Rebuttal Proof of Evidence

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Land off Pump Lane, Rainham

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Chapters

1 Introduction

1.1 In this rebuttal proof of evidence, I (Karl Jarvis) have not sought to provide a comprehensive response to the Appellant's evidence, but where I have identified points, especially with reference to those contained in the proof of evidence of Mr Simon Tucker, on which the Inspector may find it helpful to have a written response in advance of the inquiry, I have responded to those. In most instances I am content that I can provide my response in oral evidence in due course. Therefore, if I have not responded to or referred to other points in the Appellant's evidence, it is not because I have accepted these points.

1.2 This rebuttal considers aspects of the Appellant's traffic evidence with a particular focus on the Medway Aimsun Model (MAM) using the headings of Mr Tucker's main proof, referencing the relevant paragraphs (in the form STX.X). References to paragraphs in my original proof are in the form KJX.X and references to paragraphs in Mr Rand's main proof are in the form of JRX.X.

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2 Response to Section 2 of Simon Tucker's Proof

2.1 As set out at KJ6.1, there have been four assessments of the proposed development using the Medway Aimsun Model (MAM), all of which have shown a severe impact caused by the proposed development on the land off Pump Lane on Medway's network capacity. As outlined in my proof of evidence the MAM is the most appropriate tool for this assessment given its wider network coverage, high level of Medway-wide and more local calibration and validation. The MAM is also needed for the modelling work, given the scale of the proposed development and its impact on congested corridors which only the MAM can properly assess.

2.2 **ST 2.9 -** Mr Tucker states that Medway Council's modelling approach is "wholly flawed" in that it has not properly assessed the scheme, without explaining how it is said that the assessments did not properly assess the scheme. He goes on to state that the 16th December 2020 addendum partially rectifies this, but that "significant issues" remain without clearly outlining what these are.

2.3 In order to narrow the issues at the inquiry, the December 2020 and January 2021 assessments have (among other scenarios) been undertaken using the appellant's trip generation assumptions, development access points and a close representation of the opening year (Sweco modelled 2028 whereas the appellant's proposed opening year is 2029). None of the above input changes have altered the conclusions of the assessment that the proposed development results in a severe residual cumulative impact on Medway's local highway network capacity, with it being unable to accommodate the additional development traffic, as outlined in my proof and the proof of Mr James Rand.

2.4 **ST 2.10 -** Mr Tucker states the MAM model outputs cannot be "properly scrutinised" and are "un-auditable". However, he has been provided with all the MAM model outputs that he has requested and provides no reason why they cannot be scrutinised. The outputs Mr Tucker requested and has been provided with include:

- Traffic operational forecasts for numerous junctions for 3 sub-networks and for AM and PM modelled peaks with and without the development

- Traffic operational forecasts for numerous journey time routes for 3 sub-networks and for AM and PM modelled peaks with and without the development
- Forecast model flows
- MAM Trip rates
- Trip Generation for proposed development
- Details of the Macroscopic and Microscopic assignment
- Trip distribution methodology and proposed development trip origins and destinations
- Committed future highway network changes
- Traffic growth for Medway
- Traffic growth external to Medway
- Select link analysis on the entry and exit to the proposed development to show where traffic goes to and from
- Flow difference plots between with and without development scenario to show the development’s traffic impact
- Volume over capacity plots
- Forecast link speeds
- Junction delay plots (using bandwidths)
- Forecast model turn flows

In addition, Mr Tucker has been provided with the following reports:

1) Medway Aimsun Model Validation Report (CD 12.5) which provides full details of the MAM, its purpose, features, model extent, the macroscopic and microscopic model, the data collected and used, trip matrix development, network development, and the local calibration and validation of the model against observed data

2) Pump Lane and Lower Rainham Transport Impact Appraisal Report (October 2020) (Appendix M of my original proof)

3) December 2020 and January 2021 addendums (Appendices N and O of my original proof)

2.5 The above outputs have been provided in a variety of accessible forms including pdf plots, excel spreadsheets, PowerPoint presentations, email correspondence and word documents. Mr Tucker has therefore been provided with a significant amount of information on the MAM modelling assessment including input assumptions and model outputs, all of which could readily be scrutinised.

2.6 **ST 2.11** - Mr Tucker asserts that the base MAM does not validate appropriately. This is incorrect. The MAM passes all the appropriate validation criteria for traffic flows and journey times as outlined by the Department for Transport Appraisal Guidance Unit 3.1. The MAM, which uses state of the art modelling with significant investment in both data inputs and modelling expertise is well validated across Medway as detailed in my Proof (KJ2.7-2.9). Mr Tucker's unsubstantiated criticism is simply wrong.

2.7 In the same paragraph, Mr Tucker also states that for planning applications further validation is both necessary and has not been undertaken. Again, this is incorrect. As part of the modelling work Sweco undertook to assess the proposed development on the land off Pump Lane, local validation checks were undertaken, and the levels of local validation were found to be good, and therefore no additional model calibration was therefore needed. This is detailed in KJ4.6 and Table 2 of my proof.

2.8 To further expand on this, I present the local validation for the 3 sub-networks (2,3 and 7) which for the MAM assessment work have been modelled in detail (microscopic modelling). See Figure 2, in Chapter 6 (p27) of my proof for further information on these sub-networks.

Subnetwork 2 (A289/A2)

2.9 **Figure 1** shows the 13 observed local link/turn counts and journey time routes used for the local validation check on subnetwork 2 close to the proposed development and on the impacted congested corridors. In addition, 2 journey time routes were used to check local validation on the A2 and the A289 which are the two most congested corridors which are impacted by the proposed development. All this information was derived from the MAM Validation report (CD12.5). **Table 1** (below) provides the flow validation which shows between 96% and 100% of links and turns pass the Department for Transport (DfT) validation criteria for both modelled periods: far greater than the requisite 85%. **Table 2** shows the journey time validation; all local journey time routes pass the DfT criteria of modelled times being within 15% or 1 minute of the observed times.

Figure 1 Local Validation Data for Subnetwork 2

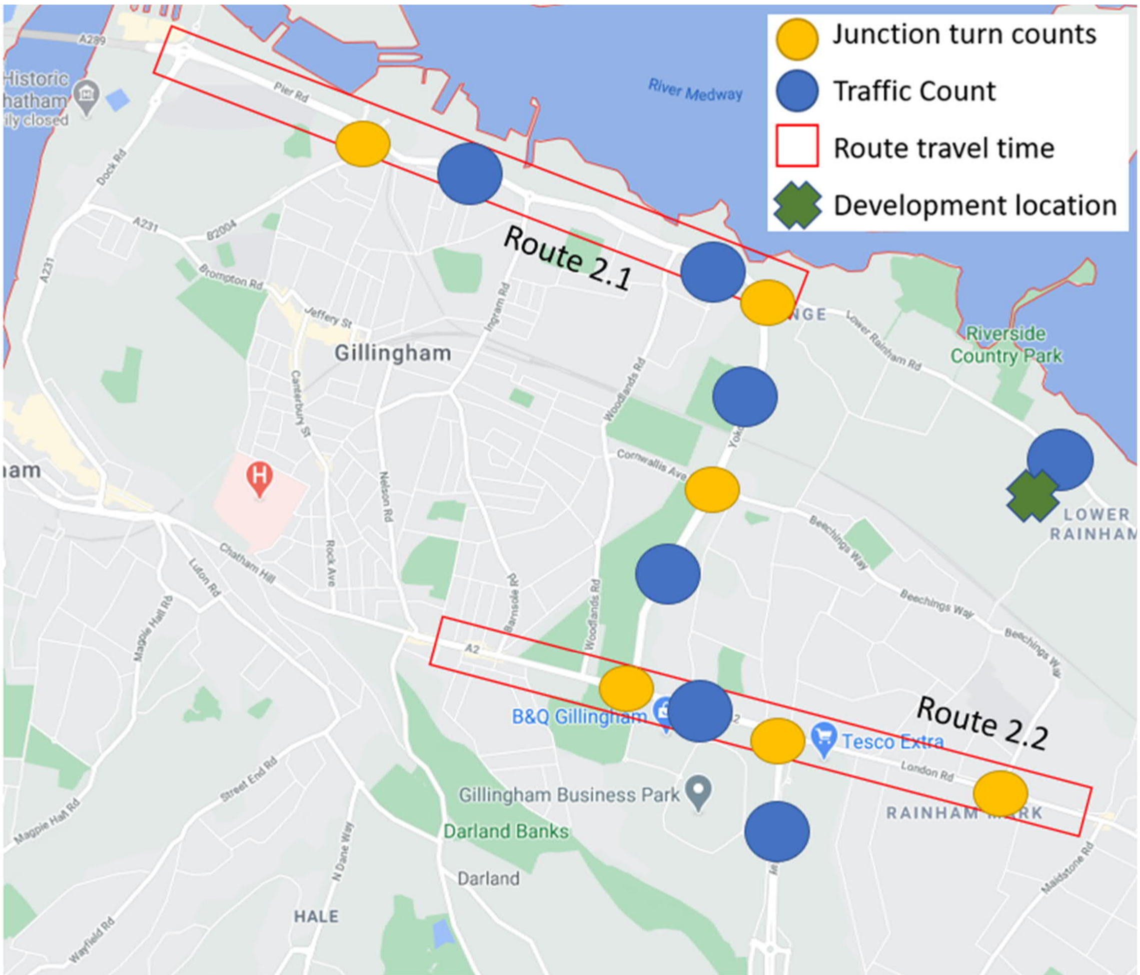

Table 1 Local Flow Validation for Subnetwork 2

Peak Hour	Network Element	Percentage Meeting Criteria					Passes DfT Criteria
		Criteria 1	Criteria 2			Either Criteria	
		GEH Statistic less than 5.0	Count less than 700 vph modelled within 100 vph	Counts between 700 vph and 2,700 vph modelled within 15%	Count greater than 2,700 vph modelled within 400 vph		
AM Peak	Sections	98.3%	98.9%	97.7%	-	98.9%	Yes
	Turns	97.4%	100.0%	95.9%	-	99.5%	Yes
PM Peak	Sections	93.3%	94.3%	98.9%	-	96.6%	Yes
	Turns	91.6%	97.1%	98.1%	-	97.4%	Yes

Table 2 Local Journey Time Validation for Subnetwork 2

Route	Length (km)	Observed (s)	Modelled (s)	Relative Difference (s)	Absolute Difference (%)	Passes DfT Validation Criteria
AM Peak Hour						
Route 2.1.A: Medway Tunnel to A289 Ito Way	6.85	489	491	2	0.51%	Yes
Route 2.1.B: A289 Ito Way to Medway Tunnel	6.65	505	518	12	2.40%	Yes
Route 2.2.A: A2 Eastbound	3.32	460	526	66	14.44%	Yes
Route 2.2.B: A2 Westbound	3.37	553	480	-73	-13.15%	Yes

Percentage of Routes meeting Validation Criteria:						100.0%
PM Peak Hour						
Route 2.1.A: Medway Tunnel to A289 Ito Way	6.85	579	546	-33	-5.78%	Yes
Route 2.1.B: A289 Ito Way to Medway Tunnel	6.65	425	479	54	12.82%	Yes
Route 2.2.A: A2 Eastbound	3.32	482	440	-42	-8.78%	Yes
Route 2.2.B: A2 Westbound	3.37	447	423	-24	-5.44%	Yes
Percentage of Routes meeting Validation Criteria:						100.0%

Subnetwork 3 (A2 / Rainham)

2.10 **Figure 2** shows 1 turn count (12 observed movements) at the key junction of the A2 and Otterham Quay Lane and 3 local journey time routes used as part of the local validation check focussed on subnetwork 3 in Rainham, in the vicinity of the proposed development and on the impacted local roads. The 3 journey time routes were used to check local validation on the A2 in Rainham, as well as Otterham Quay Lane/Meresborough Road and on Miercourt Road. All this information was derived from the MAM Validation report. **Table 3 Local Flow Validation for Subnetwork 3Table 3** provides the flow validation which shows between 97% and 100% of links and turns pass the DfT validation criteria for both modelled periods: far greater than the requisite 85%. **Table 4** shows the journey time validation; 100% of local journey time routes pass the DfT criteria of modelled times being within 15% or 1 minute of the observed times: again, far exceeding the required threshold of 85% of routes.

Figure 2 Local Validation Data for Subnetwork 3

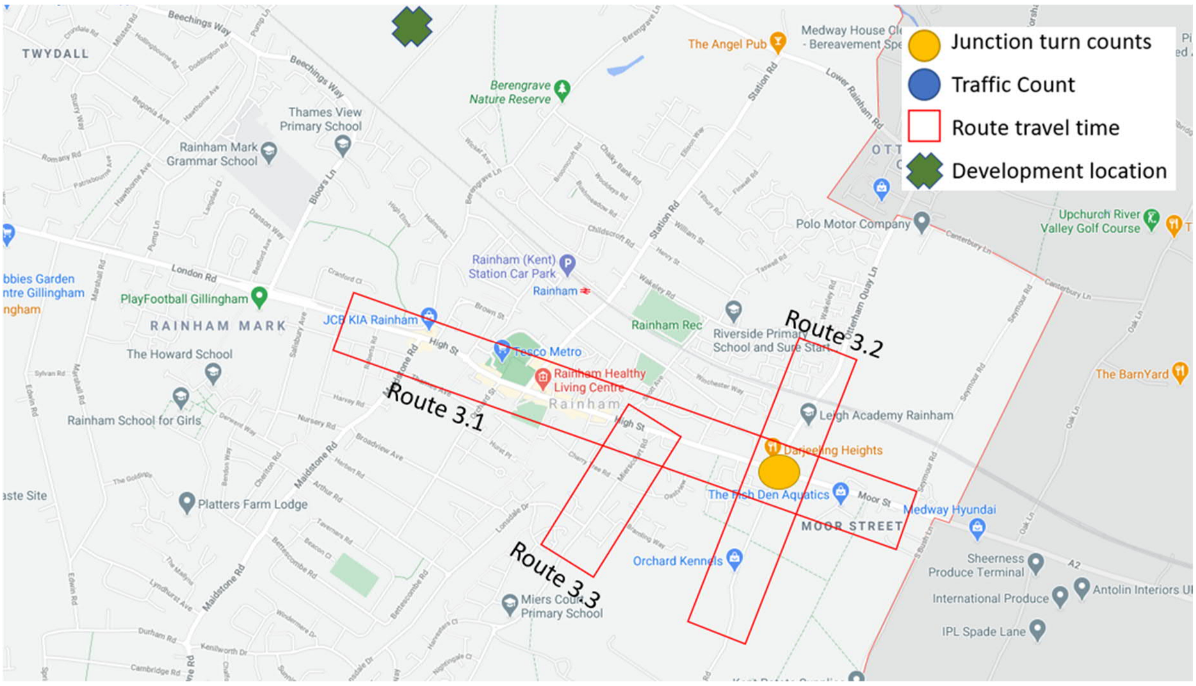

Table 3 Local Flow Validation for Subnetwork 3

Peak Hour	Network Element	Percentage Meeting Criteria					Passes DfT Criteria
		Criteria 1	Criteria 2			Either Criteria	
		GEH Statistic less than 5.0	Count less than 700 vph modelled within 100 vph	Counts between 700 vph and 2,700 vph modelled within 15%	Count greater than 2,700 vph modelled within 400 vph		
AM Peak	Sections	88.6%	97.1%	-	-	97.1%	Yes
	Turns	85.7%	100.0%	-	-	100.0%	Yes
PM Peak	Sections	91.4%	96.8%	100.0%	-	97.1%	Yes
	Turns	97.1%	100.0%	-	-	100.0%	Yes

Table 4 Local Journey Time Validation for Subnetwork 3

Route	Length (km)	Observed (s)	Modelled (s)	Relative Difference (s)	Absolute Difference (%)	Passes DfT Validation Criteria
AM Peak Hour						
Route 3.1.A: A2 Eastbound	2.40	335	340	5	1.35%	Yes
Route 3.1.B: A2 Westbound	1.92	385	356	-29	-7.58%	Yes
Route 3.2.A: Meresbrough Road to Otterham Quay Lane	0.23	81	65	-16	-20.08%	Yes
Route 3.2.B: Otterham Quay Lane to Meresbrough Road	0.23	77	56	-21	-26.84%	Yes
Route 3.3.A: Mierscourt Road to A2 (West)	0.43	114	125	11	9.74%	Yes
Route 3.3.B: A2 (West) to Mierscourt Road	0.42	80	136	57	71.32%	Yes

Percentage of Routes meeting Validation Criteria:							100.0%
PM Peak Hour							
Route 3.1.A: A2 Eastbound		2.40	341	378	37	10.92%	Yes
Route 3.1.B: A2 Westbound		1.92	387	434	47	12.20%	Yes
Route 3.2.A: Meresbrough Road to Otterham Quay Lane		0.23	77	63	-13	-17.38%	Yes
Route 3.2.B: Otterham Quay Lane to Meresbrough Road		0.23	74	57	-17	-22.64%	Yes
Route 3.3.A: Mierscourt Road to A2 (West)		0.43	175	131	-44	-25.08%	Yes
Route 3.3.B: A2 (West) to Mierscourt Road		0.42	88	148	60	67.40%	Yes
Percentage of Routes meeting Validation Criteria:							100.0%

Subnetwork 7 (Lower Rainham Road)

2.11 **Figure 3** shows 3 link/turn counts and 5 local journey time routes used as part of the local validation check focussed on subnetwork 7 in Lower Rainham, in the vicinity of the proposed development and on the impacted local roads. The 3 journey time routes were used to check local validation on Lower Rainham Road and roads off it. All this information was derived from the MAM Validation report. **Table 3 Local Flow Validation for Subnetwork 3 Table 5** provides the flow validation which shows between 97.5% and 100% of links and turns pass the DfT validation criteria for both modelled periods: far greater than the requisite 85%. **Table 6** shows the journey time validation; 100% of local journey time routes pass the DfT criteria of modelled times being within 15% or 1 minute of the observed times: again, far exceeding the required threshold of 85% of routes.

Figure 3 Local Validation Data for Subnetwork 7

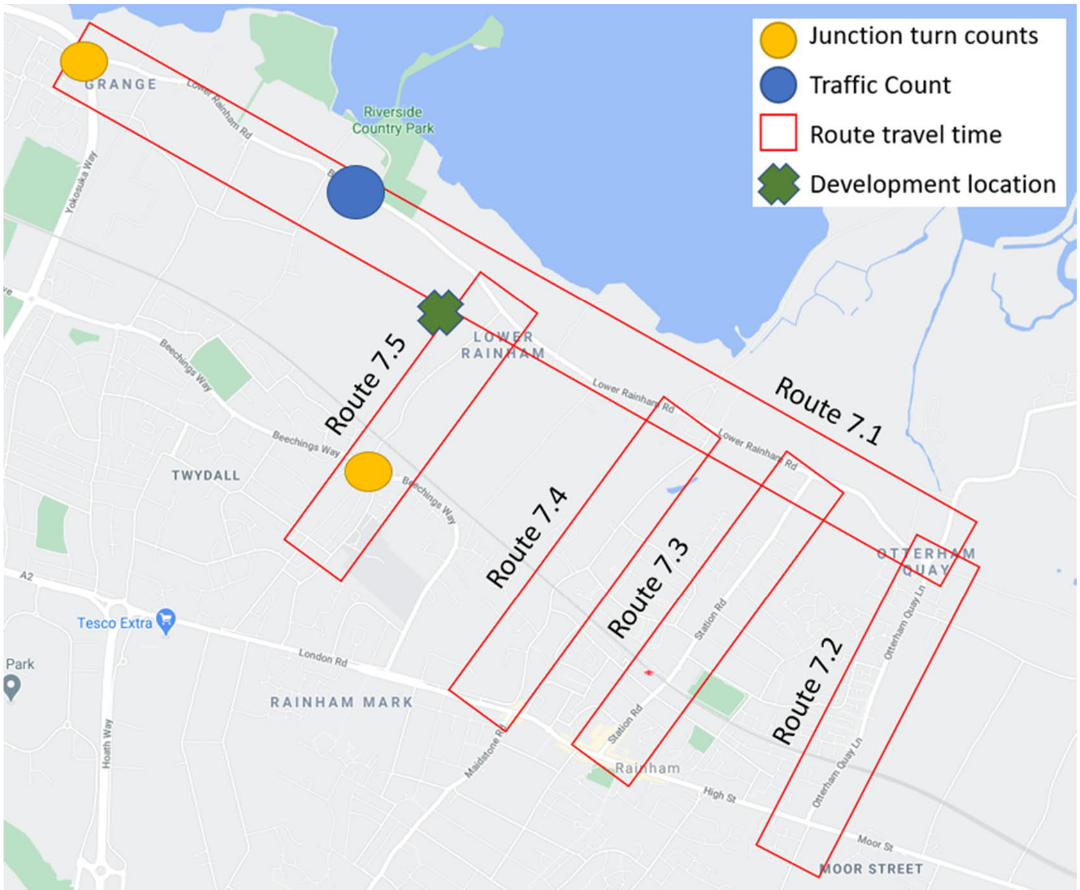

Table 5 Local Flow Validation for Subnetwork 7

Peak Hour	Network Element	Percentage Meeting Criteria					Calibrates?
		Criteria 1	Criteria 2			Either Criteria	
		GEH Statistic less than 5.0	Count less than 700 vph modelled within 100 vph	Counts between 700 vph and 2,700 vph modelled within 15%	Count greater than 2,700 vph modelled within 400 vph		
AM Peak	Sections	97.5%	97.1%	100.0%	-	100.0%	Yes
	Turns	93.3%	100.0%	100.0%	-	100.0%	Yes
PM Peak	Sections	95.0%	96.9%	100.0%	-	97.5%	Yes
	Turns	100.0%	100.0%	100.0%	-	100.0%	Yes

Table 6 Journey Time Validation for Subnetwork 7

Route	Length (km)	Observed (s)	Modelled (s)	Relative Difference (s)	Absolute Difference (%)	Validates?
AM Peak Hour						
Route 7.1.A: Lower Rainham Road Eastbound	4.09	410	440	30	7.30%	Yes
Route 7.1.B: Lower Rainham Road Westbound	4.09	501	459	-41	-8.28%	Yes
Route 7.2.A: Otterham Quay Lane Northbound	1.15	92	111	18	19.97%	Yes
Route 7.2.B: Otterham Quay Lane Southbound	1.15	145	140	-5	-3.78%	Yes
Route 7.3.A: Station Road Northbound	1.43	208	148	-59	-28.63%	Yes

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Route 7.3.B: Station Road Southbound		1.43	225	213	-12	-5.25%	Yes
Route 7.4.A: Berengrave Lane Northbound		1.58	163	175	12	7.57%	Yes
Route 7.4.B: Berengrave Lane Southbound		1.58	161	215	53	33.06%	Yes
Route 7.5.A: Pump Lane Northbound		1.14	144	134	-10	-6.98%	Yes
Route 7.5.B: Pump Lane Southbound		1.14	149	125	-23	-15.78%	Yes
Percentage of Routes meeting Validation Criteria:							100.0%
PM Peak Hour							
Route 7.1.A: Lower Rainham Road Eastbound		4.09	449	426	-24	-5.25%	Yes
Route 7.1.B: Lower Rainham Road Westbound		4.09	429	445	16	3.70%	Yes
Route 7.2.A: Otterham Quay Lane Northbound		1.15	93	111	18	19.46%	Yes
Route 7.2.B: Otterham Quay Lane Southbound		1.15	140	146	6	3.99%	Yes
Route 7.3.A: Station Road Northbound		1.43	199	181	-18	-9.23%	Yes
Route 7.3.B: Station Road Southbound		1.43	246	235	-11	-4.39%	Yes
Route 7.4.A: Berengrave Lane Northbound		1.58	176	172	-4	-2.16%	Yes
Route 7.4.B: Berengrave Lane Southbound		1.58	163	174	11	6.74%	Yes
Route 7.5.A: Pump Lane Northbound		1.14	157	128	-29	-18.53%	Yes
Route 7.5.B: Pump Lane Southbound		1.14	118	120	3	2.44%	Yes
Percentage of Routes meeting Validation Criteria:							100.0%

2.12 As can be seen in Tables 1 to 6 (above) the MAM – and specifically subnetworks 2, 3 and 7 on which the relevant assessments are based -, is very well validated to a large number of observed local link and turns counts and journey time routes.

2.13 This contrasts with the appellant's local validation for the simplistic isolated junction models which do not appear to be validated to any observed queue, delay or journey time data and only use a handful of single day manually classified observed counts, as stated in JR4.15. Conversely, the count data used to calibrate and validate the MAM come from more than 300 counts, most of which are over 14 days or more.

2.14 **ST 2.12 -** Given the robustness and functionality of the MAM I would invite the inspector to use the Lower Rainham Transport Impact Appraisal Report and December 2020 and January 2021 addendums provided in Appendix M, N and O of my Proof, as the evidence base for the assessment of the transport impacts of the proposals.

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Response to Section 6 of Simon Tucker's Proof

ST 6.1.6 - Mr Tucker suggests that the appellants assessment regarding method and output is agreed upon by Medway Council. This is incorrect**.** The Council's preferred assessment is as per their guidance on transport assessments (Appendix A of my Proof) to use the MAM. That assessment has been undertaken by Sweco using the MAM and outlined in the Lower Rainham Transport Impact Appraisal Report and December 2020 and January 2021 addendums**.**

2.15 As explained at KJ1.12, I consider that the Appellants assessment method – simplistic isolated junction modelling - is inappropriate in this case. Moreover, the Appellant's use of this modelling is flawed in a number of respects:

a) It does not appear to be calibrated and validated to observed data on existing queues and delays at junctions (see James Rand's Proof, paragraphs 4.15-4.18)

b) It cannot forecast the impact of queuing from upstream junctions on the capacity and operations of the assessed junction (i.e. the interactions between junctions)

c) It relies upon trip distribution based on 2011 census journey to work data which is deficient as it:
- Is outdated being 10 years old
- Centres on a single journey purpose (commuting) and provides no information about other trip purposes
- Relates to usual journey to work however the average person does not complete this trip every day due to sickness or holiday
- Provides no information on the timing of the trip

d) Relies upon a small number of manual classified counts which can be prone to error and only from a single day's observation

e) Cannot provide the wider area reassignment (re-routing effects) caused by traffic growth, the proposed development or mitigation.

2.16 **ST6.1.11** - Mr Tucker outlines the assessment of impacts at individual junctions was undertaken using industry standard packages. This might be correct however only isolated junction models were produced. Traffic microsimulation modelling is a minimum that would be needed on these congested corridors to model the interaction between network elements accurately. This could have been undertaken with common industry micro-simulation modelling software such as VISSIM or indeed Aimsun.

2.17 **ST6.1.12** - Mr Tucker highlights the appropriateness of isolated junction models such as Junctions and LINSIG to model the operation of individual junctions based on demand flows. It would be remiss of me not to point out that the appellant has not actually used demand flows for inputs to his junction model. He has taken output turn flows from MAM which are flow metered (which are lower than demand flows) where congestion reduces downstream flows. This has not, however, been compensated with any capacity adjustment to reflect blocking back (queues) from upstream junctions and therefore provides an overly optimistic and unrealistic forecast of traffic operations at the assessed junctions. Furthermore, for the reasons I set out in my original proof of evidence, the use of isolated junction models is not appropriate in the circumstances of this case.

2.18 **ST6.1.14** - Mr Tucker refers to regional level area assignment models having abstract structures. Although MAM is not explicitly named, itis important to underline that MAM is not a regional level area assignment model. This is not only because Medway is not a region, but also MAM is both macroscopic (strategic) and microscopic (detailed) with both model tiers running together. The microscopic model simulates several sub-networks allowing for capacity constraint, blocking back and flow metering which the appellant's approach does not. The MAM's network is coded in detail which includes detailed representation of geometry including lanes, lane widths, flares, stop lines and gradients. Junctions are modelled in detail including stop, give way, signals and banned turns. Signalised junctions are coded using controller information and stage plans which will be greater detail than an isolated junction model. The MAM simulates traffic signals using data including phasing, staging, inter-greens, phase delays, green times and offsets. See Chapter 5 of the MAM validation report (CD 12.5).

Medway Alternative Assessment Approach

2.19 **ST 6.2.1** - Mr Tucker describes that "some limited" outputs were provided during the determination of the application on 6th of December 2019. It should be noted that Mr Tucker was provided in December 2019 with outputs from detailed modelling based on 3 subnetworks (2, 3 and 7), including the following:

- Forecast Reference Case Flows (without development scenario)
- Forecast With development scenario flows
- A comparison of the operational performance of junctions in the morning and evening peak for the with and without development scenarios on 3 sub networks using average junction delays (levels of service) for over 20 junctions, greater than the number of junctions the appellant has assessed
- A comparison of the operational performance of journey time routes in the morning and evening peak for the with and without development scenarios on 3 sub networks based on output journey times (levels of service) for over 30 journey time routes, the appellants modelling approach cannot provide an assessment on the impact of journey times of the proposed development as it only assess individual junctions
- Commentary on the changes in flows due to the proposed development and analysis as to why and where the traffic operations have deteriorated due to the proposed development

2.20 **ST6.2.2** - Mr Tucker states that the December 2019 assessment was based on a 2035 future year, which differs from 2029. This is correct and is explained in my proof (section 5). It should be noted that the conclusions of the operational impact of the proposed development identified in the December 2019 assessment are consistent with the later MAM assessments, including the January 2021 addendum based on a 2028 future year.

2.21 **ST6.2.4** - Mr Tucker queries why the MAM assessment undertaken in October 2020 uses a revised 2037 forecast year. This is explained at KJ5.13. The 2037 forecast year aligned with the likely end date of Medway's emerging local plan. We do not however solely rely on the 2037 assessment, as an assessment using a 2028 future year has been produced detailed in the January 2021 addendum.

2.22 **ST6.2.5 -** The rationale for the four assessments is set out in my original proof of evidence at Section 6. In short, (i) the December 2019 assessment (Appendix L) was the assessment on which the Council's decision was originally based; (ii) the October 2020 assessment provided an update to that assessment and used a 2037 forecast year to represent the end of the emerging Local Plan period; (iii) the December 2020 assessment was an addendum to the October 2020 assessment utilising (among other scenarios) the appellant's assumptions; and (iv) the January 2021 assessment was a further addendum to the October 2020 assessment again utilising (among other scenarios) the appellant's assumptions but using a 2028 forecast year.

2.23 Even if the modelling which is most favourable to the Appellant is considered – i.e. the January 2021 addendum (LRR scenario 6) which uses a 2028 forecast year as well as the appellant's trip rates and access points - the conclusion of the MAM assessment remains materially the same: junctions reaching a LoS F in the morning and evening peaks resulting in significant queuing, as well as increased journey times.

2.24 **ST6.2.6** - Mr Tucker states fundamental flaws to the report but provides no evidence to what these flaws are or to why the findings would lack credibility given they are based on detailed and robust modelling work using the most appropriate tool (i.e. the MAM).

Trip Rate Assumptions

2.25 **ST 6.3.2 and 6.3.3** - Mr Tucker refers to trip rates and inconsistency in terms of Medway's approach. The trip rates within the MAM are fixed and applied consistently across all model zones and for all assessments, this is detailed in chapter 3 of the Medway Local Plan Forecasting Methodology Report (Appendix E of my Proof). This therefore provides a consistent basis for Medway Council to compare the traffic impacts of different developments and the number of trips each proposed development would generate. It should also be noted, to further accommodate the appellant's concerns around trip rates and trip internalisation (ST6.3.4) Sweco has modelled the proposed development on the land off Pump Lane for both 2028 and 2037 forecast years using the appellants own trip rates, see the December 2020 addendum (LRR scenario 3) and January 2021 addendum (LRR scenario 6) (appendix N and O of my proof).

2.26 **ST 6.3.4 -** Mr Tucker's point regarding internalisation is addressed in paragraph 2.25 above. Mr Tucker also erroneously states that the MAM assessment relies on census journey to work to distribute the trips. This is incorrect, the MAM primarily uses 2016 observed trip patterns from mobile phone data to distribute trips. Indeed, the appellant's approach actually uses 2011 census journey to work data to distribute trips to and from the proposed development site, despite the weaknesses of this approach, as I have outlined in section 2.15 (point c) of this rebuttal. The approach taken by the Council (Sweco) to distribute trips is more robust as it covers all journey purposes, uses more recent data and is time specific.

2.27 **ST 6.3.5** - Mr Tucker compares the trip generation from the original MAM assessment with the appellants showing that by using the appellants trip rates fewer vehicles are generated from the development. Although the appellants trip generation could be contested, it is a redundant point given the Council (Sweco) have undertaken tests in 2028 and 2037 future years using the appellant own trip rates and trip generation (appendix N and O of my proof).

2.28 **ST 6.3.6 -** Mr Tucker outlines that previous select link analysis showed incorrect flows to and from the zone the development was added into. It is correct that the proposed development was added into an existing zone in the October 2020 modelling. This is a perfectly reasonable and common modelling approach and does not alter the assessment. All this does is to load the proposed development traffic alongside some existing traffic. The total flows to and from the development were correct they were just added on top of existing local traffic making it more difficult to separate out what flows related to the development and what was existing traffic. However, to allay Mr Tuckers concerns the December 2020 and January 2021 addendums model the proposed development with its own development only zone (next to a separate zone that contain the existing local traffic). This makes no material impact on the conclusions.

2.29 **ST 6.3.7 -** Mr Tucker goes on to suggest flows are overstated by around 30%. This is not correct. They are not overstated they just include both the development and local traffic flows. This has been updated in the December 2020 and January 2021 addendums with a separate MAM development zone for the proposal, but the separate zone makes no material impact on the assessment. Mr Tucker also states that the previous modelling had different loading points to where the developments access points would be, this again is in part due to using an existing model zone which also covered the Bloors Lane area and therefore needed a zone loading point to Bloors Lane. In the December 2020 and January 2021 modelling work (Appendix N and O of my Proof) with the new development zone the loading points accurately reflect the access points to the development. The MAM modelling does therefore accurately represent the development impact.

2.30 **ST 6.3.8** – Mr Tucker indicates that the alleged 'flaws' he identified with the October 2020 assessment were "said to be addressed" in the December 2020 and January 2021 addendum. While, for the reasons I set out above, I do not accept that the October 2020 assessment was flawed, it is notable that he does not repeat his criticisms of the December 2020 and January 2021 addendums.

2.31 **ST 6.3.9 -** Mr Tucker concurs with our assessment that weight should be placed on the MAM in particular the December 2020 and January 2021 assessments (CD12.3 and CD12.4) for scenarios 3 and 6 (although the council's other assessments still remain relevant and important). Although these scenarios are most preferable to the appellant, they don't ultimately materially change the conclusions of the assessment.

Model Validation

2.32 **ST 6.4 -** Mr Tucker states that the MAM has only been developed and validated for the local plan modelling work. This clearly makes little sense given Medway Council published guidance in 2018 on their own website for the use of the MAM for transport assessments for planning applications for residential developments such as the proposed development on the land off Pump Lane (see Appendix A of my Proof).

He quotes 10.3 of the MAM Validation report (CD 12.5), namely:

> "The microsimulation model has been calibrated and validated at a wide-area level and, as such, may not fully reflect all driver behaviour and interactions at a very local level. Further calibration and validation of the microsimulation model may be required when assessing schemes in some areas, particularly on parts of the network that have not been subject to detailed traffic flow and journey time validation. "

2.33 The key words in the above text is "may" and the last line. As I have demonstrated in Tables 1 to 6 of this rebuttal the local MAM validation against observed local link and turn counts and journey times is both detailed and of a very high order and far exceeds the DfT validation requirements in TAG Unit 3.1. The local model validation was checked as part of Sweco's modelling work and no further calibration or validation was needed. Mr Tucker's comments can therefore be dismissed.

2.34 **ST 6.4.3 - ST6.4.5 and ST6.4.7** Mr Tucker goes on to erroneously state that the MAM's microscopic model does not meet the validation criteria set out in TAG Unit 3.1 regarding the PM link and turn flows. However, he has mis-represented what the guidance actually says, this is outlined in TAG Unit 3.1 section 3.3.10, and shown in **Figure 4** below. The guidance clearly states in the last sentence of 3.3.10 that the validation should be regarded as satisfactory if at least 85% or more of the traffic counts satisfy **either** the GEH **or** DMRB criteria. Mr Tucker has mistakenly just applied either a) **only** the GEH criteria or b) **only** the DMRB criteria and therefore drawn a false conclusion. Based on the correct application of the guidance, the calibration statistics, as actually reported in Table 11 of page 60 of the MAM Validation report (CD 12.5) for the PM link and turn flows for the microscopic model are **91.1%** and **92.6%** which are clearly shown in **bold**. Table 11 in the MAM Validation report is replicated in **Figure 5** below. The MAM microscopic model therefore comfortably passes the DfT validation criteria of 85% of links/turns meeting either criteria and can therefore be considered robust. Mr Tucker's mistake regarding validation and guidance is then repeated in ST6.4.7, he again mis-represents what is stated in TAG (**Figure 4**). His assertions once again can therefore be dismissed.

Figure 4 DfT TAG link and turn validation criteria (TAG Unit 3.1, section 3.3.10)

Link Flow and Turning Movement Validation

3.3.10 For link flow validation, the measures which should be used are:

- the absolute and percentage differences between modelled flows and counts
- the GEH statistic, which is a form of the Chi-squared statistic that incorporates both relative and absolute errors, and is defined as follows:

$$GEH = \sqrt{\frac{(M-C)^2}{(M+C)/2}}$$

where: GEH is the GEH statistic

M is the modelled flow

C is the observed flow

These two measures are broadly consistent and link flows that meet either criterion should be regarded as satisfactory.

3.3.11 The validation **criteria** and **guidelines** for link flows and turning movements are defined in Table 2.

Table 2 Link Flow and Turning Movement Validation Criteria and Guidelines

Criteria	Description of Criteria	Guideline
1	Individual flows within 100 veh/h of counts for flows less than 700 veh/h	> 85% of cases
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	
2	GEH < 5 for individual flows	> 85% of cases

Figure 5 Calibration Statistics for MAM Microscopic Model by time period against DfT TAG Criteria (Unit 3,1

Table 11: Traffic Flow Calibration Summary – Microscopic Model

Criteria	Description	Percentage Meeting Criteria	
		Sections	Turns
AM Peak Hour			
1	Individual flows within 100 veh/h of counts for flows less than 700 veh/h	91.7%	93.4%
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	92.0%	93.4%
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	88.9%	100.0%
2	GEH < 5 for individual flows	87.6%	86.3%
Percentage meeting either criteria 1 or 2		**93.2%**	**94.4%**
Inter Peak Hour			
1	Individual flows within 100 veh/h of counts for flows less than 700 veh/h	96.7%	97.5%
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	95.6%	97.6%
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	100.0%	-
2	GEH < 5 for individual flows	92.4%	92.1%
Percentage meeting either criteria 1 or 2		**97.0%**	**97.5%**
PM Peak Hour			
1	Individual flows within 100 veh/h of counts for flows less than 700 veh/h	90.1%	91.6%
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	90.2%	93.7%
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	88.5%	100.0%
2	GEH < 5 for individual flows	83.5%	84.3%
Percentage meeting either criteria 1 or 2		**91.1%**	**92.6%**

2.35 **ST 6.4.6 -** Mr Tucker makes unsubstantiated remarks regarding 20 locations where modelled flows are significantly different to observed but provides no evidence of this nor the locations in question (apart from one instance which is addressed below).

2.36 It has already been established in my proof and in section 2.09-2.11 of this rebuttal that the MAM is very well validated across Medway and locally near the scheme including subnetwork 3 in Rainham where over 97% of links in the AM and PM period pass the DfT validation criteria and 100% of journey time routes do too. This is much higher than the requisite 85% threshold in the guidance.

2.37 Mr Tucker has also incorrectly commented that the A2 Rainham High Street PM flow is poorly validated (observed 339 versus simulated 626). He has actually mis-identified the link in the model validation report appendices (p275) which actually represents Chatham High Street. **Figure 6** below shows the true location of this link. This is not in the local count data used for the local calibration or validation as it is nearly 6 kms away from the proposed development and has no impact. It is not in any of the subnetworks. The flow validation on the A2 in Rainham passes the DfT criteria and therefore the conclusions of the MAM assessment that the proposed development has a significant impact on the A2 in Rainham are robust. Mr Tuckers erroneous statement can therefore be dismissed.

Figure 6 The High Street link that Mr Tucker refers (Chatham High St not Rainham High St)

2.38 **ST 6.4.8** Regarding route journey time selection, Tables 2, Table 4 and Table 6 of my rebuttal provide more detailed route journey time validation results which are more closely related to the development.

2.39 **ST 6.4.9 – 6.4.14** - Regarding the journey time validation, as can be seen in Table 2 of my rebuttal all local journey time routes in sub network 2 on the A289 corridor pass the DfT validation criteria and are less than 15kms (as per TAG guidelines). Indeed, all journey time routes for all the 3 sub networks used for detailed modelling to assess the impact of the proposed development in both time periods pass the DfT criteria (see Tables 4 and 6 as well). Mr Tucker has erroneously picked longer routes away from the scheme or locations of little relevance to the scheme such as Chatham. Curiously some of the examples Mr Tucker provides pass the DfT criteria anyway, for example Route 7 modelled times are within +/-15% of the observed times across the entire route which contradicts the point Mr Tucker is making. As I have demonstrated in Tables 2, 4 and 6 in this rebuttal, the journey time validation passes 100% of the assessed local routes passing. This contrasts with the appellant's modelling approach which cannot model journey times as it is relies on simplistic isolated junction models, and even with these models appears to have no calibration or validation of either delays or queues to observed data.

2.40 **ST 6.4.15-6.4.17** - Mr Tucker mistakenly describes the MAM as "too strategic" despite it being both a macroscopic (strategic) and microscopic (detailed) model which as I have demonstrated is very well calibrated and validated both across Medway and locally. Mr Tucker erroneously states there is a lack of local validation:, it is clear that there is local validation as outlined in section 2 of this rebuttal with some 17 observed local link/turn counts and 12 observed local journey time routes for each modelled period (see Figures 1 to 3) used to validate the model locally, using a robust dataset as stated in paragraph 2.13 of this rebuttal letter. This contrasts with the appellant's simplistic modelling approach which relies on a handful of single day manually classified turn counts and no other data. It is clear that the MAM offers far greater robustness, local validation and functionality for the traffic impact assessment. It is always worth re-iterating that the MAM is the only appropriate tool to capture the capacity impacts of the development traffic on the congested corridors such as the A2 and A289 due to its ability to model junction interactions including traffic queuing along corridors. The appellant's modelling approach does not capture this and therefore it is no surprise that the appellant's modelling inaccurately forecasts less severe impacts than the Council's assessments.

ST 6.5 - Future Year / Cumulative Impact Assessment

2.41 **ST 6.5.3** - Mr Tucker refers to there being no requirement in the NPPF for the scheme to be considered against yet unallocated local plan sites. Mr Tucker appears to mis-understand what the "with development" scenario has been assessed against. As outlined in section 5 of my proof the "without development" scenario only includes committed developments, there are no unallocated local plan sites included.

2.42 **ST 6.5.6-6.5.7** - Mr Tucker references section 7.3 of TAG Unit M4 regarding the Reference Forecast. It should be noted that:

- Tempro growth (the Departments projections) have been applied to external zones in the MAM and therefore affect internal to external trips, external to internal trips and external to external trips, the MAM therefore allows for population growth and GDP.

- Internal Medway zones use Medway Council's committed housing and other development planning data (see section 5 of my proof) which will be more up to date than the planning data within Tempro. This therefore does provide a consistent basis to compare developments and schemes within Medway.

- The point being made is redundant anyway as it relates to scheme assessment where different highway schemes across the country compete for DfT funding which is not applicable to the funding arrangements for a housing development.

- Finally, as outlined in Table 3 in section 5 of my proof, the forecast MAM car traffic growth between base year and 2028 is some 3 to 4% less than the Tempro growth (circa 13% v circa 16%), so the application of the higher Tempro growth for internal Medway zones would only increase the traffic levels in the future assessment year, resulting in less spare network capacity to accommodate development traffic and weaken the appellant's case further.

Section 6.6 - Link **Capacity Impacts**

2.43 **ST 6.6.4** - Mr Tucker references Table 4 in his Proof which shows changing flows between the with and without development scenario in 2037 and the resultant level of service changes for the journey time route in sub network 2. It identifies 2 routes in the morning peak and 4 in evening peak where there are small reductions in flow yet an increase in journey time and contends that it is not credible to conclude there would be a degradation in the movement of traffic. Mr Tucker's analysis and conclusions are flawed for several reasons:

a) Mr. Tucker has selected a link flow to represent a corridor of highway links over distances of 1.5km (i.e. Medway Tunnel to Gillingham Gate Road). Clearly there could be traffic turning off and onto these corridors, so the flows do not represent the end to end corridor demand. Indeed, as the network gets more congested due to the additional development traffic greater re-routing (turning off and on) could be expected.

b) The microscopic modelling is time profiled, any breakdown in traffic resulting in queuing at the start of the model period will result in flow metering (less flow throughput) in the full hour modelled period however a degradation in the journey time level of service would still result, and this is the most likely explanation.

c) The flows cannot necessarily be linked to the levels of service, it is important to consider blocking back effects and lane changing behavior which would only be captured in the detailed MAM subnetworks.

2.44 Table 4 therefore is of little use. It is based on actual flow (flow that can get through in the hour period) whereas demand flow (the flow at the trip matrix level that wants to use the link irrespective of capacity constraint) which will clearly be higher with the additional development demand. The latter would be a more useful comparison and would certainly show an increase due to the proposed development traffic, free of flow metering effects. The same rebut applies to ST 6.6.12 and Table 5 regarding sub network 3 and the erroneous conclusions Mr Tucker has drawn once more.

2.45 **ST 6.6.14 -** Mr Tucker applies the same flawed logic to subnetwork 7, although Lower Rainham Road is less trafficked than the congested A2 corridor. The reason why a small change in flow will have a significant impact on Lower Rainham Road is the lack of capacity. To further this point **Figure 7** and **Figure 8** show Lower Rainham Road to the east and west of Pump Lane respectively. As can be seen in **Figure 7**, Lower Rainham Road to the east of Pump Lane has a shared single lane for traffic in both directions controlled by traffic signals. It is therefore unsurprising given the low capacity that an additional 95 cars an hour due to the development (Table 6 of Mr Tucker's proof) would result in a significant impact at this point. Similarly, **Figure 8** shows the narrow-congested lanes in 2019 on Lower Rainham Road to the west of Pump Lane, the additional 182 vehicles from the development (or over 30% increase in flows on top of the without development scenario flows) could therefore be expected to result in a significant impact, as forecast by the MAM.

Figure 7 Lower Rainham Road to the immediate East of Pump Lane

Figure 8 Lower Rainham Road to the immediate West of Pump Lane

ST 6.7 - **Junction Capacity**

2.46 **ST 6.7.2 -** Mr Tucker lists 5 junctions where simplistic isolated junction modelling has been undertaken devoid of any queue/delay validation or any allowance of wider re-routing or blocking back effects from other junctions on capacity in these congested corridors. The 2028 assessment which Mr Tucker in his proof has already identified as the appellant's preferred scenario identified more than the 5 junctions Mr Tucker highlights as being severely impacted by the development. Mr Tucker has omitted the following junctions that are severely impacted by the development (CD 12.3, chapter 4) these include:

- A289 (Ito Way / Sovereign Boulevard)
- A2 Otterham Quay Lane / Meresborough Road
- A289 / Gillingham Gate Road

- Eastcourt Lane / South Avenue
- In addition, significant issues in delays are forecast on Lower Rainham Road westbound, as well as on the A2 and A289 corridors as a result of the proposed development.

2.47 **ST 6.7.4 -** Once again, Mr Tucker makes the inaccurate assertion without any evidence at all, that the model validation report confirms a lack of accuracy of the MAM junction modelling. I clearly outline in section 2 of this rebuttal in tables 1, 3 and 5 that the turn flow validation at junctions for the 3 subnetworks and for both morning and evening peaks pass the DfT validation criteria between 97% and 100% of locations/movements for each subnetwork where detailed local modelling has been undertaken. This is a very good level of local validation and far higher than the guidance threshold of 85%. In addition, 100% of the local journey time routes pass the DfT validation criteria (only 85% required) which would include junction delays and the impact of corridor queuing which the appellant's approach does not. All the information I present in section 2 on junction and journey time validation can be readily drawn from the model validation report (CD12.5).

2.48 **ST 6.7.5 -** For all the reasons set out in my original proof and my rebuttal Mr Tucker's assertion that the "scheme of mitigation is demonstrably sufficient" is simply wrong. The mitigation has been tested in MAM (CD 12.3) with the proposed development and the traffic impact at several junctions and corridors are severe.

2.49 **ST 6.7.9 - 6.7.10 -** Mr Tucker mis-understands the reasons why the operational performance on subnetwork 3 deteriorates. This is due to how the changes in the zone loadings affects the routings of development traffic. This is due to the removal of the Bloors Lane connector from the development zone, which was requested by the appellant and duly undertaken by Sweco on behalf of Medway Council. Due to this removal, development traffic that previously selected Lower Bloors Lane to head east, now routes via Pump Lane southbound, heading towards A2, ultimately impacting on the operations of subnetwork 3.

2.50 **ST 6.7.11 -** Mr Tucker goes on to incorrectly state that the wider impacts except for scenario LRR 3 could be expected to be the same across scenarios but misunderstands that the zone loading does have an impact in that eastward development traffic. This now routes south via Pump Lane and then east onto the A2 with the removal of the connector from the development zone to Bloors Lane, as explained in the council's January modelling work (Appendix O of my Proof of Evidence).

2.51 **ST 6.7.12 -** Finally, Mr Tucker again misrepresents the findings in the January 2021 addendum (CD 12.3). He inaccurately states that no severe traffic impact results from the development in subnetwork 7 when it is clearly stated in section 4 of the addendum that Lower Rainham Road westbound travel time degradation is severe (additional 10 minutes). This severe impact as a result of the proposed development has been consistently highlighted in all the MAM assessments and reports provided to the appellant.