exist) for each junction that is materially affected**.**

10.3.4 Traffic impact assessment due to the sensitivity analysis has been carried out for all three peak periods (AM peak, PM peak, and Airport peak) using the validated base models and associated mitigation model where required. The impact of the sensitivity test network changes is reflected in a comparison of queue data between the sensitivity network results and the proposed network results. The detailed junction modelling reports are contained within **Appendix F and J** and summarised in **Tables 10.2 to 10.32.**

Junction 2: A299 / A256 / Cottington Link Rd (four-arm standard roundabout)

10.3.5 The difference between the queues evidenced due to the flows on the existing network and sensitivity test network during the 2039 base plus committed plus development trip scenario are shown within brackets.

Table 10.2 Junction 2 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A299 Hengist Way (E)	94 (-21)	12 (0)	3 (0)
A256	137 (-35)	169 (-36)	8 (-3)
Cottington Link Rd	66 (-31)	37 (-21)	1 (-1)
A299 Hengist Way (N)	3 (0)	1 (0)	1 (0)
Total change	-87	-57	-4

(Difference between existing network and sensitivity network shown in brackets)

10.3.6 The Sensitive Test network alterations result in lower queues at Junction 1 but the queues evidenced are still considered to be high with large queues and delays evident. The proposed mitigation scheme has also been rerun with the sensitivity flows with the results summarised in **Table 10.3.**

Table 10.3 Junction 2 – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A299 Hengist Way (E)	22 (-72)	5 (-7)	3 (0)
A256	70 (-67)	142 (-27)	4 (-4)
Cottington Link Rd	60 (-6)	17 (-20)	1 (0)
A299 Hengist Way (N)	4 (+1)	2 (+1)	1 (0)
Total change	-145	-53	-4

(Difference between existing network and sensitivity network shown in brackets)

10.3.7 Result for the mitigation model show the proposed scheme still offers benefits from the existing model. Queue lengths show significant reductions on a junction basis with the AM peak total queues reducing by 145 vehicles. The PM peak reduces by 53 vehicles and the Airport Queues remain low. It is likely that mitigation will still be required at this junction and the form proposed will continue to offer benefit over the existing form of the junction.

Junction 3: A299 / Canterbury Rd / Hengist Way (three-arm standard roundabout)

10.3.8 The comparison results are summarised in **Table 10.4.**

Table 10.4 Junction 3 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Canterbury Rd	1 (0)	0.42	0 (0)	0.31	0 (0)	0.13
A299 Hengist Way (S)	3 (-2)	0.76	3 (-1)	0.75	1 (0)	0.47
A299 Hengist Way (W)	2 (-1)	0.69	4 (-2)	0.79	1 (0)	0.47

	AM Peak	PM Peak	Airport Peak
Total change	-3	-3	0

(Difference between existing network and sensitivity network shown in brackets)

10.3.9 The Sensitivity Test flows return the same result as in the existing network scenario where no mitigation will be required as the junction continues to perform within its theoretical capacity with minimal queues and delays.

Junction 4: A299 / B2190 (four-arm standard roundabout)

10.3.10 The comparison results are summarised in **Table 10.5**. Traffic flow for this junction is unchanged (**Table 10.1**) on the Sensitivity Test network but due to redistribution of turning proportions existing model experience significant increment in queue length.

Table 10.5 Junction 4 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Hengist Way (E)	71 (-57)	1.08	99 (-56)	1.15	5 (-3)	0.83
Tothill Street	124 (+14)	1.46	141 (+10)	1.49	48 (0)	1.18
A299 (W)	173 (0)	1.20	189 (+1)	1.20	4 (0)	0.83
B2190 (N)	225 (+90)	1.37	331 (+161)	1.48	3 (+1)	0.76
Total change	+47		+116		-1	

(Difference between existing network and sensitivity network shown in brackets)

10.3.11 Results show that total queue lengths increase at Junction 4 as a result of the Sensitivity Test highway network scenario. Therefore, it is likely that mitigation will still be required at this junction. The mitigation measure proposed is now tested to evaluate the junction performance with the Sensitivity Test network flows. Results of the assessment is summarised in **Table 10.6.**

Table 10.6 Junction 4 – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Hengist Way (E)	59 (-12)	1.06	91 (-8)	1.13	4 (-1)	0.79
Tothill Street	68 (-56)	1.25	89 (-51)	1.31	17 (-31)	1.00
A299 (W)	99 (-74)	1.10	104 (-85)	1.10	3 (-1)	0.78
B2190 (N)	128 (-97)	1.23	215 (-116)	1.33	2 (-1)	0.65
Total change	-239		-260		-35	

(Difference between existing network and sensitivity network shown in brackets)

10.3.12 Results show that mitigation scheme continues to provide a reduction in queues when compared with the existing layout and as such still has merit in the Sensitivity Test network scenario. Potential for mitigation measures to be refined.

Junction 5: B2190 / Minster Rd (three-arm standard roundabout)

10.3.13 The comparison results are summarised in **Table 10.7.** Traffic flow on Sensitivity Test network in this junction increases significantly but due to ample capacity no significant change is observed in queue length.

Table 10.7 Junction 5 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
B2190 (East)	1 (0)	0.46	1 (0)	0.58	1 (0)	0.33
B2190 (South)	1 (0)	0.53	1 (0)	0.53	1 (0)	0.44
Minster Rd	1 (0)	0.35	1 (0)	0.34	0 (0)	0.17
Total change	0		0		0	

(Difference between existing network and sensitivity network shown in brackets)

10.3.14 Result show that the junction will continue to perform within its theoretical capacity with minimal queues or delays and no mitigation is required in the Sensitivity Test network as noted also in the existing layout scenario.

Junction 8: A28 / Park Ln / Station Rd (three-arm mini roundabout with left in / left out simply priority)

10.3.15 The comparison results are summarised in **Table 10.8**.

Table 10.8 Junction 8(a) – Mini roundabout – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A28 East	10 (-85)	0.93	6 (-44)	0.86	4 (-24)	0.82
A28 South	3 (-113)	0.72	6 (-109)	0.87	6 (-90)	0.88
Station Rd	4 (-140)	0.83	6 (-43)	0.88	3 (-12)	0.76
Total Difference	-337		-196		-126	

(Difference between existing network and sensitivity network shown in brackets)

10.3.16 Large reductions in queues are evidenced as a result of the Sensitivity Test Network flows compared to the existing network performance. It is possible that no mitigation may be required at this junction as a result of the Sensitivity Test Network changes, or as a maximum a much more scaled down improvement scheme compared to that proposed for the existing network scenario.

Table 10.9 Junction 8(b) – Left in/left out priority junction – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A28 North	0 (0)	0 (0)	0 (0)

	AM Peak	PM Peak	Airport Peak
Park Ln	2 (-50)	4 (-66)	1 (-14)
A28 South	0 (-6)	0 (-2)	0 (-1)
Total Difference	-56	-68	-15

(Difference between existing network and sensitivity network shown in brackets)

10.3.17 Large reductions in queues are evidenced as a result of the Sensitivity Test Network flows compared to the existing network performance. It is possible that no mitigation may be required at this junction as a result of the Sensitivity Test Network changes, or as a maximum a much more scaled down improvement scheme compared to that proposed for the existing network scenario.

Junction 9: Park Ln / Manston Rd / Acol Hill (left in / left out simple priority junction)

10.3.18 The Sensitivity Test proposals would see the existing left in / left out priority junction be replaced by a roundabout comprising an additional arm (in addition to existing three arms) which adjoins the existing junction with A28 Canterbury Road. This junction is therefore not assessed as part of the Sensitivity Test assessments due to the fundamental changes proposed at this junction which will override any improvements proposed by this assessment.

Junction 10: Shottendane Rd / Manston Rd / Margate Hill (four-arm staggered junction)

10.3.19 This junction is also not assessed for the post-sensitivity analysis traffic flow due to the new junction arrangement which denotes that the existing staggered junction will be replaced by a roundabout. As the new junction geometric parameters are not available so the net traffic impact for this junction is not assessed. But impact assessment for this junction should be carried out prior to any design work.

10.3.20 The Sensitivity Test proposals would see the existing staggered junction will be replaced by a roundabout. This junction is therefore not assessed as part of the Sensitivity Test assessments due to the fundamental changes proposed at this junction which will override any improvements proposed by this assessment.

Junction 11: Columbus Avenue / Spitfire Way (three-arm standard roundabout)

10.3.21 The comparison results are summarised in **Table 10.10**. Traffic flow on Sensitivity Test network in this junction increases significantly but due to ample reserve capacity small incremental change in queue length is observed.

Table 10.10 Junction 11 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Spitfire Way	2 (+1)	0.64	2 (+1)	0.71	1 (0)	0.44
B2190 Columbus Avenue West	1 (0)	0.43	1 (0)	0.36	1 (0)	0.35
B2190 Columbus Avenue North	0 (0)	0.12	0 (0)	0.23	0 (0)	0.10
Total change	+1		+1		0	

(Difference between existing network and sensitivity network shown in brackets)

10.3.22 There is minimal change in the results at Junction 11 between the Sensitivity Test network and existing network flows and as such the findings of this assessment are likely to stand irrespective of if the Sensitivity Test network changes occur.

Junction 12: Manston Road / B2050 / Spitfire Way (four-arm staggered priority junction)

10.3.23 The comparison results are summarised in **Table 10.11.**

Table 10.11 Junction 12 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Spitfire Way to B2050 (West)	8 (+3)	2.14	7 (+2)	3.52	7 (+2)	1.68
Spitfire Way to B2050 (East) / Manston Road (North)	307 (+164)	2.42	559 (+259)	3.78	214 (+73)	1.86
B2050 (East)	280 (+209)	1.52	427 (+414)	***	28 (+20)	1.01
Manston Road (North) to B2050 (East)	93 (+29)	***	176 (+52)	***	95 (+42)	4.57
Manston Road (North) to Spitfire Way / B2050 (West)	254 (+80)	***	307 (+91)	***	144 (+64)	4.62
B2050 (West)	2 (+2)	0.38	16 (+16)	1.03	0 (0)	0.13
Total change	+487		+834		+201	

(Difference between existing network and sensitivity network shown in brackets)

10.3.24 Queues are shown to increase significantly as a result of the changes made in the Sensitivity Test network. Mitigation measures proposed in the existing network scenario may need reconsideration should the Sensitivity Test network changes be delivered given the larger queues evidenced in **Table 10.11.**

Table 10.12 Junction 12 – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	DoS	MMQ	DoS	MMQ	DoS
Spitfire Way (1/1+1/2)	110 (-204)	137.9%	259 (-307)	204.2%	205 (-16)	191.9%
Manston Road East (B2050) (4/1+4/2)	10 (-270)	69.2%	10 (-418)	65.8%	9 (-19)	57.1%
Manston Road North (3/1)	148 (-199)	243.7%	222 (-261)	323.2%	181 (-58)	305.5%
Manston Road West B2050 (2/1)	13 (+11)	48.2%	5 (-12)	26.0%	7 (+7)	31.5%
Total Difference	-663		-996		-86	

(Difference between existing network and sensitivity network shown in brackets)

10.3.25 The proposed mitigation shows an overall reduction in queues in the Sensitivity Test network than the existing network scenario and as such given the increase in queues in the Sensitivity Test network with the existing layout it is noted that the mitigation measures will still add benefit to the network.

Junction 13: Manston Court Road / B2050 (three-arm priority junction) and New Access Junction 3 and 4

10.3.26 These junctions are looked at as part of a network in the mitigation strategy and as such they are discussed together. The comparison results are summarised in T**able 10.13.**

Table 10.13 Junction 13 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Manston Court Road	287 (+181)	4.50	248 (+159)	5.27	197 (+135)	3.25
B2050	0 (0)	0.04	0 (0)	0.07	0 (0)	0.04
Total change	+181		+159		+135	

(Difference between existing network and sensitivity network shown in brackets)

10.3.27 The impact of the Sensitivity Test network changes see large queue increases at Junction 13.

Table 10.14 New Access Junction 3 & 4 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Manston Road East	489 (+479)	308.9%	133 (+126)	137.0%	421 (+412)	281.8%
Southern Access Road	0 (0)	0.5%	2 (-1)	29.3%	3 (+2)	4.0%
Manston Road West	262 (+250)	210.3%	166 (+152)	145.0%	259 (+246)	209.0%
Northern Access Road	1 (-1)	3.5%	3 (-1)	28.1%	1 (-1)	6.4%
Total Difference	+728		+276		+659	

(Difference between existing network and sensitivity network shown in brackets)

10.3.28 The impact of the Sensitivity Test network changes see large queue increases at Junctions 3 & 4.

10.3.29 As queues have increased at the junction and mitigation measures will still be needed in the event of the Sensitivity Test network changes. The existing layout mitigation changes are now discussed in the context of the Sensitivity Test network changes.

Table 10.15 Junction 13 and New Access Junction 4 & 5 combined – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Manston Court Road	64 (-222)	133.8%	32 (-216)	111.8%	52 (-145)	129.8%
Manston Road East	22 (-468)	75.2%	11 (-121)	50.7%	18 (-404)	66.7%
Southern Access Road	0 (0)	1.0%	3 (+1)	37.6%	1 (-2)	7.4%
Manston Road West	23 (-239)	78.0%	28 (-138)	86.1%	22 (-237)	75.1%
Northern Access Road	1 (+1)	7.5%	5 (+2)	37.1%	2 (+1)	14.6%

	AM Peak	PM Peak	Airport Peak
Total change	-928	-472	-787

(Difference between existing network and sensitivity network shown in brackets)

10.3.30 The mitigation proposals see large queue decreases when compared with the existing layout performance and as such the mitigation measures are considered to still offer benefit at this location with the Sensitivity Test network changes in place.

Junction 15: Manston Rd / Hartsdown Rd / Tivoli Rd / College Rd / Nash Rd (five-arm signalised)

10.3.31 The comparison results are summarised in **Table 10.16.** Total traffic flow in this junction reduces but due to redistribution of turning proportions total change in queue length increases.

Table 10.16 Junction 15 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Nash Road East	6 (-5)	74.3%	36 (-37)	110.1%	6 (-7)	72.6%
Manston Road South	147 (+80)	189.3%	221 (+125)	236.4%	114 (+87)	169.3%
Hartsdown Road	95 (+26)	138.3%	16 (-21)	100.1%	13 (-10)	97.2%
College Road	174 (+75)	164.8%	136 (+11)	147.9%	117 (+73)	140.7%
Total Difference	+176		+78		+142	

(Difference between existing network and sensitivity network shown in brackets)

10.3.32 Result show that the Sensitivity Test network changes will result in this junction operating with greater queues and delays than during existing network scenario. Mitigation measures will therefore still be required at this junction.

Table 10.17 Junction 15 – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Nash Road East	5 (-1)	26.6%	8 (-28)	40.1%	5 (-1)	26.5%
Manston Road South	265 (+119)	454.3%	347 (+126)	567.5%	229 (+114)	406.4%
Hartsdown Road	10 (-85)	48.6%	7 (-10)	36.5%	6 (-7)	35.4%
College Road	239 (+66)	189.0%	172 (+36)	153.5%	157 (+39)	149.0%
Total Difference	+98		+125		+146	

(Difference between existing network and sensitivity network shown in brackets)

10.3.33 The mitigation measures are shown to increase queues at Junction 15 and as a result the results suggest that the mitigation measures proposed for the existing highway network may not be relevant in the event that the Sensitivity Test network changes come into effect.

Junction 16: Ramsgate Rd / College Rd / A254 / Beatrice Rd (five-arm signalised)

10.3.34 The comparison results are summarised in **Table 10.18.**

Table 10.18 Junction 16 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
College Road East	245 (+164)	340.9%	191 (+126)	286.9%	212 (+143)	308.5%
Ramsgate Road South	9 (-90)	64.6%	15 (-94)	81.6%	16 (-100)	83.2%
College Road West	19 (-88)	96.6%	36 (-66)	103.8%	11 (-89)	86.6%
Ramsgate Road	12 (-21)	71.3%	11 (-10)	66.6%	11 (-12)	68.0%
Total Difference	-36		-44		-59	

(Difference between existing network and sensitivity network shown in brackets)

10.3.35 The Sensitivity Test network changes result in a reduction in total queueing at this junction but it is noted that queues appear to have shifted around the arms and as such the mitigation measures may no longer be as relevant for the Sensitivity Test network as they are for the existing network form. Results of the assessment is summarised in **Table 10.19.**

Table 10.19 Junction 16 – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
College Road East	242 (-2)	269.4%	183 (-8)	226.7%	207 (-6)	243.8%
Ramsgate Road South	6 (-3)	44.5%	9 (-6)	55.9%	10 (-6)	57.0%
College Road West	129 (+110)	133.2%	108 (+72)	126.0%	77 (+66)	118.4%
Ramsgate Road	8 (-3)	49.2%	8 (-3)	45.7%	8 (-3)	46.7%
Total Difference	+101		+56		+52	

(Difference between existing network and sensitivity network shown in brackets)

10.3.36 The mitigation measures are shown to increase queues at Junction 16 and as a result the results suggest that the mitigation measures proposed for the existing highway network may not be relevant in the event that the Sensitivity Test network changes come into effect.

Junction 17: Ramsgate Road / Poorhole Lane / Margate Road / Star Lane (four-arm standard roundabout)

10.3.37 The comparison results are summarised in **Table 10.20**.

Table 10.20 Junction 17 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
Poorhole Lane	10 (0)	17 (+6)	16 (+2)

	AM Peak	PM Peak	Airport Peak
Margate Road	8 (-21)	21 (-62)	39 (-57)
Star Lane	15 (-19)	16 (-21)	6 (-5)
Ramsgate Road	16 (-16)	53 (-32)	20 (-19)
Total change	-55	-109	-79

(Difference between existing network and sensitivity network shown in brackets)

10.3.38 Queues are shown to reduce and as such the Sensitivity Test network can be stated as lessening the level of traffic through this junction and improving its residual capacity. Relatively large queues still exist on Ramsgate Road and as such mitigation is still likely to be required but there may be opportunity to reduce the scale of such improvements.

Table 10.21 Junction 17 – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
Poorhole Lane	9 (-2)	15 (-2)	13 (-3)
Margate Road	6 (-2)	14 (-7)	28 (-11)
Star Lane	7 (-7)	7 (-9)	3 (-2)
Ramsgate Road	11 (-5)	35 (-17)	13 (-7)
Total change	-16	-36	-23

(Difference between existing network and sensitivity network shown in brackets)

10.3.39 During the Sensitivity Test network scenario, the mitigation measure is shown to reduce queues on all arms and could therefore be considered to still be relevant to the Sensitivity Test network flows. Rationalisation of the mitigation scheme may be possible once the ultimate flows are known in more certainty.

Junction 20A & 20B: A256 / Manston Road (three-arm roundabout with priority junction)

10.3.40 The comparison results are summarised in **Table 10.22.**

Table 10.22 Junction 20A (1 & 2) – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A256 (S) to Manston Road East	38 (-20)	1.14	79 (-69)	1.40	31 (-16)	1.12
Manston Road East to A256 (S)	104 (-27)	1.29	117 (-30)	1.47	106 (-29)	1.38
Total change	-47		-99		-45	

(Difference between existing network and sensitivity network shown in brackets)

10.3.41 The impact of the Sensitivity Test network changes is a reduction in queuing at this junction. That said the queues are still large and the need for mitigation is still very likely.

Table 10.23 Junction 20A (3) – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
A256 (North) to Manston Rd (East)	0 (0)	0.30	1 (0)	0.45	1 (0)	0.42

(Difference with pre-sensitivity test results are shown in brackets)

10.3.42 Junction 20A (3) shows no difference with either the Sensitivity Test or existing highway network flows and as such the current thinking should

Table 10.24 Junction 20B – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 North	6 (-6)	16 (-22)	8 (-9)
A256 South	242 (-81)	88 (-72)	55 (-14)
Manston Road West	11 (-2)	207 (-37)	6 (-1)
Total change	-88	-131	-24

(Difference between existing network and sensitivity network shown in brackets)

10.3.43 The result of the changes associated with the Sensitivity Test network sees relatively large AM and PM peak hour reduction in queues at junction 20B.

10.3.44 To assess if the mitigation proposal is still relevant it has been assessed with the Sensitivity Test network amendment flows with the results summarised in **Table 10.25.**

Table 10.25 Junction 20A & 20B – Mitigation Model - Sensitivity Analysis Modelling Results

		AM Peak		PM Peak		Airport Peak	
		Average Queue	**DoS**	**Average Queue**	**DoS**	**Average Queue**	**DoS**
20A	A256 (S) to Manston Road East (Right Turn C-AB)	2 (1)	59.1%	4 (1)	61.4%	3 (1)	65.4%
	Manston Road East to A256 (S) (Left Turn B-AC)	12 (0)	76.6%	9 (0)	55.1%	11 (0))	62.0%
	A256 (North) to Manston Rd (East)	11 (-4)	73.9%	15 (-5)	82.9%	9 (-2)	58.8%
20B	A256 North	9 (1)	92.8%	8 (1)	89.9%	8 (1)	75.8%
	A256 South	28 (-8)	87.7%	31 (-10)	84.1%	20 (-1)	74.0%
	Manston Road West	0 (0)	0.0%	0 (0)	0.0%	0 (0)	0.0%
	Total Difference	-9		-13		-1	

(Difference between existing network and sensitivity network shown in brackets)

10.3.45 The assessment shows that the mitigation measure offers a solution with significantly reduced queues over and above the existing junction performance. Once the ultimate Sensitivity Test network flows are more certain there may be scope to reduce the level of mitigation measures in this location.

Junction 21A: Canterbury Road / Haine Road (three-arm standard roundabout)

10.3.46 The comparison results are summarised in **Table 10.26.**

Table 10.26 Junction 21A – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 Haine Road	5 (-3)	103 (-58)	4 (-2)
A256 Canterbury Road	2 (0)	2 (0)	1 (0)
Canterbury Road West	16 (-9)	67 (-22)	4 (-1)
Total Change	-12	-80	-3

(Difference between existing network and sensitivity network shown in brackets)

10.3.47 The effect of the Sensitivity Test network flows sees a reduction in queues at this junction, although it is noted that queueing is still significant during the PM peak hour. The mitigation model performance within the Sensitivity Test network flow scenario is summarised in **Table 10.27.**

Table 10.27 Junction 21A – Mitigation Model - Sensitivity Analysis Modelling Results

	AM Peak	PM Peak	Airport Peak
	Average Queue	**Average Queue**	**Average Queue**
A256 Haine Road	3 (-2)	25 (-78)	2 (-1)
A256 Canterbury Road	2 (0)	2 (0)	1 (0)
Canterbury Road West	5 (-12)	21 (-46)	2 (-2)
Total change	-14	-125	-3

(Difference between existing network and sensitivity network shown in brackets)

10.3.48 The mitigation proposal is shown to reduce queues and can still be considered to be relevant to the Sensitivity Test network scenario.

Junction 21B: A299 / A256 / Sandwich Rd / Canterbury Rd E (four-arm signalised)

10.3.49 The comparison results are summarised in **Table 10.28**.

Table 10.28 Junction 21B – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	**DoS**	**MMQ**	**DoS**	**MMQ**	**DoS**
Canterbury Road	113 (0)	127.4%	82 (0)	132.9%	33 (0)	106.5%
Sandwich Road	26 (-10)	116.3%	48 (-2)	129.4%	27 (-3)	105.7%
Hengist Way South	14 (-3)	65.1%	16 (-5)	70.1%	8 (-1)	47.1%

	AM Peak		PM Peak		Airport Peak	
A256 Canterbury Road	13 (-3)	69.9%	69 (-30)	110.4%	22 (-20)	96.0%
Total change	-16		-37		-24	

(Difference between existing network and sensitivity network shown in brackets)

10.3.50 The Sensitivity Test network scenario results in less queuing at Junction 21B but it is noted that the queues remain high and the junction exceeds its theoretical capacity. The performance of the mitigation model during the Sensitivity Test network flows is summarised in **Table 10.29.**

Table 10.29 Junction 21B – Mitigation Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	MMQ	DoS	MMQ	DoS	MMQ	DoS
Canterbury Road	51 (-62)	108.7%	13 (-70)	67.2%	9 (-24)	78.1%
Sandwich Road	10 (-16)	99.9%	40 (-8)	114.9%	5 (-22)	87.3%
Hengist Way South	25 (+11)	97.5%	53 (+37)	103.9%	12 (+5)	84.6%
A256 Canterbury Road	17 (+4)	95.3%	73 (+4)	110.3%	11 (-11)	81.6%
Total change	-63		-37		-52	

(Difference between existing network and sensitivity network shown in brackets)

10.3.51 The mitigation model is shown to operate with less queuing during the Sensitivity Test network scenario and as such can still be considered as adding benefit to the highway network.

Junction 23: Star Lane / Star Lane Link (three-arm priority junction)

10.3.52 The comparison results are summarised in **Table 10.30**.

Table 10.30 Junction 23 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	RFC	Average Queue	RFC	Average Queue	RFC
Star Lane West to Star Lane East	1 (0)	0.46	2 (+1)	0.66	0 (0)	0.27
Star Lane West to Star Lane Link	0 (0)	0.24	0 (0)	0.32	0 (0)	0.16
Star Lane East – all movement	6 (+4)	0.82	9 (+6)	0.87	5 (+3)	0.77
Total change	+4		+7		+3	

(Difference between existing network and sensitivity network shown in brackets)

10.3.53 The existing model is shown to operate with marginally larger queues during the Sensitivity Test network scenario than in the existing network situation. It is likely though that given the level of increase that mitigation at this junction may still not be required.

Junction 24: Star Lane / Nash Road (four-arm standard roundabout)

10.3.54 The comparison results are summarised in **Table 10.31**.

Table 10.31 Junction 24 – Existing Model – Sensitivity Analysis Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Star Lane East	1 (0)	0.54	2 (0)	0.68	1 (0)	0.56
Nash Road South	0 (0)	0.30	1 (0)	0.47	1 (0)	0.36
Star Lane West	1 (0)	0.44	2 (+1)	0.66	1 (0)	0.49
Nash Road North	44 (+33)	1.12	6 (+4)	0.88	4 (+2)	0.81
Total change	+33		+5		+2	

(Difference between existing network and sensitivity network shown in brackets)

10.3.55 The Sensitivity Test network scenario sees an increase in queues at this junction and as a result the junction may require mitigation, unlike in the existing network scenario.

Proposed site access junction 1:

10.3.56 The comparison results are summarised in **Table 10.32**. Traffic flow from Sensitivity Test network change increases significantly in this junction but due to ample reserve capacity no significant change in queue length is observed.

Table 10.32 New Access Junction 1 - 2017 Base Line Peak Hour Modelling Results

	AM Peak		PM Peak		Airport Peak	
	Average Queue	**RFC**	**Average Queue**	**RFC**	**Average Queue**	**RFC**
Arm 1	1 (0)	0.43	1 (0)	0.44	1 (0)	0.42
Arm 2	0 (0)	0.01	0 (0)	0.01	0 (0)	0.02
Arm 3	1 (0)	0.32	1 (0)	0.32	1 (0)	0.37
Total change	0		0		0	

(Difference between existing network and sensitivity network shown in brackets)

10.3.57 The base model is shown to operate with minimal queues and delays in the Sensitivity Test network scenario and as such this compares with the findings of the existing network scenario meaning it is unlikely that mitigation measures will be required at this junction over and above the form proposed.

10.4 Sensitivity Test Summary

10.4.1 The following junctions have seen little change in the level of queues evidenced as a result of the Sensitivity Test Network changes, Junctions 3, 5, 11, 17, 20A, 20B, 23, 24, and proposed site access junction 1. Little change is therefore anticipated for the proposed mitigation measures as a result of the Sensitivity Test network changes for these junctions.

10.4.2 The following junctions have seen a large reduction in queuing as a result of the Sensitivity Test network changes, Junctions 2, 4, 8, 12, 13, 21A, 21B, and proposed site access junction 4 and 5.

The mitigation measures associated with these junctions may be able to be rationalised or simply provide additional benefit in their proposed form.

10.4.3 The following junctions have seen a large increase in queuing as a result of the Sensitivity Test network changes, Junctions 15 and 16. The mitigation measures associated with these junctions may need revisiting to better reflect the needs of the amended traffic flows.

11. Preliminary Construction Traffic Management Plan - Summary

11.1.1 **Appendix K** of this is a Preliminary CTMP that has been prepared to support this DCO Submission for Manston Airport.

11.1.2 The Preliminary CTMP sets out the measures and approaches required to support the construction of the Proposed Development. Due to the high volume of HGVs during construction and the purpose of this Preliminary CTMP is to identify traffic management proposals to minimise the impact of these vehicles. The routing of operational HGVs related to the proposed development are included within the TA.

11.1.3 The Preliminary CTMP also sets out the proposed traffic generation of the construction phase associated with the development of Manston Airport.

11.1.4 The Preliminary CTMP identifies HGV construction traffic vehicles are to follow the proposed route from the A299 along Minster Road, Spitfire Way and Manston Road to the proposed construction site accesses for the main airport site and Northern Grass Area. A separate construction traffic route from the A299 onto Canterbury Road West to the Fuel Farm access is also proposed. A review of the local area indicated that these routes are the most suitable to the proposed construction accesses and no significant height, weight, width or timing restrictions were identified.

11.1.1 As part of this Preliminary CTMP, a number of mitigation measures have been proposed to manage the following:

- Access;
- Working hours;
- Preferred construction routes for all vehicle trips;
- Timing of deliveries;
- Temporary traffic signage;
- Vehicle identification;
- HGV emissions;
- The requirement for banksman at accesses;
- Vehicle/wheel washing;
- Temporary traffic management procedures;
- Information packs and communications;
- Sustainable staff travel;
- Highway condition survey; and
- PRoW impacts

11.1.2 By implementing the proposed mitigation measures, this will reduce any potential impact of the movement of construction traffic in the highway network. The construction phase is only temporary and therefore it is not expected that there will be any lasting effects on the local environment.

11.1.3 **Table 11.1** summarises the measures which have been addressed and acknowledged as part of the Preliminary CTMP and provides information regarding any further actions required.

Table 11.1 Measures Addressed/Acknowledged as Part of the Preliminary CTMP and Further Actions Required

Measure	General Construction Traffic	Further Actions
Delivery Routes		Contractor will be informed of approved HGV access routes in contract documentation.
Site Access Management		As per Preliminary CTMP.
Route Enforcement /1		Standard contractor enforcement measures to be adopted.
Highways Accommodation Works (Access)	Not Required	Outside of accommodation works at accesses no highway works are required for the construction phase.
Dilapidation Surveys		As per Preliminary CTMP. To be agreed with KCC and contractor and to be focused on pin pointed locations.
Coordination/Emergency contact		As Per Preliminary CTMP
Route and Access Signage		As Per Preliminary CTMP
Vehicle Livery/Identification		As Per Preliminary CTMP
Wheel Cleaning/Street Cleaning		As Per Preliminary CTMP

12. Framework Travel Plan Summary

12.1.1 **Appendix L** of this TA is a Travel Plan that has been prepared to support this DCO Submission for Manston Airport.

12.1.2 The Thanet District Transport Strategy highlights the planning requirement for major employers, of over 250 staff, to produce a staff travel plan.

12.1.3 An important factor in minimising the carbon footprint of an airport and the impact on the local community is to maximise the number of trips made by sustainable modes. Travel Plans are long term strategies and action plans which set modal share targets and recommend measures to encourage travel by sustainable transport. It recommends the best use of the public transport infrastructure and suggests improvements where required.

12.1.4 There are three fundamental objectives for the Travel Plan which are defined as follows:

- To actively promote and encourage travel by sustainable means for passengers;
- To actively promote and encourage travel by sustainable means for staff; and
- To improve the provision of sustainable travel options to the airport, including the introduction of a shuttle bus service from Ramsgate rail station.

12.1.5 To achieve the fundamental objectives of the Travel Plan a range of targets and measures as well as a monitoring process to follow to track these targets and measures. The results of the Travel Plan are set out in **Table 12.1**.

Table 12.1: Travel Plan – Action Plan

Objective	Target	Measure	Responsibility	Monitoring
To actively promote and encourage travel by sustainable modes for passengers	Increase the number of passengers accessing the airport by public transport from an initial 5% to 25% in Year 20.	Integrated ticketing options for passengers	TPC/Local operator	Review and update
		Easily available multi-modal travel information, through the internet, travel apps or at transport hubs. Live travel information at airport, including connecting services.	Airport operator	Maintain standard of provision
		Improvements to bus routes serving the airport by increasing frequency and ensuring that the timetable matches the hours of operation.		Monitor take up
	Reduce single car occupancy to 35% of trips, by promoting benefits for car sharer and public transport users.	Parking charges to be applied at an appropriate level to encourage car sharing and non-car alternatives.	Airport operator	Review through passenger travel surveys.
To actively promote and encourage travel by sustainable modes for members of staff	Increase the proportion of staff walking or cycling to work to 3% by Year 20.	Reasonable provision of workplace shower and changing facilities.	Developer	Monitor use
		Provision of cycle parking spaces compliant with KCC standards.	Developer	Monitor use
		Retention, enhancement and optimisation of the existing PRoW network.	Developer	

Objective	Target	Measure	Responsibility	Monitoring
		Travel Plan Coordinator to arrange with local shops for discounted cycling equipment.	TPC	Monitor take up
	Increase the number of passengers accessing the airport by public transport from an initial 2% to 10% in Year 20.	Discounted tickets and season ticket loans for staff	TPC	Monitor take up
		Increase the hours of operation and frequency of public transport to the airport from the neighbouring towns to	Developer	Monitor use
	Encourage measure to promote car sharing for staff trips to the airport.	Reserved car parking spaces for car sharers located close to the terminal.	TPC	Monitor use
		Car sharing database to be set up to enable staff to organise. Shift patterns to compliment car sharing arrangements, i.e. people living in close proximity to each other to be assigned same shift patterns when possible.	TPC	Monitor take up
Improve the provision of sustainable transport options to the airport, including the introduction of a shuttle bus service from Ramsgate rail station.	Influence sustainable travel decisions and facilitate the modal share targets set out in the staff and passenger objectives.	Provision of shuttle bus service to link Ramsgate rail station to the airport.	Developer	Monitor use
		Personalised travel planning for members of staff.	TPC	Review take up

13. Public Rights of Way Management Strategy – Summary

13.1.1 **Appendix M** of this TA is a Public Rights of Way Management Strategy (PRoWMS) that has been prepared to support this DCO Submission for Manston Airport.

13.1.2 The PRoWMS identifies any PRoW which may be affected by the Proposed Development and sets out the mitigation required to manage any potential impacts on the PRoW/PRoW users.

13.1.3 The PRoWMS identified two footpaths which were affected by Manston Airport proposals including;

- Footpath TR8; and
- Footpath TR9.

13.1.4 Footpath TR8 currently routes south from Manston Road, along the existing boundary of the Manston site and continues along the existing Manston site boundary as the boundary heads east towards High Street, Manston where TR8 terminates. Under current proposals in the masterplan significant sections of TR8 are proposed to be car parking provision for the redeveloped Manston site.

13.1.5 Footpath TR9 currently routes from High Street, Manston towards the south east following a track through a farm property and terminating within the existing Manston site boundary.

13.1.6 The following mitigation measures are proposed to address the impact of the Proposed Development on the affected PRoWs:

- TR8 will be diverted along the edge of the new proposed perimeter fence of the Airport. The route will remain as it currently is, until it is diverted onto a new alignment along the fence. The previous route will be permanently extinguished and the new route permanently established. This will be done early in the project life cycle so it is established before major works take place;
- The width of the diverted TR8 bridleway will be increased to 3m and it is proposed it will run alongside a hedgerow planted east of the fence to allow for screening of the car park and the Airport site. Any way marker posts or other PRoW infrastructure will be replaced and relocated as appropriate; and
- TR9 will be extinguished south of the perimeter fence of the Airport so that no PRoW falls within the red line boundary of the site.

14. Car Parking Strategy – Summary

14.1.1 **Appendix N** of this TA is a Car Park Management Strategy that has been prepared to support this TA and DCO Submission for Manston Airport.

14.1.2 The car park management strategy has set out the initial estimates of car parking across the proposed development site, including the passenger terminal, staff parking and parking for developments for the northern grass area and the cargo facility.

14.1.3 The document summarises the assumptions and methodology for the development of car parking requirements for year 20 of the Manston development when the development is fully operational.

14.1.4 The documents sets out the parking demand for the passenger terminal has been derived from the forecast year 20 passenger numbers developed by RiverOak and for staff parking the forecast number of staff working in different areas of the development.

15. Airport Surface Access Strategy

15.1.1 **Appendix O** of this TA contains the Airport Surface Access Strategy that has been prepared to support this DCO Submission for Manston Airport.

15.1.2 Good surface access and transport connections are crucial to any airport growth strategy, with impacts on: traffic congestion on the local network; the economic and environmental sustainability of the airport; and general customer satisfaction. As passenger numbers grow, sustainable access would therefore require the reduction of reliance in private car use, placing the emphasis on public transport.

15.1.3 The primary focus of the airport would be on air freight and cargo operations, but as detailed in this appendix it is anticipated that there would be passenger services from Year 3 of the airport's operation, culminating a peak in year 20.

15.1.4 In accordance with the DfT Aviation Policy Framework, an Airport Surface Access Strategy should aim to set out:

- Targets for increasing the proportion of staff and passengers accessing the airport by sustainable transport.
- Details of the strategic approach used to achieve these targets
- A strategy for implementation and monitoring the strategy.

15.1.5 The focus of the Airport Surface Access Strategy is on multi-modal access to the airport as a way to reduce the environmental impact of the airport and its impact on the neighbouring communities. An understanding of the catchment area that both passengers and staff are likely to derive from is included in this strategy.

16. Summary and Conclusions

16.1.1 The Aim of this TA is to assess and demonstrate that the Proposed Development can be accommodated within the existing local and strategic transport network to a standard acceptable to KCC and HE, as the relevant highways authorities.

16.1.2 This section summaries the Proposed Development in terms of the details of the TA and presents an outcome of the operational development.

16.2 Summary of Location and Development Proposals

16.2.1 The site is located to the west of Ramsgate in the district of Thanet, East Kent and covers an area of approximately 3km.

16.2.2 There has been an operational airport at the Proposed Development site since 1916. Until 1998 it was operated by the RAF as RAF Manston, and for a period in the 1950s was also a base for the USAF.

From 1998, it was operated as a private commercial airport, known as Kent International Airport. The airport offered a range of services including scheduled passenger flights, charter flights, air freight and cargo, a flight training school, flight crew training and aircraft testing. In recent years it was operating as a specialist air freight and cargo hub servicing a range of operators. The airport was closed in May 2014 and whilst much of the airport infrastructure, including the runway, taxiways, aprons, cargo facilities and passenger terminal remains, it does require improvement and redevelopment to cater for the proposed use.

16.3 Summary of Transport Proposals

16.3.1 A set of well-considered and designed transportation proposals are included within this TA to support the development. The TA is focused on the capacity issues associated with the Proposed Development on the local highways network and highways safety.

16.3.2 A series of supporting documents have been prepared as appendices to the TA, which consider the following impacts:

- **Appendix K**: The CTMP considers construction traffic impacts;
- **Appendix L:** The Travel Plan considers impacts on Sustainable Access;
- **Appendix M:** The PRoWMS considers impacts on local PRoW;
- **Appendix N:** The Car Park Management Strategy considers impacts on car parking;
- **Appendix O:** The Airport Surface Access Strategy considers impacts on Airport Access; and
- **Chapter 14: Traffic and Transport** of the ES considers the environmental impacts.

16.3.3 A summary of these documents is provided within this TA, and for further details on the findings and development of the strategy, reference should be made to these specific documents.

16.3.4 The following section sets out a summary of the transport proposals for the Airport.

Vehicular based proposals

Five proposed site accesses

- Cargo Facility Access with Spitfire Way

  - The Cargo Facility, ATC tower, security and other ancillary parts of the airport and associated vehicle parking for HGVs and staff will be served by one access which will be a new junction off Spitfire Way. This is proposed to be a three-arm roundabout. The proposed scheme is a new offset three arm roundabout to the south of the Spitfire Way.

- Northern Grass Area Western Access with Manston Road

  - The Western access to the Northern Grass area will be from Manston Road which is proposed to access the western elements of the Northern grass area and will be provided with a link through to the Southern Northern Grass Area access. The junction is proposed to a three-arm ghost right turn priority junction with informal pedestrian crossing facilities.

- Northern Grass Area's Southern Access with Manston Road

  - The Southern access to the Northern Grass area will be from the B2050 Manston Road which is proposed to access the southern elements of the Northern Grass Area and will provided with a link though to the Western Northern Grass Area Access. The junction is proposed to be a new signalised junction linked with the adjacent access (passenger terminal access) to the east. he junction has been designed to incorporate pedestrian crossing facilities across the access arm and across Manston Road.

- Passenger Terminal Access with Manston Road

  - The Passenger Terminal and associated car parking for passengers and staff will be served by one access, which is in the same location as the existing access to the former terminal building and car park. The junction will be upgraded to a fully signalised junction, linked with a second new junction to the west ('Northern Grass' area Southern Access). The junction has been designed to incorporate pedestrian crossing facilities across the Airport access arm and across Manston Road.

- Fuel Farm Access

  - The existing access to the fuel farm off Canterbury Road West is not proposed to be amended, since it is an established access to the facility that has been designed to accommodate large tankers.

Improvements to Manston Road and Spitfire Way

16.3.5 A key aspect of the proposals for improvements to the local highway network is the proposal included on the development masterplan to widen two local roads as follows;

- Spitfire Way – Between Columbus Avenue and B2050 Manston Road; and
- B2050 Manston Road – Between Spitfire Way and the Passenger Terminal Access junction.

16.3.6 It is proposed to widen both carriageways to a standard 7.3m width which predominantly focused on providing a more appropriate route for the increased numbers of total vehicles and particularly the HGVs.

16.3.7 The surface of the entire route from the Columbus avenue to the airport terminal access will be replayed and if necessary reinforced for the conveyance of regular HGV flow.

Proposed Improvement Scheme at Manston Road and Spitfire Way Junction

16.3.8 Provision of a new four arm signalised junction with pedestrian crossing facilities.

Proposed car parking

16.3.9 Revised car parking facilities at both the cargo and main airport access as set out in **Appendix N**. It is proposed that two large car parks are provided accessed from the Cargo access and main passenger terminal access. In addition, a large car park to accommodate passengers will be provided which includes for a large area of overflow parking.

16.3.10 Appropriate parking will also be provided at the Northern Grass Area for staff and visitors in accordance with the appropriate KCC guidance.

Sustainable transport proposals

Pedestrian improvements

- Safe and convenient pedestrian crossings will be provided at the Manston Road/Spitfire Way junction and the linked signals providing access to the Northern Grass Area and passenger terminal access; and
- A new pedestrian footway is proposed alongside Manston Road and Spitfire Way between the Cargo and Passenger Terminal Accesses on the south side of the carriageway.

Other proposals

16.3.11 The Airport Surface Access Strategy (**Appendix O**) sets out a series of proposals for improving access for bus, coach and shared taxi the key features of which are;

- Provision of a shuttle bus from Ramsgate Station;
- Provision for bus drop off near the entrance to the passenger terminal;
- Proposal to enhance as appropriate local bus services to accommodate increase staff in the area;
- Internal road network designed to accommodate bus movements as necessary; and
- A moved and upgraded bus stop on Spitfire Way near the junction with Manston Road.

Diversion of local Public Rights of Way

16.3.12 **Appendix M** sets out the proposals for dealing with the effects of the development on local PRoW. The following mitigation measures are proposed to address the impact of the Proposed Development on the affected PRoWs:

- TR8 will be diverted along the edge of the new proposed perimeter fence of the Airport. The route will remain as it currently is, until it is diverted onto a new alignment along the fence. The previous route will be permanently extinguished and the new route permanently established. This will be done early in the project life cycle so it is established before major works take place;
- The width of the diverted TR8 bridleway will be increased to 3m and it is proposed it will run alongside a hedgerow planted east of the fence to allow for screening of the car park and the Airport site. Any way marker posts or other PRoW infrastructure will be replaced and relocated as appropriate; and
- TR9 will be extinguished south of the perimeter fence of the Airport so that no PRoW falls within the red line boundary of the site.

Cycle parking

16.3.13 Cycle parking would be provided at all elements of the proposed development in accordance with the appropriate KCC guidance.

Travel Plan

16.3.14 The creation of a Travel Plan (**Appendix L**) which will be supported by the developer and provide viable travel choice and promote, enable and encourage internal and external journeys by sustainable modes.

16.4 Highways Mitigation Proposals

16.4.1 The greatest single network constraint within the area is the junction capacity and this TA has sought to identify the locations where the development would significantly impact upon the prevailing conditions and as a consequence mitigation would be needed.

16.4.2 To understand the traffic impact, a first principals spreadsheet model of the local highways network has been developed and a comparison of traffic in the future year (Year 20) of the network with and without the development traffic has been made.

16.4.3 The approach of the assessment is to find any mitigation schemes that provide a "nil Detriment" solution in that the transport network should be no worse off with the development than it would be without it. It is desirable to have any mitigation scheme reduce the impact on RFC/DoS to local congestions thresholds but this is not always achievable or desirable if other factors are at play such as safety or pedestrian provision. In terms of the development, it is considered that either providing a RFC/DoS for the identified location falling below that identified in the future year without development it is considered acceptable.

16.4.4 A wide-ranging set of junctions were assessed as agreed to match the scope of a Strategic Highways Model developed by KCC, which was not available to be used at the time of this DCO submission. It is proposed however to undertake more modelling work using this strategic model post DCO submission and formal request has been made to do so.

16.4.5 The rest of this assessment indicated the following mitigation schemes were required to mitigate the development proposals at 9 offsite locations;

- Junction 2: A299 / A256 / Cottington Link Rd
  - Widening of the eastern arm, improvements to junction road markings with aim of equal lane usage
- Junction 4: A299 / B2190
  - Widening the eastern arm and providing a flared approach as well as improvements to the road markings at the junction
- Junction 6: A299 / Seamark Rd / A253 / Willetts Hill
  - Minor physical improvements as well as improvements to the road markings at the junction
- Junction 7: A299 / A28
  - Improvements to signage and carriageway markings
- Junction 13: Manston Court Road / B2050
  - Provision of a new three arm signalised junction with pedestrian crossing facilities linked to the signalised junction proposals for the main airport terminal access
- Junction 15: Manston Rd / Hartsdown Rd / Tivoli Rd / College Rd / Nash Rd
  - Provision of new signal head locations and revised stage sequence operation. Also, proposals to change the road markings at the junction
- Junction 16: Ramsgate Rd / College Rd / A254 / Beatrice Rd
  - Provision of new stop line and signal head locations as well as a revised stage sequence operation. Scheme also includes proposals to change the road markings at the junction
- Junction 20: A256 (N) / A256 (S) / Manston Road
  - Provision of a large new 4 arm signalised junction arrangement with relevant pedestrian crossings, although noting that this would be unnecessary as the Manston Green development scheme has recently secured a £2.5 million grant towards the delivery of the

roundabout improvement and road infrastructure. Testing of the proposed roundabout design will be required.

- Junction 21: A299 / A256 / Sandwich Rd / Canterbury Rd E /Haine Road
  - Increase in flare length on approach to the junction and increase to entry widths. Also, proposals for revised signal stage timings and staging

16.4.6 In addition to capacity assessments a safety assessment also indicated the need for one junction improvement. The issue at this junction was noted to be a lack of visibility from the Allend Grange Road minor arm and as such an improvement scheme, is proposed to provide for a clearer visibility splay from the junctions. This scheme is in conjunction with the proposals to widen Spitfire Way to a 7.3 carriageway and provide further signage warning users of Spitfire Way of the presence of this minor arm.

16.5 Highways England Strategic Impacts

16.5.1 In addition to the assessment undertaken in this TA for the local road network, a link assessment of the wider HE network was undertaken which indicates impacts of less than 30% increase for total vehicles or HGVs on the HE network and as such is not considered significant. As such, no mitigation is proposed on the HE network within this TA.

16.6 Sensitivity Test

16.6.1 In recognition of the proposed improvements to the road network in Thanet that might be proposed in the future, as discussed during scoping with KCC, a sensitivity test has been undertaken of these schemes with the inclusion of the Proposed Development traffic.

16.6.2 Based on the limited information of the road connections and improvements included in the draft Thanet District Transport Strategy, a series of detailed assumptions to inform the rest were made.

16.6.3 The result of this test indicated that 7 junctions would potentially need a smaller or reduced mitigation scheme from what has been proposed in the TA, while 2 junctions would likely need further improved mitigation schemes compared to the assessments on the existing network.

16.6.4 As has been set out, it is proposed to undertake further modelling with KCC using a Thanet-wide strategic model that has been development, and discussions are ongoing as to how this can be scoped and programmed.

16.7 Conclusions

16.7.1 Through provision of the scheme proposals that have been highlighted throughout this TA and its associated appendices, it is considered that, not only will the traffic garneted by the development fit broadly within the capacity of the local highways network, with the provision of mitigation schemes, but it will improve the safety and transport options though the area by providing improvements to local pedestrian and sustainable links.

16.7.2 The site should also become a hub for European air travel, bringing jobs, visitors and economic benefits to the area.