Appendices Contents

Appendix A

Transport Assessments

Guidance Note

Medway Council
Serving You

Published January 2018

Guidance Note
Transport Assessments

Introduction

1. This Guidance Note is intended for applicants preparing planning applications for strategic and major developments in Medway. It will introduce the new Medway Aimsun Model and an optional protocol for its use in Transport Assessments (TAs).

   In summary, the protocol involves:

   - a preliminary recommendation by officers;
   - collaboration between officers and the applicant;
   - a licencing arrangement for the use of the model itself; and
   - impartial validation on behalf of the council.

2. Collaborative working will ensure that the council can effectively plan for growth, while the potential advantages may result in a more efficient planning process, leading to increased confidence, reduced costs and higher quality developments.

Growth

3. The North Kent Strategic Housing and Economic Needs Assessment (March 2015) established the development needs for housing, employment and retail in Medway to 2035:

   - 29,500 homes;
   - 155,000m^2 industrial land;
   - 164,000m^2 warehousing land;
   - 50,000m^2 office space;
   - 35,000m^2 comparison retail space; and
   - 10,500m^2 convenience retail space.

4. The scale of growth in Medway is challenging; the resident population is forecast to increase by one-fifth to 330,220 in 2035. Residents have stated their concerns about traffic generation and congestion during early rounds of consultation for the new Local Plan.

Local Plan

5. The council is preparing a new Local Plan to provide direction on the future growth of the area for the period up to 2035. The aim of the new Local Plan will be to ensure that Medway grows sustainably, to provide land for housing, employment, infrastructure and services, whilst protecting the area's environment and heritage. Subject to outcomes of an independent examination by a planning inspector, it is anticipated that the new Local Plan will be adopted in 2020.

Medway Aimsun Model

6. The council commissioned the new Medway Aimsun Model in 2016. The model covers the Medway road network, including the next major junction. The model has been built in Aimsun, enabling the simultaneous modelling of traffic impacts and possible mitigation strategies at the macro (i.e. whole road network) and micro (i.e. localised) scale.

7. The 2016 base year model is complete; it is the authoritative transport model for Medway, having been subject to calibration and validation by Highways England.

8. Note that the model does not have mode split functionality, however this could be addressed through future investment.

9. Committed developments and other highways schemes have been incorporated in order to undertake the Strategic Transport Assessment, i.e. part of the transport evidence base to support the new Local Plan. Future year reference cases to 2035 have been developed in line with the current stage of work towards the new Local Plan.

10. The council commissioned an Interim Assessment to support the most recent Local Plan consultation. This was a macro assessment, based on developments with planning permission and other broad locations with the potential for development up to 2035. This assessment demonstrated that congestion will increase significantly, although it did not include any mitigation or sustainable transport initiatives which will be identified through the new Local Plan.

11. This Guidance Note sets out how the model can be used in TAs.

National planning policy and guidance

12. The protocol set out at page 4 is supported by national planning policy and guidance.

13. The National Planning Policy Framework states that:

'All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- *the opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure*
- *safe and suitable access to the site can be achieved for all people*
- *improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.'*[1]

[1] NPPF Para 32

14. This is reinforced by Planning Practice Guidance, which sets out key principles for TAs, including the need to 'build on existing information wherever possible' and be 'tailored to particular local circumstances'.[2] Planning Practice Guidance states that:

> *'It is important to give appropriate consideration to the cumulative impacts arising from other committed development (i.e. development that is consented or allocated where there is a reasonable degree of certainty will proceed within the next 3 years). At the decision-taking stage this may require the developer to carry out an assessment of the impact of those adopted Local Plan allocations which have the potential to impact on the same sections of transport network as well as other relevant local sites benefitting from as yet unimplemented planning approval'*.[3]

15. Planning Practice Guidance highlights the 'need for, scale, scope and level of detail required of a Transport Assessment or Statement should be established as early in the development management process as possible …'.[4] This is the first stage of the protocol set out at page 4.

[2] Planning Practice Guidance - Para: 007 Reference, ID: 42-007-20140306 (6 March 2014)
[3] Planning Practice Guidance - Para: 014 Reference, ID: 42-014-20140306 (6 March 2014)
[4] Ibid

Protocol

16. The protocol will enable collaborative working between the council and applicants:

1. Preliminary recommendation
Integrated Transport will consider the potential use of the model according to criteria. The criteria will be in line with Planning Practice Guidance[5], including the planning context of the proposal, road network capacity, road trip generation and safety implications. The planning officer will discuss the preliminary recommendation with the applicant at the pre-application meeting / at the earliest opportunity. Clearly it would be at the applicant's discretion whether to accept the preliminary recommendation or to undertake a TA based on independent modelling. However, please note, the model will enable the council to assess and potentially contest TAs based on independent modelling. The advantages in using the model have been set out below.
2. Pre-application
Subject to the preliminary recommendation, the applicant and council officers will discuss the intentions, expectations and opportunities for the TA at pre-application stage / at the earliest opportunity. This may form part of a Planning Performance Agreement. The appropriate study parameters (i.e. area, scope and duration of study) will need to be agreed between the applicant and the council. Highways England will be consulted at this stage if the scheme is likely to impact the Strategic Road Network.
3. Licence
The council will issue a copy of the model under a unique licence number for the applicant to use in the TA. Subsequent planning applications for the same site will need to be based on the latest version of the model. Therefore, each licence will be strictly tied to a planning application. The council will need to maintain the integrity of the model by discouraging unlicenced distribution, which could lead to TAs based on superseded versions of the model. TAs must carry the allocated unique licence number for validation.
4. Transport Assessment
The applicant will appoint a suitable consultant to undertake the TA. The council will share a list of approved companies to assist applicants in appointing a suitable consultant, if required. The council will liaise with the applicant's consultant to ensure that committed developments and proposed site allocations have been included as appropriate.
5. Impartial validation
Modelling outputs will be validated by a consultant appointed from an approved group of companies on behalf of the council and made available to Highways England.

[5] Ibid

Fee structure

17. The fee structure (excluding VAT) is set out below:

Application type	Licence	Impartial validation	*Total*
Strategic	£6,100	£3,900	*£10,000*
Major	£3,600	£2,900	*£6,500*

18. This is likely to be arranged under a Planning Performance Agreement in the first instance. Note the council reserves the right to revise the exact fees periodically.

19. Strategic developments comprise:

    - 50 or more residential units; or
    - 5,000 sqm floorspace and over; or
    - development on a site of 2 ha or more; or
    - proposals requiring an Environmental Assessment

    Major developments comprise:

    - 10 to 49 residential units; or
    - 1,000 to 4,999 sqm floorspace; or
    - development on a site of 2 ha or less.

20. The council has made a substantial investment to develop the model. The licence fee will be allocated to the ongoing maintenance costs of the model, e.g. annual updates to baseline datasets. Highways England will be consulted to ensure that the model remains fit for purpose.

21. In addition to the licence fee, the applicant will meet the costs of impartial validation on behalf of the council. This will be chargeable once the planning application has been received and validated. The council will expect the implications to be considered at the macro scale to inform strategic infrastructure planning. The council will be responsible for this appointment. Modelling outputs will be made available to Highways England.

Advantages for applicants and the council

22. The protocol may result in a more efficient planning process, leading to increased confidence and reduced costs. Clearly applicants will not need to develop an independent model and, in most instances, there will be no need to undertake traffic surveys; the baseline has been established in the model. However, traffic surveys for minor roads in the vicinity of the proposal may be necessary.

23. The outputs, such as computer simulations, could be used in communicating the impacts and any proposed mitigation measures to Members and the general public.

24. The simultaneous modelling at the micro and macro scale will enable applicants to demonstrate the impacts on the Strategic Road Network to Highways England. This will also enable the council to understand the wider, cumulative traffic impacts of development; this could be used to inform strategic infrastructure planning, e.g. to support regional and national bids for funding.

25. This collaborative process will ensure that the council can effectively plan for growth, while the site-specific mitigation and design considerations may result in higher quality developments.

Contact

Please send enquiries to: planning.policy@medway.gov.uk

Appendix B

Appeal Decision

Hearings held on 9 January and 21 February 2018

Site visit made on 9 January 2018

by Mike Fox BA (Hons) DipTP MRTPI

an Inspector appointed by the Secretary of State for Communities and Local Government

Decision date: 22nd March 2018.

Appeal Ref: APP/D3315/W/16/3157862
Land at Hartnell's Farm, Monkton Heathfield Road, Monkton Heathfield, Taunton, Somerset, TA2 8NU

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission under section 73 of the Town and Country Planning Act 1990 for the development of land without complying with a condition subject to which a previous planning permission was granted.
- The appeal is made by Strategic Land Partnerships against the decision of Taunton Deane Borough Council.
- The application Ref 48/16/0033, dated 27 April 2016, was refused by notice dated 30 August 2016.
- The application sought outline planning permission for residential development up to 320 dwellings, green infrastructure including public open space, associated works and demolition of buildings with all matters reserved including the point of access on land at Hartnell's Farm, Monkton Heathfield without complying with a condition attached to planning permission Ref 48/13/0008, dated 26 November 2015.
- The condition in dispute is No 12 which states that: *No more than 150 dwellings shall be constructed and occupied until the Western Relief Road, as required by the Taunton Deane Core Strategy, has opened for use*.
- The reason given for the condition is: *In the interests of highway safety and to ensure that the development does not result in an unacceptable overloading of the existing highway network*.

Decision

1. The appeal is allowed and outline planning permission is granted for residential development up to 320 dwellings, green infrastructure including public open space, associated works and demolition of buildings with all matters reserved including the point of access on land at Hartnell's Farm, Monkton Heathfield in accordance with application Ref 48/16/0033, dated 27 April 2016 without compliance with condition number 12 previously imposed on planning permission Ref 48/13/0008, dated 26 November 2015 and subject to all the other conditions imposed on that permission.

Preliminary Matters

2. A second application (Ref 48/16/0025), which is a resubmission of the appeal application (same proposal, same site), was granted planning permission on 26 May 2017. Unlike the appeal application, the second application includes a Section 106 Agreement, which makes provision for a financial contribution of £1 million towards the provision of the Western Relief Road (WRR) prior to or on commencement of development.

3. Although all matters were reserved in the original outline application for future approval, an illustrative layout drawing shows a possible location for the vehicular access in the form of a priority junction. The Appellant also indicated that the precise form of this access would be determined in consultation with the highway authority, including the possibility of either a signalised junction or a roundabout, and a couple of options were submitted[1].

4. In determining the appeal, I have taken account of the Statement of Common Ground (SCG), dated December 2017, signed by the Appellant and the Local Planning Authority. This document states both the areas of agreement and those aspects which are still an issue between the main parties.

5. The areas of agreement state: (i) housing land supply figures are not relevant to the determination of this appeal; (ii) the dispute over the impact of the proposed development on the local highway network is confined to the junction of the A3259, Milton Hill and Greenway; (iii) the highway authority's automatic traffic counter (ATC) data is correct and can be relied upon; (iv) the development and occupation of 320 dwellings on the appeal site will not have a severe impact on the highways network; (v) the traffic on the network in 2017 is lower than that forecast in 2013 for 2018; and (vi) there is a planning permission for the construction of the WRR, which must be implemented by 9 March 2018, and a mechanism for its funding is included within a signed Memorandum of Understanding (MOU).

6. The matters still in dispute centre on traffic considerations and partly cut across the areas of agreement. In particular, the highway authority contends that the Appellant's conclusions on the traffic counts since the introduction of the Bridgwater Road bus gate are premature, and that there is insufficient evidence to conclude that the traffic pattern will settle at the current recorded level. I will address this matter later in my decision.

Main Issue

7. The main issue is whether condition no (12) attached to planning permission Ref 48/13/0008 is necessary and reasonable for the satisfactory development of up to 320 dwellings at Hartnell's Farm, having regard to the impact of the 'full' proposal on the local highway network, including the principles of sustainable development, highway safety and the satisfactory flow of traffic.

Reasons

8. The appeal site is agricultural land, to the north-west of the A3259 main road, about 5 kilometres north-east of Taunton town centre. The 16.1 ha site lies on the north-west edge of the Monkton Heathfield urban extension, which is being developed into a large, sustainable neighbourhood.

Policy background

9. Policy SS1 of the Core Strategy[2] makes provision for a new sustainable neighbourhood comprising 4,500 new homes, in addition to 22.5 ha of employment land, other community uses and strategic landscaping, to be delivered at Monkton Heathfield. This will form phase 1 of a north-eastern urban extension of Taunton. In addition to the number of homes in Phase 1,

[1] Hearing Document 12.
[2] Adopted Taunton Dean Core Strategy 2011-2028; September 2012.

the Council has agreed to the release of interim sites, such as Hartnell's Farm, to ensure a 5 year supply of available housing land in the Borough.

10. Policy SS1 highlights the importance of strategic highway improvements as part of an integrated strategy for the new development at Monkton Heathfield. Improvements to the A38 and A3259 are identified as a prerequisite of the urban extension, and the policy identifies two specific highway schemes as part of its approach. The first is a new eastern development spine, the Eastern Relief Road (ERR) which has recently been opened to traffic. It is designed to be converted to a dual carriageway should this be necessary.

11. The second scheme is a new western development spine, the Western Relief Road (WRR), to the south-west of the appeal site. The WRR has not been constructed in its entirety[3], and it is a material consideration in this appeal. In addition, the former A38 at Bridgwater Road has been closed to private vehicles, with the implementation of a bus gate at its southern end. Through traffic has been diverted to the ERR, which is now designated as the A38. A second bus gate is proposed on the A3259, just to the north of the appeal site, with through traffic to be diverted to the ERR, to be implemented once the WRR is open to traffic.

The Main Issue – Highways Impact

12. The role of the WRR, which is identified on the Monkton Heathfield Concept Plan in the Core Strategy, is to connect the A38 and the A3259 on a route to the south-west of Monkton Heathfield. By linking these two roads, and connecting to the ERR, the WRR will take a significant amount of the existing vehicular traffic using the A3259, which will provide access to the appeal site.

13. The Council considers that condition (12), which limits the number of dwellings that can be constructed and occupied to 150 on the appeal site until the WRR has opened for use, is necessary for highway safety and to ensure that the proposal does not result in a cumulative severe vehicular impact on the existing highway network.

14. The Council considers that the cumulative impact on the existing A3259, including the operation of the A3259/Greenway/Milton Hill junction, and the Milton Hill/Bridgwater Road junction, which is located a short distance to the south of the appeal site in the absence of condition (12) would be severe[4]. It therefore considers that the proposal would be contrary to paragraph 32[3] of *the Framework*[5], which states that development should be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

15. There is no definition of the term 'severe' in either *the Framework* or in the Government's Planning Practice Guidance (PPG). There was a discussion at the Hearing into what is meant by 'severe', and the Appellant drew my attention to an appeal decision and an Inspector's report to the Secretary of State which consider the term[6]. In the report to the Secretary of State[7], the Inspector

[3] A short section of the WRR has been built at the eastern end of the route, to enable access to the housing development at Aginhills.
[4] This was confirmed at Day 2 of the Hearings and in the Appellant's Technical Note 2, Section 1 – Introduction and Overview.
[5] DCLG: National Planning Policy Framework (NPPF) (*the Framework*); March 2012.
[6] Hearing Documents 8 and 9.
[7] Hearing Document 8.

comments (paragraph 34) that the term 'severe' sets a high bar for intervention via the planning system in traffic effects arising from development, stating that: *"The Council agreed that mere congestion and inconvenience was not sufficient to trigger the 'severe' test but rather it was a question of the consequences of such congestion*". I agree with my colleague's comments, which have influenced my determination of the appeal…

16. In the above mentioned appeal decision[8], the Inspector considers (paragraph 25f), and I agree with him, that the queuing of vehicles is a relevant matter in looking at cumulative impact of development on the local highway network.

17. The main parties considered that the critical elements in assessing whether the impact was severe were firstly, increase in the number of vehicles likely to be generated by the proposed development in relation to the capacity of the road to accommodate such an increase, both in terms of free-flow of traffic and highway safety. In addition, the ability for pedestrians to cross the main road conveniently and safely and the ease of vehicles to gain access to the main road from side streets and access points, were agreed to be important factors in assessing potential severity of impact.

18. In considering whether the cumulative impact of the 'full' proposal at Hartnell's Farm on the local highway network would be 'severe' (i.e. with the removal of condition (12)) and in the light of the written submissions and discussion at the Hearings, I have identified four relevant considerations:

Consideration 1 – Projected traffic flows on the A3259 Corridor as a result of the full proposal in terms of congestion and highway safety

19. In looking at the projected traffic flows along the A3259, it is necessary to consider the impact of the full development on the 'carrying capacity' of the road; would it significantly erode the free flow of traffic and driver/pedestrian safety and would the critical junctions be overloaded?

20. The Appellant's Technical Note 2 (TN2), dated January 2014, analyses traffic conditions at both the Milton Hill/A38 (now the declassified Bridgwater Road) junction and the A3259/Greenway Junction. It is based on three development scenarios over the period 2015 - 2020, for 100, 150 and 320 units of housing.

21. TN2 states that in the forecast year 2020, the Milton Hill/Bridgwater Road junction would continue to function "comfortably", even with the full 320 dwellings at the appeal site.

22. The modelling for the A3259/Greenway Junction, however, reveals serious congestion, even at the 2015 baseline scenario. It is expected to continue to operate above the 85% threshold. However, TN2 shows that with the inclusion of the proposed signalised crossings on the A3259, this figure reduces from 109% capacity, in the 150 dwelling scenario, to 100.1%, for the AM peak, i.e. 9% betterment, with a slight rise to 103.0% for the PM peak, still representing a substantial betterment over the 2020 base year. The 320 dwelling scenario gives a higher figure of 103.9% in the AM peak and 105.6% for the PM peak.

23. TN2 concluded that the development at Hartnell's Farm should be capped at 150 dwellings until such time as both the ERR and WRR were constructed and opened to public use, based on the operational capacity of key pinch points

[8] Hearing Document 9.

(i.e. the two above-mentioned junctions) being safeguarded within reasonable levels. TN2 was also prepared against an expectation by the main parties that the development of the WRR was "imminent".

24. Two updated traffic reports were submitted by the Appellant since TN2. The first, dated January 2016, showed traffic growth was lower than forecast when the original Transport Assessment (TA) was produced in 2013. The highway authority stated that January is not considered to be a 'neutral' month for traffic surveys[9], and considered the timing of the survey to be premature in being able to assess the full effects of the recent opening of the ERR, whilst there were also several temporary road closures in the area at that time. However, the SCG's Matters of Agreement (section 7, bullet point 7) indicate that the actual traffic on the network in 2017 is lower than that forecast in the 2013 TA for 2018[10].

25. Concern was expressed by the highway authority that the full effect of the implementation of the Bridgwater Road bus gate in September 2017 could result in increased traffic using the A3259 past the appeal site; ideally, more time was needed to understand the effects of both the ERR and the bus gate on traffic patterns in Monkton Heathfield.

26. The Appellant submitted a further updated traffic statement, 'Supplementary Transport Statement of Evidence (STS) No 3'[11], dated 14 February 2018. It provides data based on highway authority vehicle counts at its ATC on the A3259, a short distance to the north-east of the appeal site. This shows four months of traffic data recorded since the implementation of the Bridgwater Road bus gate, i.e. from September to December 2017. The STS shows not only a fall for both AM and PM peak traffic from October to December in 2017 compared to 2016, but importantly, a sharp decline in both the AM and PM peaks to below the December 2016 levels, in the region of 8.6% for the AM peak and 10.3% for the PM peak.

27. The veracity of these traffic figures was not challenged by the local planning authority, although members of the public pointed out that even if the amount of traffic has declined (which they doubted), the noise impact from large vehicles using the A3259, especially after midnight, remains high. In view of the late submission of the STS, and little officer time to digest it, the local planning authority was given additional time to make a written response.

28. It appears from the latest data that traffic has adjusted to both the Bridgwater Road bus gate and the ERR. There is no evidence to suggest that more traffic will use the A3259 in preference to the ERR. In fact the opposite appears to have happened. The ERR would be the 'obvious' through route for the majority of drivers, even before the opening of the WRR, in terms of signing and quality/ alignment of the highway, whilst the proposed pedestrian crossings on the A3259 and the impact of the proposed access to the appeal site would further discourage traffic from using this route. An additional supporting factor is that the ERR provides direct access to the M5 as well as to Taunton town centre.

[9] DMRB Volume 13, Part 14.
[10] This conclusion is also set out in SCDC's second bullet point in its comments on the Appellant's Rebuttal, in the form of a Memorandum dated 20 December 2017 (although the date is given erroneously as 2018).
[11] Examination Document 13.

29. Both main parties submitted late final documents: a SCC Memorandum[12] maintaining its concern that the removal of the 150 dwelling cap would be premature, and a response by the Appellant[13], arguing that the latest figures show an overall decrease in peak hour traffic between 2016 and 2017. Whilst I accept there has been relatively little time since the implementation of the Bridgwater Road bus gate in September 2017, the SCC Memorandum acknowledges "some spare capacity" due to considerable network changes, and the ATC figures show a decrease in traffic for eight out of the twelve months over 2016/17, including a significant decrease in the December totals. I accept that part of the reason for the overall drop in peak flows could be that the peak period has spread from one to over two hours in recent years, but the fact remains that the figures show an overall reduction in peak traffic.

30. Based on the above information, and in particular the additional, updated highway survey work in the STS and the highway authority's acceptance at the Hearing that the projected traffic numbers have fallen, I do not agree that the cumulative traffic impact generated by the increase from 150 to 320 dwellings at Hartnell's Farm would result in unacceptable congestion on the A3259 in the vicinity of the appeal site. On this basis, I conclude that the impact would not be 'severe' with reference to paragraph 32 of *the Framework*.

Consideration 2 - Infrastructure improvements along the A3259 Corridor

31. The Appellant argues that the existing and proposed infrastructure improvements along the A3259 Corridor would enhance pedestrian access both along and across the main road, and enable key junctions to operate within capacity. These improvements include the following:

    (i) Relocated 30 mph speed limit sign further to the north-east, to reduce legal vehicle speeds at the entrance to the Hartnell's Farm. This is to be reinforced by a village gateway feature.

    (ii) Three signalised pedestrian crossings on the A3259 between its junction with the A38 to the north-east and Yallands Hill to the south-west, one of which is in place and operational.

    (iii) Sections of footway along the A3259 are to be improved to ensure a continuous 1.8-2m width.

    (iv) Several junctions are to be improved, most notably Greenway/Milton Hill/A3259.

    (v) The proposed access to Hartnell's Farm is to be in the form of either a roundabout or a signalised T junction.

32. These improvements would slow traffic and break up the continuous flow of vehicles into what were described at the Hearing as 'platoons', which would allow for the emergence of gaps to enable turning traffic to manoeuvre safely. The Appellant's modelling[14] shows that although vehicle delays would increase, this is not sufficient to cause a material impact on the road network.

33. I find no reason to doubt the robustness of the Appellant's traffic modelling. The projected traffic flows, delays and queue lengths would not be sufficient to

[12] Examination Document 26.
[13] Examination Document 27.
[14] For example included within the Appellant's Transport Statement; August 2016.

cause material harm to either safety or ease of traffic flow along the A3259 corridor, or to any other parts of the local highway network. On the basis of the traffic data discussed at the Hearing, I consider that the existing and proposed infrastructure improvements along the A3259 Corridor would improve pedestrian movement along and across the main road. I therefore do not consider that the impact on highway safety or on ease of traffic movement could be classified as 'severe'.

Consideration 3 – The potential for sustainable transport

34. The Appellant argues that the sustainable location of the appeal site means that it is likely that a high proportion of trips could take place by sustainable means without using the private car.

35. Clearly, not everyone would stop driving cars along the A3259 as a result of public transport improvements. I consider, however, that the combination of the appeal site's proximity to several facilities and services, such as schools and shops, and the likelihood of significant improvements to bus services (including the Taunton-Bridgwater rapid transit bus proposal), cycling and pedestrian routes coming to fruition, will have some effect in reducing the growth of vehicular traffic along the A3259.

36. From the evidence before me, I expect the proposals for sustainable transport along the A3259 would have some effect on reducing the volume of traffic, even if the amount of modal shift from the car turns out to be less than expected. I have already stated that the traffic impact of the full proposal would not be 'severe', so the effect of any modal shift would be likely to improve an already non-severe impact on the local highway network.

Consideration 4 – Implementation of the Western Relief Road (WRR)

37. Both parties agreed that the delivery of the road is not straightforward. The Council's situation update on the implementation of the WRR[15] maintains it is a critical part of the proposed strategic highway network for the new community of Monkton Heathfield, as outlined in Policy SS1. It states that its detailed design is almost complete, with the only matter holding back its delivery being the lack of a £1 million contribution, included in the Section 106 Agreement accompanying the second application for the same scheme (see Preliminary Matters above). The Council also stated its intention to start work on the WRR by 9 March 2018, before the expiry of the planning permission. It submitted a plan[16] showing the critical importance of the WRR in relieving the A3259.

38. The Council also submitted a schedule of estimated costs for the delivery of the WRR[17], amounting to £5.4 million, and outlined its concern that, in the absence of funding from the Appellant, there could be further delay in the delivery of this road. In the absence of the necessary funding for the WRR to come forward in the near future, the Council, supported by SCC, stated that the development of the full planning permission at Hartnell's Farm would result in severe cumulative highway impact. However, at the Hearing, the Council stated it would look to other potential finance to complete the road, such as through the Borough's recently granted Garden City status.

[15] Hearing Document 6.
[16] Hearing Document 2.
[17] Hearing Document 19.

39. The Appellant states[18] that the delivery of the WRR is in the hands of a third party, the Persimmon/Redrow Consortium (PRC) and that the Council is a party to the second deed of variation to a unilateral undertaking made under Section 106 of the Act[19] in relation to the planning application for Phase 1 of the Monkton Heathfield urban extension. The significance of this document is that it gives the owners at their absolute discretion up to ten years to complete the WRR. The Council has also removed the cap on the number of dwellings PRC can build without the completion of the WRR, from 651 to 900 dwellings on this phase. This indicates an acceptance by the Council that some latitude in the absence of the WRR is acceptable.

40. Despite the second deed of variation, it seems likely that the PRC will be keen to develop more than 900 dwellings on their land at Monkton Heathfield, and that it will be in their commercial interests to ensure the delivery of the WRR in the short term. From the evidence submitted and discussed at the Hearing, I consider that there is a realistic prospect of additional resources, either from the Council or the PRC, to construct the WRR in the short term.

41. However, the precise timing of the delivery of the WRR is unclear at this time, and the key question is whether the WRR is critical to the delivery of the full application without resulting in severe cumulative traffic impact.

Main Issue - Conclusion

42. From the first three considerations, all of which have as their context the lack of the WRR, I consider that the full proposal at Hartnell's Farm would not result in unacceptable congestion on the A3259; it would not significantly harm highway safety or ease of traffic movement; and the proposed sustainable transport measures would further reduce the traffic impact to a degree. Without the WRR, the evidence conclusively demonstrates that the cumulative traffic impact of the full proposal would not be severe, and as such it would not be contrary to national planning policy or the development plan.

Housing land supply

43. Although it is not my remit to consider whether the Council has a five year housing land supply, the amount of housing that the site could deliver within five years was contested between the main parties and is relevant.

44. The Council's Strategic Housing Land Availability Assessment (SHLAA)[20] estimates a delivery rate of 50 dpa at Hartnell's Farm from 2018/19, meaning the site has a build life of about 6-7 years. These figures could be optimistic, given that planning permission for the appeal site is in outline, with all the reserved matters still to be determined. However, a second developer has expressed an interest to work on the site[21], effectively giving it dual branding. I therefore consider that the figure of 50 dpa in the SHLAA is realistic. On this basis, it is reasonable to assume that the 150 dwelling cap, as required by condition (12) would not be breached until year 4, by which time it is likely that the WRR would be open to traffic. If the above scenario comes to fruition, the highways impact issue, as identified by the Council, is unlikely to happen.

[18] Hearing Document 14.
[19] Hearing Document 16.
[20] SHLAA, Taunton Urban Area Trajectory, site 48/13/0008OA Hartnell's Farm; dated March 2017
[21] Hearing Document 6.

The Planning Balance

45. The principal benefit of deleting condition (12) is the opportunity to bring forward the delivery of an additional 170 dwellings on the appeal site. If the entire complement of up to 320 dwellings were developed within 5 years, (which I consider to be possible but unlikely), the site would be able to contribute even more effectively to the Council's 5 year housing land supply, as required by paragraph 47 of *the Framework*. I have therefore given substantial weight to this consideration in determining the appeal.

46. The potential harm relates to whether the traffic impact generated by the additional 170 dwellings over the 150 dwelling cap would result in a severe cumulative impact on the local highway network, such that it would be contrary to national policy as set out in paragraph 32 [3] of *the Framework*. I find that:

- Traffic generation could be absorbed by the highway network without undue congestion, in the context of peak flows on the A3259 that have declined over the period 2016-2017;
- The proposed infrastructure improvements along the A3259 would enable the safe and convenient movement of traffic, both along the main road and for gaining access/egress to/from the surrounding areas;
- The potential for modal shift to bus, cycle and pedestrian movement would further limit vehicular traffic increase on the A3259; and
- It is reasonable to assume that the WRR would be completed and open to traffic in the near future and certainly within five years, by which time at a rate of 50 dpa, only about 250 out of the 320 dwellings at Hartnell's Farm would have been completed. However, even if the WRR's implementation is further delayed the development of the full proposal would not result in a severe cumulative impact on the A3259.

47. On the basis of my findings, I consider that the benefit of allowing the appeal outweighs the cumulative impact on the local highway network following the implementation of the proposed development, which, without the imposition of condition (12) would be less than 'severe'. As such there is no sound basis for placing a restriction on the number of dwellings to be built and occupied on the site prior to the opening of the WRR. Based on these considerations, Condition (12) becomes redundant.

Other conditions

48. At the Hearing, the main parties agreed that the remaining conditions attached to the original planning permission Ref 48/13/0008 were still appropriate and complied with the requirements set out in paragraph 206 of *the Framework*. Having read these conditions, I consider that they all comply with national policy and I shall impose all of them, with the exception of course of condition (12). In the event that some of these conditions may have been discharged, that is a matter which can be addressed by the parties.

Conclusion

49. Taking account of the above considerations, the disputed condition (12) is not justified, having regard to national policy and the development plan. For the reasons given above and having regard to all other matters raised, I conclude

that the appeal should be allowed and that condition (12) should be deleted. All the other conditions imposed on planning permission Ref 48/13/0008 are not at issue and are not changed by my decision.

Mike Fox

INSPECTOR

APPEARANCES

FOR THE APPELLANT:

Celina Colquhoun	Counsel
Jeremy Penfold	WSP
Tim Baker	Strategic Land Partnerships
Phil Jones	Turley

FOR THE LOCAL AUTHORITY:

Julie Moore	Taunton and Deane Borough Council
Helen Vittery	Somerset County Council
Lisa McCaffrey	Somerset County Council

INTERESTED PERSONS

Cllr Norman Cavill	West Monkton Parish Council
Barry Gage	Resident
Michael Plaister	Resident
Mrs Plaister	Resident
Jeanette Weston	Resident

DOCUMENTS SUBMITTED ON OR AFTER THE HEARING

1. Plan showing infrastructure improvements along the A3259 in the vicinity of Hartnell's Farm; submitted by Taunton Deane Borough Council (TDBC).
2. Plan showing location of the Western Relief Road (WRR), Eastern Relief Road (ERR), the A3259 and the Appeal Site; submitted by TDBC.
3. Statement of Common Ground (SCG) signed by the main parties, dated 20 December 2017 and 5 January 2018; joint submission.
4. Plan showing new housing, both built and committed/proposed at Monkton Heathfield, showing Persimmon/Redrow Consortium (PRC) developments as well as the appeal site; submitted by TDBC.
5. Unilateral Undertaking under Section 106 of the TCP Act 1990 relating to land at Hartnell's Farm, dated 4 January 2018; submitted by Appellant.
6. Situation update on the implementation of the WRR; submitted by TDBC, dated 2 February 2018.
7. Master Plan for Monkton Heathfield/Bathpool at 1:2,000 scale, dated 02/05/2016; submitted by Somerset County Council (SCC).
8. Report of Inspector to Secretary of State Ref APP/U1105/A/13/2208393 for land at Pinn Court Farm, Pinn Hill, Exeter, EX1 3TG, dated 20/03/2015; submitted by Appellant.

9. Appeal Decision Ref APP/Y1138/W/17/3172380 for land off Silver Street, Willand, Devon, dated 3 November 2017; submitted by Appellant.
10. Record of Attendance, Day 1, dated 9 January 2018.
11. Document of Clarification regarding points within Section 7 of SCG, dated 1 February 2018; submitted by SCC.
12. Plan Ref 1492-SK-04 Monkton Heathfield/Bathpool Overview, showing new housing, both built and committed/proposed at Monkton Heathfield; submitted by TDBC.
13. Supplementary Transport Statement (STS) of Evidence no 3 – 14 February 2018; submitted by WSP on behalf of Appellant.
14. E-mail from Turley addressing (i) housing land supply and delivery rates; (ii) timescale for construction of WRR; and (iii) comments on third party representations; submitted on behalf of Appellant, dated 30 January 2018.
15. Annex 1 to Turley letter (Document 14); submitted by David Wilson Homes on behalf of Appellant, dated 5 January 2018, concerning build out rates.
16. Second Deed of Variation between Persimmon Homes Ltd, Redrow Homes Ltd and Taunton Deane Borough Council in relation to a Unilateral Undertaking made under Section 106 of the Act, dated 18 April 2008; submitted by Appellant.
17. Third Deed of Variation between Persimmon Homes Ltd, Redrow Homes Ltd and Somerset County Council in relation to an Agreement made under Section 106 of the Act, dated 14 April 2008; submitted by Taunton Deane Borough Council.
18. Extract from Somerset Local Transport Plan, dated November 2011; submitted by SCC.
19. Appendices A and B of MOU between main parties on estimated costs associated with delivery of WRR and contributions to delivery of WRR, dated 2 February 2018; submitted by SCC.
20. E-mail from TDBC, commenting on Appellant's e-mail of 30 January 2018, dated 2 February 2018.
21. E-mail from SCC as lead local flood authority regarding flood risk, dated 24 January 2018.
22. Plan showing Phase 2 of Monkton Heathfield, dated 25 April 2017; submitted by TDBC.
23. Land at Hartnell's Farm, Monkton Heathfield-Schedule of housing numbers related to TDBC Plan; submitted by SLP.
24. Letter from Sarah Nicole to Cllr Cavill; submitted 21 February 2018 by Cllr Cavill.
25. Record of Attendance, Day 2, dated 21 February 2018.
26. Memorandum from SCC to PINS in response to Appellant's STS No 3 (Document 13), dated 26 February 2018.
27. WSP Response to SCC Memorandum dated 26 February 2018 (Document 26), dated 6 March 2018.

Appendix C

Department for Communities and Local Government

Mr Joe Murphy
RPS Planning & Development
RPS Group, Highfield House
5 Ridgeway
Quinton Business Park
Quinton
Birmingham
B23 1AF

Our Ref: APP/B1605/W/14/3001717

Your Ref: JBB7795

5 May 2016

TOWN AND COUNTRY PLANNING ACT 1990 – SECTION 78
APPEAL BY BOVIS HOMES LIMITED AND MILLER HOMES LIMITED
LAND AT KIDNAPPERS LANE, LECKHAMPTON, CHELTENHAM

Dear Sir

1. I am directed by the Secretary of State to say that consideration has been given to the report of the Inspector, P W Clark MA MRTPI MCMI, who held a public local inquiry on 22 - 25 September and 29 September - 2 October 2015, into your client's appeal against the decision of Cheltenham Borough Council (the Council) to refuse planning permission for residential development of up to 650 dwellings; mixed use local centre of up to 1.94 ha comprising a local convenience retail unit Class A1 Use (400 sq m), additional retail unit Class A1 Use for a potential pharmacy (100 sq m), Class D1 Use GP surgery (1,200 sq m) and up to 4,500 sq m of additional floorspace to comprise one or more of the following uses, namely Class A Uses, Class B1 offices, Class C2 care home and Class D1 Uses including a potential dentist practice, children's nursery and/or cottage hospital; a primary school of up to 1.721 ha; strategic open space including allotments; access roads, cycleways, footpaths, open space/landscaping and associated works; details of the principal means of access; with all other matters to be reserved; in accordance with application reference 13/01605/OUT dated 13 September 2013.

2. The appeal was recovered on 18 February 2015, for determination by the Secretary of State, in pursuance of section 79 of, and paragraph 3 of Schedule 6 to, the Town and Country Planning Act 1990, on the grounds that it involves proposals for residential development of over 150 units or on a site of over 5ha, which would significantly impact on the Government's objective to secure a better balance between housing demand and supply and create high quality, sustainable, mixed and inclusive communities.

Department for Communities and Local Government
Julian Pitt, Decision Officer
Planning Casework
3rd Floor Fry Building
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London SW1P 4DF

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Inspector's recommendation and summary of the decision

3. The Inspector recommended that the appeal be dismissed and planning permission refused. For the reasons given below, the Secretary of State agrees with the Inspector's recommendation. A copy of the Inspector's report (IR) is enclosed. All references to paragraph numbers, unless otherwise stated, are to that report.

Events following the close of the Inquiry

4. Following the close of the Inquiry the Secretary of State is in receipt of correspondence from the appellant dated 22 January 2016 enclosing documents Exam 146 and Exam 146A from the Examination into the emerging Joint Core Strategy for Gloucester, Cheltenham and Tewkesbury (JCS, see paragraph 10 below) and from Mr K Pollock dated 1 February and 4 April 2016 outlining progress of the JCS examination. As these representations do not raise new matters that would affect his decision, the Secretary of State has not considered it necessary to circulate them to all parties for comments.

Procedural matters

5. An application for an award of costs was made by Bovis Homes Ltd and Miller Homes Ltd against the Council (IR1). The outcome of this application is the subject of a separate decision letter.

6. In reaching his decision, the Secretary of State has taken into account the Environmental Statement (ES) which was submitted under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (IR4). The Secretary of State considers that the ES and the further environmental information provided complies with the above regulations and that sufficient information has been provided for him to assess the environmental impact of the proposal.

7. The Secretary of State agrees with the Inspector that nobody would be prejudiced by basing the decision on the amended drawings referred to at IR6-8.

Policy considerations

8. In deciding this appeal, the Secretary of State has had regard to section 38(6) of the Planning and Compulsory Purchase Act 2004 which requires that proposals be determined in accordance with the development plan unless material considerations indicate otherwise.

9. In this case, the adopted development plan for the area comprises the Cheltenham Borough Local Plan Second Review 1991-2011 Adopted July 2006 (the LP) and the Secretary of State agrees with the Inspector that the most relevant policies are those detailed at IR20-25.

10. The Council, along with Gloucester City Council and Tewkesbury Borough Council, supported by Gloucestershire County Council submitted the emerging JCS for examination on 20 November 2014. The Secretary of State agrees with the appeal Inspector that the most relevant policies from the strategy as submitted are those described at IR27-31, but given that examination is still on-going and the considerable amount of unresolved objection to relevant policies, the Secretary of State gives limited weight to the emerging JCS and associated documents including those referred to at IR32, IR35 and paragraph 4 above. The Secretary of State has also had regard to the Issues and Options consultation of the preparation of the Cheltenham Plan (part one) (IR33-34), but as this emerging Plan is at an early stage he gives it little weight.

11. Other material considerations which the Secretary of State has taken into account include the National Planning Policy Framework (the Framework) and the associated planning practice guidance (the guidance); and the *Community Infrastructure Levy (CIL) Regulations 2010* as amended.

12. In accordance with section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 (LBCA), the Secretary of State has paid special regard to the desirability of preserving listed buildings or their settings or any features of special architectural or historic interest which they may possess.

Main issues

13. The Secretary of State agrees with the Inspector that the main disputed issues in this case are those set out at IR219-220.

The highway network

14. The Secretary of State agrees with the Inspector's analysis of highway issues at IR221-238. Overall, he agrees with the Inspector that, taking account of the measures which are included in the s106 agreement, the residual cumulative effects of development proposed would increase demand for use of sections of the highway network which are already operating at over-capacity levels, contributing to a severe impact on a wider area of Cheltenham as traffic is displaced, contrary to both adopted and emerging policies (IR238). Paragraph 32 of the Framework states that development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

Air pollution

15. The Secretary of State has carefully considered the Inspector's reasoning at IR239-240 and like him, concludes that the development would have an acceptable effect on air pollution (IR240).

Density

16. For the reasons given at IR241-245 the Secretary of State is satisfied that a high density in terms of dwellings would not necessarily translate into an appearance of an intense development (IR243) and that the illustrations in the Design and Access Statement represent a plausible and realistic depiction of the character and appearance of development which would result if this appeal were allowed. Like the Inspector, even if the site were not sufficiently large and separated from surrounding development to allow it to develop its own character, the Secretary of State would not expect the likely outcome of detailed design at reserved matters stage to harm the character and appearance of the surrounding area. Similarly, he agrees with the Inspector that if the eventual outcome of detailed applications on the various sites which make up the JCS proposed Strategic Allocation were to result in delivery of housing in excess of the expected figure, that would not necessarily be harmful in the context of the government's desire to boost significantly the supply of housing (IR245).

Impact on the Cotswolds Area of Outstanding Natural Beauty (AONB)

17. For the reasons given at IR246-252 the Secretary of State agrees with the Inspector that both the view from and character of the Cotswolds AONB would be unharmed (IR252).

18. With regard to the view toward the AONB from the western corner of the site, for the reasons at IR253-256 the Secretary of State agrees with the Inspector that the

effects of the development on the view of Leckhampton Hill from this viewpoint are unlikely to compromise or harm the setting or character of Cheltenham (IR256).

Landscape of the site itself and conclusion on landscape character and appearance

19. Turning to the site itself, the Secretary of State has considered the Inspector's assessment at IR257-263 and agrees that, whilst not designated, the site has its own intrinsic charm which gives it value (IR260), is a locally valued landscape, and that its value derives from its own characteristics, of which views towards the AONB are only one of a number of charming features (IR263).

20. In conclusion, the Secretary of State agrees that development on this site at the present time would harm the character and appearance of the local area through the loss of a valued landscape (IR264). Although development of the site would not harm more structural elements of the wider contextual landscape character, such as the nearby AONB or the setting of Cheltenham as a whole, its development would cause a local loss and would conflict with LP policies identified at IR265.

Local Green Space

21. The Secretary of State agrees with the Inspector's assessment at IR266-269 regarding the proposed Local Green Space Designation which covers some of the appeal site. For the reasons given he agrees that the appeal proposal is premature in terms of Framework paragraph 76 and the guidance (IR269).

Obligations and Local Infrastructure

22. The Secretary of State agrees with the Inspector's assessment of the proposed planning obligations in relation to local infrastructure at IR270-275. For the reasons given he finds that the provision for walking, cycling, highway safety, public transport, playspace, primary and secondary school facilities, library facilities, healthcare, open space and affordable housing all meet the tests of paragraph 204 of the Framework and comply with the guidance. However, he does not consider that these obligations would overcome his reasons for dismissing the appeal. Furthermore, for the reasons given by the Inspector at IR221-238 and IR272 the Secretary of State finds that the contributions to the South West Sustainable Transport Strategy would fail to comply with CIL regulation 122, and he gives this contribution no weight in his decision.

Gypsies, travellers and travelling showpeople

23. For the reasons given at IR276-281, the Secretary of State agrees with the Inspector that the element of the s106 agreement that makes a contribution to the provision of pitches for gypsies, travellers and travelling showpeople would also fail the test of CIL regulation 122 and should be disregarded (IR276-281). In finding this, he also agrees with the Inspector that the proposal would fail to comply with draft JCS policies SD14 and SA1, and that though this is not fatal it is a factor to be weighed against the proposal (IR282).

Housing supply

24. For the reasons given at IR283-292 the Secretary of State agrees with the Inspector that, without this appeal, Cheltenham is about two years' short of an identified five-year housing land supply. He also agrees that the appeal itself represents the equivalent of about one-year's supply (although it would be likely to be delivered over a period of many years) and that this is an indication of one of the benefits it would bring (IR293).

Other matters

25. The proposal would involve loss of an area of best and most versatile agricultural land. However for the reasons given the Secretary of State agrees with the Inspector that, though weighing against the proposal, this is not a matter of great significance in this case (IR294).

26. The Secretary of State agrees with the Inspector that as the application is in outline it would be possible to design the scheme in a way which reduced the risk of downstream flooding, which counts in a small way as a benefit in favour of the scheme (IR295).

27. The Secretary of State agrees with the Inspector that there would be no harmful effect on other local centres (IR296) and no effects on the significance of heritage assets (IR297). He also agrees that the proposed development would not result in an adverse effect on the integrity of the Cotswold Beechwoods Special Area of Conservation, either alone or in combination with other plans or projects (IR298).

Planning conditions

28. The Secretary of State agrees with the Inspector's reasoning and conclusions on planning conditions at IR311-316 and he is satisfied that the conditions proposed by the Inspector at pages 79-81 of the IR are reasonable and necessary and would meet the tests of paragraph 206 of the Framework. However, he does not consider that the conditions would overcome his reasons for dismissing the appeal.

Overall conclusions and planning balance

29. The Secretary of State agrees with the Inspector's overall conclusions at IR299-310.

30. The Secretary of State concludes that granting permission for the appeal scheme would be contrary to the development plan overall due to the severe residual cumulative transport impacts and through the loss of a locally valued landscape (IR300-301). He has therefore gone on to consider whether there are any material considerations that indicate the proposal should be determined other than in accordance with the development plan.

31. Due to the lack of a five year supply of deliverable housing sites the relevant development plan policies for the supply of housing are out of date. Therefore, in line with the presumption in favour of sustainable development at paragraph 14 of the Framework, permission should be granted unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or specific policies in this Framework indicate development should be restricted.

32. The residual cumulative transport impacts of development would be severe, in conflict with Framework paragraph 32. The development would prejudice the possible designation of Local Green Space, in conflict with Framework paragraph 76, and the guidance indicates that allowing the appeal would be premature in such circumstances. Though not designated, the site is clearly a locally valued landscaped which paragraph 109 of the Framework states should be protected. The Secretary of State agrees with the Inspector that all three paragraphs in the Framework indicate that development should be restricted and, in the circumstances of this case, that the appeal should be dismissed (IR305).

33. Finally, in considering the balance of planning considerations in this case, the Secretary of State agrees with the Inspector's assessment at IR306-309.

Substantial though some of the benefits are, notably in terms of boosing housing supply, the Secretary of State considers that the sum of adverse impacts would significantly and demonstrably outweigh the benefits when assessed against the policies in this Framework taken as a whole.

34. For the above reasons the Secretary of State finds no reason to determine the appeal other than in accordance with the development plan.

Formal decision

35. Accordingly, for the reasons given above, the Secretary of State agrees with the Inspector's recommendations and he hereby dismisses your client's appeals and refuses planning permission for a residential development of up to 650 dwellings; mixed use local centre of up to 1.94 ha comprising a local convenience retail unit Class A1 Use (400 sq m), additional retail unit Class A1 Use for a potential pharmacy (100 sq m), Class D1 Use GP surgery (1,200 sq m) and up to 4,500 sq m of additional floorspace to comprise one or more of the following uses, namely Class A Uses, Class B1 offices, Class C2 care home and Class D1 Uses including a potential dentist practice, children's nursery and/or cottage hospital; a primary school of up to 1.721 ha; strategic open space including allotments; access roads, cycleways, footpaths, open space/landscaping and associated works; details of the principal means of access; with all other matters to be reserved; in accordance with application reference 13/01605/OUT dated 13 September 2013

Right to challenge the decision

36. A separate note is attached setting out the circumstances in which the validity of the Secretary of State's decision may be challenged. This must be done by making an application to the High Court within six weeks from the date of this letter for leave to bring a statutory review under section 288 of the Town and Country Planning Act 1990.

37. Copies of this letter have been sent to Cheltenham Borough Council, Leckhampton with Warden Hill Parish Council and the Leckhampton Green Land Action Group. Notification has been sent to all other parties who asked to be informed.

Yours faithfully

Julian Pitt

Authorised by the Secretary of State to sign in that behalf

Extract from Inspector's Report

Appellant Case

would not prevent that, as is recognised in a joint position statement presented to the JCS examination.[212]

Transport

92. The appellant's case may be summarised as follows;

- NPPF paragraphs 32 and 34 remind us that development should only be refused on transport grounds where the residual cumulative effects of development would be severe[213]. Decisions should ensure that developments are located where the need to travel will be minimised[214] and should take account of whether
    - Opportunities for sustainable transport modes have been taken up to reduce the need for major transport infrastructure,
    - Safe and suitable access can be achieved for all people,
    - Cost effective improvements to the transport network can be undertaken to limit significant impacts.[215]
- Studies undertaken previous to the JCS, by the JCS team and by the appellant show the sustainable transport merits of the site[216]. It would be beneficial in reducing the need to travel, capitalising on existing sustainable transport infrastructure and its location close to Cheltenham town centre.[217] Contrary to its own policy,[218] the Council has ignored the benefits of mitigation by avoidance which would capitalise on the site's proximity to Cheltenham and existing public transport services so as to offer access to employment and services without the need to rely on the private car.[219]
- Detailed transport studies, independent traffic forecasts, modelling and capacity testing include consideration of the wider Strategic Allocation.[220] They show that there would be limited practical difference in terms of traffic impact on the local road network whether or not the appeal proposal proceeds, which would be about a 23% growth in any event.[221] This is because the

[212] Paragraph 81 of Mr Cahill's closing remarks, quoting paragraph 2.4 of the Local Green Space Position Statement submitted on behalf of Redrow Homes, Bovis Homes, Miller Homes and David Wilson Homes to the JCS examination (document CD/OTH16)
[213] Paragraph 32 of Statement of Case (in green folder on PINS file)
[214] Paragraph 33 of Statement of Case (in green folder on PINS file)
[215] Paragraph 32 of Statement of Case (in green folder on PINS file) Paragraph 12.26 of Tim Partridge's evidence (document CD/APP67)
[216] Paragraphs 34 and 41 of Statement of Case (in green folder on PINS file). Paragraph 5.2.3 of Hilary Vaughan's evidence (document CD/APP70)
[217] Paragraph 41 of Statement of Case (in green folder on PINS file). Paragraph 5.3.2 of Hilary Vaughan's evidence (document CD/APP70)
[218] Paragraph 3.2.4 of the Transport Assessment (document CD/APP23), referencing paragraph 14.14 of the Local Plan (document CD/POL4)
[219] Paragraph 14 of Mr Cahill's opening remarks (document INQ52). Paragraphs 5.3.6 and 7.3.5 of Hilary Vaughan's evidence (document CD/APP70)
[220] Paragraphs 35, 36 and 41 of Statement of Case (in green folder on PINS file)
[221] Paragraphs 37 and 41 of Statement of Case (in green folder on PINS file), tables 9.3, 9.4 and 9.5 of Environmental statement (document CD/APP12) and paragraph 3.10.19 of supplementary Environmental Statement Movement Section (document CD/APP27),

development would be a small proportion of both Cheltenham's population and overall future development in the JCS area.[222] The Council has ignored Cheltenham's inevitable growth and its impact on the road network.[223] The highways network around the site suffers some congestion but the NPPF test is whether the additional impact of a scheme would be severe.[224]

- The proposal will add traffic but, as part of the broader development context in 2023, the traffic from the appeal proposals would have no practical effect on the cumulative traffic impact in the area.[225] Shurdington Road is already overloaded[226]. Existing traffic on Shurdington Road would be displaced onto other routes by traffic from the development.[227] In the wider area, none of the increases would be material compared to the forecast volume of traffic on the roads without the development. The greatest increase of just more than one vehicle per minute is predicted to occur on Caernarvon Road west of Alma Road. The daily change on Caernarvon Road is unlikely to reach the threshold of 10% recommended by the Institution of Highways and Transportation (IHT) for consideration of environmental assessment.[228]
- The Parish Council's transport study is unsatisfactory and does not follow recognised methods.[229]
- The transport section of the Local Plan recognises that there is existing congestion but that the character of Cheltenham means that this needs to be addressed by demand management.[230] A number of measures are proposed to alleviate the impact of the development[231];
    - Contributions are agreed towards infrastructure measures and off-site travel planning (the South West Cheltenham Sustainable Transport Fund) to reduce existing traffic flows.[232]

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paragraphs 6.10.10 and 7.4.3 of Transport Assessment (document CD/APP23) and paragraphs 4.5.21 and 5.6.8 to 5.6.15 of Hilary Vaughan's evidence (document CD/APP70)
[222] Paragraph 37 of Statement of Case (in green folder on PINS file). Paragraphs 4.5.21, 5.6.6, 5.6.7 and 7.3.4 of Hilary Vaughan's evidence (document CD/APP70) and oral evidence in chief.
[223] Paragraph 14 of Mr Cahill's opening remarks (document INQ52)
[224] Paragraph 13 of Mr Cahill's opening remarks (document INQ52)
[225] Paragraphs 14 and 15 of Mr Cahill's opening remarks (document INQ52). Paragraph 5.6.21 of Hilary Vaughan's evidence (document CD/APP70). Sections 4.2 and 4.3 of the appellant's Supplementary Traffic Note, January 2014 (document CD/APP26) also refers.
[226] Paragraph 3.10.19 of Supplementary Environmental Statement Movement Section (document CD/APP26)
[227] Paragraphs 6.10.14 and 7.45 of the Transport Assessment (document CD/APP23)
[228] Paragraphs 4.3.1, 4.3.2 and 4.3.3 of the appellant's Supplementary Traffic Note, January 2014 (document CD/APP26) and paragraph 9.3.4 of the Environmental Statement (document)
[229] Paragraph 41 of Statement of Case (in green folder on PINS file). Paragraph 8.2.2 of Hilary Vaughan's evidence (document CD/APP70)
[230] Paragraph 3.2.4 of Transport Assessment, referencing paragraph 14.12 of the Local Plan (document CD/POL4). Hilary Vaughan's evidence paragraph 5.6.2 (document CD/APP70)
[231] Paragraph 14 of Mr Cahill's opening remarks (document INQ52). Section 4.6 and paragraphs 5.6.16 and 7.6.7 of Hilary Vaughan's evidence (document CD/APP70)
[232] Paragraph 38 of Statement of Case (in green folder on PINS file) and paragraph 2.1.21 of Design and Access Statement (document CD/APP12). But in the section headed *Leckhampton*

  - Travel Plans are proposed. These are recognised as an important element in mitigating traffic impact.[233] An effective Travel Plan can create a modal shift away from private vehicle to other means of transport of about 10%.[234]

  - Agreement has been reached to divert local bus services through the site and to provide Real Time Passenger Information (RTPI) priority measures along Shurdington Road.[235]

- The illustrative masterplan encompasses the comprehensive development of the wider Strategic Allocation. It makes provision for a high standard of pedestrian and cycle movement and for connectivity to the surrounding area.[236]

- Existing rat runs along Kidnappers Lane and Farm Lane would be made more indirect, limiting through movement.[237]

- Proposed new junctions have been subject to a safety audit.[238] The local safety record identifies no roads or locations in the local area with an adverse safety record meriting attention.[239] Growth in traffic volumes does not cause a growth in accidents.[240]

- The transport impact of the proposal have been thoroughly assessed and examined by the appellant, the County Council as Highways Authority and Highways England.[241] No objection is made by either the Highway Authority or the Highway Agency.[242] Gloucester County Council, as the Highways Authority

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(650 Dwelling) Contribution of Appendix E of Gloucestershire County Council's Highway Contributions Technical Note (document INQ3), the fourth and fifth paragraphs make it clear that the development will not now contribute to off site travel planning; "Instead of specifically targeting employers, this sum is now considered more appropriate… to provide missing infrastructure which is a current barrier to making journeys by non-car means…." Five specific pieces of infrastructure are listed. Up to fifteen per cent of the contribution would be spent to undertake a study to ascertain the most appropriate use of the funding to achieve modal shift of existing commuters.

[233] Paragraphs 38 and 41 of Statement of Case (in green folder on PINS file). Section 4.4 of Hilary Vaughan's evidence (document CD/APP70)

[234] Paragraph 2.4.2 of appellant's Supplementary Traffic Note, January 2014 (document CD/APP26). Paragraph 4.3.3 of Hilary Vaughan's evidence (document CD/APP70)

[235] Paragraphs 38 and 41 of Statement of Case (in green folder on PINS file), sections 3.1, 4.1 and 4.8 of Design and Access Statement (document CD/APP11), paragraphs 1.3.11, 2.1.21 and 9.6.11 of Environmental Statement (document CD/APP12), paragraph 2.14 of Supporting Planning statement (document CD/APP21). But Hilary Vaughan giving evidence in chief stated that the current proposal is not to divert the number 10 bus route but to provide the infrastructure to make such a diversion possible.

[236] Paragraph 39 of Statement of Case (in green folder on PINS file)

[237] Paragraph 41 of Statement of Case (in green folder on PINS file). Section 7.5 of Hilary Vaughan's evidence (document CD/APP70)

[238] Paragraphs 39 and 41 of Statement of Case (in green folder on PINS file). Section 7.4 of Hilary Vaughan's evidence (document CD/APP70)

[239] Paragraph 5.7.7 of Hilary Vaughan's evidence (document CD/APP70) and her rebuttal proof (document CD/APP72)

[240] Paragraph 5.7.3 of Hilary Vaughan's evidence (document CD/APP70)

[241] Paragraph 12 of Mr Cahill's opening remarks (document INQ52)

[242] Paragraphs 40 and 45 of Statement of Case (in green folder on PINS file)

has reached a clear view of the acceptability of the proposal. Its response when consulted on the application is very comprehensive. Its advice is that there is no highway justification for refusal of planning permission. It maintains that view in subsequent statements.[243]

- The Council disregarded technical advice and based its refusal on no technical assessment.[244] The Council's case is divorced from reality and from the position it has taken at the JCS examination where it continues to support the site allocation.[245]

93. The Council's reason for refusal makes five points;

- Congestion.
- Adequacy of mitigation.
- Adequacy of access points.
- Rat running.
- Pollution.

There is no suggestion in the reasons for refusal or in the Council's Statement of Case that the Central Severn Vale (CSV) Saturn model relied upon by the appellants is unreliable.[246]

94. The Council's evidence can be summarised[247] as;

- Complaints about the reliability of the Central Severn Vale model.
- Related complaints about the reliability of trip generation.
- Calibration of junctions.
- Mitigation measures.

It is immediately apparent that there is little or no correlation between the Council's evidence and its reasons for refusal.[248]

95. The complaints about the reliability of the CSV model and the calibration of junctions are rebutted[249] without contradiction.[250] In any event, the Council's evidence does not attempt to quantify the consequences of the alleged flaws in

[243] Paragraph 5 of Mr Cahill's closing remarks (document INQ59) inferring reference to Hilary Vaughan's comment that the consultation response from the County Council was one of the most detailed such documents she had seen (paragraph 1.2.6 of her evidence (document CD/APP70) and making reference to the introduction to document INQ3 and point 1 of document INQ28
[244] Paragraph 42 and 43 and 46 of Statement of Case (in green folder on PINS file) and paragraphs 1.2.7 to 1.2.9 of Hilary Vaughan's evidence (document CD/APP70)
[245] Paragraph 12 of Mr Cahill's opening remarks (document INQ52) and paragraph 10 of his closing remarks (document INQ59)
[246] Paragraph 9 of Mr Cahill's closing remarks (document INQ59)
[247] By Mr Cahill in paragraph 12 of his closing remarks (document INQ59)
[248] Paragraph 13 of Mr Cahill's closing remarks (document INQ59)
[249] Hilary Vaughan's rebuttal proof (document CD/APP72)
[250] Paragraph 16 of Mr Cahill's closing remarks (document INQ59)

the CSV model or in the junction calibration, provides no information of the extent to which traffic conditions are expected to worsen as the result of the development proposed and so could not be the basis of a conclusion that the effects would be severe in the terms of paragraph 32 of NPPF.[251]

96. The Council's witness was fulsome in his appreciation of the mitigation measures.[252] He expected the A46 Shurdington Road, properly managed and conducted, to be able to manage with a development at this favourable location.[253] He was strongly confident that it could be made to work.[254] The Whitford Road appeal decision (APP/P1805/A/14/2225584)[255], which the Council prayed in aid of its case, is dissimilar.[256]

Pollution

97. The appellant's original Environmental Statement, section 11 confirms that there is a risk of dust during construction which needs to be ameliorated and a condition is recommended.[257] For air pollution arising from traffic, although Cheltenham as a whole is designated an Air Quality Management Area (AQMA), the area in the vicinity of the appeal site has not been found to have harmful levels of pollution when calculated properly on an annual basis.[258] The Environmental Statement Addendum relating to Air Quality, July 2014[259] supersedes the relevant parts of chapter 11 of the original Environmental Statement. This concludes that the air quality effects of the proposed development would be of negligible significance.[260] The Council agrees.[261]

98. Paragraph 2.9 of the Design and Access Statement[262] records that a noise survey shows unacceptable conditions for gardens and balconies on the northern perimeter of the site. An appropriate scheme of mitigation would produce acceptable living conditions.

Flooding and Drainage

99. The Environment Agency has accepted the findings of the JBA report[263] on the extent of flooding from the principal watercourses, so the Sequential Test is not an issue and Local Plan policy UI1 does not apply.[264] Table 11 of the submitted Flood Risk Assessment (FRA)[265] sets out the need for land raising in a small part

[251] Paragraph 18 of Mr Cahill's closing remarks (document INQ59)
[252] Paragraph 22 of Mr Cahill's closing remarks (document INQ59)
[253] Paragraph 1 of Mr Cahill's closing remarks (document INQ59)
[254] Paragraph 2 of Mr Cahill's closing remarks (document INQ59)
[255] Document CD/AD30
[256] Paragraphs 28 and 29 of Mr Cahill's closing submissions (document INQ59)
[257] Environmental statement paragraphs 11.5.8 and 11.5.33, (document CD/APP12) , endorsed by Fiona Prismall in paragraph 5.3 of her evidence (document CD/APP65)
[258] Paragraph 92 of Mr Cahill's closing remarks (document INQ59)
[259] Document CD/APP29
[260] Fiona Prismall's evidence (document CD/APP65), paragraphs 3.40, 3.59 and 3.62
[261] Paragraph 5.4.2 of the Statement of Common Ground (document INQ1)
[262] Document CD/APP11. Paragraph 10.5.1 of the Environmental statement (document CD/APP12) conveys the same information
[263] Section 4 and Appendix 4 of Flood Risk Assessment (document CD/APP14)
[264] Paragraph 70 of the appellant's Statement of Case (in green folder on PINS file)
[265] Document CD/APP14

Extract from Inspector's Report

Local Planning Authority Case

- Environmental;
  - Open space managed in perpetuity.

118. The disadvantages are;

- Increases in journey times.
- Loss of Best and Most Versatile agricultural land.
- Loss of greenfield land and effects on landscape.[317]

119. It is very obvious that this balance falls heavily in favour of granting permission.[318]

Prematurity

120. There remain unresolved objections to the allocation of the site within the JCS for development. But the following cannot be denied[319];

- The lengthy evidence base which led to the selection of the appeal site.
- The clear need for additional housing in Cheltenham.
- The Council's steadfast defence of the site allocation at the JCS examination.

121. The Council no longer pursues a prematurity argument. Others do but have failed to show what harm would result from a grant of planning permission now. The LGS argument is simply a device to defeat the appeal proposal; the proposal complies with the layout plan on page 154 of the JCS. That allows for a very substantial area of land to be designated as LGS, which is a decision for another day.[320]

The Case for Cheltenham Borough Council (the local planning authority)

The basis for decision

122. Planning decisions must be taken in accordance with the Development Plan unless material considerations indicate otherwise. The Development Plan is the Cheltenham Borough Local Plan 2006. It does not allocate the appeal site for development.[321]

123. The emerging plan may well be a material consideration but the allocation of the site for development in the JCS is not a knockout blow to consideration of the merits of a planning application[322]. The ongoing examination of the JCS does not fetter the discretion of the Secretary of State, Inspector or Council. Key points of the allocation proposal confirm that detailed consideration should be given to how

[317] Paragraph 12.27 of Tim Partridge's evidence (document CD/APP67)
[318] Paragraph 134 of Mr Cahill's closing remarks (document INQ59) and paragraphs 12.22 to 12.25 of Tim Partridge's evidence (document CD/APP67)
[319] Paragraphs 136 and 137 of Mr Cahill's closing remarks (document INQ59)
[320] Paragraphs 138 to 142 of Mr Cahill's closing remarks (document INQ59)
[321] Paragraph 4 of Miss Clover's opening (document INQ53)
[322] Second paragraph of Miss Clover's closing statement (document INQ56). (I have imputed paragraph numbers to this document).

a comprehensive scheme can be delivered.[323] It is accepted that the transport evaluation of the development application should be in line with, and provide for, the necessary development needs and provision for the strategic allocation as a whole, not just the application site.[324] Transportation evidence yet to be submitted to the JCS examination will not be available to this appeal Inquiry.[325]

124. It is accepted that this appeal will proceed on the basis that the Council does not have a five-year HLS, with the consequences which flow from that.[326] Although aspects of the Wainhomes case are highlighted[327], there is no need to prove the exact figures for OAN or for housing land supply, or to set the former at the highest possible level and the latter at the lowest[328]; it is accepted that paragraph 14 of the NPPF applies.[329]

125. In terms of the planning balance, the Council has identified two areas of harm significant enough to tip the balance away from the development.[330] There has never been any resistance to the appellant's view of the economic and social benefits of the proposal as described by Tim Partridge. The dispute around the environmental benefit equates to the Council's landscape case.[331] NPPF places no greater weight on landscape considerations than on others but they do tend to be irreversible. By contrast, severe transport impacts are seen by NPPF to be a knockout blow.[332] The fact that subsequent evidence was produced which supports a decision based on members' local knowledge does not invalidate their original decision.[333]

Transport

126. The three levels of analysis which a development must go through for transport purposes are[334];

- Assessment of baseline conditions (what the conditions would be without the development).
- The impact of development.
- The effects of mitigation.

In this case, the appellant argues that there is no need for mitigation because the transport package offered is part of the proposal, not required as a result of the proposal[335].

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[323] Paragraph 8 of Miss Clover's opening (document INQ53)
[324] Paragraph 9 of Miss Clover's opening (document INQ53)
[325] Paragraph 10 of Miss Clover's opening (document INQ53) and paragraphs 4.1.4 and 4.1.5 of David Nock's evidence (document CD/LPA7)
[326] Paragraph 7 of Miss Clover's opening (document INQ53) and third paragraph of her closing (document INQ56)
[327] Sixth and seventh paragraphs of Miss Clover's closing (document INQ56)
[328] Eighth paragraph of Miss Clover's closing (document INQ56)
[329] Third paragraph of Miss Clover's closing (document INQ56) and paragraph 2.3 of Craig Hemphill's evidence (document CD/LPA5)
[330] Ninth paragraph of Miss Clover's closing (document INQ56)
[331] Fourth and fifth paragraphs of Miss Clover's closing (document INQ56)
[332] Tenth paragraph of Miss Clover's closing (document INQ56)
[333] Eleventh paragraph of Miss Clover's closing (document INQ56)
[334] Fifteenth paragraph of Miss Clover's closing (document INQ56)

127. The Council has employed consultants, Pell Frischmann (PF), to check the transportation work carried out on the planning application by the appellant's consultant, the Peter Evans Partnership (PEP) and by Gloucestershire County Council (GCC). That review, in limited time, has identified faults in the transport analysis[336]. More time would have uncovered more faults.[337] A defensive response to criticism and a lack of transparency engenders suspicion that there is something to hide.[338] A county highway authority is not infallible.[339] The Whitford Road decision[340] shows that, to be relied upon as a basis for decision making, whatever model is used must be used accurately.[341]

The model

128. Traffic forecasting and modelling was undertaken using the County Council's Central Severn Vale (CSV) SATURN based model.[342] It is not inherently unreliable[343] but it is a strategic model, outputs from which need to be adjusted to obtain the detail relevant to consideration of this development. There are concerns about its accuracy for this purpose. [344]

129. PF's approach is to model local conditions, feed that back into the strategic model and re-run the results until they reflect reality. That approach is endorsed by the Transport for London Highway Assignment Model.[345] By contrast, the appellant made adaptation by manual analysis, of which no details are provided.[346]

130. The A46 Shurdington Road is the key highway involved. It currently experiences peak hour congestion.[347] All parties accept that the highway network will suffer from substantial and increasing congestion.[348]

131. In 2023, three junctions would be operating at or above capacity without the development[349];

- The A46 Shurdington Road/Leckhampton Lane priority junction.

[335] Twelfth and sixteenth paragraphs of Miss Clover's closing (document INQ56) reflecting response given by Hilary Vaughan in cross-examination
[336] Paragraph 12 of Miss Clover's opening (document INQ53) and paragraph 1.1.2 of David Nock's evidence (document CD/LPA7)
[337] Fourteenth paragraph of Miss Clover's closing (document INQ56)
[338] Eighteenth, nineteenth and twentieth paragraphs of Miss Clover's closing (document INQ56)
[339] Twenty-first paragraph of Miss Clover's closing (document INQ56)
[340] APP/P1805/A/14/2225584 (Document CD/AD30)
[341] Fifty-third to fifty-seventh paragraph of Miss Clover's closing (document INQ56)
[342] Paragraph 16 of Miss Clover's opening (document INQ53)
[343] Twenty-fourth paragraph of Miss Clover's closing (document INQ56)
[344] Twenty-fifth paragraph of Miss Clover's closing (document INQ56) and paragraphs 5.2.31, 5.2.32, 5.3.2 and 5.3.7 of David Nock's evidence (document CD/LPA7)
[345] Twenty-sixth paragraph of Miss Clover's closing (document INQ56)
[346] Twenty-eighth, twenty-ninth and thirty-third paragraphs of Miss Clover's closing (document INQ56), quoting paragraph 5.3.6 of David Nock's evidence (document CD/LPA7). Paragraphs 5.3.7, 5.3.8 and 5.3.9 also apply.
[347] Paragraph 14 of Miss Clover's opening (document INQ53)
[348] Paragraph 13 of Miss Clover's opening (document INQ53) reflecting question and answer given by Hilary Vaughan in cross-examination
[349] Paragraph 5.3.10 of David Nock's evidence 9document CD/LPA7)

- The A46 Shurdington Road/Moorend Park Road signalised junction.
- The Leckhampton Road/Church Road/Charlton Lane double mini roundabout.

The only route to avoid them would be Up Hatherley Road. Its junction with the A46 Shurdington Road is forecast to have capacity so it would form an attractive alternative route. Yet, with the development in place, it is forecast to experience only a marginal increase in peak hour traffic.[350] The appellant's analysis is inherently contradictory. At the end of the Inquiry, there is still no answer as to where the traffic will have gone.[351]

132. PF note discrepancies and unexplained disappearances of traffic flows in the appellant's Transport Note 13[352]. PF note unexplained reductions in traffic flows between the appellant's Transport Notes 10 and 13[353]. PF were particularly concerned with the work displayed in Transport Note 23[354] and its two attachments[355]. This showed paired results which did not correspond logically with one another and flow results that appeared to suggest that flows would improve with development traffic, without being able to show where the extra traffic had gone.[356]

Trip rates

133. Trip rates for the development were generated by the appellant's consultants from the TRICS database. PF tested these by comparison with census data and found that the TRICS rates were significantly lower.[357] The appellant was concerned that census data risked over-estimation. Similarly, the appellant's use of the figure for the 50%ile of trips rather than the 85%ile results in substantial under-estimation. Yet the greater risk of error in assessing the development is under-estimation.[358]

134. School trips have been wrongly estimated. The error is of some significance. PEP has underestimated two-way trips by some 55% in the morning peak; a total of 240 vehicles. The estimates of trip generation for the doctors' surgery and for the local centre are all counterintuitive. When taken into account they show a worsening of the situation.[359]

[350] Twenty-second paragraph of Miss Clover's closing (document INQ56) quoting paragraphs 5.3.10 and 5.3.11 of David Nock's evidence (document CD/LPA7)
[351] Twenty-third paragraph of Miss Clover's closing (document INQ56)
[352] Paragraphs 5.3.44 to 5.3.46 and appendix 5 of David Nock's evidence (document CD/LPA7)
[353] Paragraph 5.3.47 and appendices 2 and 5 of David Nock's evidence (document CD/LPA7)
[354] Document CD/APP43
[355] Atkins Technical Notes TN05 and TN06
[356] Twenty-seventh paragraph of Miss Clover's closing (document INQ56) and paragraphs 5.5.17 to 5.5.48 of David Nock's evidence (document CD/LPA7)
[357] Thirty-fifth paragraph of Miss Clover's closing (document INQ56), referencing paragraph 5.3.22 of David Nock's evidence (document CD/LPA7)
[358] Thirty-seventh paragraph of Miss Clover's closing (document INQ56)
[359] Thirty-eighth paragraph of Miss Clover's closing (document INQ56) and paragraphs 1.1.3 5.2.11 and 5.3.27 to 5.3.41 of David Nock's evidence (document CD/LPA7)

Junction calibration

135. The appellant modelled eight junctions using Picady, Arcady and Linsig models. Each model failed to calibrate against reality.[360] Most were moderate failures but one (Shurdington Road/Leckhampton Lane) was a serious failure[361]. The appellant concluded that the junction models did not replicate driver behaviour and it was left there. Manual adjustments were made, without explanation[362]. By contrast, PF adjusted the model, in accordance with the user guide[363], to reflect reality. When run to predict the future it showed considerable queues to form, greater than those which could be dealt with by a 10% modal shift.[364]

136. The Council's consultants have not had time to re-model all junctions[365] but the work on the one tested can be taken as representative.[366] The road system is all on such a knife edge that even a small change can represent severe impact.[367]

Safety

137. Geographical patterns of traffic accidents are not the only thing that should trigger a response. Their severity is of equal importance. There is a pattern of involvement of schoolchildren and pensioners.[368] Three fatal accidents should have triggered a response that has not happened.[369]

Landscape

138. The appellant's main point is that the indicative plan on page 154 of the submitted JCS shows housing development up to the edge of the A46 Shurdington Road and that the Council's opposition to this extent of development implies schizophrenia. But there is a difference in purpose between a JCS and its examination on the one hand and a planning application and appeal on the other.[370]

139. Information about Strategic Allocations on page 129 of the submitted JCS makes it clear that their boundaries are drawn to include areas of land and buildings which may not be suitable for development. The plan on page 154 is

[360] Thirty-ninth and fortieth paragraph of Miss Clover's closing (document INQ56) referencing paragraph 6.1.4 of David Nock's evidence (document CD/LPA7)
[361] Paragraph 6.3.2 of David Nock's evidence (document CD/LPA7)
[362] Forty-second and forty-third paragraph of Miss Clover's closing (document INQ56)
[363] Forty-fifth paragraph of Miss Clover's closing (document INQ56)
[364] Forty-third and forty-fourth paragraphs of Miss Clover's closing (document INQ56) and section 7 of David Nock's evidence (document CD/LPA7)
[365] Forty-sixth paragraph of Miss Clover's closing (document INQ56)
[366] Fiftieth paragraph of Miss Clover's closing (document INQ56)
[367] Forty-eighth and forty-ninth paragraphs of Miss Clover's closing (document INQ56) and paragraph 6.4.1 of David Nock's evidence (document CD/LPA7)
[368] Paragraph 8.3.5 of David Nock's evidence (document CD/LPA7)
[369] Fifty-second paragraph of Miss Clover's closing (document INQ56)
[370] Sixtieth and sixty-first paragraphs of Miss Clover's closing (document INQ 56)

Extract from Inspector's Report

Parish Council Case

proportionate to site area. On that basis, the current appeal site (not the site allocation) is expected to provide a contribution for three pitches, off-site.[387]

150. More recently (on 3 November 2015), the JCS authorities presented a paper to the JCS examination confirming the intention of pursuing the latter approach. Five sites have been identified with a potential to deliver fifty pitches within the next five years.[388]

The Case for Leckhampton with Warden Hill Parish Council

The matter of weight

151. The appellants appear to ascribe significant weight to the housing proposals in the draft JCS.[389] Yet page 148 of the JCS warns that the indicative layout on page 154 should not be regarded as policy.[390] Two recent appeal decisions have afforded the draft JCS policies little or no weight.[391] Applying the advice of NPPF paragraph 216 and noting that the base data of objectively assessed housing need is being revisited and is likely to take some time considering arguments for a 30% uplift and that there are many objections to the plan, the appellants are chasing an allocation which does not exist.[392] Furthermore, the Council has resolved to seek the removal of Site Allocation SA6 from the JCS.[393]

Transport

152. A SATURN transport model is not needed to demonstrate that Leckhampton Lane and Church Road are already heavily congested. The Parish Council has already provided unchallenged information of trip times which show that this congestion is already unacceptable and occasionally results in gridlock.[394]

153. Existing pedestrian facilities in locations of high demand such as in Church Road near the primary school are inadequate with footway widths as low as 0.8m and suffering from vehicles parking on the pavement.[395] There are few dedicated

[387] Ibid and document INQ32
[388] Document INQ45
[389] First and fourth paragraphs of Mr Graham's closing statement (document INQ57) (I have imputed paragraph numbers to this document)
[390] Second paragraph of Mr Graham's closing statement, referencing the statement at page 148 of the submitted plan (document CD/POL10)
[391] Third paragraph of Mr Graham's closing statement (document INQ57), referencing paragraph 11 of appeal decision APP/G1630/W/15/3003302 (document INQ24) and paragraph 18 of appeal decision APP/G1630/W/15/3002522 (document INQ25)
[392] Fifth to eighth paragraphs of Mr Graham's closing statement (document INQ57)
[393] Parish Council's response to LEGLAG's suggested points of common ground (documents INQ 40 and INQ41)
[394] Sixteenth paragraph of Mr Graham's opening statement (document INQ54) (I have imputed paragraph numbers to this document) and tenth, eleventh and twelfth paragraphs of Mr Graham's closing statement and paragraphs 3.32, 3.33 and 5.4 of Dr Mears's evidence (document CD/LH8) referencing section 3.4.1 and Annexes 2 and 3 of the Parish Council's NPPF Concept Plan & Local Green Space Application July 2013 (document CD/LEG2) (duplicate copies at CD/HIG2 and found in red folder of third party submissions to PINS in response to notice of appeal)
[395] Paragraph 3.10 of Dr Mears's evidence (document CD/LH8)

cycle facilities yet it is seen as too dangerous to use the roads.[396] The diversions of Kidnappers Lane will cause a rat run, dangerous to pedestrians.[397]

154. A simple traffic model (not reassigning traffic to different routes consequent on the behavioural responses of drivers to predicted increases in traffic[398]) shows the severe results of adding additional traffic to already congested roads.[399] The appellant's SATURN modelling shows, whether or not the Leckhampton development is built, that overall growth in demand would be about 23% and there would be a substantial increase in over-capacity queues, indicating a considerable increase in congestion. The deterioration in the performance of the network would greatly exceed the 23% increase in demand.[400] Additional new development should not be introduced into this unacceptable situation. Mitigation measures are proposed but their effects are not quantified.[401]

Landscape and visual impact

155. Open countryside to which the public has access contributes to both the social and environmental roles of sustainable development as defined in paragraph 7 of the NPPF. Finding ways to enhance and improve the places in which people live and recognising the intrinsic character and beauty of the countryside are two of the objectives set out in paragraph 17 of the NPPF. Protecting and enhancing valued landscapes is a policy set out in paragraph 109 of the NPPF. There is therefore ample support in NPPF for any soundly based objection on landscape grounds.[402]

The site itself

156. The landscape value of Leckhampton Fields was comprehensively assessed for the Borough Council in 2003 by Landscape Design Associates (the LDA report).[403] The landscape, and its value, have hardly changed since.[404]

157. Previous Inspectors have recognised that the appeal site should be protected because of its varied topography, landscape history, dense network of footpaths

[396] Paragraph 3.11 of Dr Mears's evidence (document CD/LH8)
[397] Paragraph 8.5 of Parish Council's Statement of Case (in green folder on PINS file)
[398] Twelfth paragraph of Mr Graham's closing statement (document INQ57), recognising point made in cross-examination of Dr Mears
[399] Sixteenth paragraph of Mr Graham's opening statement (document INQ54) and thirteenth and fourteenth paragraphs of his closing statement (document INQ57) referencing the traffic queue model and analysis found at section 6 (Annex 3) on page 57 of the Parish Council's Neighbourhood Planning NPPF Concept Plan and Local Green Space Application report July 2013 (appendix 2 to its Statement of Case in green folder on PINS file; further copies found at document CD/LEG2 and CD/HIG2)
[400] Paragraphs 3.15 to 3.20 of Dr Mears evidence (document CD/LH8), quoting the appellant's Transport Note 23 (document CD/APP43)
[401] Paragraphs 3.23 to 3.25 of Dr Mears's evidence (document CD/LH8). Paragraph 4.5.15 of Hilary Vaughan's evidence (document CD/APP70) refers, confirmed in cross-examination by her response to a question from Miss Clover
[402] Fifteenth paragraph of Mr Graham's closing statement (document INQ57)
[403] Document CD/LH3. A duplicate copy was sent with the Parish Council's representation to PINS found in red folder of third party submissions to PINS in response to notice of appeal.
[404] Sixteenth paragraph of Mr Graham's closing statement (document INQ57)

Extract from Inspector's Report

Local Highway Authority Comments

- The appeal proposal is premature and prejudicial to the JCS examination not just in terms of housing allocations and consideration of LGS but also in terms of transport issues awaiting studies due to report in Spring 2016.
- Shurdington Road, even with environmentally unattractive enlarged junctions, would fail to have sufficient capacity to serve the development.
- Displacement of traffic would be onto unsuitable roads, themselves lacking capacity.
- Mitigation of traffic effects would be impractical or ineffective; it is not speed which needs to be moderated on Church Road/Leckhampton Lane but congestion; the length of the queuing lanes at Moorend Park Road would not be increased but the hazard to pedestrians would be by removal of a refuge; the diversion of bus route 10 is not wanted by the operator; other routes canvassed for diversion to the site are infrequent; the South West Cheltenham Modal Shift Strategy will have negligible effect.
- Closures and re-routeings of Kidnappers Lane would be inappropriate, inconvenience existing residents which it serves and fail to achieve comprehensive access for the whole JCS Strategic Allocation.
- The environmental dimension of sustainable development cannot be replaced once lost, so should have a veto over the other dimensions.
- Traffic impacts would cause harm to the economic dimension of sustainable development.
- The prominence of the commercial centre would give it disproportionate attraction, drawing trade from, and so harming, other local centres.
- The density proposed would be too great for a rural edge location in proximity to the AONB.
- The illustrative masterplan does not demonstrate the feasibility or viability of the scheme.
- There would be a loss of “Best and Most Versatile” agricultural land.
- No viability assessment demonstrates that promised 40% affordable housing can be delivered.

Other speakers

196. Vivian Matthews, Ann Davies, Gillian Goulet and Ann McIntosh did not present a case orally but put questions to Hilary Vaughan concerning the efficacy of modal shift to buses and to cycles, the alleviation of problems on Church Road, the effects of other development and the needs of emergency vehicles.

Written Representations

Gloucester County Council

197. Gloucester County Council (GCC) provided a lengthy (56 page) commentary on the planning application with a five-page non-technical summary as well as a

Technical Note on the contributions expected from the s106 agreement[513] and a justification for including monitoring costs within the agreement.[514] In brief, these confirm that the site is located within a range of destinations that can be accessed by walking, cycling and public transport. This location means that through area wide travel planning and modal shift, patterns of growth can be actively managed to make the fullest use of these modes.

198. It notes that the A46 Shurdington Road experiences recurrent congestion on a regular basis, that two junctions (at Leckhampton Lane and at Moorend Park Road) have capacity issues and that the development proposed will impose on the performance of those junctions. However, GCC takes the view that the development is only required to mitigate its own impact, not any existing capacity issues.

199. GCC confirms that the development is likely to generate 434 (am) and 460 (pm) additional trips. It notes that the applicant and the highway authority have prepared a package of mitigation that will deliver modal shift and improvements to capacity along key transport networks. These should not include restrictions on Leckhampton Lane but should include improvements to the signals at Moorend Park Road and a contribution to the South West Cheltenham Modal Shift Strategy. This will build upon work already carried out through the Local Sustainable Transport Fund to develop a real modal shift towards alternative modes, helping to reduce the impact of car-borne trips.[515]

200. It concludes that, with mitigation measures coupled with area wide modal shift and trip banking, the residual cumulative impact of the development compared with what would happen anyway by 2023 will not be severe.[516] Situations of congestion would be relatively short-lived. This is not to say that there would be no queuing but delays should be of relatively short duration and confined to the peak hours.[517] It confirms that the matters raised by Mary Nelson do not affect GCC's position.[518]

[513] Document INQ3
[514] Document INQ47(e)
[515] The section headed *Leckhampton (650 dwelling) Contribution* of Appendix E of Gloucestershire County Council's Highway Contributions Technical Note (document INQ3) explains that the £400,000 contribution from the development would not be spent, as had been initially proposed, on continuing funding for Personalised Travel Planning for existing residents or for Work Place Travel Planning for existing employers. Instead, the money would be spent on providing infrastructure, the lack of which is currently a barrier to making journeys by non-car means. These include; increasing public transport provision to the Strategic Site Allocation SA6; creating and extending combined pedestrian/cycle provision to major employment, education and transport destinations in Cheltenham; ten cycle and walking signs providing route and journey-time information; a monolith in the local centre; and the Up Hatherley Cycle Way.
[516] Second paragraph of "Local transport Modelling" section of Non-Technical summary of Document CD/HIG14 and concluding paragraph of chapter six of document CD/HIG14
[517] Final four paragraphs of chapter nine of document CD/HIG14
[518] Document INQ28A

Extract from Inspector's Report

Inspector's Conclusion

- Whether it would prejudice the designation of LGS.
- Its effects on local infrastructure.
- Its effects on the supply of housing.

220. There are also less disputed considerations which need to be taken into account, such as;

- Its effects on the supply of pitches for gypsies, travellers and travelling showmen.
- Its effects on agricultural land supply.
- Its effects on flooding.
- Its effects on the vitality and viability of existing local centres
- Its effects on heritage.
- Its effects on ecology.

The highway network

221. It is an often-expressed view that development should be expected to do no more than "wash its own face" and not solve all existing unrelated problems. In relation to transport, that appears to be the view of the appellant [92], the local authority [126] and the local highway authority [198]. By contrast, third parties point out that the existing situation into which the development would be placed is already not suitable in terms of highway capacity [152] and that the future situation would be far worse and even less acceptable as a location for the development of 650 dwellings [154, 182, 183, 193, 195, 213].

222. The location of the site provides opportunities for sustainable transport modes such as walking, cycling and public transport to reduce the need for major transport infrastructure [92 (2nd bullet) and 197]. The safety audits show that safe and suitable access to the site can be achieved for all people [92 (9th bullet)]. So, there is no real challenge to the appellant's argument that the scheme would meet the requirements of the first two bullet points of NPPF paragraph 32.

223. But the third bullet of NPPF paragraph 32 refers not to the additional impact of a scheme, as the appellant asserts [92 (3rd bullet)] but to residual "cumulative" effects, implying that it is the cumulative effect of all expected development which must be taken into account, rather than the individual contribution of each development in turn, which is likely to be (as in the present case) marginal. (In cross-examination, the appellant's witness, Hilary Vaughan confirmed that the appeal proposal would be responsible for only about 10% of the overall effect of development proposed by the JCS).

224. National Planning Practice Guidance (Guidance) also refers to the cumulative impacts of multiple developments within a particular area when determining the need for a transport assessment of a proposal.[524] It also advises that it is important to give appropriate consideration to the cumulative impacts arising

[524] Guidance paragraph 013, reference ID 42-013-20140306

from other committed development at the decision-taking stage.[525] Hilary Vaughan, the appellant's expert witness appears to accept this in paragraphs 5.6.3 and 7.3.4 of her evidence.[526]

225. Whilst I can agree therefore, that the development should not need to solve all existing unrelated transport problems, the existing or future "in any event" situation on the highway network, is not an unrelated problem which evaluation of the proposed development should ignore. It is a related problem which is highly pertinent to the evaluation of the current appeal proposal.

226. Likewise, although DfT Circular 02/2013 deals only with the Strategic Road Network, its principles can have equal validity to the road network in general. Paragraph 9 advises that development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (link or junction) of the strategic road network, or they do not increase demand for use of a section that is already operating at over-capacity levels, taking account of any travel plan, traffic management and/or capacity enhancement measures that may be agreed. It repeats the advice of NPPF paragraph 32 that development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

227. All parties accept that the present network is congested and that the A46 Shurdington Road and several of its junctions are already operating at over-capacity levels [92 (4th bullet), 130, 154, 182 (6th bullet), 198]. Applying the principles of DfT Circular 02/2013, this alone would suggest that the appeal should be dismissed unless mitigation resolves the problem.

228. The County highway authority predicts that the development will add 434 (am) and 460 (pm) two-way trips [199] to the Shurdington Road. The Council's argument that this effect has probably been underestimated [134] is convincing. Shurdington Road presently carries 1543 two-way flows past the site in the morning peak, 1726 in the evening[527]. Even on the County's figures, the already overloaded Shurdington Road would be expected to accommodate 27-28% more traffic. Yet the appellant's models predict increases in traffic on Shurdington Road past the site of 6% in the am peak, 17% in the pm.

229. The explanation given is that Shurdington Road and its junctions do not have spare capacity and that the traffic from the development would displace traffic from Shurdington Road on to other routes [92 (4th bullet)]. Those parties who are professionally advised by transport experts seem to accept the predictions of the appellant's traffic modelling that all development in and around Cheltenham will contribute to a cumulative effect of growth in traffic of about 23% by the year 2023 [92 (3rd bullet), 131, 154, 198].

230. In the end, traffic would find its own level on the network as a whole but there would be an overall increase in journey times and congestion [130] and a consequent deterioration in network performance. The Parish Council points out that, even on the appellant's own figures, the deterioration in the performance of

[525] Guidance paragraph 014, reference ID 42-014-20140306
[526] Document CD/APP70
[527] Paragraph 3.10.1 of Supplementary Environmental Statement Movement Section (document CD/APP27)

the network would greatly exceed the 23% increase in demand [154]. In my view, that would constitute a severe impact.

231. The way displacement would work in practice needs to be understood. It means that traffic conditions on the A46 Shurdington Road would have to be so unacceptable to drivers that they would change their behaviour. The harmful practical effects of this displacement are graphically described in Hugh Lufton's evidence [182 (6th bullet)]. Notwithstanding the County highway authority's blithe assertion that congestion would be short-lived, of short duration and confined to the peak hours [200], those are the hours when the greatest number of people would be affected. It would cause not just displacement onto other roads but also to other times, to less preferred destinations, or to a decision not to travel and so it would affect all three dimensions of sustainable development.

232. Even allowing for the criticisms made by the Council of the appellant's modelling [128-136], the appellant's argument, that the part which the appeal development has to play in this would be small, is convincing [92 (3rd and 4th bullets)]. Nevertheless, the conclusion is inescapable that, unless effective measures are taken, the cumulative impact of development on conditions on the highway network in 2023, both for existing residents and for potential future residents of the appeal proposal, would be unacceptable.

233. The appellant claims [92 (6th bullet)], and the highway authority agrees [199], that the proposal includes a package of measures to alleviate the impact of development. I now turn to consider whether this would be sufficiently effective to overcome the identified issues and for the residual cumulative impact so to be acceptable.

234. The first observation I make is that Local Plan policy recognises that the historic distribution of development and land use in and around Cheltenham has created travel patterns which are currently characterised by substantial volumes of trips and a high proportion of car use. The transport policies of the County and Borough councils seek to modify these patterns by traffic management schemes and parking control [92 (6th bullet)]. It appears that the emerging JCS would not alter the thrust of this strategy. It also appears that the examination of the JCS has yet to demonstrate that this strategy is sound; further work has been requested and this is not likely to be reported until the spring of 2016 [123, 184].

235. The second observation I make is that even the County highway authority expects the measures proposed in this appeal to be effective only in reducing the residual cumulative impact of the development to less than severe compared with what would happen anyway by 2023 [200]. That is not the correct test, since the A46 Shurdington Road is already overloaded; applying the principles of DfT Circular 02/2013, the development should not be permitted unless effective measures are taken to relieve or counter the existing overloading of Shurdington Road. Neither appellant nor County highway authority claims that to be the case.

236. The third observation I make is that the package keeps changing; when the Strategic Allocation of site SA6 was first proposed, it was predicated on the provision of a Park and Ride site and bus priority measures. Those are not now proposed [185]. When the appeal site application was first submitted, the presumption was that physical measures would be taken to reduce congestion in Leckhampton Lane and Church Road by preventing traffic from turning into and

passing along Leckhampton Lane. Subsequent modelling showed that to be either ineffective or even counterproductive; it is not now proposed and forms no part of the measures now included in the s106 agreement [199]. Similarly, when the application was first submitted, numerous documents were adamant that bus route 10 would be diverted through the development. That is not now proposed.[528] At one stage modelling envisaged network management which would have resulted in speeds reduced to 15mph over a considerable proportion of the network. That is not now proposed [188]. Travel plans are known to be effective in achieving a modal shift of around 10%, more when combined with other measures. Workplace travel plans addressing commuter behaviours in Cheltenham as a whole were to have been funded through the development contributing to the South West Cheltenham Sustainable Transport Fund. Although the contribution remains, the workplace travel planning is not now proposed.[529] The package of measures intended to alleviate the situation is clearly a work in progress with no guarantee of any substantive or effective outcome.

237. The fourth observation I make is that the effects of the package of measures are unquantified. The South West Cheltenham Sustainable Transport Fund has no track record of outcomes. There are no indications of the possible effectiveness of any measure either alone or in combination. All the modelling carried out takes no account of the effects of the package [154]. This may be a consequence of its changing nature. Whatever the reason for the absence of quantification and without disagreeing with Mr Nock's view that a package could be devised which could be made to work [96], I share the scepticism of third parties about the effectiveness of the package of measures presently proposed.

238. I therefore conclude that, taking account of the measures which are included in the s106 agreement, the residual cumulative effects of development proposed would increase demand for use of sections of the highway network which are already operating at over-capacity levels, contributing to a severe impact on a wider area of Cheltenham as traffic is displaced. It would therefore conflict with Local Plan policy CP4 (b) which would permit development only where it would not result in traffic levels to and from the site attaining an environmentally unacceptable level. It would also conflict with emerging policies INF1 and INF2 which seek to ensure, amongst other matters, that any increased level of car use derived from development proposals would not result in a severe impact.

Air pollution

239. These arguments parallel the highways arguments. Certain locations on the highway network experience episodes when pollution levels exceed recommended maxima. But the threshold for unacceptability is properly calculated on an annual basis. That threshold is not presently exceeded.

240. Because the highway network runs at capacity at peak times, the future situation in those locations would hardly change as a result of the development. Instead, additional traffic (and consequent pollution) would be more widespread but would still not trigger annual thresholds of unacceptability [97]. I therefore conclude that the development would have an acceptable effect on air pollution.

[528] See footnote 235
[529] See footnote 232

Residual cumulative impacts

September 8, 2016

The High Court recently rejected a challenge to refusal of planning permission for 650 homes in Cheltenham.

RELATED ARTICLES

Jan 15, 2021
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Jan 14, 2021
Developer loses Court of Appeal battle over

The ruling is important on the issue of residual cumulative impacts of development, writes Ashley Bowes.

Mr Justice Holgate has refused Bovis Homes and Miller Homes permission to proceed to challenge the decision of the Secretary of State to withhold planning permission for 650 new homes in Cheltenham, finding the claim to be "unarguable".

The challenge was of particular note for its analysis of paragraph 32 of the National Planning Policy Framework, which provides that development should be prevented if the "residual cumulative impacts of development are severe".

The Inspector had concluded at IR,225 that:

Article continues below...

"Whilst I can agree therefore that the development should not need to solve all existing unrelated transport problems, the existing or future "in any event" situation on the highway network, is not an unrelated problem which evaluation of the proposed development ignore. It is a related problem which is highly pertinent to the evaluation of the current appeal proposal"

He went on to have regard to the guidance in DfT Circular 02/2013,

whether 'tilted balance' applied to 50-home scheme

Jan 14, 2021
Judge rejects legal challenge to planning permission for 'extra care' residential development

Jan 13, 2021
Court of Appeal rules on whether VAT is payable on top of caps on costs in Aarhus Convention claims

See all in this section

paragraph 9 which provides:

"Development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (link or junction) of the strategic road network, or they do not increase demand for use of a section that is already operating at over-capacity levels, taking account of any travel plan, traffic management and/or capacity enhancement measures that may be agreed …"

Mr Justice Holgate was not persuaded that the Inspector and Secretary of State arguably erred in law by taking into account of the existing highway situation when resolving the paragraph 32 NPPF questions. In particular, the Judge noted that it would be open to a decision taker to rationally conclude that a given development could wash its own face in highway impact terms, but due to existing over capacity, the residual cumulative impacts of the development could be severe.

Whilst the decision that the claim is not arguable does not create binding authority on the meaning of para.32 NPPF, it does provide an interesting insight into the breadth of discretion open to a decision taker when resolving whether the residential cumulative impacts of development are severe.

Ashley Bowes is a barrister at Cornerstone Barristers. He acted for the successful Interested Parties (Leckhampton with Warden Parish Council and Leckhampton Green Land Action Group Ltd, instructed by Richard Stein at Leigh Day) before the High Court, and on behalf of Leckhampton Green Land Action Group Ltd before the planning inquiry.

Notes

Appeal decision letter reference: LAND AT KIDNAPPERS LANE, LECKHAMPTON, CHELTENHAM APP/B1605/W/14/3001717

Case reference: *Bovis Homes Ltd & Miller Homes Ltd v SSCLG* (CO/3029/2016) (2 September 2016).

Appendix D

Report

Pump Lane and Lower Rainham Transport Impact Appraisal

On behalf of Medway Council

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05/10/2020
Project Reference: 0
Document Reference: 2
Revision: 1
Prepared For: Medway Council

Status / Revisions

Rev.	Date	Reason for issue	Prepared		Reviewed		Approved	
[1]	05/10/2020	New draft	GC/ AP	05/10/2020	DH	05/10/2020	KJ	05/10/2020
[2]	[00.00.00]	[Text]	[XX]	[00.00.00]	[XX]	[00.00.00]	[XX]	[00.00.00]
[3]	[00.00.00]	[Text]	[XX]	[00.00.00]	[XX]	[00.00.00]	[XX]	[00.00.00]

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1 Lower Rainham site sensitivity tests

1.1 Introduction

Medway Council requested the evaluation of development sites in the Rainham area, including Pump Lane. The sites have been converted into highway trips, based on the Strategic Transport Assessment Local Plan site trip generations and trip distribution assumptions. The modelling has been undertaken using the latest 2037 Reference Case scenario (as of August 2020).

Three sensitivity tests were devised based on different build out rate assumptions:

- Sensitivity 1: 1,250 homes
- Sensitivity 2: 2,500 homes
- Sensitivity 3: 5,548 homes

The above sensitivity tests were agreed with Medway Council. The work also includes the development of a new subnetwork (Subnetwork 7) which includes the B2004 Lower Rainham Road.

The aim of the work is to evaluate the traffic impact of the proposed developments related to specific housing sites around Rainham. The location of the sites are shown in Figure 1.

Figure 1: Proposed development sites at Lower Rainham

2 Methodology

In order to assess the impact of the development sites on the traffic operations of the road network in Lower Rainham, several different outputs were used for analysis. This includes:

- Level of Service (LoS) for Junctions:

The Highway Capacity Manual (HCM) defines LoS for signalized and unsignalized junction as a function of the average vehicle control delay. The estimation of the LoS for a junction is based on the following:

- LoS is calculated per movement or per approach of the junction
- LoS for the junction as a whole is based on the average of the queue delay of the approaches, weighted by the flow of each approach
- Different threshold values are provided by HCM depending on the type of the junction (signalised or unsignalised) presented in the following table:

Table 1 Junction Level of service classification

Level of Service	Control Delay(sec/veh) Signalised	Delay (sec/veh) Unsignalised
A	≤ 10	≤ 10
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	> 80	> 50

- Subnetwork detailed Aimsun statistical output which is includes several indicators presented in the following table:

Table 2 Statistical traffic microsimulation indicators included in the evaluation

Statistic	Units	Description
Travel Time	sec/km	Average time a vehicle needs to travel one kilometre inside the network. This is the mean of all the single travel times (exit time - entrance time) for every vehicle that has crossed the network, converted into time per kilometre.
Delay	sec/km	Average delay time per vehicle per kilometre. This is the difference between the expected travel time (the time it would take to traverse the system under ideal conditions) and the travel time. It is calculated as the average of all vehicles and then converted into time per kilometre. It does not include the time spent in virtual queue.
Flow	veh/h	Average number of vehicles per hour that have passed through the network during the simulation period. The vehicles are counted when leaving the network via an exit section.
Speed	km/h	Average speed for all vehicles that have left the system. This is calculated using the mean journey speed for each vehicle.
Stop Time	sec/km	Average time at standstill per vehicle per kilometre.
Mean Queue	veh	Average queue in the network during the simulation period. It is measured in vehicles.
Mean Virtual Queue	veh	Average virtual queue in the network during the simulation period. It is measured in number of vehicles which are blocked from entering the network.
Waiting Time in Virtual Queue	sec	Average time in seconds that vehicles remained waiting in a virtual queue. The vehicles taken in account in computing this statistic are those which have completed their trips through the network.

- Traffic flow diagrams
- Speed diagrams
- Volume / Capacity diagrams
- Flow differences between Do Something and Reference Case scenarios
- Select link analysis plots; and
- Delay plots

The Level of Service metric has been used in the past to evaluate the performance of key junctions across the other Medway subnetworks and to identify the locations where capacity is exceeded. The outputs have been used to understand the wider impacts of the additional highway trips generated by the proposed schemes.

The development scenario is compared against a 2037 reference case scenario that only contains the traffic demand on the local network without any additional trips stemming from the development.

2.1 Trip Generation

2.1.1 Introduction

Trips associated with committed developments and proposed Local Plan allocations within Medway have been estimated using average person trip rates derived from the TRICS Database. These are subsequently converted to vehicle trips by applying mode share which consider a range of location dependent factors such as accessibility.

2.1.2 Person Trip Rates

2.1.2.1 Effect of Location

Traffic generation is dependent on location, with the greatest influence being the accessibility of the location, particularly with regards to sustainable modes. However, person trip rates are also dependent on location for most development types and, for this reason, trip rates for all land uses except residential houses have been split into two broad categories as follows:

- Central – comprising sites with the “Town Centre” and “Edge of Town Centre” TRICS location categories
- Suburban – comprising sites with the “Suburban”, “Edge of Town” and “Neighbourhood Centre” TRICS location categories.

These TRICS categories are “possibly compatible” location type categories, as set out in the TRICS Good Practice Guide[1].

Further disaggregation of the location categories was not undertaken for the following reasons:

- There are not enough sites within the TRICS Database to provide reliable estimates of average trip rates for many of the land uses considered;
- There are no significant differences between trip rates calculated using the disaggregated location categories that fall within the two broad categories set out above.

This approach is intended to capture the changes in person trip generation as a result of the site location. Further locational factors that affect traffic generation, such as access to local facilities, public transport accessibility and car ownership, are reflected in the mode share that is applied later in the process.

[1] *TRICS Good Practice Guide 2016*, TRICS Consortium Limited

2.1.2.2 Residential Trip Rates

The trips rates for residential developments comprising predominately houses have been determined using sites within the “Houses Privately Owned” trip generation category. As such, the trip rates apply to sites with a mixture of tenures (but less than 75% privately owned) and housing types (but less than 25% being flats).

Residential trip rates are dependent on the size of the development, with larger developments generally having lower trip rates due to the internalisation of trips. For example, whilst individual houses may have the same trip rates, more of these trips occur within the development (e.g. to other houses, local shops or other facilities) and the number of trips arriving and leaving the development tends to be lower. This has been captured by deriving trip rates for three broad sizes of residential development, as follows:

- Less than 50 houses;
- Between 50 and 100 houses;
- More than 100 houses.

For larger developments, evidence suggests that external trip making is lower still, however, there are insufficient larger sites (e.g. greater than 500 houses) within the TRICS database to derive reliable trip rates. However, it should be noted that for larger developments, the trip rates derived will therefore be robust.

It has been found that, for person trip rates, the size of development has a greater influence on the trip rate than location and therefore, separate trip rates have been derived for different development sizes rather than different locations. The dependence of traffic generation on location in this case is captured through the application of a location-specific mode share.

Trip rates for developments comprising mostly flats have been derived using the “Flats Privately Owned” category (at least 75% privately owned and at least 75% flats). For these developments, there was no strong trend related to development size apparent in the sites within the TRICS Database. However, there was a locational trend, with central sites having higher person trip generations than suburban sites and therefore separate trip rates have been derived for these categories.

2.1.2.3 Person Trips Rates

Having regard to the above points, person trip rates for a wide range of land uses within the Reference Case and Local Plan (Without Mitigation) scenarios have been derived from the TRICS Database. The search criteria used to query the database are set out in Table 3 and the resulting trip rates are presented in Table 4.

Table 3: TRICS Search Criteria for Residential Sites

Land Use	Location	TRICS Search Criteria			Number of Sites	Reference
		TRICS Land Use / Sub Land Use	Size Range	TRICS Location		
Houses (≤50 Dwellings)	Central	03 – Residential A - Houses Privately Owned	6 to 50 dwellings	Edge of Town Centre Suburban Area Edge of Town	50	03_A_CEN_1-50
Houses (51 to 100 Dwellings)	Central	03 – Residential A - Houses Privately Owned	52 to 98 dwellings	Edge of Town Centre Suburban Area Edge of Town	19	03_A_CEN_51-100
Houses (>100 Dwellings)	Central	03 – Residential A - Houses Privately Owned	108 to 432 dwellings	Edge of Town Centre Suburban Area Edge of Town	15	03_A_CEN_101+
Houses (≤50 Dwellings)	Suburban	03 – Residential A - Houses Privately Owned	6 to 50 dwellings	Edge of Town Centre Suburban Area Edge of Town	50	03_A_SUB_1-50
Houses (51 to 100 Dwellings)	Suburban	03 – Residential A - Houses Privately Owned	52 to 98 dwellings	Edge of Town Centre Suburban Area Edge of Town	19	03_A_SUB_51-100

Land Use	Location	TRICS Search Criteria			Number of Sites	Reference
		TRICS Land Use / Sub Land Use	Size Range	TRICS Location		
Houses (>100 Dwellings)	Suburban	03 – Residential A - Houses Privately Owned	108 to 432 dwellings	Edge of Town Centre Suburban Area Edge of Town	15	03_A_SUB_101+
Flats	Central	03 – Residential C - Flats Privately Owned	6 to 294 dwellings	Town Centre Edge of Town Centre	30	03_C_CEN
Flats	Suburban	03 – Residential C - Flats Privately Owned	8 to 493 dwellings	Suburban Area Edge of Town	28	03_C_SUB
Student Accommodation	Central	03 – Residential G - Student Accommodation	146 to 241 residents	Edge of Town Centre	3	03_G_CEN
Student Accommodation	Suburban	03 – Residential G - Student Accommodation	72 to 265 residents	Suburban Edge of Town	3	03_G_SUB

Table 4: Person Trip Rates by Land Use

Reference	Land Use	Location	Parameter	Person Trip Rates					
				AM Peak Hour (0800 to 0900)			PM Peak Hour (1700 to 1800)		
				Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
03_A_CEN_1-50	Houses (≤50 Dwellings)	Central	Dwelling	0.31	0.95	1.27	0.70	0.40	1.09
03_A_CEN_51-100	Houses (51 to 100 Dwellings)	Central	Dwelling	0.22	0.77	0.99	0.60	0.31	0.92
03_A_CEN_101+	Houses (>100 Dwellings)	Central	Dwelling	0.19	0.69	0.89	0.56	0.34	0.90
03_A_SUB_1-50	Houses (≤50 Dwellings)	Suburban	Dwelling	0.31	0.95	1.27	0.70	0.40	1.09
03_A_SUB_51-100	Houses (51 to 100 Dwellings)	Suburban	Dwelling	0.22	0.77	0.99	0.60	0.31	0.92
03_A_SUB_101+	Houses (>100 Dwellings)	Suburban	Dwelling	0.19	0.69	0.89	0.56	0.34	0.90
03_C_CEN	Flats	Central	Dwelling	0.10	0.45	0.55	0.38	0.19	0.56
03_C_SUB	Flats	Suburban	Dwelling	0.08	0.43	0.51	0.35	0.13	0.48
03_G_CEN	Student Accommodation	Central	Resident	0.01	0.15	0.16	0.18	0.10	0.27
03_G_SUB	Student Accommodation	Suburban	Resident	0.03	0.23	0.26	0.19	0.09	0.27

2.1.3 Person Trip Generation

The relevant trip rates have been applied to each development site for each sensitivity test and are summed to give the total person trip generation as set out in Table 6 and the total vehicle trip generation as set out in Table 7. The site names and ID references are presented in Table 5 for each test.

Table 5 Site name and Site ID for person and vehicle trip generation

Site name	Site ID
Sensitivity 1	
West of (lower) Pump Lane, Rainham	1283
Land Between Pump Lane & Bloors Lane, Rainham	750
South of Lower Rainham Road, west of Pump Lane	1061
Sensitivity 2	
West of (lower) Pump Lane, Rainham	1283
Land Between Pump Lane & Bloors Lane, Rainham	750
South of Lower Rainham Road, west of Pump Lane	1061
Westmoor Farm, Moor Street, Rainham	814
Westmoor Farm, Moor Street, Rainham	1086
Land West of South Bush Lane, Rainham	1288
Meresborough Lane & South Bush Lane, Rainham	1059
Sensitivity 3	
Mill Hill, Grange Road, Gillingham	774
Meresborough Lane & South Bush Lane, Rainham	1059
Wayside, Meresborough Lane, Gillingham	1083
Land at Lower Bloors Lane Rainham	1108
Westmoor Farm, Moor Street, Rainham	814
Siloam Farm, Rainham	847
Land west of 749 Lower Rainham Road	1191
Westmoor Farm, Moor Street, Rainham	1086
Land at Lower Rainham	1303
Land at Mill Hill, Grange Road, Gillingham	1073
West of (lower) Pump Lane, Rainham	1283
Land West of South Bush Lane, Rainham	1288
Land West of Meresborough Lane, Meresborough	1291
Land East of Meresborough Lane, Meresborough	1292
Land btw Lower Rainham Rd and Grange Rd	1304
Land east of Eastcourt Lane, Gillingham	1085
Land Between Pump Lane & Bloors Lane, Rainham	750
South of Lower Rainham Road, west of Pump Lane	1061
Between Ivy Cottage and Providence House Lower Bloors Lane	1158
Whetstead, Off Grange Road, Lower Twydall	1014

309 Lower Rainham Road, Gillingham	1125

Table 6: Person Trip Generation

Site Reference	Person Trip Generation					
	AM Peak Hour (0800 to 0900)			PM Peak Hour (1700 to 1800)		
	Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
1283	16	48	63	35	20	55
750	116	416	532	333	206	539
1061	116	416	532	333	206	539
Sensitivity 1	248	880	1127	701	432	1133
814	68	243	310	194	120	315
1086	3	9	11	6	4	10
1288	90	323	412	258	160	418
1059	92	330	422	264	164	428
Sensitivity 2	501	1785	2282	1423	880	2304
774	77	278	355	222	138	360
847	226	812	1038	649	402	1052
1014	0	1	1	1	0	1
1073	22	77	99	60	31	92
1083	2	5	6	3	2	5
1085	29	104	133	83	52	135
1108	6	17	23	13	7	20
1125	1	4	5	3	2	4
1158	3	10	14	8	4	12
1191	2	7	9	5	3	8
1291	38	138	177	110	68	179
1292	33	117	150	94	58	152
1303	118	423	541	339	210	548
1304	30	107	137	85	53	138
Sensitivity 3	1088	3885	4970	3098	1910	5010

2.1.4 Vehicle Trip Generation

The person trips were then translated into vehicle trips by applying the Census MSOA car mode share for the zone that each development site is located within. Please refer to Table 7 that outlines the vehicle trip generation per site and sensitivity test.

Table 7 Vehicle Trip Generation

Site Reference	Vehicle Trip Generation					
	AM Peak Hour (0800 to 0900)			PM Peak Hour (1700 to 1800)		
	Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
1283	11	34	45	25	14	39
750	82	295	377	236	146	382
1061	82	295	377	236	146	382
Sensitivity 1	175	624	799	497	306	803
814	49	175	224	140	87	227
1086	2	6	8	5	3	7
1288	65	232	297	186	115	301
1059	66	238	304	190	118	308
Sensitivity 2	357	1275	1632	1018	629	1646
774	55	197	251	157	98	255
847	163	585	747	468	290	758
1014	0	1	1	0	0	1
1073	16	55	70	43	22	65
1083	1	3	5	3	1	4
1085	21	74	94	59	37	96
1108	4	12	16	9	5	14
1125	1	3	4	2	1	3
1158	2	7	10	5	3	9
1191	1	4	6	3	2	5
1291	28	99	127	80	49	129
1292	23	84	108	68	42	109
1303	83	300	383	240	149	389
1304	21	76	97	61	38	98
Sensitivity 3	776	2775	3551	2216	1366	3581

2.2 Assignment

2.2.1 Macroscopic Model

Traffic has been assigned in the macroscopic model using user equilibrium. Whilst several assignment algorithms are available in Aimsun, experience has shown that where junction delay functions are used (see Capacity Restraint Mechanisms, below), it is necessary to use the Method of Successive Averages (MSA) in order to achieve convergence and this approach has been adopted for this model.

2.2.2 Microscopic Model

A proportion of paths from the macroscopic model has been used by vehicles in the microscopic model. These user equilibrium paths can be thought of as representing the routes that drivers habitually follow day after day based on their historic knowledge of the highway network. Following the best practice from other Aimsun models, the following proportions have been assigned to follow user equilibrium paths:

- Car – 85%
- LGV – 90%
- HGV 95%

The remaining vehicles are set to follow dynamically chosen path-based costs experienced by vehicles currently travelling through the network. Drivers choose these paths before they depart on their journey however some of these may alter their paths within their journey. These dynamic paths represent those drivers that have additional knowledge of current network conditions obtained, for example, from satellite navigation systems and radio traffic alerts.

2.2.3 Generalised Cost

The generalised cost equation used in the Medway Aimsun Model takes the following form:

$$cost = \text{travel time} + \frac{\text{vehicle operation cost per km} \times \text{distance}}{\text{value of time}} + \frac{\text{first user defined cost}}{\text{value of time}} + \frac{\text{first usecond user defined cost} \times \text{distance}}{\text{value of time}}$$

The generalised cost is expressed in units of time (seconds in the Medway Aimsun Model) to removes the difficulty of changes in costs over time, due to inflation and other changes, which may change from year to year.

2.2.4 Travel Time

Travel time is calculated using the volume delay, turn penalty and junction delay functions (see below) and represents the time taken to travel along a section, to make a turn and any delay associated with passing through a junction.

2.2.5 Vehicle Operating Cost

The vehicle operating cost has two components: fuel costs and non-fuel costs and are calculated in accordance with the guidance set out in WebTAG unit A1.3.

Fuel costs, L, are calculated using the following formula:

$$L = \frac{a}{v} + b + (c \times v) + (d \times v^2)$$

where L is the cost expressed in pence per kilometre,

v is the average speed in km/h,

a, b, c and d are parameters defined for each vehicle category.

The values for the parameters are taken from Table A1.3.12 of the WebTAG Data Book (November 2016) for the 2016 base year and are summarised Table 8 below.

Table 8: Vehicle Operating Cost Parameters

Vehicle Type	Parameter			
	A	b	c	d
Average Car	61.475	4.215	-0.028	0.0003
Average LGV	110.255	2.608	-0.017	0.0006
Average OGV1	165.225	29.783	-0.451	0.0039
Average OGV2	263.691	55.000	-0.787	0.0059
Average HGV	230.114	46.401	-0.672	0.0052

Note: Average HGV is calculated as a weighted average of OGV1 and OGV2 using the surveyed proportions of 34.1% and 65.9%, respectively, derived from ATC survey information across Medway.

Non-fuel operating costs are calculated using the following formula:

$$C = a1 + \frac{b1}{v}$$

Where C is the cost in pence per kilometre,

V is the average speed in km/h,

b1 is a parameter for the vehicle capital saving defined for each vehicle category.

The values for parameters a1 and b1 are taken from Table A 1.3.15 of the WebTAG shown in Table 9.

Table 9: Vehicle Operating Cost Parameters

Vehicle Type	Parameter	
	a1	b1
Average Car	3.972	16.394
Average LGV	7.213	41.458
Average OGV1	6.714	263.817
Average OGV2	13.061	508.525
Average HGV	10.897	425.080

Note: Average HGV is calculated as a weighted average of OGV1 and OGV2 using the surveyed proportions of 34.1% and 65.9%, respectively, derived from ATC survey information across Medway.

The values of time used in the model have been taken from the WebTAG Databook and are set out below.

Table 10 Value of time table

User Class	Value of Time (£ / h)

	AM Peak Hour (08:00 to 09:00)	Interpeak Hour (13:00 to 14:00)	PM Peak Hour (17:00 to 18:00)
Car (HBW) (1)	12.15	12.35	12.19
LGV (HBW) (2)	9.62	9.62	9.62
Car (NHBW) (3)	21.56	22.09	21.87
LGV (NHBW) (4)	15.76	15.76	15.76
HGV (NHBW) (5)	15.47	15.47	15.47
Car (HBO+NHBO) (6)	8.38	8.93	8.78
LGV (HBO+NHBO) (7)	9.62	9.62	9.62

2.2.6 First and Second User Defined Costs

The first user defined cost is effectively a fixed monetary cost of travelling along a link and could be used to model a toll road, for example. However, this is not currently used in the model.

The second user defined cost can be used to represent additional perceived costs incurred travelling along a link or turn as a function of distance travelled. It can be used to represent other costs that are explicitly considered in the cost function or cruise speeds, such as the deterrence effect of a narrow carriageway or cobbled street.

2.2.7 Capacity Restraint Mechanisms

Macroscopic Model

In the macroscopic model, travel time and delay are determined using the following functions:

- Volume Delay Function (VDF) – these calculate the cost of travelling along a section and is set to represent the free-flow cost using the generalised cost equation set out above.
- Turn Penalty Function (TPF) – these calculate the cost of traversing a turn and is set to represent the free-flow cost using the generalised cost equation set out above.
- Junction Delay Function (JDF) – these calculate the additional cost of completing a turn at junctions and consider the volume of traffic sharing an approach or undertaking conflicting turns. These are used to model the additional delay incurred at traffic signal controlled junctions, pedestrian crossings, give-ways, roundabouts and merges.

The above functions use information taken from the detailed microscopic coding of the highway network. For example, VDFs and TPFs use the coded lengths of links and turns. JDFs use the coded signal timings, give-way parameters and geometry to determine the available capacity

and delay. In this way, the macro model is consistent with the micro model coding and provides appropriate capacity constraint within the macroscopic assignment. Furthermore, the detailed nature of the microscopic coding means that mid-block delays caused by pedestrian crossings and minor road right turns and other minor junctions will be explicitly taken into account in the macro assignment. The delay functions used in the model are discussed further in section 8.5.

Microscopic Model

Within the microsimulations, capacity constraint, queuing and blocking back is fully taken into account by virtue of the nature of the simulation.

2.2.8 Dynamic Traffic Assignment (Micro)

As set out in above, stochastic dynamic traffic assignment (DTA) has been used to determine the paths that the non-user equilibrium vehicles will take between a given origin and destination from a set of alternative routes. In a stochastic model, the probability of a vehicle taking a particular route depends on the cost of that route relative to the costs of the alternative route(s). The costs are determined by the cost function and the probabilities are determined by the route choice model. The route choice model defines the drivers' decision of which path to take from a set of alternatives, connecting one origin to one destination, depending on the cost calculation by the cost function. The 'standard' route choice models within Aimsun include:

- Fixed (time);
- Binomial;
- Proportional;
- Logit;
- C-Logit.

The fixed model is not appropriate to use, as it will not allow vehicles to respond to congestion as it determines fixed routes at the start of simulation using travel time in free-flow conditions (or the travel time during the warm-up period). The Binomial model has not been used as it does not consider the travel costs in the decision process. The proportional model has also not been used, as it is not particularly sensitive to small changes in travel costs.

The remaining models are therefore the Logit and the C-Logit model. In these models, the probability of a given path is expressed as a function of the difference between the costs of that path and all other alternative paths. In the C-Logit model, a commonality factor is introduced which controls the degree to which overlapping routes between a given OD pair are used in large networks where many alternative paths between origins and destinations exist.

In calibrating the model, there are a number of parameters that need calibrating in the C-Logit model as follows:

- Cycle time: this is the length of the period after which the route choice paths and probabilities are recalculated;
- Number of intervals: this is the number of preceding cycles that are used to calculate the route choice paths in the next route choice cycle;
- Initial K-SPs: the number of route choice paths used at the beginning of the simulation;
- Maximum number of routes: the maximum number of routes for each O-D pair to which vehicles are assigned;
- Scale factor, θ: this influences the standard error of the distribution of expected travel times and effectively determines the weight given to differences in costs between routes. For a small value of the scale factor (θ <1), there is a large variability about the true route costs and hence a trend towards using many routes whereas for large value of the scale factor (θ > 1) there is a small variability about the true route costs and route choice is concentrated in very few routes;
- Commonality factor: this is directly proportional to the degree of overlap of a given path with other alternative paths and is scaled by the parameters β and γ. The β parameter scales the commonality factor such that as β gets larger, the overlapping factor has greater importance with respect to utility (or cost). The γ parameter has a smaller influence than β and has the opposite effect.
- Attractiveness weight: this is the weighting afforded to the capacity when the route costs are calculated by the cost function;
- User defined cost weight: this is the weighting afforded to the user defined costs when the route costs are calculated by the cost function.

The final calibrated values for the route choice model are shown in Table 11.

Table 11: DTA Model Calibrated Values

Logit Model Parameter	Final Calibrated Values
Cycle time	00:15:00
Initial K-SPs	3
Maximum Number of Paths	3
Scale Factor, θ	1
Beta Factor, ß	0.15
Gamma Factor, γ	1
Attractiveness Weight	1
User-Defined Cost Weight	1

2.3 Trip Distribution

A methodology has been adopted to generate the vehicle trip matrices, based wholly on observed data (mobile network data, Census origin-destination data, Census mode share data, traffic count data and car park capacity data).

2.4 Future Growth projections

2.4.1 Trip End Growth – Medway

The developments within the Reference Case in Medway have been assigned a model zone and where necessary, new zones have been created. The vehicle arrivals and departures are then summed for each zone and added to the respective destination and origin totals to provide the growth in traffic for each zone within the Medway local authority area. In this way, growth for trip ends within Medway are based solely of the projected development in the Reference Case Scenarios.

2.4.2 Trip End Growth – Other Areas

For all other zones in the model (i.e. those outside of Medway) trip end growth for non-home-based work (NHBW) LGV and HGV trips has been based on the forecasts contained in "*Road Traffic Forecasts 2015*" for LGV, rigid and artic vehicle types.

Trip end growth for all car trips and other LGV trips outside Medway (e.g. in neighbouring authorities) has been estimated using TEMPro v7.2. The resulting growth factors have also been modified using the income and fuel adjustment factors set out in WebTAG Databook Table M4.2.1.

In order to determine whether the level of growth from neighbouring authorities is appropriate, the projected household growth within NTEM has been compared with that set out in the Adopted Local Plans for Gravesham, Maidstone, Swale and Tonbridge & Malling. The results are set out in Table 12.

Table 12: Comparison of NTEM and Adopter Local Plan Growth

Local Authority	Household Growth (2016 to 2037)	
	National Trip End Model	Adopted Local Plan
Gravesham	8,785	6,897
Maidstone	18,350	16,777
Swale	9,170	21,073
Tonbridge & Malling	13,265	8,075
Total	**49,570**	**52,882**

The table shows that the NTEM projections for Gravesham and Maidstone are slightly above, but similar too, those set out in the Adopted Local Plans. However, for Tonbridge & Malling the growth in households is overestimated by 64%. Despite this, the level of growth assumed in NTEM has been adopted to ensure model robustness.

Given the large discrepancy between NTEM growth and Swale's adopted Local Plan, alternative growth assumptions have been adopted following liaison with Swale Council. Following discussions, it was understood that Swale's predicted household growth assumed 776 households per year pre 2022 and 1,054 households from 2022 to 2037. This alternative assumption was then used to generate updated growth factors within TEMPro. Based on this approach, an updated comparison is provided below.

Table 13: Comparison of NTEM and Adopted Local Plan Growth – Alternative Swale Assumptions

Local Authority	Household Growth (2016 to 2037)	
	National Trip End Model	Adopted Local Plan
Gravesham	8,785	6,897
Maidstone	18,350	16,777
Swale (Alternative Assumption)	20,744	21,073
Tonbridge & Malling	13,265	8,075
Total	**61,144**	**52,882**

The table above demonstrates that the level of growth assumed in NTEM, and therefore in the model, is broadly similar to that set out in the Adopted Local Plans. Additionally, the above demonstrates that the level of growth in neighbouring areas is robust, with a difference of 16% observed.

2.5 Infrastructures changes

The infrastructure changes from the Base Case to the Reference Case are presented below.

Table 14 Infrastructure changes from the Base Case to the Reference Case

Scheme Reference	Development	Planning Reference	Scheme Description
1	Former Cement Works, Halling (St Andrews Park)	MC/07/2153, MC/12/1791 (Amended by MC/14/1486)	Site connection to eastern arm of existing A228 Formby Road / Kent Road roundabout
			New ghost island priority-controlled junction access off A228 Formby Road
2	Land Rear of 187-193 Princes Avenue, Rear of 32/41 Gatcombe Close and North of Peacock Rise, Walderslade	MC/08/1043 & MC/14/1685	New development access – affects roads not included within the model
3	Land Between Roman Way and Knight Road, East of the Medway Valley Railway Line (Temple Waterfront) (Reserved Matters (Phase 1A)	MC/09/0417 & MC/16/0600 (Reserved Matters (Phase 1A)	Third access arm off existing Roman Way / Chariot Way roundabout
4	Mid Kent College Site, Horsted Centre, Maidstone Road, Chatham (Horsted Park)	MC/11/0001, MC/15/0335, MC/15/4540	Two new priority-controlled access junctions off A229 Maidstone Road
5	Land at Station Road (Bakersfield), Rainham, Kent ME8 7QZ	MC/14/0285 (granted by APP/A2280/W/15/3002877) & MC/17/1820	New priority-controlled access junction off Station Road, Rainham
6	Former Temple School, Brompton Farm Road, Strood, ME2 3NP	MC/14/1760	New priority-controlled access junction off Brompton Farm Road at location of existing school access
7	Gilbratar Farm, Ham Lane, Hempstead, Gillingham, Kent, ME7 3JJ	MC/14/2395 (granted by APP/A2280/W/16/3143600), MC/18/0556	New residential development road network connecting via a new arm to North Dane Way / Albemarle Road junction
8	Street Farm, Stoke Road, Hoo, ME3 9BH	MC/15/0098 (Outline, all matters reserved), MC/18/1795	New priority-controlled access off Stoke Road

Scheme Reference	Development	Planning Reference	Scheme Description
9	Land at Otterham Quay Lane, Rainham	MC/15/0761, MC/16/2051, MC/18/2328	New priority-controlled access off Otterham Quay Lane plus new signal-controlled pedestrian crossing
10	Land North of Peninsula Way, Main Road, Chattenden, Rochester	MC/15/3104 & MC/16/4229	New access road to existing eastern stub arm at the A228 Peninsula Way / Main Road Hoo Roundabout plus new Toucan crossing on A228 Peninsula Way
11	Land to East of Mierscourt/South of Oastview Rainham, ME8 8JF	MC/15/4539	New priority-controlled access off Mierscourt Road
12	Land at 185 Walderslade Road, Chatham, ME5 0ND	MC/16/0370	New priority-controlled access off Walderslade Road
13	Land South of Stoke Road, Hoo,	MC/18/0702	New priority-controlled access off Stoke Road
14	Land North of Commissioners Road Strood, ME2 4EQ	MC/16/4268	New priority-controlled access off Commissioners Road
15	Pier Road (Victory Pier)	MC/04/1214,	Signal-controlled A289 Pier Road / Pier Approach Road junction already included in the base year model
16	Land at Chatham Docks	MC/11/2756	New signal-controlled junction to replace existing A289 Pier Road / Church Road / Strand Approach Road roundabout
			Signalisation of Gillingham Gate Roundabout already included in the base year model
17	Former Southern Water Site, Capstone Road	MC/14/2737	New signal-controlled junction to replace existing A289 Pier Road / Church Road / Strand Approach Road roundabout
			Signalisation of Gillingham Gate Roundabout already included in the base year model

Scheme Reference	Development	Planning Reference	Scheme Description
18	Rochester Riverside	MC/17/2333	Introduction of two exit lanes on New Road at the A2 Star Hill / A2 New Road / A229 City Way roundabout plus relocation of existing pedestrian crossing
19	Land at Brickfields, Darland Farm, Pear Tree Lane	MC/16/2776, MC/18/0705	Traffic Calming on a Pear Tree Lane plus
20	Kitchener Barracks	MC/15/0079, MC/17/1392	Residential road layout –affects roads not included in the model
21	Chatham Quayside (Formerly Colonial House)	MC/14/3631, MC/17/1250	Development road layout – affects roads not included in the model
22	10-40 & 48-86 Corporation St, Rochester (MHS Homes)	MC/15/2039	Two new priority-controlled accesses off A2 Corporation Street
23	Land Rear of 43-107 Beatty Avenue (Centenary Gardens)	MC/14/1912, MC/15/1909	Residential road layout – affects roads not included in the model
24	Land South of Ratcliffe Highway, BAE Systems, Hoo	MC/17/1884	Two new priority-controlled accesses off Ratcliffe Highway
25	Former Peters Pit and Peters Works	TM/05/00989/OAEA, TM/07/03045/RM	New highway layout comprising Rochester Road, Court Road and New Court Road
26	Kingsnorth Industrial Estate	MC/08/0370, MC/16/0479	Improvements to Ropers Lane including new roundabouts at the Ropers Lane / Stoke Road and Stoke Road / Eshcol Road junctions – already included in base year model
27	Aldi Foodstore, Strood	MC/11/3017	New priority-controlled access junction off Friary Place
28	Land Off Bailey Drive, Gillingham Business Park	MC/13/0750	New development accesses – affects roads not included in the model
29	Rochester Fire Station	MC/13/1265	New priority-controlled access junction off Marconi Way
30	Former Military Site, Upnor Depot, Lower Upnor	MC/13/1804	New priority-controlled access junction off Upnor Road
31	Temporary Access Road, Manor Farm Quarry	MC/10/2068	Construction of temporary access road

Scheme Reference	Development	Planning Reference	Scheme Description
32	Gillingham Islamic Centre (Formerly Croneens Car Park), Railway St, Gillingham	MC/13/0102, MC/16/4403	New priority-controlled access junction off Railway Street
33	Chatham Driving Range, Street End Road, Chatham	MC/17/2767	
34	Land at White House Farm, Stoke Road, Hoo	MC/18/0247	New priority-controlled access junction off Stoke Road – appropriate access already in the model
35	Former DX Freight Site, Maidstone Road	MC/18/0556	New priority-controlled access junction off North Dane Way – appropriate access already in the model
36	Walnut Tree Farm, High Halstow	MC/17/4408	New priority-controlled access junction off Britannia Road – appropriate access already in the model
37	Berenegrave Nursery, Berengrave Lane	MC/17/3687	New priority-controlled access junction off Berengrave Lane – appropriate access already in the model
38	Rear of 7-13, New Road, Rochester	MC/17/0092	Appropriate access already in the model
39	Rookery Lodge, Thacters Lane	MC/17/0410	Existing site access arrangements assumed
40	Yeoman House, Princes Street	MC/17/1192	Existing site access arrangements assumed
41	Former NHS Walk-in Centre, Canterbury Street, Gillingham	MC/17/2872	Existing site access arrangements assumed
42	Tara, 419 Walderslade Road, Walderslade	MC/18/0207	Appropriate access already in the model
43	Former Grieveson House, 1-26 Cross Street, Chatham	MC/18/0224	Existing site access arrangements assumed
44	Acorn Shipyard, Gas House, Rochester	MC/18/0706	Existing site access arrangements assumed
45	Land Adj to Rochester Train Station	MC/18/2309	Existing site access arrangements assumed
46	HE 001 M2 J5		

Scheme Reference	Development	Planning Reference	Scheme Description
47	HE 002 M20 J7		
48	STA SCH01 Leigh Academy (STA)		
49	002_ Laker Road Private Access Closure (other)		
50	CH2 2021 Strood Town Centre Improvements		

2.6 Amendments to model –

The latest August 2020 version of the Reference Case model contains several changes compared to the previous version. The changes are as follows:

- The demand data for committed developments for Medway has been updated with data 2018 – 2037.
- We have updated wider growth assumptions from TEMPRO and adjustments for Swale borough development plans.
- Finally, we have added in some additional strategic highway schemes to the model. This includes M2 Junction 5 upgrade and the upgrade to M20 Junction 7 in line with feedback from Highways England.

2.7 Proposed mitigations in the area

The latest version of the model was updated with mitigations in two of the locations as outlined in correspondence with David Tucker Associates. The following mitigations have been adopted in the Aimsun model and the results presented in sections 4.1, 4.2 and 4.3 include the effect of these mitigations.

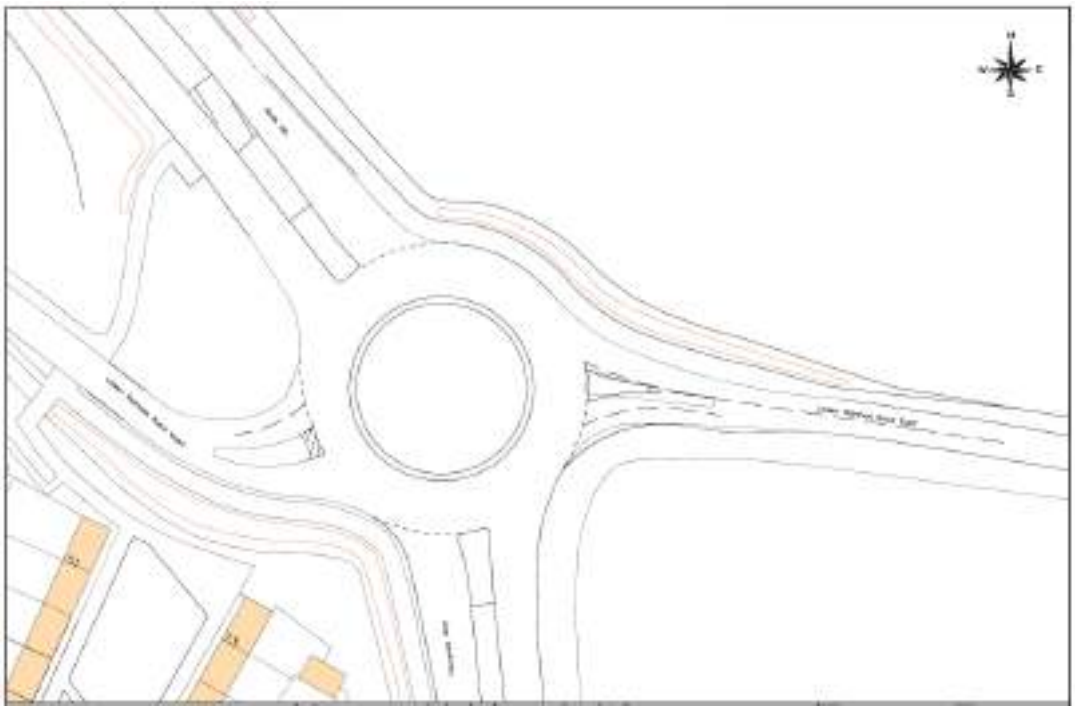

Figure 2 Proposed Improvements Yokosuka Way – Lower Rainham Road Lower Rainham Road East Arm

Figure 3 Proposed A2-Bloor Lane Junction Improvement works

The change proposed at Pump Lane in terms of signal shuttle working was not directly adopted in the model, but instead the access along the link was coded in with higher Generalised Cost to reflect impacts on journey time from the shuttle set up.

Figure 4 Proposed Pump lane Railway Bridge Improvements

3 Sensitivity Test 1, 2 & 3

For this report three sensitivity tests were conducted which examined the impact of the three tests which are described in section 1.1. Sections 3.1, 3.2 and 3.3 will describe each test in more detail.

3.1 Sensitivity Test 1

Figure 5 – Sensitivity test 1 (1,250 homes)

Sensitivity Test 1 involved a new residential development between the Lower Rainham Road and the railway line leading to Rainham railway station around Pump Lane. Sensitivity Test 1 included the building of 1,250 new homes. The exact area can be seen in Figure 5. The demand matrix of the reference case of Aimsun was adapted based on the new housing of this sensitivity test by adding the new traffic demand arising from the new residential area.

3.2 Sensitivity Test 2

Figure 6 – Sensitivity test 2 (2550 homes)

Sensitivity Test 2 involved the development of two new residential areas. One of them was identical to the area included in Sensitivity Test 1 (see section 3.1). The second residential area was developed south of Moor street and west of South Bush Lane in Rainham (see Figure 6). The total number of homes for this sensitivity test was 2,550. Like sensitivity test 1, the additional traffic demand created by the development of these two new residential areas was added to the demand of the reference case.

3.3 Sensitivity Test 3

Figure 7 – Sensitivity 3 (5,548 homes)

Finally, Sensitivity Test 3 involved the development of two new housing areas around the areas described in Sensitivity Test 2. The difference between Sensitivity test 2 and 3 is that Sensitivity test 3 included the building of more than double the amount of homes than sensitivity test 2 (5,548 homes instead of 2,550). Once again, the default Aimsun demand was adapted to accommodate the demand arising from the new homes.

4 Model Run Outputs

4.1 Subnetworks

The Aimsun Medway model consists of 8 main sub-networks which can be seen in Figure 8. This report will analyse the impact of the sensitivity tests on three of them, namely subnetwork 2, subnetwork 3 and subnetwork 7, as they are located next to the proposed development sites.

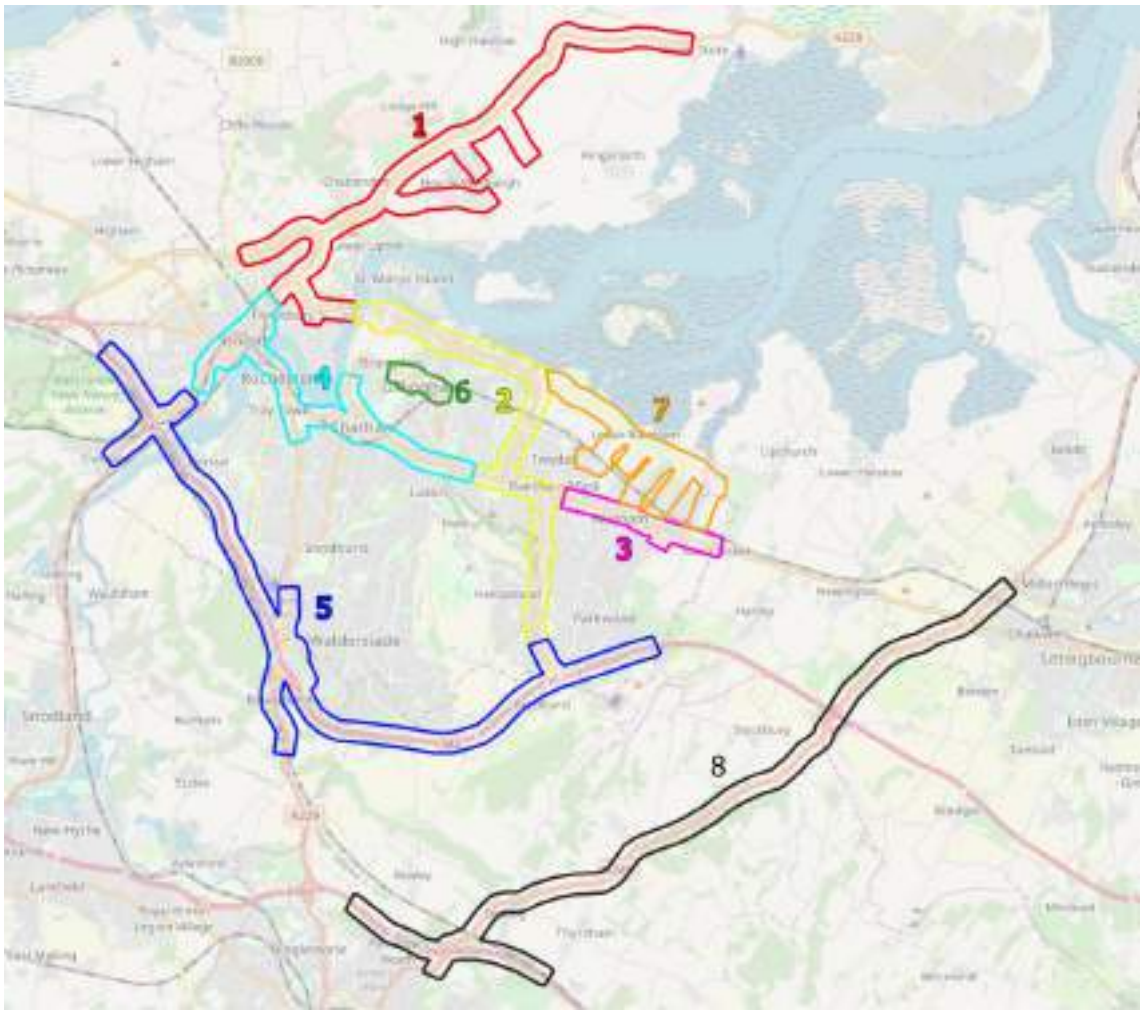

Figure 8 Subnetworks included in the Medway Aimsun Model

Subnetwork 2 covers the A289 from Medway Tunnel to the A2, the short section of A2 that links from the A289 to the A278 Hoath Way, and the A278 Hoath Way. It must be emphasised that subnetwork 2 is significantly bigger than the other 2 subnetworks and covers some part of the Strategic Road Network. Subnetwork 3 covers the A2 east of Bowaters Roundabout through

Rainham to the Medway boundary. Subnetwork 7 covers the link along Lower Rainham Road from the A2 in Rainham to the A289 junction at Yokosuka Way.

The following sections will present the subnetworks in question in more detail and discuss the main simulation findings from subnetworks 2, 3 and 7. It must be noted that in total eight simulation scenarios were ran for each subnetwork. One for each (three) sensitivity test and the reference case, for AM and PM peak periods using macro and micro simulation.

4.2 Traffic Impact Summary

Each sensitivity test has been compared against the Reference Case. The table below summarises the key changes between the scenarios within each of the subnetworks and the percentage change from the Reference Case.

Table 15 Traffic demand for the three subnetwork and percent change compared to the reference case

Subnetwork		AM				PM			
		RC	S1	S2	S3	RC	S1	S2	S3
2	Demand	21,123	21,423	21,561	21,973	20,710	21,383	21,443	23,639
	% Change	-	1.4%	2.1%	4.0%	-	3.2%	3.5%	14.1%
3	Demand	4,758	4,833	5,362	5,537	4,821	5,012	5,376	5,676
	% Change	-	1.5%	12.6%	16.3%	-	3.9%	11.5%	17.7%
7	Demand	11,224	11,835	12,416	12,648	11,224	11,343	11,432	12,355
	% Change	-	5.4%	10.6%	12.6%	-	1.0%	1.8%	10.0%

4.3 Subnetwork 2

The outline of subnetwork 2 along with its main corridors is presented in Figure 9. This subnetwork covers an area of 2024053 m^2, has a total section length of 64 km and includes 689 sections, 245 nodes and 161 centroids among 4 centroid configurations.

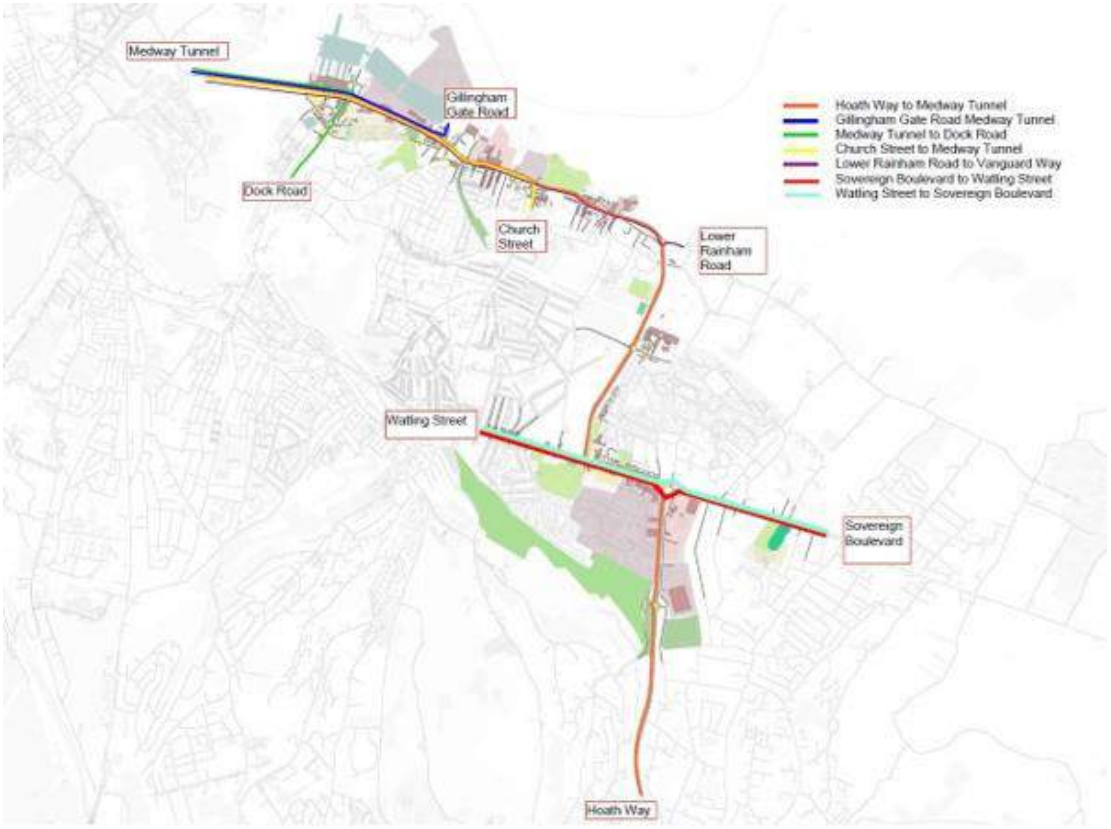

Figure 9 – Subnetwork 2 corridors

Figure 10 presents the main junctions of subnetwork 2, while Table 16 and Table 17 present the junction LoS results.

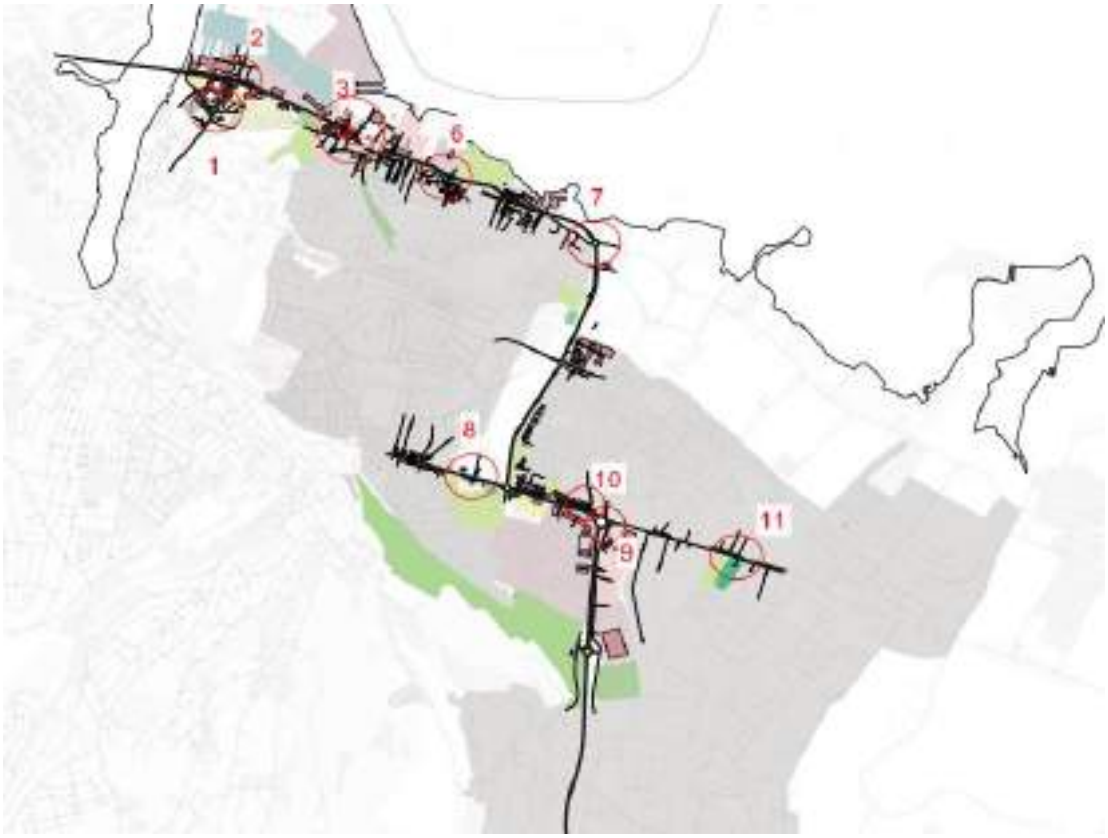

Figure 10 – Subnetwork 2 Junctions

It is observed that except for Pier Road /Gillingham Gate Road Roundabout West the LoS of all other junctions deteriorates significantly as the number of new houses increases, a result which is expected. For several junctions, the flow at the junction, approaches or exceeds capacity, as the level of service reaches level F. More specifically, level of service reaches level F at the following junctions:

- Pier Road/Maritime Way Roundabout in sensitivity 3 scenario during the AM peak and in all three sensitivity scenarios during the PM peak
- Yokosuka Way Roundabout in all scenarios including reference case during the AM peak and in sensitivity tests 2 and 3 in the PM scenario. This specific junction is already highly congested in the reference case. Adding extra traffic makes the traffic conditions worse.
- Rotary Gardens/Woodlands Road/Sovereign Boulevard Junction in the sensitivity 1, 2 and 3 during the AM peak and sensitivity tests 2 and 3 during the PM peak scenario
- Bowater Roundabout in the sensitivity tests 2 and 3 during the AM peak period and in the sensitivity tests 1 and 3 during the PM peak period
- Eastcourt Lane/South Avenue Junction in all tests including reference case during the AM peak period and in sensitivity tests 1, 2 and 3 during the PM peak. This junction is

highly congested in the reference case. Adding extra traffic arising from the proposed developments will make traffic conditions at the roundabout deteriorate further.

- London Road/Bloors Lane Junction in the sensitivity test 3 scenario during the PM peak.

Table 16 – Junctions AM Peak Period LoS Subnetwork 2

Jct No.	Junction	LoS (HMC) 2037 AM RC	LoS PUMP LANE 2037 AM Sensitivity test 1	LoS PUMP LANE 2037 AM Sensitivity test 2	LoS PUMP LANE 2037 AM Sensitivity test 3
1	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	C	C	C	C
2	Pier Road/Maritime Way Roundabout	C	C	D	F
3	Pier Road /Gillingham Gate Road Roundabout	D	D	E	E
4	Pier Road /Gillingham Gate Road Roundabout West	D	E	E	E
5	Pier Road /Gillingham Gate Road Roundabout East	C	C	C	C
6	Pier Road/ChuLPh Street/Strand Junction	C	C	D	D
7	Yokosuka Way Roundabout	F	F	F	F
8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	D	F	F	F
9	Bowater Roundabout	C	E	F	F
10	Eastcourt Lane / South Avenue Junction	F	F	F	F
11	London Road /Bloors Lane Junction	D	D	D	D

Table 17 – Junctions PM Peak Period LoS Subnetwork 2

Jct No.	Junction	LoS (HMC) 2037 PM RC	LoS PUMP LANE 2037 PM Sensitivity 1	LoS PUMP LANE 2037 PM Sensitivity 2	LoS PUMP LANE 2037 PM Sensitivity 3
1	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	A	B	C	C
2	Pier Road/Maritime Way Roundabout	E	F	F	F
3	Pier Road /Gillingham Gate Road Roundabout	D	D	D	E
4	Pier Road /Gillingham Gate Road Roundabout West	E	F	D	E
5	Pier Road /Gillingham Gate Road Roundabout East	B	C	C	C
6	Pier Road/ChuLPh Street/Strand Junction	C	C	D	D
7	Yokosuka Way Roundabout	A	A	F	F
8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	C	E	F	F
9	Bowater Roundabout	D	F	E	F
10	Eastcourt Lane / South Avenue Junction	D	F	F	F
11	London Road /Bloors Lane Junction	C	D	D	F

Table 18 and Table 19 present the simulation output in terms of travel time, delay, flow, speed, stop time, density, mean queue, and virtual queue. Overall, the results are showing the anticipated effect with increasing housing:

- An increase of travel time
- An increase in delay
- An increase in traffic flow
- A reduction of average network speed

- An increase in time that vehicles spend stopped
- An increase in the queue and the time that vehicles spend in queue waiting to get in

However, it must be noted that there is small difference in the network's statistics between sensitivity test 1 and sensitivity test 2. This can be attributed to the fact that the demand difference between those two scenarios is small compared to the overall traffic. Hence this difference can be considered statistically insignificant.

Figure 11 and Figure 12 present the increase in travel time, delay and stop time graphically for the AM and PM peak hours accordingly.

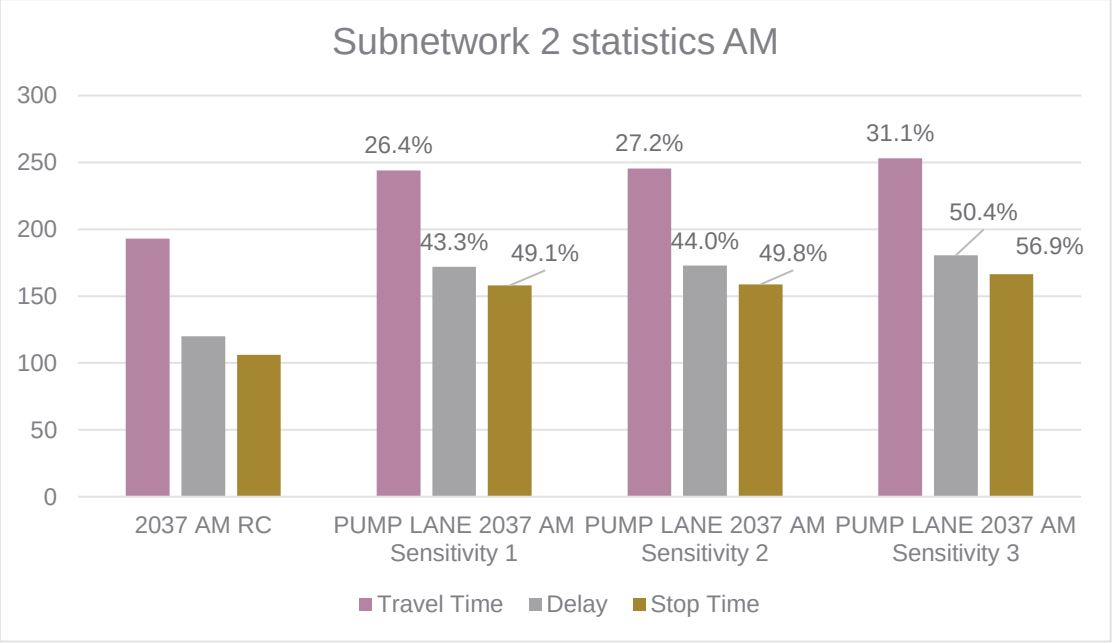

Figure 11 – Travel time, delay time and stop time statistics for subnetwork 2 AM

The increase in Travel time, Delay and Stop time between sensitivity tests 1 and 2 is similar due to the fact that the traffic demand is similar within subnetwork 2 in both tests. The largest increase in Delay is observed in Sensitivity test 3, ultimately reaching 50% and 59% in the AM and the PM peak scenarios accordingly. This increase in average network delay is a significant impact on the local network and traffic operations.

Table 18 – Simulation output AM Peak Period – Subnetwork 2

Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Travel Time	sec/km	193	244	245	253
Delay	sec/km	120	172	172	180
Flow	veh/h	11,266	11,380	11,473	11,653
Speed	km/h	28	27	26	25.7
Stop Time	sec/km	106	158	158	166
Mean Queue	veh	502	860	873	1015
Mean Virtual Queue	veh	146	574	607	815
Waiting Time in Virtual Queue	sec	46	178	186	234

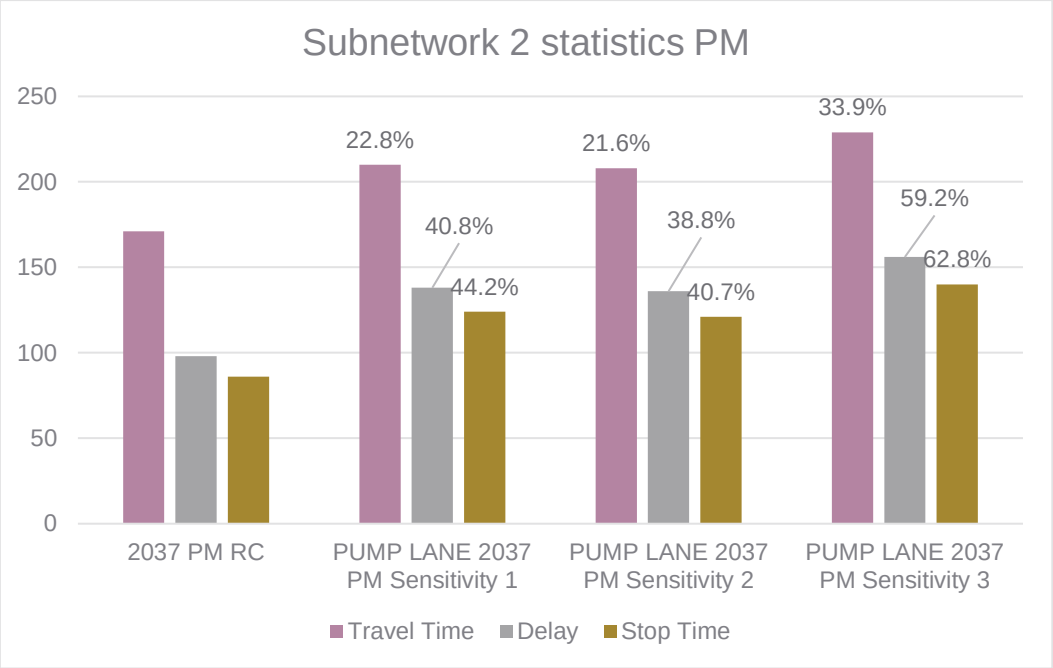

Figure 12 Travel time, delay time and stop time statistics for subnetwork 2 PM

Table 19 – Statistics PM Peak Period – Subnetwork 2

Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity 1	PUMP LANE 2037 PM Sensitivity 2	PUMP LANE 2037 PM Sensitivity 3
Travel Time	sec/km	171	210	208	229
Delay	sec/km	98	138	136	156
Flow	veh/h	11,124	11,495	11,454	12,731
Speed	km/h	30	27	27	25
Stop Time	sec/km	86	124	121	140
Mean Queue	veh	325	581	588	697
Mean Virtual Queue	veh	180	342	298	783
Waiting Time in Virtual Queue	sec	58	105	92	217

Tables 20 and 21 provide the total statistics for subnetwork 2 in terms of total travelled time, travelled distance, average travel time per vehicle, waiting time in virtual queue and total travel time including virtual queue for all vehicles in the network. Once again it can be observed that congestion increases as more houses are being built in the network both in the AM and PM peak periods.

Table 20 – Total Statistics AM Peak Period – Subnetwork 2

Total Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Total Travelled Time	h	2,236	2,951	3004	3297
Total Travelled Distance	km	52,434	53,374	54,137	55,782
Average travel time per vehicle	s/veh	357	467	471	509
Total Waiting Time in Virtual Queue	h	143	561	595	759
Total travel time including virtual queue	h	2,379	3,512	3,600	4,083
Total Queue	veh	648	1,435	1,480	1,831

Table 21 – Total Statistics PM Peak Period – Subnetwork 2

Total Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Total Travelled Time	h	1,817	2,445	2,459	2,801
Total Travelled Distance	km	51,350	53,893	53,713	56,416
Average travel time per vehicle	s/veh	294	383	386	396
Total Waiting Time in Virtual Queue	h	3	10	8	47
Total travel time including virtual queue	h	1,820	2,455	2,467	2,856
Total Queue	veh	505	924	886	1,480

Finally, Tables 22 and 23 provide the throughput statistics for subnetwork 2 for AM and PM peak periods. It must be underlined that in the AM sensitivity test 3 scenario even when the simulation run finishes, there are still vehicles waiting to enter. This means that there are points in the network where the capacity of the road cannot accommodate the new increased demand. After observing all the plots attached in the appendix of this document, these points were observed around the development areas.

Table 22 – Throughput AM Peak Period – Subnetwork 2

Throughput Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Vehicles Out	veh	22,531	22,761	22,947	23,307
Vehicles In	veh	6	7	6	83
Vehicles Waiting to Enter	veh	0	0	0	30
Total	veh	22,538	22,768	22,953	23,420
Vehicles In and Waiting to Enter	veh	6	7	6	112

Table 23 – Throughput PM Peak Period – Subnetwork 2

Throughput Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Vehicles Out	veh	22,247	22,990	22,908	25,462
Vehicles In	veh	6	6	6	21
Vehicles Waiting to Enter	veh	0	0	0	9
Total	veh	22,253	22,996	22,914	25,491
Vehicles In and Waiting to Enter	veh	6	6	6	29

4.3.1 Subnetwork 2 Summary

In summary, the Sensitivity tests have a significant impact on the performance of the highway network along the A289 and A278, and the linking A2 section. In particular, the data shows that:

1. Pier Road / Maritime Way Roundabout
2. Eastcourt Lane / South Avenue Junction
3. Yokosuka Way Roundabout and
4. London Road /Bloors Lane Junction

are particularly impacted. Their level of service consistently reaches level F which indicates that in the sensitivity scenarios these roundabouts' demand would exceed their capacity. Overall, Sensitivity test 1 sees delay rise around 40% in both AM and PM scenarios in comparison to RC, Sensitivity test 2 46% (AM) and 41% (PM), and Sensitivity test 3 50% (AM) and 59% (PM). The significant increase between sensitivity test 1 and 2 to sensitivity test 3 in the AM scenario clearly indicates the negative impact of the new developments on the performance of the network.

4.4 Subnetwork 3

Figure 13 – Subnetwork 3 Corridors

The outline of subnetwork 3 along with its main corridors is presented in Figure 13. This subnetwork covers an area of 450918 m^2, has a total section length of 8 km and includes 146 sections, 36 nodes and 30 centroids among 5 centroid configurations.

Figure 14 presents the main junctions included in subnetwork 3 and Tables 24 and 25 demonstrate the LoS results for the corresponding junctions. It is observed that the level of service deteriorates along with the increase in housing in all junctions of subnetwork 3. However, the junctions that are heavily impacted are:

- Otterham Quay Lane - Meresborough where the flow of the junction is greater than its capacity and the level of service becomes F in the PM scenario
- Mierscourt Road - High Street Junction where the level of service becomes E consistently in the sensitivity tests

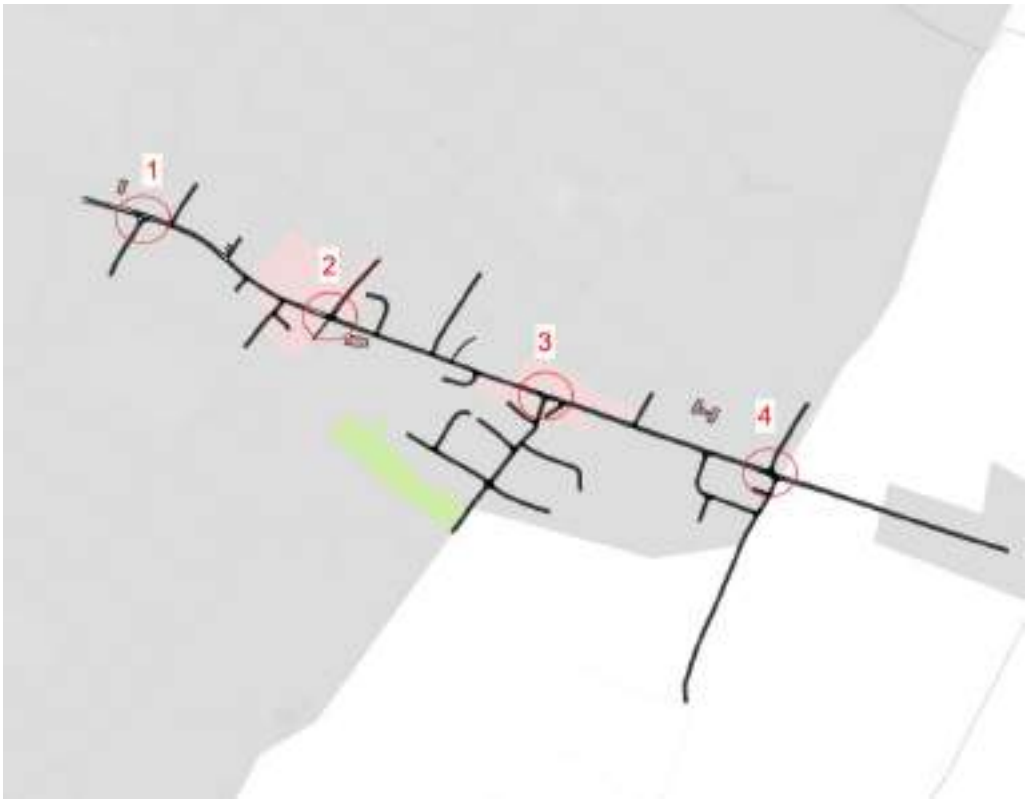

Figure 14 – Subnetwork 3 Junctions

Table 24 – Junctions AM Peak Period LoS – subnetwork 3

Jct No.	Junction	LoS (HMC) 2035 AM RC	LoS PUMP LANE 2037 AM Sensitivity test 1	LoS PUMP LANE 2037 AM Sensitivity test 2	LoS PUMP LANE 2037 AM Sensitivity test 3
1	Mierscourt Road_High Street Junction	C	E	E	E
2	Otterham Quay Lane_Meresborough	D	D	E	E
3	Sovereign Bd & Maidstone Rd	C	D	D	D
4	Sovereign Bd & Station Rd	C	D	D	D

Table 25 – Junctions PM Peak Period LoS - subnetwork 3

Jct No.	Junction	LoS (HMC) 2035 PM RC	LoS PUMP LANE 2037 PM Sensitivity test 1	LoS PUMP LANE 2037 PM Sensitivity test 2	LoS PUMP LANE 2037 PM Sensitivity test 3
1	Mierscourt Road_High Street Junction	D	E	E	E
2	Otterham Quay Lane_Meresborough	D	F	F	F
3	Sovereign Bd & Maidstone Rd	C	C	C	D
4	Sovereign Bd & Station Rd	C	D	D	E

Tables 26 and 27 present the simulation output in terms of travel time, delay, flow, speed, stop time, density, mean queue, and virtual queue. Overall, the results are showing the anticipated effect due to the increased number of trips both in the AM and the PM time periods:

- An increase of travel time as the number of houses completed increases
- An increase in delay
- An increase in traffic flow
- A great reduction of average network speed
- An increase in time that vehicles spend stopped

- An increase in the queue and the time that vehicles spend in queue waiting to get in the network

Figure 15 and Figure 16 present the increase in travel time, delay and stop time graphically for the AM and PM periods accordingly.

It is observed that for Subnetwork 3 the difference between sensitivity test 1 and the reference case is not significant, as the proposed developments are far away from the subnetwork. However, as the South development areas show up in sensitivity tests 2 and 3 the impact on this subnetwork is clear, ultimately increasing the delay by 18% and 15% in sensitivity test 2 in the AM and PM peak scenarios respectively and 63% and 41% in the sensitivity test 3 scenarios. A large increase in delay is forecast between sensitivity tests 2 and 3, emphasising once again the magnitude of the development.

Table 26 – Statistics AM Peak Period – Subnetwork 3

Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Travel Time	sec/km	247	248	274	347
Delay	sec/km	161	162	190	263
Flow	veh/h	2,475	2,502	2,801	2,901
Speed	km/h	19	20	19	16
Stop Time	sec/km	146	146	173	244
Mean Queue	veh	66	72	94	139
Mean Virtual Queue	veh	8	43	96	188
Waiting Time in Virtual Queue	sec	12	62	123	231

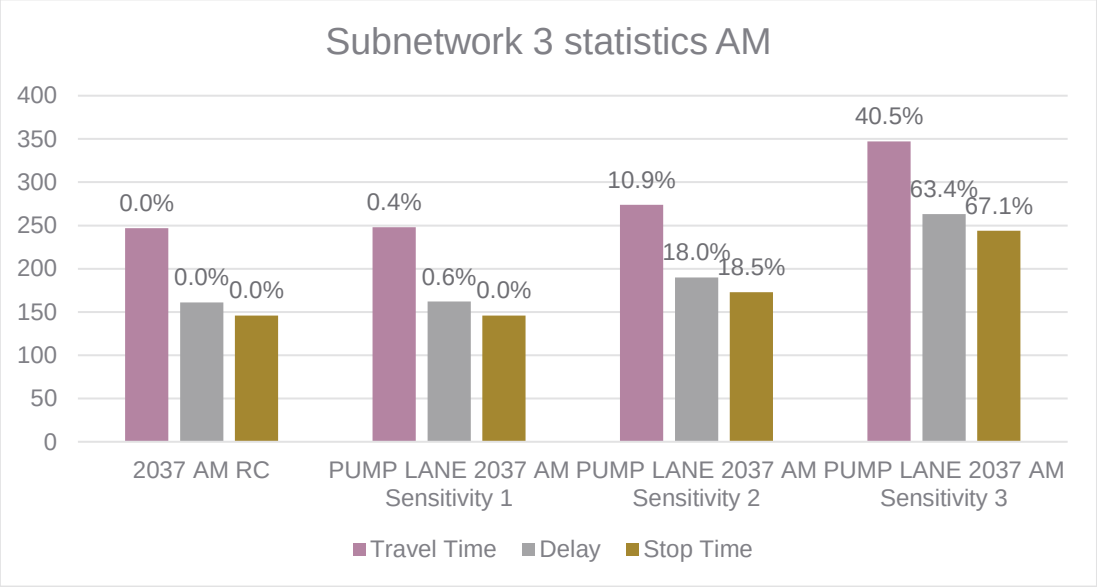

Figure 15 Travel time, delay and stop time results for subnetwork 3 AM

Table 27 – Statistics PM Peak Period – Subnetwork 3

Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Travel Time	sec/km	272	284	299	347
Delay	sec/km	186	199	214	263
Flow	veh/h	2,529	2,649	2,855	2,901
Speed	km/h	18	18	19	16
Stop Time	sec/km	171	182	197	244
Mean Queue	veh	72	96	108	139
Mean Virtual Queue	veh	12	127	160	188
Waiting Time in Virtual Queue	sec	16	173	203	231

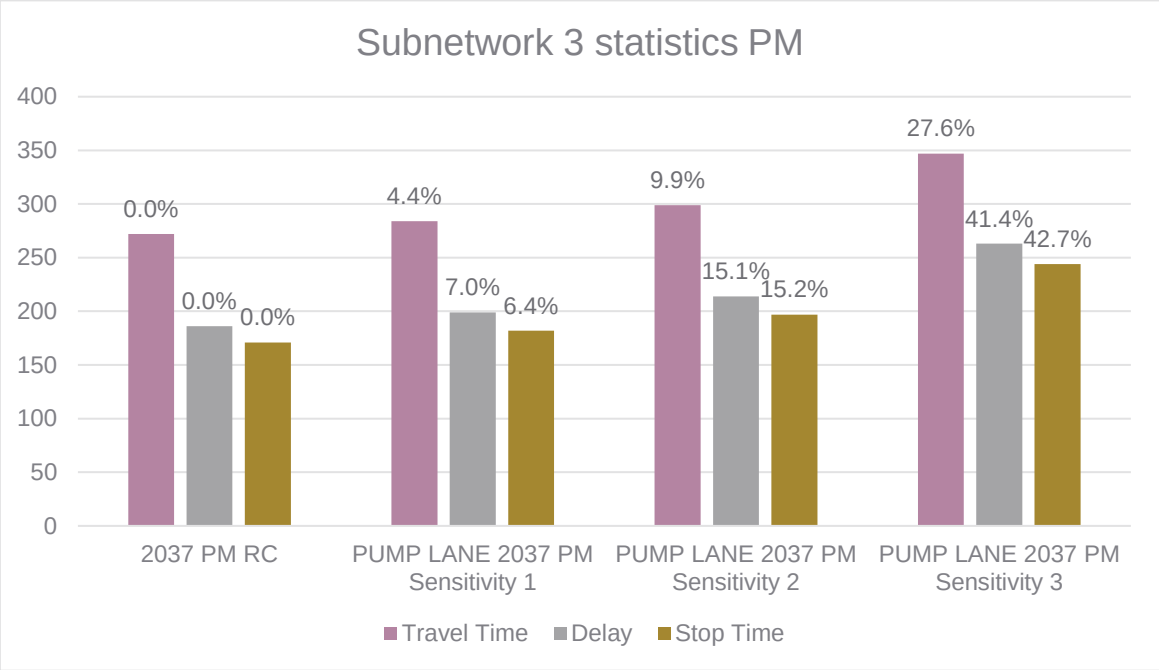

Figure 16 Travel time, delay and stop time results for subnetwork 3 PM

Tables 28 and 29 provide the total statistics for subnetwork 3 in terms of total travelled time, travelled distance, average travel time per vehicle, waiting time in virtual queue and total travel time including virtual queue for all vehicles in the network. Once again it can be observed that congestion increases as more houses are being built in the network both in the AM and PM peak periods.

Table 28 – Total Statistics AM Peak Period – Subnetwork 3

Total Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity 1	PUMP LANE 2037 AM Sensitivity 2	PUMP LANE 2037 AM Sensitivity 3
Total Travelled Time	h	242	260	320	419
Total Travelled Distance	km	3,607	3,785	4,236	4,413
Average travel time per vehicle	s/veh	176	187	206	260
Total Waiting Time in Virtual Queue	h	0	1	3	12
Total travel time including virtual queue	h	242	261	323	431
Total Queue	veh	74	115	190	328

Table 29 – Total Statistics PM Peak Period – Subnetwork 3

Total Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Total Travelled Time	h	264	324	358	419
Total Travelled Distance	km	3,896	4,165	4,415	4,413
Average travel time per vehicle	s/veh	188	220	226	253
Total Waiting Time in Virtual Queue	h	0	6	9	12
Total travel time including virtual queue	h	264	330	367	431
Total Queue	veh	84	223	269	328

Finally, Tables 30 and 31 provide the throughput statistics for subnetwork 3 for AM and PM peak periods respectively.

Table 30 Throughput AM Peak Period – Subnetwork 3

Throughput Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Vehicles Out	veh	4,950	5,005	5,601	5,801
Vehicles In	veh	1	1	1	1
Vehicles Waiting to Enter	veh	0	0	0	0
Total	veh	4,952	5,006	5,602	5,803
Vehicles In and Waiting to Enter	veh	1	1	1	1

Table 31 Throughput PM Peak Period – Subnetwork 3

Throughput Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Vehicles Out	veh	5,058	5,297	5,710	5,972
Vehicles In	veh	2	2	2	2
Vehicles Waiting to Enter	veh	0	0	0	0
Total	veh	5,060	5,299	5,712	5,974
Vehicles In and Waiting to Enter	veh	2	2	2	2

4.4.1 Subnetwork 3 summary

In Summary, subnetwork 3 results indicate that the sensitivity tests have an immediate impact on the performance of the network. More specifically and after also observing the plots attached in the appendixes of the document, it is observed that the performance of A2 Eastbound direction is significantly affected in terms of average travel speed. As far as junctions are concerned, the most significant impact is observed in Otterham Quay Lane/Meresborough where the flow of the junction is greater than its capacity and the level of service becomes F in

the PM scenario and the Mierscourt Road_High Street Junction where the level of service becomes E consistently in the sensitivity tests.

With regards to travel time, it was observed that in the AM scenario the difference between sensitivity test 1 and the reference case is not as great as it was in subnetwork 2. This was attributed to the fact that subnetwork 3 is more far away from the Pump lane developments than subnetwork 2. Once again, significant increase is observed between sensitivity test 2 and 3 is observed in network delay from 18% to 63% in the AM scenario and 15% to 41% in the PM scenario. This jump even though it is significant, it is not as high as in subnetwork 2.

4.5 Subnetwork 7

The outline of subnetwork 7 along with its main corridors is presented in Figure 17. This subnetwork covers an area of 2372593 m^2, has a total section length of 35 km and includes 329 sections, 86 nodes and 87 centroids among 5 centroid configurations.

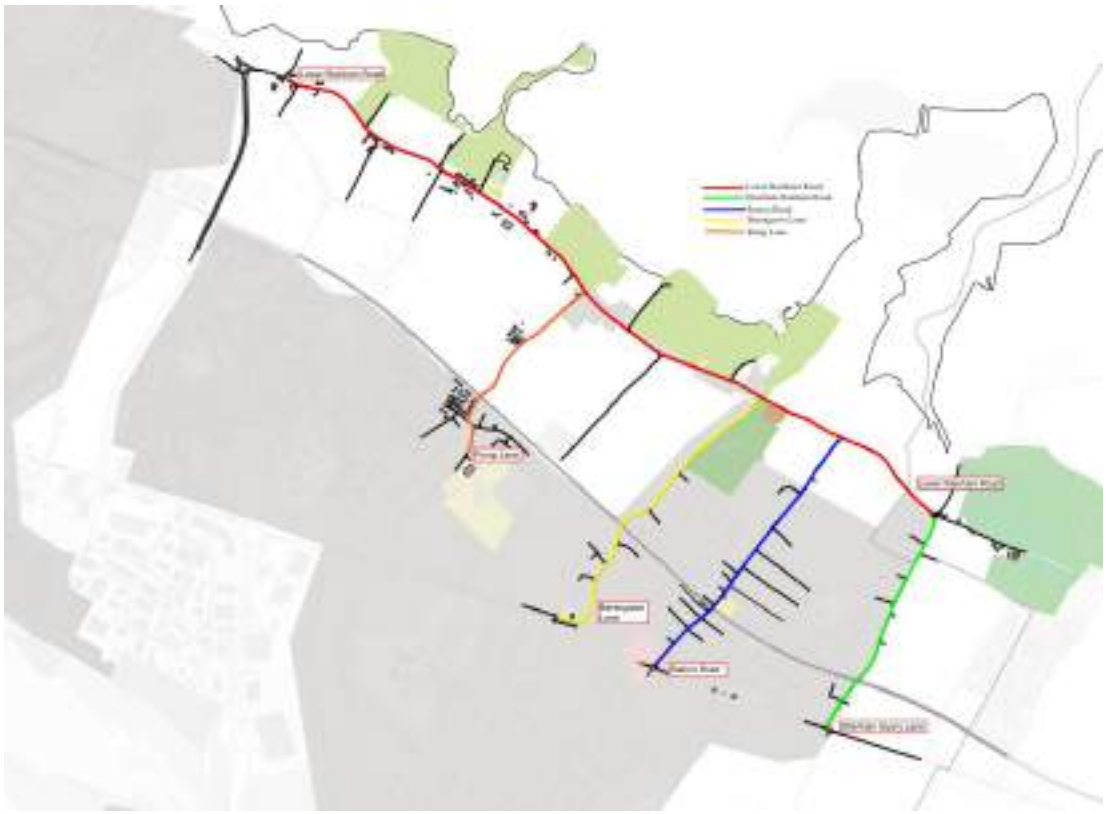

Figure 17 –Subnetwork 7 Corridors

Figure 18 presents the main junctions included in subnetwork 7 and tables 32 and 33 demonstrate the LoS results for the corresponding junctions. It is observed that the level of service of

- Lower Rainham Road / Berengrave Lane deteriorates along with the increase in housing, ultimately reaching level of service F both in the AM and the PM peak scenarios
- B2004 Lower Rainham Road / B2004 Station Road junction level of service becomes C from A in sensitivity test 3 in the AM scenario

Figure 18 – Subnetwork 7 Junctions

Table 32 – Junctions AM Peak Period – Subnetwork 7

Jct No.	Junction	LoS (HMC) 2035 AM RC	LoS PUMP LANE 2037 AM Sensitivity test 1	LoS PUMP LANE 2037 AM Sensitivity test 2	LoS PUMP LANE 2037 AM Sensitivity test 3
1	B2004 Lower Rainham Road / Pump Lane	A	A	A	A
2	Beechings Way / Pump Lane (North)	A	A	A	A
3	Beechings Way / Pump Lane (South)	A	A	A	A
4	B2004 Lower Rainham Road / Berengrave Lane	C	C	F	F
5	B2004 Lower Rainham Road / B2004 Station Road	A	A	A	C
6	Lower Rainham Road / Otterham Quay Lane	A	A	A	A

Table 33 Junctions PM Peak Period – Subnetwork 7

Jct No.	Junction	LoS (HMC) 2037 PM RC	LoS PUMP LANE 2037 PM Sensitivity test 1	LoS PUMP LANE 2037 PM Sensitivity test 2	LoS PUMP LANE 2037 PM Sensitivity test 3
1	B2004 Lower Rainham Road / Pump Lane	A	A	A	B
2	Beechings Way / Pump Lane (North)	A	A	A	A
3	Beechings Way / Pump Lane (South)	A	A	A	A
4	B2004 Lower Rainham Road / Berengrave Lane	C	C	D	F
5	B2004 Lower Rainham Road / B2004 Station Road	A	A	A	A
6	Lower Rainham Road / Otterham Quay Lane	A	A	A	A

Tables 34 and 35 present the simulation output in terms of travel time, delay, flow, speed, stop time, density, mean queue, and virtual queue. Overall, even though subnetwork 7 is much less congested than the other two subnetworks, the results are still showing the anticipated effect due to the increased number of trips both in the AM and the PM time periods:

- An increase of travel time as the number of houses completed increases
- An increase in delay
- An increase in traffic flow
- A great reduction of average network speed
- An increase in time that vehicles spend stopped
- An increase in the queue and the time that vehicles spend in queue waiting to get in

However, it must be noted that there is small difference in the network's statistics between sensitivity test 1 and sensitivity test 2. This can be attributed to the fact that the demand difference between those two scenarios is small compared to the overall traffic. Hence this difference can be considered statistically insignificant.

Figure 19 and Figure 20 present the increase in travel time, delay and stop time graphically for the AM and PM periods accordingly.

In the AM scenario, a linear increase in delay is observed in delay: 34%, 48% and 87% increase in Sensitivity tests 1, 2 and 3 accordingly. However, the same effect cannot be observed in the PM peak scenario where the delay fluctuates around 70% between the sensitivity scenarios compared to the reference case. Other indicators such as flow and average network speed seem to agree with this result as they show very small differences between the sensitivity scenarios. This can be attributed to the fact that subnetwork 7 is a subnetwork much less congested overall than subnetwork 2.

Table 34 Statistics AM Peak Period – Subnetwork 7

Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Travel Time	sec/km	140	162	171	194
Delay	sec/km	61	82	90	114
Flow	veh/h	5,853	6,170	6,454	6,654
Speed	km/h	36	34	33	32
Stop Time	sec/km	51	70	78	102
Mean Queue	veh	57	155	171	213
Mean Virtual Queue	veh	4	69	130	224
Waiting Time in Virtual Queue	sec	2	39	72	119

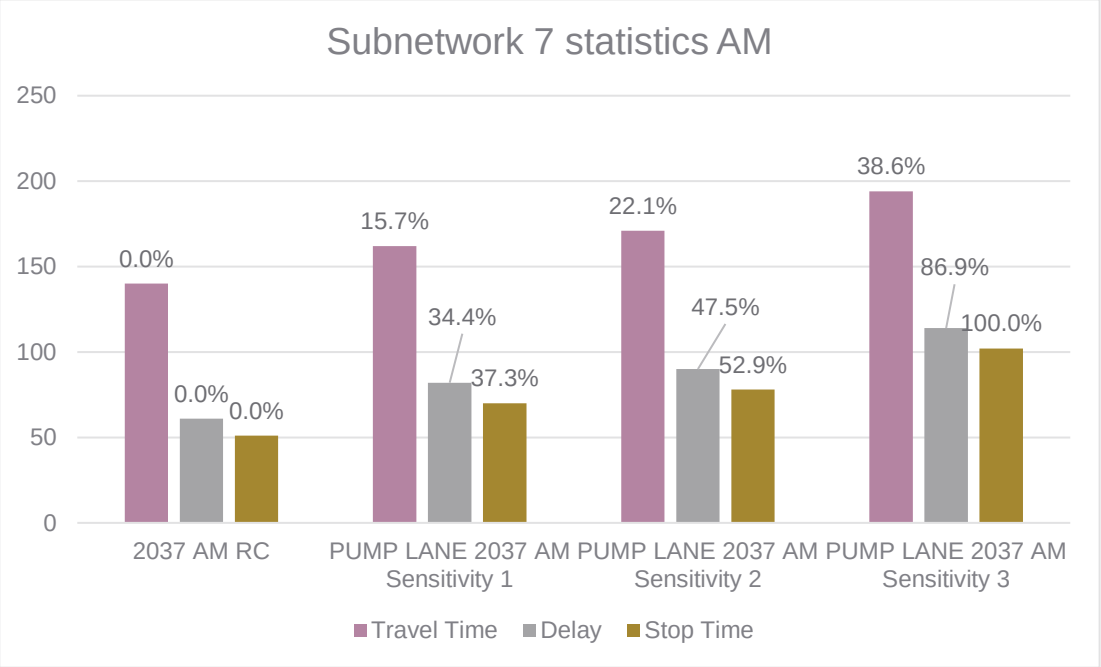

Figure 19 Travel time, delay time and stop time statistics for subnetwork 7 - *AM*

Table 35 – Statistics PM Peak Period – Subnetwork 7

Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Travel Time	sec/km	123	154	146	154
Delay	sec/km	42	74	65	73
Flow	veh/h	5,542	5,964	6,004	6,461
Speed	km/h	38	36	36	35
Stop Time	sec/km	35	64	56	63
Mean Queue	veh	28	68	43	63
Mean Virtual Queue	veh	2	87	153	121
Waiting Time in Virtual Queue	sec	1	53	93	68

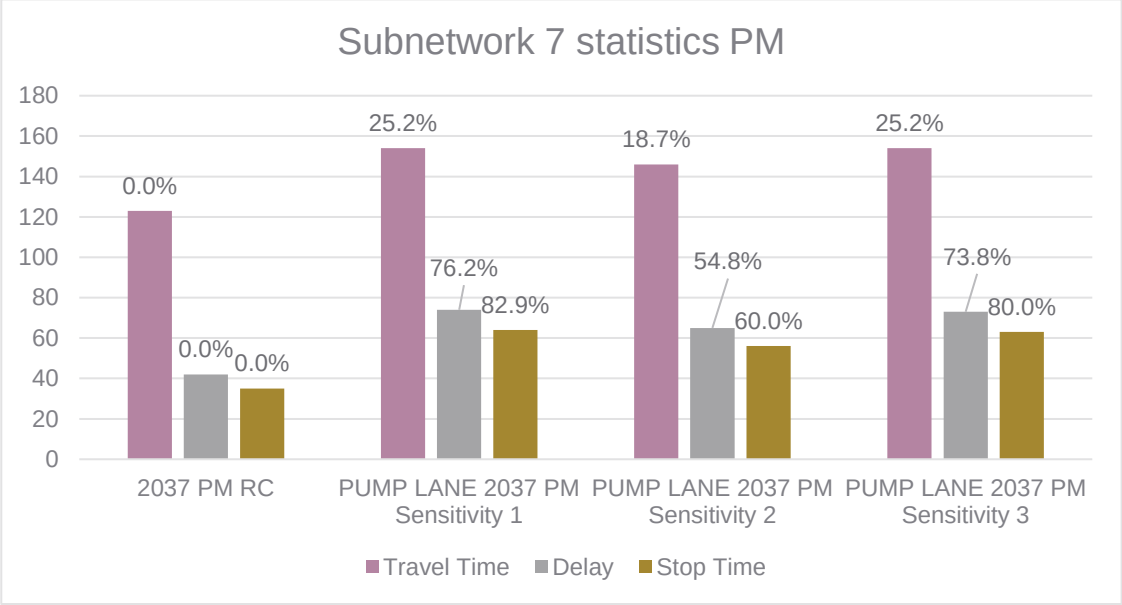

Figure 20 Travel time, delay time and stop time statistics for subnetwork 7 – *PM*

Tables 36 and 37 provide the total statistics for subnetwork 7 in terms of total travelled time, travelled distance, average travel time per vehicle, waiting time in virtual queue and total travel time including virtual queue for all vehicles in the network. Once again it can be observed that congestion increases as more houses are being built in the network both in the AM and PM peak periods.

Table 36 Total Statistics AM Peak Period – Subnetwork 7

Total Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Total Travelled Time	h	445	701	750	837
Total Travelled Distance	km	13,043	14,357	14,784	14,981
Average travel time per vehicle	s/veh	137	205	209	226
Total Waiting Time in Virtual Queue	h	0	1	3	7
Total travel time including virtual queue	h	445	702	752	844
Total Queue	veh	61	224	302	437

Table 37 Total Statistics PM Peak Period – Subnetwork 7

Total Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Total Travelled Time	h	358	484	419	499
Total Travelled Distance	km	12,201	13,572	13,128	14,564
Average travel time per vehicle	s/veh	116	146	126	139
Total Waiting Time in Virtual Queue	h	0	1	4	2
Total travel time including virtual queue	h	358	486	423	501
Total Queue	veh	30	155	196	184

Finally, Tables 38 and 39 provide the throughput statistics for subnetwork 7 for AM and PM peak periods accordingly.

Table 38 Throughput AM Peak Period – Subnetwork 7

Throughput Statistics	Units	2037 AM RC	PUMP LANE 2037 AM Sensitivity test 1	PUMP LANE 2037 AM Sensitivity test 2	PUMP LANE 2037 AM Sensitivity test 3
Vehicles Out	veh	11,705	12,340	12,908	13,308
Vehicles In	veh	2	2	2	2
Vehicles Waiting to Enter	veh	0	0	0	0
Total	veh	11,707	12,342	12,910	13,310
Vehicles In and Waiting to Enter	veh	2	2	2	2

Table 39 Throughput PM Peak Period – Subnetwork 7

Throughput Statistics	Units	2037 PM RC	PUMP LANE 2037 PM Sensitivity test 1	PUMP LANE 2037 PM Sensitivity test 2	PUMP LANE 2037 PM Sensitivity test 3
Vehicles Out	veh	11,084	11,927	12,008	12,922
Vehicles In	veh	2	2	2	2
Vehicles Waiting to Enter	veh	0	0	0	0
Total	veh	11,086	11,929	12,009	12,924
Vehicles In and Waiting to Enter	veh	2	2	2	2

4.5.1 Subnetwork 7 summary

In summary, it is observed that the sensitivity tests will significantly affect subnetwork 7 as well compared to the 2037 reference case. The link speed diagrams in the appendix of this report can be observed that the network elements that will most significantly be affected are:

- B2004 Lower Rainham Road / Berengrave Lane where the flow of the junction is greater than its capacity and the level of service becomes F in the PM scenario

- Lower Rainham Road westbound especially close to the Lower Rainham Road/Yokosuka Way Roundabout

In terms of network delay, in the AM scenario, a significant increase in travel time and delay is observed in sensitivity tests 1 (34%), 2 (48%) and 3 (87%). However, following the results of the other two subnetworks a jump of approximately 30% is observed between sensitivity tests 2 and 3. In the PM scenario, the average network delay seems to fluctuate around 70% between the three sensitivity tests, a result that arises from the fact that the subnetwork is not as congested as the other 2 subnetworks. Nevertheless, an increase in delay of around 70% cannot be considered negligible. With regards to junction level of service, it can be observed that in all junctions except B2004 Lower Rainham Road / Berengrave Lane, the level of service remains mostly unchanged throughout the sensitivity tests. Consequently, it is considered that these junctions can accommodate the new housing.

5 Select link analysis on the entry and exit of the proposed Development (Development to/from bandwidth plots)

The select link analysis plots can be found in the PDF attachments. Please refer to Appendix 1 for the exact file names of the Select link analysis plots.

The key outcomes from the review of the Select Link plots are as follows:

- A significant increase of assigned traffic is observed around the links where the development sites are located
- The primary links used are
    - A289 via junction with Yokosuka Way to link to employment sites around Gillingham including the hospital and Business Park, Medway Tunnel, and westbound on the A2
    - Eastbound on the A2 via Rainham High Street
    - A278 Hoath Way on the M2 eastbound via Pump Lane

6 DS-DM bandwidth plots

The DS-DM bandwidth plots can be found in the PDF attachments of Appendix 2. Please refer to Appendix 2 for the exact file names**Appendix *2* Do something versus reference case traffic flow plots**.

Specific comments about the DS-DM plots for all sensitivity tests:

Large increases in assigned volume compared to the reference case for the following links:

- Pier Road eastbound
- Ito Way and Yokosuka way southbound
- Lower Rainham road westbound

7 Network Stress (V/C) Diagrams

The category-based network stress V/C diagrams can be found in the PDF attachments of Appendix 3. Please refer to Appendix 3 for the exact names of the attachments.

Key insights from the V/C diagrams are:

- The main impact is along the A289 corridor
- High V/C values for the important roundabouts in Pier Road/Maritime Way, Pier Road/ Gillingham gate road East and West
- The section V/C ratios seem to increase as more houses are being built.
- The highest V/C ratios are observed on Pier Road, east of the junction with Gillingham Gate Road.

8 Link Speed Diagrams

The link speed diagrams can be found in the PDF attachments of Appendix 4. Please refer to Appendix 4 for the exact file names of the Link speed Diagrams.

Significant drops of speed are observed in all the subnetworks. This observation can be confirmed by the statistics results tables presented in sections 4.1, 4.2 and 4.3. Some of the most significant differences are observed in the following links:

- A2 west of Ito Way in Subnetwork 2
- A2 Eastbound in Subnetwork 3
- Lower Rainham Road Westbound for Subnetwork 7

9 Junction delays in terms of bandwidths

The junction delays diagrams in terms of bandwidths plots can be found in the PDF attachments of Appendix 5. Please refer to Appendix 5 for the exact file names of the Junction delay plots.

Significant increase in delays is observed in all subnetworks as more houses are being built in the network. More specifically the largest increases are observed in:

- Ito Way and Yokosuka Way Northbound approaches in Subnetwork 2
- A2 Westbound and Eastbound in Subnetwork 3
- Lower Rainham Road / Yokosuka Way approach

10 Reassignment Flow Plots

The reassignment flow plots can be found in the PDF attachments of Appendix 6. Please refer to Appendix 6 for the exact file names of the reassignment flow plots.

Significant increase in flows is observed around the development area (Pump lane). However, some decrease in flows is observed in some of the main arterials of the network such as Yokosuka Way and Ito Way. This is attributed to the fact that due to congestion on the network from the new development sites the traffic microsimulation vehicles dynamically change their route avoiding highly congested routes.

11 Summary

This report evaluates the traffic impact of three proposed developments in the Lower Rainham Road area. The developments included the building of new residential areas around Pump Lane and south of Moor street/West of South Bush Lane in Rainham. Three tests (Sensitivity test 1, 2 and 3) were developed for the year 2037 including these two development areas and were compared with the reference case for the same future year. The demand matrices of these three scenarios were adapted in order to accommodate the new trips arising from the new houses. The tests were evaluated separately.

The evaluations were conducted using the traffic simulation software Aimsun. The Aimsun network developed was calibrated and validated using observed – real world census origin destination data following TAG. The trip generation for the different trip purposes was conducted using TRICS. For the purpose of this report, the Aimsun model was divided into three subnetworks and for each subnetwork two analyses were conducted for the AM and PM peak periods.

The simulation results provide useful insights regarding the impact of the proposed developments. Overall, through most subnetworks and sensitivity tests a significant impact is observed in average simulated travel time, delay and stop time as a result of the housing developments. In more detail in:

- Sensitivity test 1, the increase in average network delay is around 43% in subnetwork 2, around 7% in subnetwork 3 and 76% in subnetwork 7 in the worst peak period
- Sensitivity test 2, the increase in average network delay is around 45% in subnetwork 2, 18% in subnetwork 3 and 54% in subnetwork 7 in the worst-case peak period
- Sensitivity test 3, the increase in average network delay is around 59% in subnetwork 2, 63% in subnetwork 3 and 86% in subnetwork 7 in the worst-case peak period

It is observed that sensitivity test 3 has a much greater impact on the traffic performance of the subnetworks than the other 2 sensitivity tests.

Additionally, it is observed that the level of service in most of the key junctions in all subnetworks deteriorates significantly in all sensitivity tests, ultimately reaching level of service F which indicates that the flow of the junction exceeds its capacity. More specifically the following junctions are most heavily impacted:

- Pier Road/Maritime Way Roundabout
- London Road /Bloors Lane Junction
- Bowater Roundabout
- Yokosuka Way Roundabout
- Otterham Quay Lane/Meresborough Junction
- B2004 Lower Rainham Road / Berengrave Lane Junction

In terms of links, after observing the link speed diagrams and the DS-DM plots, the following links are most significantly affected by the sensitivity tests:

- A289 and A278, and the linking A2 section
- A2 Eastbound direction
- Lower Rainham Road Westbound

The aforementioned congestion hotspots were also confirmed by observing the delay and simulated flow plots located in Appendix 5 and Appendix 6. The results were a direct product of the new trips arising from the new housing areas. It is observed that the impacts are more severe during the AM peak time where the demand is higher in most subnetworks.

Based on the above, there is a significant traffic impact on the local road network in all of the housing scenarios (all sensitivity tests). The results in terms of congestion in the road network surrounding Pump Lane and Moor Street would be detrimental for the traffic flow of Rainham and Gillingham and would significantly affect the road users' perceived level of service.

12 Appendices

Appendix 1 Select link analysis plots

The select link analysis plots are included in the attachment “Select Link Analysis Plots.zip” folder.

Appendix 2 Do something versus reference case traffic flow plots

The Do something versus reference case traffic flow plots are included in the attachment “DS-DM Bandwidth Plots.zip” folder.

Appendix 3 Network Stress (V/C) diagrams

The network stress (V/C) diagrams are included in the attachment “V_C Plots.zip” folder.

Appendix 4 Link speed diagrams

The Link speed diagrams are included in the attachment “Speed Diagram Plots.zip” folder.

Appendix 5 Junction delays in terms of bandwidths plots

The junction delays in terms of bandwidths plots are included in the attachment “Simulated Delay Plots.zip” folder.

Appendix 6 Reassignment flow plots

The reassignment flow pots are included in the attachment “Flow Plots.zip” folder.

Appendix E

Carter Jonas

Mayfield House
256 Banbury Road
Oxford
OX2 7DE
T: 01865 511444
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Your ref: SJT/20230
Our ref: MC/19/1566

Mr Simon Tucker
David Tucker Associates
Forester House,
Doctor's Lane,
Henley-in-Arden,
Warwickshire.
B95 5AW

By email: SJT@dtatransportation.co.uk

14 December 2020

Dear Simon

APP/A2280/W/20/3259868: LAND OFF PUMP LANE, RAINHAM, KENT, ME8 7TJ

I write further to your letter of 8 December 2020, the content of which I have now discussed with officers at Medway Council and SWECO.

At the outset of this letter I should underscore that the Council does not accept the implicit accusation within your letter that the Council has failed to respond to previous requests for information, or has in anyway been uncooperative

In any event, in this letter I address below the information which we understand that you consider remains outstanding namely:

1) Instructions to SWECO;
2) Growth assumptions included in the model;
3) TRICS outputs for the adopted rates and assumptions made in respect of the distribution of development traffic;
4) Whether the appellant's TA follows best practice and guidance;
5) Clarification in respect of the Select Link Analysis
6) Revised modelling

This letter should be read together with the attachments – sent under separate cover given file size and format – which consist of the following:

a) Emails relating to the instructions given to SWECO
b) Shape files denoting Centriods and Medways Zones
c) Growth Data
d) Growth Factors
e) TRICS Data's

Instructions to SWECO

On your request for the instructions and briefs from Medway Council to SWECO, I can confirm that there was no one set of instructions or brief in respect of the modelling for the appeal site, but I can provide the following information:

In the summer of 2019, Medway's Planning department was in the process of requesting a technical document from SWECO to provide an evidence base for the local plan. There was an opportunity to increase the scope of this, to allow a modelling assessment of the Pump Lane application.

SWECO provided a Methodology Note at the request of Medway Council on the 16th September 2019 to evaluate the impact of developments within the Lower Rainham Area and creation of a new subnetwork (Subnetwork 7).

On the 17th September 2019, an email was sent from Medway Council to the SWECO, with suggested amendments/confirmation (relating to this application) as follows:

- the timeframe to complete this work.
- requesting the subnetwork include the Beechings Way / Pump Lane junction.
- Requesting "*Sensitivity 1*" relates to the current application for 1,250 new homes, assumed to be built out by 2028 (*reference MC/19/1566*).
- Cross reference to the (very limited) transport mitigation proposed. Details available via https://publicaccess1.medway.gov.uk/online-applications/

Then, on the 18th September 2019, SWECO provided a screenshot of the extended network (subnetwork 7) confirming Beechings Way/Pump Lane Junction was included in the subnetwork.

On the 13th November 2019, SWECO provided a map of the assumptions to be made in the scenarios with sensitivity 1 relating to the Pump Lane development.

Later, on 27th November 2019 the first instalment of model results were provided by SWECO to Medway Council, with the second instalment provided on the 29th November 2019.

The modelling results were then sent to Duncan Parr on the 3rd December 2019.

In terms of the revised modelling, the concerns raised by Simon Tucker in his letter dated 7th July 2020 were passed onto SWECO on the 14th July 2020. After discussions with SWECO the scope of the further model run was confirmed on the 27th July 2020.

The report in relation to this further model run (dated 05/10/2020) was received by the Council on the 19th October 2020. Following a review by Peter Hawke, it was then forwarded onto the appellants on the 6th November 2020 via several emails.

Growth assumptions included in the model

You have asked about the growth assumptions in the model, and how they have been derived, referring to PPG at Reference ID: 42-015-20140306.

For future year traffic growth for the 2037 reference case (without development scenario), additional trips to or from Medway zones are based on committed developments and the trip generation associated with those developments as per TAG Unit M4. Please find in the attached spreadsheet (Growth.xls) the sites provided by Medway Council's planning team which are committed development for delivery between the base (2016) and future years (2023, 2028 and 2037). This provides the additional net growth in total residential, employment and other development sites and their scale. The spreadsheet also provides the corresponding

trip rates and the absolute number of person and vehicle trips for each future year, time-period, vehicle type and journey purpose. These committed developments therefore underpin the growth assumptions in the model.

Regarding the PPG on transport assessments to which you refer, this indicates that projections should use local traffic forecasts *such as* TEMPRO (it does not require TEMPRO to be used). In this instance, it should be noted that:

a) The information concerning committed developments that Medway Council has provided for this modelling will be more up to date and detailed than the assumptions contained within TEMPRO for Medway. It is for this reason that the details of the actual committed developments and their projected trip generations, rather than TEMPRO, has been used to underpin the growth assumptions in the model within the Medway area.

b) Resultant TEMPRO growth for Medway between 2016 and 2037 is in fact higher than the growth in the Medway model.

Trips to and from zones external to Medway are constrained to Tempro growth.

In order for the appellant to see the resultant change in traffic growth, the spreadsheet called “LRR Growth factors” (as attached) provides the total trips to and from each modelled zone in the Medway model including Medway zones and external zones, for 2016 and 2037 for AM and PM peaks. The absolute growth is also provided as well as a comparison with the higher TEMPRO growth. You will need to refer to a zone plan in order to identify the location of each zone. Please also find attached a shapefile of the Medway zoning system including the boundaries of each zone and the centroid number corresponding to the aforementioned spreadsheet. The full trip matrices are also provided for each future year and time period.

TRICS outputs for the adopted rates and assumptions made in respect of the distribution of development traffic

Attached is an excel file entitled “TRICS information.xls”. It contains one sheet that shows the site reference and the corresponding TRICS database lookup tables. The other two excel sheets in the same file are a copy of the TRICS database which includes the site-specific observed trip data.

For the distribution, we have provided the trip matrices (see “LRR Growth factors.xls” file) which show the demand to and from the zone which contains the proposed development to and from all the other Medway model zones. The future year development trip distribution is based on the 2016 base year trip distribution to and from the zone which contains the proposed development. This is based on observed mobile phone and Census origin-destination data. Please refer to the model validation report already provided. In particular, see sections 6 Trip matrix development and “Mobile network data” appendices A and B which contain the methodology and verification accordingly.

Whether the appellant’s TA follows best practice and guidance

The Council does not consider that the Appellant, in its TA, has followed best practice, nor applicable guidance. In particular:

First, the Appellant has not followed the Medway ‘Transport Assessments’ Guidance Note (January 2018), and specifically the protocol it establishes at paragraph 16. Whilst guidance cannot mandate the approach which should be taken, the Appellant decided to progress with its TA on the basis of conventional modelling, and not use the Medway Model in accordance with the Protocol.

Second, the Appellant’s original TA made several assumptions regarding internal trip rates. Following requests from the Council for justification of these internalisation rates, the Appellant reduced the assumed percentage of internal trip rates (see Technical Note 1). However, the Appellant has not subsequently updated the modelling assessment within the Transport Assessment, and therefore fails to properly

demonstrate the level of impact from the proposals (which is required in order to apply the requisite policy tests, including NPPF, para 109) . Further, given that Appellant's modelling data is deficient, it is not possible to determine (on the basis of the Appellant's TA alone) whether improvements can be cost effectively provided to mitigate the potential impact to an acceptable degree (as is necessary to apply the requisite policy tests, including NPPF, para 108(c)).

It is unclear whether the Appellant will seek to update its modelling to address this issue ahead of the upcoming inquiry. If it intends to rely on additional modelling, we would expect this to be provided ahead of proof exchange.

Clarification in respect of the Select Link Analysis

Because the zone in which the appeal site is located is slightly larger than the appeal site itself, it is correct to say that the select link analysis undertaken in the October 2020 report is not simply in relation to the entry and exit of the proposed development, but also captures other locations within that zone. While the impact on the results is expected to be minimal, in the additional model runs currently being undertaken (see below) the site will be modelled with its own explicit zone.

Additional Modelling

As was explained at the CMC, and reiterated in an email to Duncan Parr on 9th December 2020, the Council's additional modelling runs are being undertaken primarily to test the implications of adopting the Appellant's proposed trip rates (which are not accepted by the Council). This is not work that the Council was required to undertake, nor even that the Appellant has requested that it undertake. The Appellant are not funding the work. The Council decided, of its own initiative, to undertake the additional model runs in an attempt to determine whether the issues between the parties can be narrowed down at the Inquiry (particularly the dispute concerning trip rates). The Council will provided the additional model runs to the Appellant when they are available. It is hoped that this can be before Christmas, but it may be early in the new year. The deadline for the highway proofs has been adjusted to accommodate this.

Other matters: Highways England

It is also understood that the Appellant has been in discussions with Highways England regarding the impact of the proposed scheme on the Strategic Road Network. It is understood that, subject to a contribution being made in respect of mitigation at M2 Junction 4, Highways England would not sustain their objection. However, the Council is unclear whether any agreement has been reached regarding the level of contribution. Please can the Council be updated on the Appellant's position in respect of this matter at your earliest convenience.

Yours sincerely,

Peter Canavan BA(Hons) MSc MRTPI

Associate Partner

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Appendix F

Jacqueline Aggiss

From: Bowie, David <David.Bowie@highwaysengland.co.uk>
Sent: 23 April 2020 11:38
To: gunner, hannah
Cc: Planning SE; Bown, Kevin; Bradley, Alistair; Jacqueline Aggiss; Simon Tucker; Michael.Birch@rapleys.com; Duncan.Parr@rapleys.com
Subject: MC/19/1566 - Land Off Pump Lane, Rainham, Kent, ME8 7TJ

Follow Up Flag: Follow up
Flag Status: Completed

For attention of:	Hannah Gunner, Medway Council
Site:	Land Off Pump Lane, Rainham, Kent, ME8 7TJ
Proposal:	residential development comprising approximately 1,250 residential units, a local centre, a village green, a two-form entry primary school, a 60-bed extra care facility, an 80-bed care home and associated access (vehicular, pedestrian, cycle).
Your Reference:	MC/19/1566
Highways England's Reference:	85118 #8020

Dear Hannah,

Further to our response to the above application dated 31 October 2019, we have received a response directly from the applicant's agent on 2 April 2020, which was also copied to Medway Council Planning.

Highways England ("we") have been appointed by the Secretary of State for Transport as strategic highway company under the provisions of the Infrastructure Act 2015 and are the highway authority, traffic authority and street authority for the Strategic Road Network (SRN). The SRN is a critical national asset and as such works to ensure that it operates and is managed in the public interest, both in respect of current activities and needs as well as in providing effective stewardship of its long-term operation and integrity.

We will be concerned with proposals that have the potential to impact on the safe and efficient operation of the SRN. In this case our interest relates to the M2, and potentially the A2, A249 and M20.

We understand that the proposal/site is **not** in the Medway Local Plan 2003.

The emerging Medway Local Plan for 2019 to 2037 is still being developed. It is not clear if the site will be part of the new emerging Medway Local Plan for 2018 to 2035.

We have therefore assessed the site on the following basis in accordance with NPPF, C2/13 and the Highways England guidance on working with applicants.

History of the Proposal

Initially, we reviewed the following document related to this application and responded on 17 July 2019:

- David Tucker Associates, 21 March 2019, *Land at Pump Farm and Bloors Farm, Lower Rainham, Final Transport Assessment* ("the TA").

We then received the following document, which we reviewed in our response of 31 October 2019:

- David Tucker Associates, 14 August 2019, *Land at Pump Farm and Bloors Farm, Lower Rainham, Response to Highways England* ("the August 2019 submission").

Subsequently, we received the following document on 2 April 2020, which we review in this current response:

- David Tucker Associates, 5 March 2020, *Land at Pump Farm and Bloors Farm, Lower Rainham, Second Response to Highways England* ("the March 2020 submission").

Review of the March 2020 Submission

I refer to our previous response of 31 October which has resulted in the March 2020 submission from David Tucker Associates. Our response to that March 2020 submission is only where I consider that our original concerns/requests have not been adequately addressed and therefore remain issues of concern.

For ease of reference, the following comments in this section are colour-coded as follows:

- Our 31 October 2019 response text in black;
- The applicant's March 2020 submission in blue; and
- Our updated response in red.

Base traffic volumes and growth

We previously commented as follows:

- The TA has no details of base traffic data for the SRN;
- TEMPRO growth factors have only been determined for urban roads, not strategic roads,
- TEMPRO output needs to be provided so we can verify if the selection parameters are accurate.
- For base and future traffic volumes on the SRN, use of the Medway Local Plan Traffic Modelling may be appropriate. This is still under development; please see further comments below under "Modelling".

The August 2019 submission responded to this as follows:

- The TA included forecast development traffic on the SRN at junctions 1, 3 and 4 of the M2.
- The "*impact of the proposals on base traffic levels on the M2 will be indiscernible*".
- The DfT website provided base flow data on the M2 within the vicinity of junctions 2, 3 and 4 shows an annual average daily flow of in the region of 70,000 and 100,000 vehicles.
- If TEMPRO factors are applied this will reduce the percentage impact of development traffic.
- "*On the basis of the forecast traffic impact on the SRN, full modelling of individual junctions is not warranted, and therefore TEMPRO factors are not necessary*".
- For completeness, 10-year growth factors for Medway 018 (selecting urban and trunk roads) are 1.1156 for the AM peak and 1.1185 for the PM peak.

In response, we commented as follows:

- As noted further below in this response, for various reasons we cannot yet be confident that the "*impact of the proposals on base traffic levels on the M2 will be indiscernible".*
- ***Furthermore, junction 2 may be impacted also.***
- ***See comments below regarding TEMPRO also.***
- If we reach agreement on the other parameters of this assessment, it should be noted that ***a reduced percentage impact of the development traffic, due to background traffic growth, is not necessarily an acceptable argument against further assessment.*** Where there is existing congestion, a small proportional impact can make a large difference, as a small volume of traffic would consume a large proportion of any available capacity (if any capacity is available).
- ***Our previous comments therefore still apply.***

The March 2020 submission responds as follows:

- Table 1 replicates the development trips on the SRN as given previously (in the August 2019 submission);
- It then states that the "*proposed impact will be a maximum of 2 vehicles per minute on any given approach which cannot be considered to be material in the context of the operation of the motorway junctions*".
- It also states that "*it is unlikely that Junction 2 of the M2 will be impacted as the main destinations would preclude the use of this junction*".

Our updated response is as follows:

- Please also see our other comments further below regarding growth, trip generation and distribution.
- Even if we assume the Table 1 development trips to be accurate, the impact *on any given approach* would be up to one vehicle every two minutes (correcting this error in the March 2020 submission actually improves the situation); however, the impact within the junctions would be higher. Traffic from the different approaches interacts within the junctions, so we need to consider the combined volumes as well as the link volumes.
- The assumption that these volumes "*cannot be considered to be material"* needs to be supported with evidence, for the volumes on the links and within the junctions. Such volumes may seem small but – as mentioned before – where there is existing congestion, a small proportional impact can make a large difference, as a small volume of traffic would consume a large proportion of any available capacity (if any capacity is available). Our view is that any impact on a severely congested network is in itself severe as the additional traffic will only serve to increase vehicle delay, journey times and queue lengths.
- The current Medway modelling is showing need for mitigation at all SRN junctions; this development – which is outside the Local Plan – then further adds to this, so we still need to understand more fully the impact of this traffic.
- If we permitted every development that adds a "small, immaterial" amount of traffic to a junction, these all add up; as is demonstrated by the need for mitigation even before this development's traffic is added.
- The assumption that Junction 2 would not be impacted needs further supporting evidence; the comment in the submission is essentially anecdotal and is not accepted.
- While an assessment *might* potentially demonstrate that our concerns are unfounded (or relatively less of a concern than we thought), we need to see such an assessment in order to decide on this. **Therefore, all our previous comments still apply.**

Committed developments

We previously commented as follows:

- We requested that Medway Council confirm, or otherwise, that the list of committed developments in Paragraph 6.1.3 of the TA is complete and that the stated development types and quantums are correct?
- As noted above, we need some details of the TEMPRO growth for the SRN in order to determine their accuracy and also then to assess the validity of the point in paragraphs 6.1.4 and 6.1.5 of the TA, i.e. the assertion that no account needs to be made of the committed development traffic because TEMPRO growth already accounts for a greater level of growth.
- Also, as noted above, use of the Medway Local Plan Traffic Modelling may be appropriate once agreed and finalised with the council.

The August 2019 submission responded to this as follows:

- A response is awaited from Medway Council in respect of the TA which will confirm the position in respect of committed development.
- Within the TA, the committed development sites were reviewed within the immediate vicinity and total around 900 dwellings. The extent of additional housing growth included within TEMPRO for Medway is for 11,380 households. This is significantly higher than the committed development quantum and therefore no further uplift is required.

In response, we commented as follows:

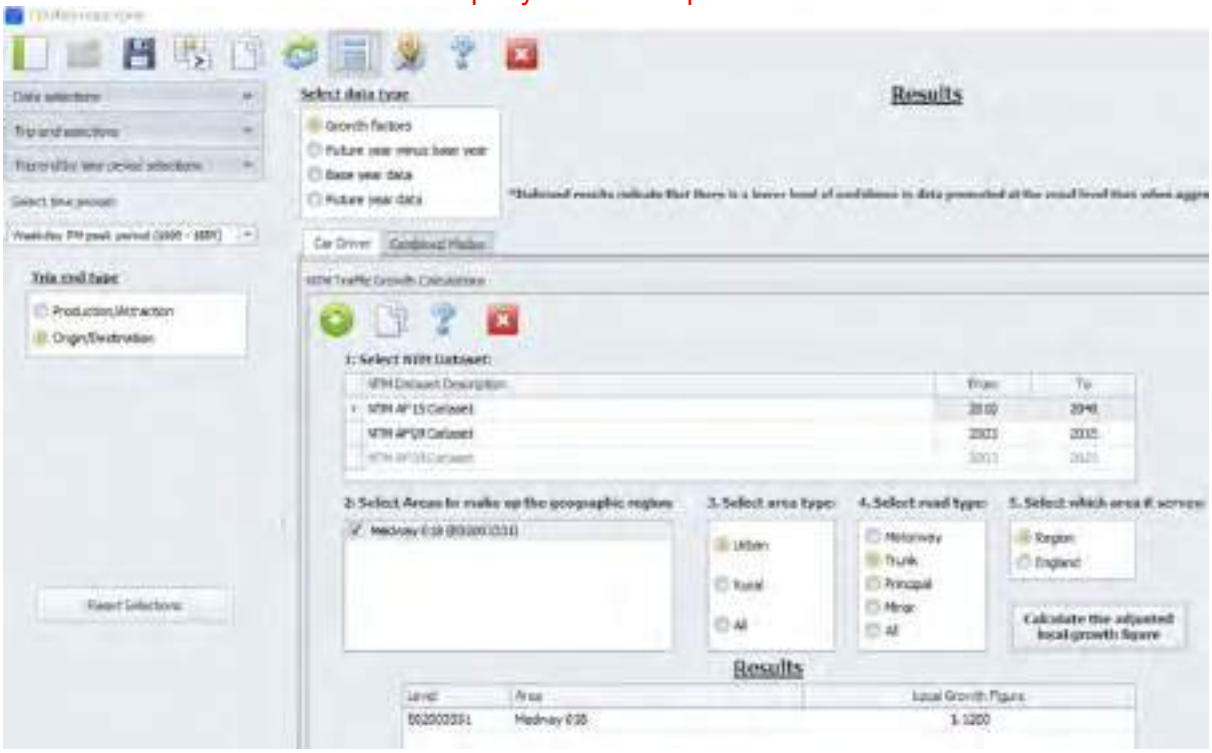
- We agree with the general principle that TEMPRO growth can subsume committed development traffic. ***However, in this particular case we cannot be certain that this applies until we review the TEMPRO output (as previously requested), so we can verify if the selection parameters are accurate, in particular the study area extent (and potentially other parameters). Also, the growth factors for SRN and urban roads separately should be provided.***
- ***As before, we also request confirmation from Medway Council that the list of committed developments in Paragraph 6.1.3 of the TA is complete and that the stated development types and quantums are correct.***

The March 2020 submission responds as follows:

- The TEMPRO growth factors are set out in Table 2 for these parameters:
  - Trunk road;
  - Urban roads;
  - Car driver;
  - Medway 018 study area;
  - 2019-2029;
  - Using TEMPRO7.2 and the NTM AF15 Dataset.
- The submission also states that *"Medway Council have confirmed in a meeting on 28th October 2019 that the list of committed developments in the TA are appropriate."*

Our updated response is as follows:

- Our own TEMPRO query using the above parameters produced quite different results; we need to see a screenshot of the above TEMPRO query, to verify the results of the March 2020 submission.
- A screenshot of our own TEMPRO query for the PM peak is shown below:



- The Medway 018 study area is a very small local area around the development site, as shown in this link: http://statistics.data.gov.uk/atlas/resource?uri=http://statistics.data.gov.uk/id/statistical-geography/E02003331
- As we are concerned with the *background* traffic on the SRN, it would be appropriate to expand the study area further.
- We ask that Medway Council confirm the statement that they "*have confirmed in a meeting on 28th October 2019 that the list of committed developments in the TA are appropriate*."

Development trip generation

We previously commented as follows:

- The residential trip generation is determined in the TA by:
    - TRICS *person* trip rates; National Travel Survey (NTS) data to determine percentages of AM and PM peak trip for each purpose; Census 2011 Journey to Work Statistics for Middle Super Output Area Medway 018, to determine mode share for each journey purpose separately.
    - A degree of internalisation is applied to the residential trips, as described in section 5.9 and the resulting external residential trips are then summarised in Table 31.
- The care facilities trip generation is determined in the TA by TRICS vehicle trip rates.
- We requested the NTS data and Census 2011 Journey to Work Statistics, to verify the quoted percentages.
- The NTS data in Table 17 (journey purpose splits) could vary across locations.
- We requested details of the geographical extent of the Middle Super Output Area Medway 018, used to determine mode share. If this includes locations with much better access to non-car transport than the proposal site, then this could be under-estimating the probable car mode share of the proposal.
- Use of TRICS *vehicle* trip rates, with careful selection of TRICS sites based on similar characteristics to the proposal site, may be more accurate and should at least be used for comparison. These similar characteristics should include on- and off-street parking provision; non-car transport provision; local population, vehicle ownership, location type, as well as the age of the surveys and sample sizes.

The August 2019 submission responded to this as follows:

- NTS data and Census 2011 Journey-to-Work data are provided in Appendix B of the August 2019 submission.
- NTS data is "*based on national figures and no equivalent dataset is available for specific regions*".
- The development trips on the SRN are limited to commuting and business trips on the basis that trips associated with other trip purposes will be local to the site.
- The numbers of commuting and business trips are summarised in the August 2019 submission in the table under paragraph 4.2 (which is also Table 47 of the TA). These are determined from the data in Appendix B, which also includes assessment of traffic distribution.
- The extent of the MSOA for Medway 018 is illustrated in Image 1 in the August 2019 submission. "*The area included is immediately adjacent to the proposed site and includes the built up residential area immediately to the south*".

In response, we commented as follows:

- We have reviewed the NTS 0502 data in Appendix B of the August 2019 submission and checked it against the Table 17 of the TA. While the combined proportions of commuting and business trips are correctly recorded in Table 17 for the periods 8 to 9am (24%) and 5 to 6pm (37%), these may not necessarily be the peak hours on the SRN. The period 7 to 8am could feasibly be very busy also; and in this period, the NTS data show that combined proportions of commuting and business trips are 56%, i.e. over twice as much. Therefore, application of this methodology could more than double the number of development trips per hour during the critical AM peak period.
- As mentioned before, there is also the additional concern that the NTS data are national averages, not local. While this could of course mean that this data source is *over*-estimating impact, it may also be under-estimating the impact and we need to consider the potential worst-case scenario. While we need to be reasonable, it must also be considered that there is existing congestion at various M2 junctions and the proposal is not in the Local Plan; therefore, we need to be particularly careful to assess the impact more thoroughly.
- ***Regarding both points related to the NTS data, sensitivity testing would be appropriate in this instance, or the use of a different data source as we suggested in our previous response.***
- ***We also previously requested the Census 2011 Journey to Work Statistics for Middle Super Output Area Medway 018, which was used in the TA to determine mode share for each***

journey purpose separately. Appendix B does not include this; it only includes the directional data for the traffic distribution assessment. <u>This request is still outstanding</u>.

- The geographical extent of the Middle Super Output Area Medway 018 includes streets served by several bus services. Many homes in this area would have a bus stop within a very short distance, served by several bus routes, whereas residents of the proposed site would have to walk much further. This could make a real difference to mode shares and therefore, as commented previously, this methodology could be under-estimating the probable car mode share of the proposal. ***In order to verify the use of this data source for mode share, we would recommend that funding of a bus service within close proximity to most houses of the development (ideally 400 metres, in line with planning guidance) could be secured through a S106 Agreement, in the event that this development is approved in future.***
- ***Overall, we cannot yet agree to the stated trip generation of the TA.***

The March 2020 submission responds as follows:

- Table 4 of the submission summarises the revised AM peak development trips on the SRN.
- Reference is also made to the strategy for improving bus services to the site in section 4.5 of the TA.

Our updated response is as follows:

- The strategy for improving bus services to the site, as in section 4.5 of the TA, is welcomed and should be secured by the S106 Agreement if the proposals are consented. Highways England would like to be consulted on the planning of the strategy, if consent for the development were given.
- As previously requested, we require the Census 2011 Journey to Work Statistics for Middle Super Output Area Medway 018; not just a table of results. We need a link to the dataset on the appropriate online source so that we can assess the source of the data and all assumptions/exclusions etc.
- ***Subject to the above and subject to our comments below under "Development trip distribution"***, the revised AM peak development trips in Table 4 would appear broadly acceptable. However, we still do not agree with the assertion that these trips "*cannot be considered material in the context of the operation of the strategic network*", for the reasons already given above in our updated response to "*Base traffic volumes and growth*".

Development trip distribution

We previously commented as follows:

Different methodologies are applied for different journey purposes. The majority of trips in the critical AM peak are for commuting, business, escorted education and education.

Secondary education trips have been distributed according to the locations of nearby schools and assumed splits between them.

Primary school pupil and staff trips have been distributed according to 2011 Census journey to work data for the Middle Super Output Area (MSOA) of Medway 018.

The commuting and business vehicle trips have also been distributed based on the 2011 Census journey to work data for the Middle Super Output Area (MSOA) of Medway 018.

- We requested the Census 2011 Journey to Work Statistics, to verify the quoted percentages.
- We requested details of the geographical extent of the Middle Super Output Area Medway 018, as this could have quite varied distribution in reality.
- We said that, on receipt of the above information, we will review the distribution further. We will also check that the methodology does not double-count the reduction in trips due to internalisation (as noted under "Development trip generation" above).

The August 2019 submission responded as follows:

- Census 2011 Journey to Work Statistics are provided in Appendix B.
- The geographical extent of the Middle Super Output Area Medway 018 is shown in Image 1.
- The numbers of commuting and business trips are summarised in the August 2019 submission in the table under paragraph 4.2 (which is also Table 47 of the TA). These are determined from the data in Appendix B of the August 2019 submission.

In response, we commented as follows:

- We agree that the geographical extent of the Middle Super Output Area Medway 018 is acceptable for determination of trip distribution (although we have raised concerns above regarding its use for trip *generation*).
- ***We have the following queries regarding the distribution of commuting / business trips in the peak:***
    - ***While the use of Census 2011 Journey to Work directional percentages is reasonable, it is likely that traffic commuting to destinations to the west may use either Junction 2 or Junction 1; we will consider the potential worst case for each junction in our assessment of potential impacts.***
    - ***Regarding the internal Medway locations in Appendix B, we ask that the applicant's agent provide a map of these locations, so that we can assess the accuracy of this methodology.***
- Upon receipt of the above requested information, we will complete our review of the development trip distribution, based on this information.

The March 2020 submission responds as follows:

- The submission again asserts that "*it is unlikely that there will be an impact at junction 2. In any event, if a proportion of journeys take this route this will only reduce the overall impact at other locations*".
- Of the internal Medway locations from Appendix B of the previous August 2019 submission, the March 2020 submission shows the locations of three of them (out of a total of 38).

Our updated response is as follows:

- As we stated above, we cannot assume that there will be no impact at Junction 2.
- We need to consider the potential worst case for *each* junction. They may use Junction 2 *or* they may use other junctions, so we cannot accept that an impact on Junction 2 is acceptable because it reduces the impacts on other junctions. Either situation may happen – we need to plan for each junction's worst-case scenario.
- Furthermore, some traffic may use Junction 2 and other junctions in the same trip.
- We had requested a plan showing the locations of the 38 Medway internal locations listed in the methodology in Appendix B of the previous August 2019 submission; not just the three local ones. We need to assess the accuracy of this methodology for determining the distribution of commuting / business trips in the peak.
- Upon receipt of the above requested information, we will complete our review of the development trip distribution, based on this information.

Modelling

We previously responded as follows:

- No modelling of the SRN has been undertaken; the TA states that this is not considered necessary because the "*the impact on any single link will be a maximum of 30 trips during the peak hour*".
- Please refer back to our above comments on various aspects of the TA's methodology. When these are addressed, we will be in a better position to understand whether or not SRN modelling may be required.
- We need to consider the cumulative impact with committed developments and/or background traffic growth too.
- There is existing congestion at various M2 junctions. Also, the proposal is not in the Local Plan and we therefore need to be particularly careful to assess the impact more thoroughly.
- It may be appropriate to consider this proposal within the Medway Local Plan Traffic Modelling. This is still under development, and Highways England are involved in this process.
- The number of additional trips at a junction is more important than the additional trips on a *link*, due to the interaction of links at a junction.

The August 2019 submission does not address this, and instead maintains that, based on the forecast additional traffic onto the M2, a detailed assessment of the SRN is not warranted.

In response, re-iterate that we have outstanding concerns regarding the methodology of the assessment; and therefore, our previous comments on modelling still apply.

The March 2020 submission responds as follows:

- *"Based on the forecast traffic impact on the strategic road network, which is modest, it is not considered junction modelling is warranted."*
- *"Medway have undertaken their own modelling on the surrounding network using their AIMSUN model which includes the strategic road network (Subnetwork 1). They have confirmed that only subnetworks 2, 3 and 7 experience any material change on flows and therefore the strategic road network is not affected."*

Our updated response is as follows:

- For our reasons given elsewhere in this response, we do not have certainty that the impact on the strategic road network is modest; junction modelling is therefore warranted.
- We need further detail on the Medway model, particularly in support of the statement that "*only subnetworks 2, 3 and 7 experience any material change on flows*". In what growth and development scenarios, which time periods and years? And how is a "material change" defined in this instance?
- Even if Medway's modelling showed no material change in flows on the SRN, the addition of the development traffic on top could be a material impact, especially as the model shows that there is already a need for mitigation at all SRN junctions without this development.
- ***All our previous comments on modelling still apply***.

Mitigation

We previously commented as follows:

We will consider the need, if any, for mitigation measures when the above comments and queries have been addressed and we are in a position to understand fully the potential SRN impacts.

We may also comment on construction traffic impact, if appropriate, which could be addressed by a construction traffic management plan.

The March 2020 submission does not respond to this at all.

Our response remains the same.

Summary and Conclusions

Overall, we remain of the view that the development has the potential to result in a significant amount of AM and PM peak hour trips, and there is not yet a definite indication of the impact upon the SRN. We therefore cannot determine if the proposal will materially affect the safety, reliability and / or operation of the SRN (the tests set out in DfT Circular 02/13, particularly paragraphs 9 & 10, and DCLG NPPF, particularly para 109).

Please note that this email does not constitute a formal recommendation from Highways England. We will provide a formal recommendation when we can be confident that the application is in its final form. In the meantime, we would ask that **the planning authority does not determine the application** (other than a refusal), ahead of us receiving and responding to the required/requested information. In the event that the authority wishes to permit the application before this point, we would ask the authority to inform us so that we can provide substantive response based on the position at that known time**.**

You will note that I have also copied our response to the applicant's agents and transport advisors. If they or you have any queries, please contact us at planningse@highwaysengland.co.uk.

Kind regards,

David
David Bowie

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Please note that for the foreseeable future we are all working from home. All meetings will be via telephone, Skype or similar. We will continue to seek to work to our statutory and other deadlines. In case of IT or other issues, as a precaution, please copy all emails to PlanningSE@highwaysengland.co.uk . Thank you.

Appendix G

Report

Pump Lane and Lower Rainham Transport Impact Appraisal Addendum 2 (2028 results)

On behalf of Medway Council

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16/12/2020
Project Reference: [0]
Document Reference: [3]
Revision: [1]
Prepared For: Medway Council

Status / Revisions

Rev.	Date	Reason for issue	Prepared		Reviewed		Approved	
[1]	6.1.2021	First Draft	AP	6.1.2021	DH	7.1.2021	KJ	8.1.2021

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Appendices

1 Introduction

This report is an addendum to the “Pump Lane and Lower Rainham Transport Impact Appraisal Report” produced by Sweco in October 2020. This report was produced as a result of the discussions between Medway Council and the developer. As a result of these discussions, several additional modelling scenarios were developed. This report will present the results of the year 2028 scenarios only. The following sections present the amendments to the model, the demand used for each scenario and the results from the microsimulation for the selected subnetworks around the development area.

2 Model amendments

The two main differences between the modelling undertaken in this report and the previous report are:

i) The trip rates used for the demand to and from the development area and
ii) The centroid configuration around the development area.

2.1 Development Demand

The development demand as calculated by the developer along with the demand calculated by Sweco is presented in Table 1. It is observed that the demand calculated by the developer is 26% (214 two-way trips) and 31% (245 (two-way trips) lower than the strategic model demand that Sweco calculated in the AM and PM scenarios accordingly. The trip rates used to derive the strategic model demand have been presented in detail in the previous report and technical notes produced by Sweco (Note name “Pump_Farm_Lower_Rainham_ref_MC. 19.1566_Sweco_Response.docx on the 10th of December 2020).

This report will present the results of an Aimsun scenario using the demand calculated by the developer.

Table 1 Development demand

Demand	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Developer Demand	187	398	585	365	193	558
Strategic Model Demand	175	624	799	497	306	803

2.2 Development zone configuration

The second issue around the modelling of the development area in the previous report, was the fact that the demand of the development zone was added on top of an existing centroid (Aimsun vehicle input and output) which included the demand of the reference case scenario and had a connection to Lower Bloors Lane as shown in Figure 1.

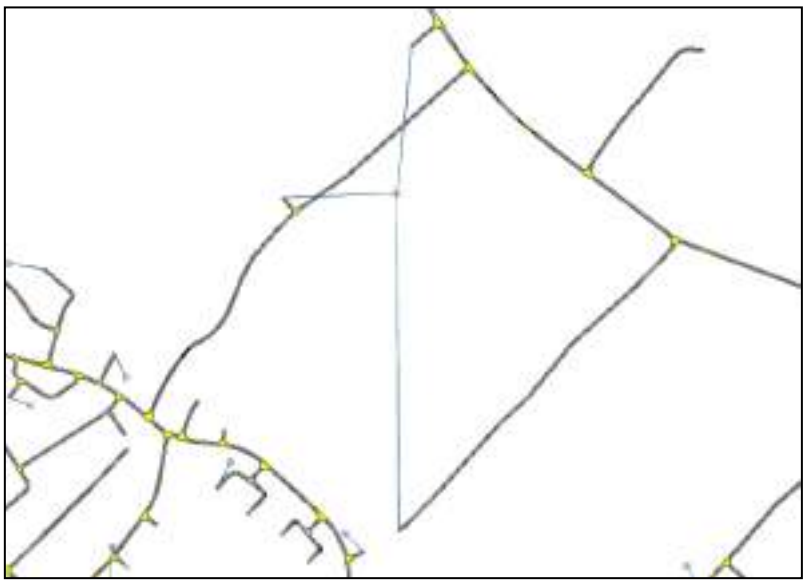

Figure 1 Original report development zone configuration in Aimsun

This report will present the results of the following new additional scenarios:

A) The **LRR Scenario 4** where the demand of the development is still added on top of the reference case demand in the same centroid, but the centroid connection to Lower Bloors Lane is removed, because, as proved by the select link analysis plots provided together with the previous report, the reference case traffic was not using the centroid connection to Lower Bloors Lane. The LRR Scenario 4 configuration is shown in Figure 2 (LRR Scenario 4)

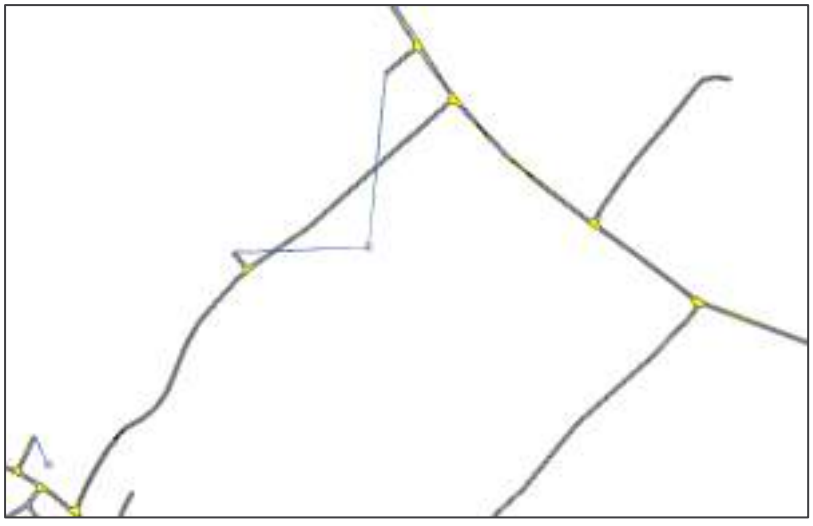

Figure 2 LRR Scenario 4 development zone configuration in Aimsun

B) The **LRR Scenario 5** and **LRR Scenario 6** where the demand of the development is assigned to a new standalone development zone (centroid), solely used for the modelling of the development, as shown in Figure 3. In Scenario 5, the development strategic model demand is used, while in Scenario 6, the developer demand is used.

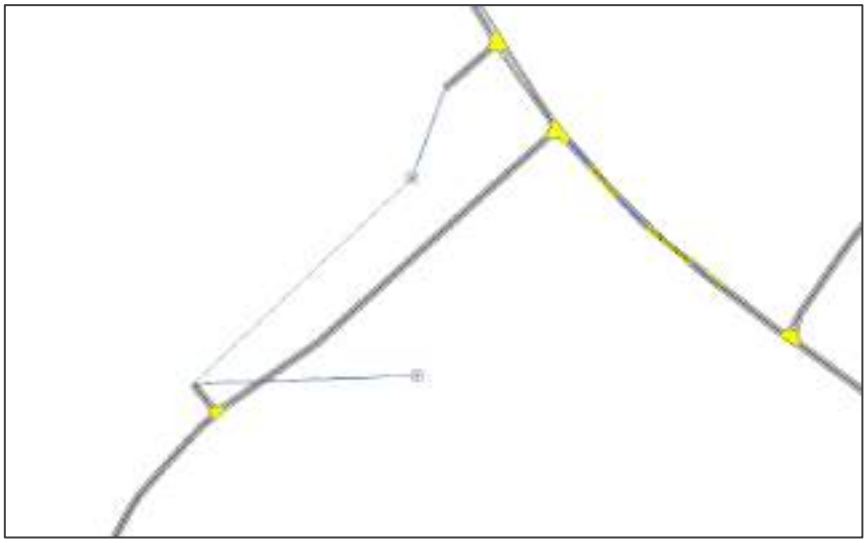

Figure 3 LRR Scenario 5 and 6 development zone configuration in Aimsun

2.3 Scenarios

The scenarios produced as a result of the aforementioned model amendments are presented in

Table 2.

Table 2 Additional Pump Lane development evaluation scenarios

Scenario No	Year	Trip rates for development at Pump Lane (centroid 442792)	Development zone used	Centroid Configuration
Reference Case	2028	N/A	N/A	N/A
LRR Scenario 4	2028	Strategic Model Trip rates	Existing strategic zone	Two access points
LRR Scenario 5	2028	Strategic Model Trip rates	Standalone development zone	Two access points
LRR Scenario 6	2028	Developer Trip rates	Standalone development zone	Two access points

2.4 Additional output analysis

In addition to the results provided in the previous report produced by Sweco, this report will present the following additional results:

- Three additional junctions have been added to the Level of Service results presented in this report to provide a direct comparison between the results presented in the developer's report and Sweco's report. The methodology used to calculate the Level of Service results has been analysed in the original report.
- The travel time results for several key paths in the three subnetworks around the development area are presented in this report in order to underline the impacts of the development on traffic. The travel times have been extracted both for the reference case and the new additional scenarios. In order to calculate the travel time for the paths, the appropriate Subpaths have been defined in the Aimsun model, by selecting the corresponding sections for each of them. The path travel time results shown in the following subnetwork sections will also show the absolute difference and percent difference compared to the reference case scenario.

3 Results

3.1 Subnetwork 2

Initially, the Subnetwork 2 statistics for AM and PM peak times are presented in Table 3 and Table 4 accordingly. An increase in average travel time (25%), delay (around 45%) and queue (around 76% and 97% in the AM and PM peak time accordingly) is observed between the 2028 Reference case and the scenarios including the development (LRR Scenarios 4, 5 and 6). Consequently, a decrease in average speed is observed between the reference case and the development scenarios. It needs to be underlined that the difference in travel time, delay, speed and mean queue between the development scenarios (4,5 and 6) is small and can be attributed to the inherent randomness of the microsimulation. For example, the difference in travel time between LRR Scenario 4 and 5 is 1 second per kilometer which can be considered negligible. The percent change for each statistic is presented graphically in Figure 4 and Figure 5 for the AM and PM peak times accordingly.

Table 3 Subnetwork 2 Statistics AM peak

Statistic	AM Peak (0800 to 0900)				
	Units	2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	193	245	246	246
Delay	sec/km	119	172	173	173
Speed	km/h	27.9	26.5	26.8	26.4
Mean Queue	veh	489	861	861	854

Table 4 Subnetwork 2 Statistics PM Peak

Statistic	PM Peak (1700 to 1800)				
	Units	2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	165	205	206	206
Delay	sec/km	93	132	134	133
Speed	km/h	31.2	27.6	27.6	27.8
Mean Queue	veh	284	559	557	563

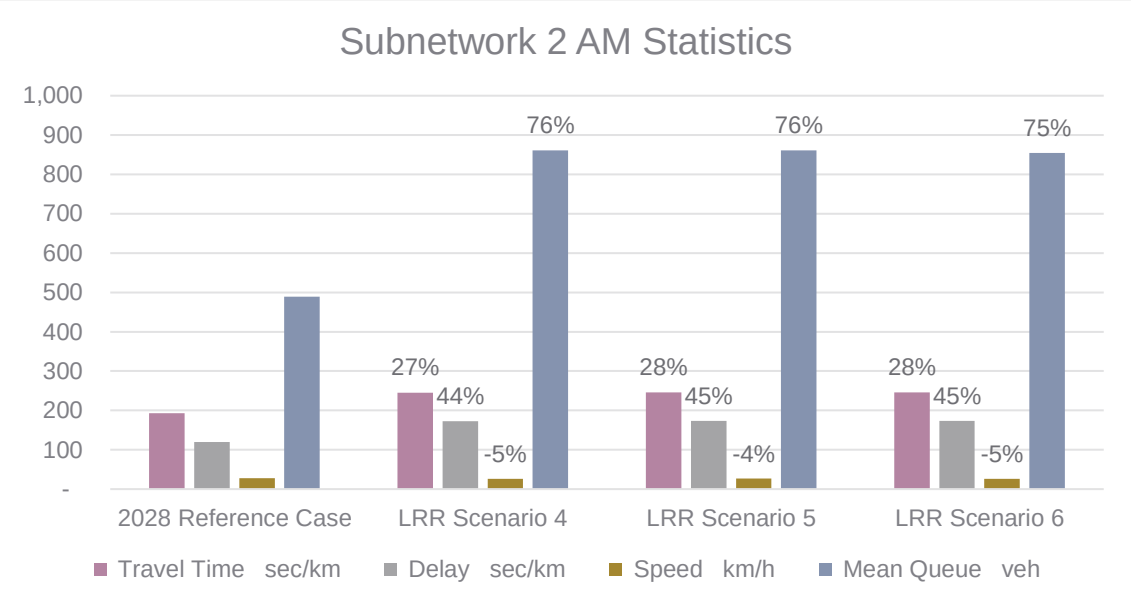

Figure 4 Subnetwork 2 AM Statistics

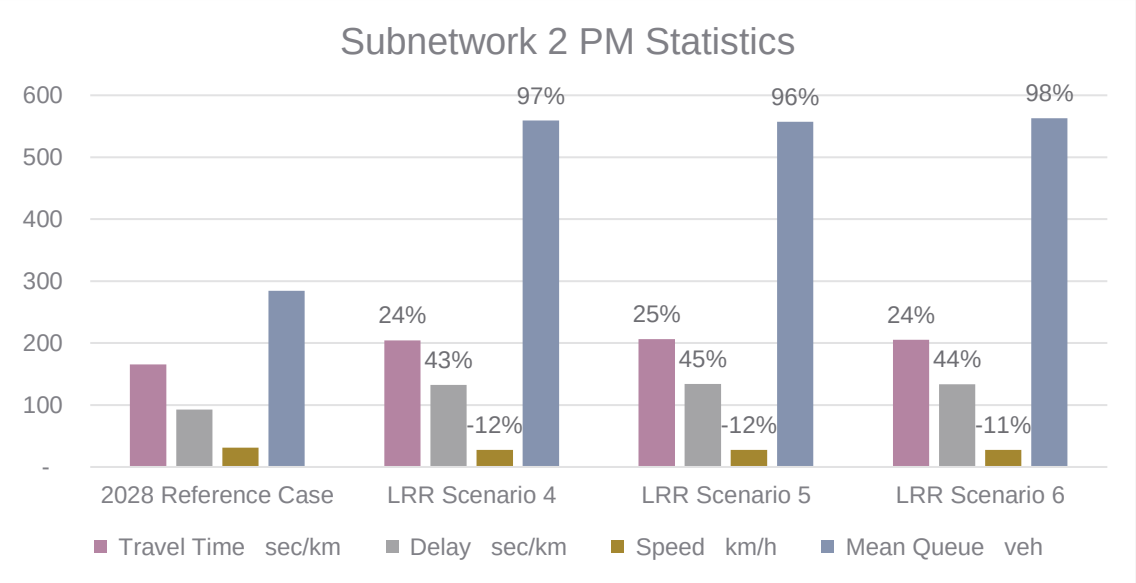

Figure 5 Subnetwork 2 PM Statistics

Table 5 and Table 6 present the Level of Service results for key junctions in Subnetwork 2. The location of each junction and roundabout is shown in Figure 6.

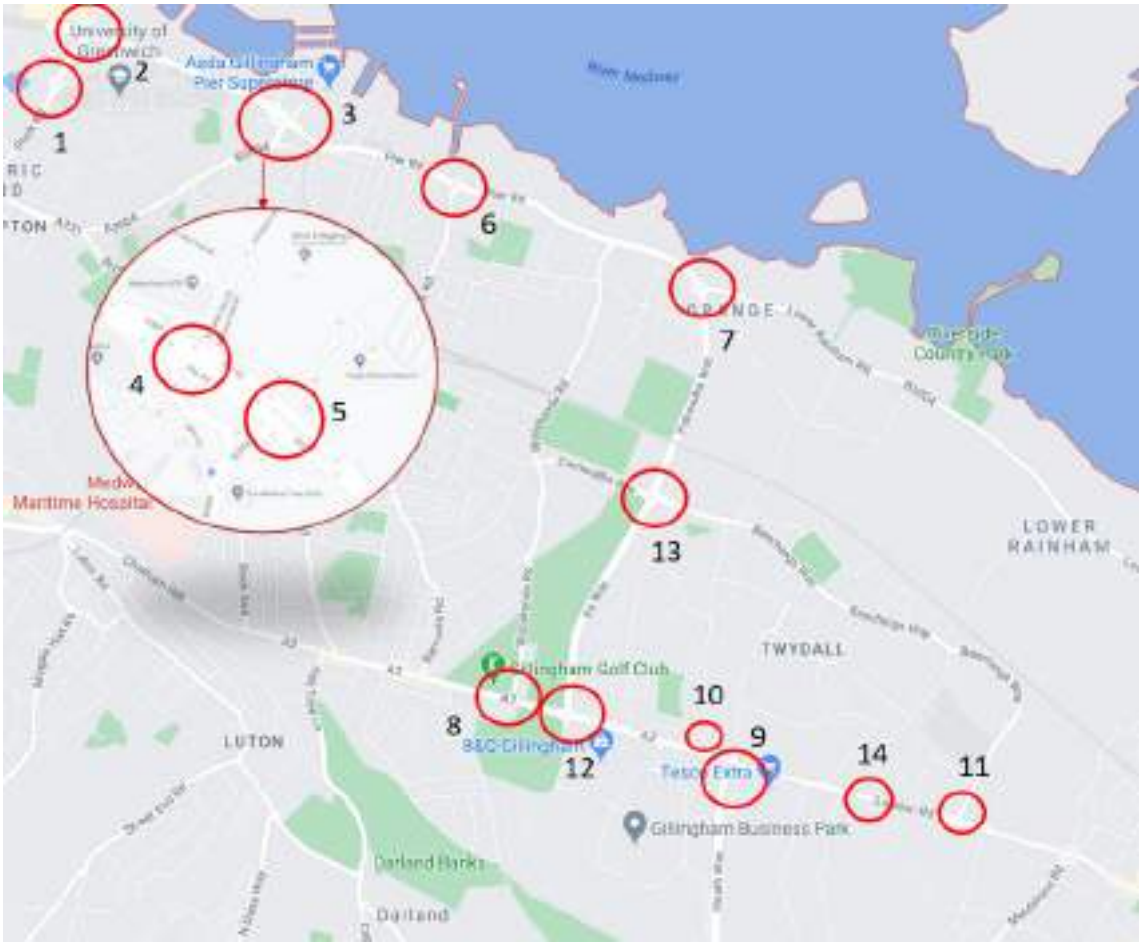

Figure 6 Subnetwork 2 Junctions and Roundabouts

It is observed that:

- Junctions number 8, 9 and 12 Level of Service goes to F where the demand of the junction exceeds capacity, in the AM scenarios where the development is present
- Junctions number 2, 4 ,9 and 10 Level of Service goes to F in the PM scenarios where the development is present
- Very small to no change is observed between the development scenarios (LRR Scenarios 4, 5 and 6)
- No additional Junctions with level of service F are observed in Subnetwork 2 junctions between years 2028 and 2037. The traffic growth between those years is not large enough to break the functionality of junctions.

Table 5 Subnetwork 2 Junction Level of Service AM Peak

Junction	ID	Ref AM	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Pembroke/Dock Road/Western Avenue/ Maritime Way Roundabout	1	C	C	C	C
A289 (Pier Road/ Maritime Way Roundabout)	2	C	C	C	C
A289 (Pier Road / Gillingham Gate Road)	3	D	D	D	D
A289 Pier Road / Gillingham Gate Road West	4	D	E	E	E
A289 Pier Road / Gillingham Gate Road East	5	C	C	C	C
A289 Pier Road / Church Street / Strand Junction	6	C	C	C	C
A289 (Yokosuka Way Roundabout)	7	F	F	F	F
A2 (Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction)	8	D	F	F	F
A2 (Bowater Roundabout)	9	B	E	F	F
Eastcourt Lane / South Avenue	10	F	F	F	F
A2 (London Road / Bloors Lane Junction)	11	D	D	D	D
A289 (Ito Way / Sovereign Boulevard)	12	A	F	F	F
A2 (Yokosuka / Ito / Beechings Way Roundabout)	13	A	A	A	A
A2 / Pump Lane	14	A	E	E	E

Table 6 Subnetwork 2 Junction Level of Service PM Peak

Junction	ID	Ref PM	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Pembroke/Dock Road/Western Avenue/ Maritime Way Roundabout	1	A	A	A	A
A289 (Pier Road/ Maritime Way Roundabout)	2	C	F	F	F
A289 (Pier Road / Gillingham Gate Road)	3	D	D	E	D
A289 Pier Road / Gillingham Gate Road West	4	D	F	F	F
A289 Pier Road / Gillingham Gate Road East	5	B	C	C	C
A289 Pier Road / Church Street / Strand Junction	6	B	C	C	C
A289 (Yokosuka Way Roundabout)	7	A	A	A	A
A2 (Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction)	8	C	D	E	E
A2 (Bowater Roundabout)	9	D	F	F	F
Eastcourt Lane / South Avenue	10	D	F	F	F
A2 (London Road / Bloors Lane Junction)	11	C	D	D	D
A289 (Ito Way / Sovereign Boulevard)	12	A	A	A	A
A2 (Yokosuka / Ito / Beechings Way Roundabout)	13	A	A	A	A
A2 / Pump Lane	14	A	D	D	D

Figure 7 shows the paths analysed in terms of travel time in subnetwork 2, while Table 7 and Table 8 present the path travel time results for the AM and PM Peak periods accordingly. The most outstanding difference is observed in:

- A289 (Church Street) to A278 (Hoath Way) and A2 (Watling to Sovereign Boulevard) where the travel time increases by 66-75% and 113-117% accordingly in the AM scenarios. This increase is around 10 minutes for and 13 minutes for Path 4. It is considered a significant increase and it is much higher than the increase observed in the corresponding values in 2037.
- A289 (Church Street) to A278 (Hoath Way) and A278 (Hoath Way) to A289 (Church Street) and A2 (Watling to Sovereign Boulevard) where the travel time increases by 31 to 40%, 37 to 55% and 94% to 104% accordingly in the PM scenarios. This increase is around 3-4 minutes, 3-4 minutes and 6-7 minutes accordingly and can be considered significant.
- The differences between the path travel time results of the development scenarios are considered small and can be attributed to the stochasticity (randomness) of the microsimulation.

Figure 7 Subnetwork 2 Paths

Table 7 Subnetwork 2 Path travel time AM Peak

Path	2028 Reference Case AM	LRR Scenario 4 (sec)			LRR Scenario 5 (sec)			LRR Scenario 6 (sec)		
		Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A289 (Church Street) to A278 (Hoath Way)	800	1,390	591	74%	1,400	601	75%	1,330	530	66%
A278 (Hoath Way) to A289 (Church Street)	604	638	34	6%	639	35	6%	615	11	2%
A2 (Sovereign Boulevard to Watling Road)	400	422	22	6%	427	27	7%	426	26	6%
A2 (Watling to Sovereign Boulevard)	672	1,460	788	117%	1,456	784	117%	1,433	760	113%
A289 (Church Street to Lower Rainham)	140	140	-	0%	141	1	1%	139	0	0%
A289 (Lower Rainham to Church Street)	121	123	2	2%	124	3	2%	123	2	2%

Table 8 Subnetwork 2 Path travel time PM Peak

Path	2028 Reference Case AM	LRR Scenario 4 (sec)			LRR Scenario 5 (sec)			LRR Scenario 6 (sec)		
		Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A289 (Church Street) to A278 (Hoath Way)	565	791	226	40%	778	213	38%	740	175	31%
A278 (Hoath Way) to A289 (Church Street)	402	622	220	55%	576	174	43%	552	150	37%
A2 (Sovereign Boulevard to Watling Road)	384	400	16	4%	399	15	4%	396	12	3%
A2 (Watling to Sovereign Boulevard)	423	863	440	104%	845	422	100%	821	398	94%
A289 (Church Street to Lower Rainham)	156	161	5	3%	163	7	5%	160	3	2%
A289 (Lower Rainham to Church Street)	119	124	5	4%	122	3	3%	122	3	2%

3.1.1 Subnetwork 2 Summary

Initially, the subnetwork 2 statistics results showed that traffic conditions in the subnetwork deteriorate in all the scenarios where the development exists, and a substantial increase in delay, travel time and queue is observed between those scenarios and the reference case. The difference between the scenarios using the strategic model demand and the scenarios using the

developer demand seems to be small compared to the difference between the reference case and the development scenarios.

Additionally, Junction level of service results showed that the demand for Junctions number 8, 9 and 12 Level of Service exceeds capacity in the AM development scenarios. In the PM development scenarios, the demand for Junctions number 2, 4 ,9 and 10 exceeds capacity. Very small to no change is observed between the development scenarios in terms of Junction Level of Service.

Finally, path travel time results underlined that the travel time for paths A289 (Church Street) to A278 (Hoath Way) and A2 (Watling to Sovereign Boulevard) in the AM peak and paths A289 (Church Street) to A278 (Hoath Way), A278 (Hoath Way) to A289 (Church Street) and A2 (Watling to Sovereign Boulevard) in the PM peak increases substantially between the 2028 case scenario and the development scenarios. The large increase in travel time of the path A2 (Watling Road to Sovereign Boulevard) was not observed in the 2037 scenarios. The travel times results seemed to not show significant differences among the development scenarios.

Overall, it needs to be underlined that besides the A2 (Watling to Sovereign Boulevard) increase in travel time, no other additional congestion hotspots are observed in the 2028 results compared to the 2037 results.

3.2 Subnetwork 3

The Subnetwork 3 statistics for AM and PM peak times are presented in Table 9 and Table 10 accordingly. It is observed that the increase in average travel time, delay and queue between the reference case 2028 and the development scenarios is smaller than the increase observed in subnetwork 2. It needs to be underlined that the difference in travel time, delay, speed and mean queue between the three new LRR scenarios is small and can be attributed to the stochasticity of the microsimulation. For example, the difference in travel time between LRR Scenario 4 and 5 is 7 seconds per kilometer in the AM peak scenario which can be considered negligible. The percent change for each statistic is presented graphically in Figure 8 and Figure 9 for the AM and PM peak times accordingly.

Table 9 Subnetwork 3 Statistics AM Peak

Statistic		AM Peak (0800 to 0900)			
	Units	2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	239	245	252	245
Delay	sec/km	153	160	166	160
Speed	km/h	19.0	19.3	19.5	19.5
Mean Queue	veh	63	71	75	70

Table 10 Subnetwork 3 Statistics PM Peak

Statistic	PM Peak (1700 to 1800)				
	Units	2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	255	279	287	277
Delay	sec/km	169	193	201	192
Speed	km/h	18.3	18.0	17.7	18.0
Mean Queue	veh	65	95	97	95

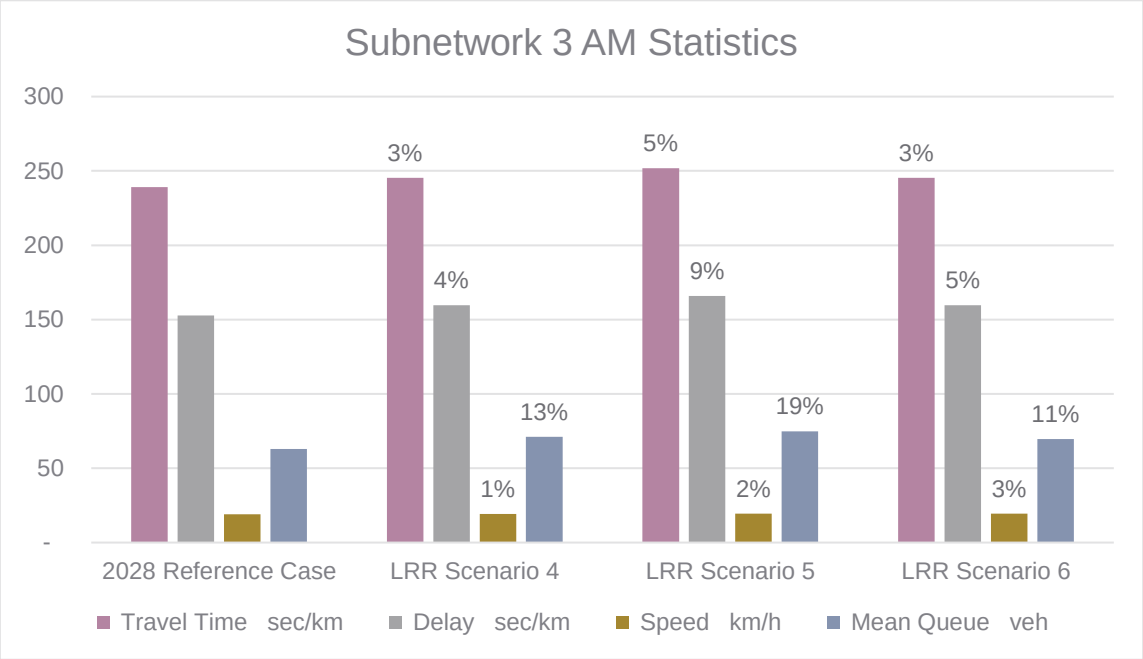

Figure 8 Subnetwork 3 Statistics AM

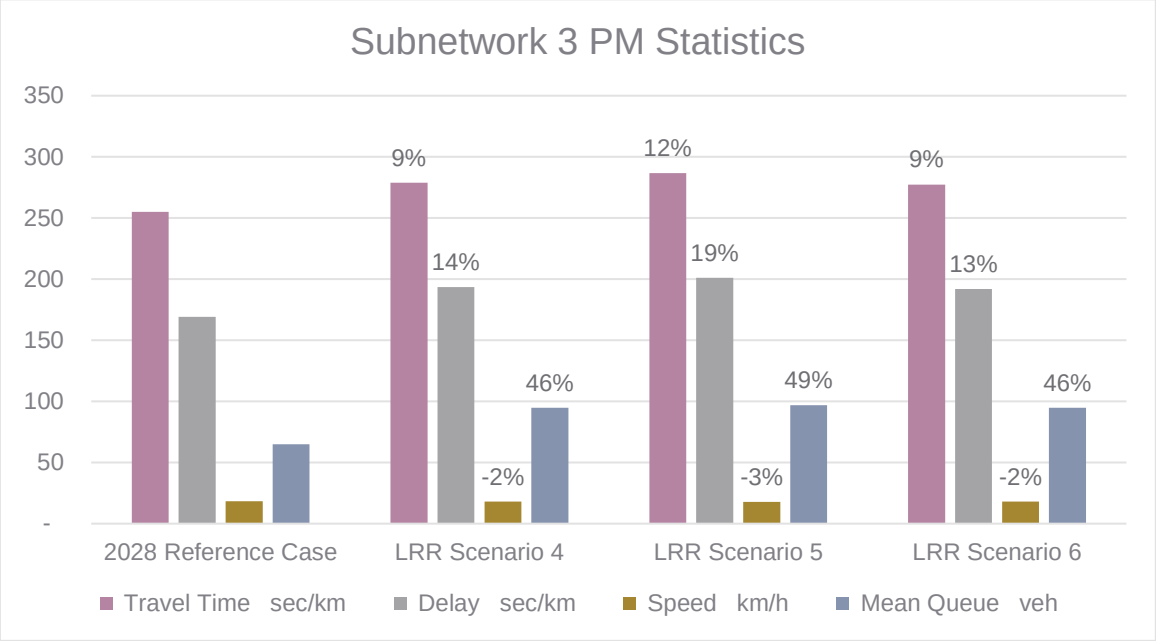

Figure 9 Subnetwork 3 Statistics PM

Table 11 and Table 12 present the Level of Service results for key junctions in Subnetwork 3. The location of each junction and roundabout is shown in Figure 10.

Figure 10 Subnetwork 3 Junctions and Roundabouts

It is observed that the demand at Junction 2 (A2 (Otterham Quay Lane/Merersborough Road) in the new LRR scenarios exceeds capacity, an effect which is not present in the reference case scenario. For this specific junction, in 2037, the results had showed an increase between sensitivity 1 scenario results and Scenarios 1,2 and 3 from D to F, which was attributed to the loss of the Lower Bloors lane centroid connector from the development.

A small increase in level of service is observed in the rest of the junctions but in none of them the demand exceeds capacity. The results between the new LRR scenarios do not show any difference. The 2028 results do not seem to be different than the 2037 results.

Table 11 Subnetwork 3 Junction Level of Service AM

Junction	ID	2028 RC AM	LRR Scenario 4 AM	LRR Scenario 5 AM	LRR Scenario 6 AM
A2 (Mierscourt Road_High Street Junction)	**1**	C	E	E	E
Otterham Quay Lane_Meresborough	**2**	D	F	F	F
Sovereign Bd & Maidstone Rd	**3**	C	D	D	D
Sovereign Bd & Station Rd	**4**	C	D	D	D

Table 12 Subnetwork 3 Junction Level of Service PM

Junction	ID	2028 RC PM	LRR Scenario 4 PM	LRR Scenario 5 PM	LRR Scenario 6 PM
Mierscourt Road_High Street Junction	**1**	D	E	E	E
Otterham Quay Lane_Meresborough	**2**	D	F	F	F
Sovereign Bd & Maidstone Rd	**3**	C	D	D	D
Sovereign Bd & Station Rd	**4**	C	D	D	D

Finally, Figure 11 shows the location of the subnetwork 3 paths which are analysed in terms of travel time, while the travel time results are presented in Table 13 and Table 14 for the AM peak and PM peak scenarios accordingly. A large increase is observed for the path A2 (Moor Street to Sovereign Boulevard) in both the AM and the PM peak scenarios. More specifically, in the PM peak scenario travel time for the A2 corridor (WB) is increased by 278 (64%) to 314 (72%) seconds which is approximately 5 minutes.

Figure 11 Subnetwork 3 Paths

Table 13 Subnetwork 3 Path travel time AM

Path	2028 Reference Case AM	LRR Scenario 4 (sec)			LRR Scenario 5 (sec)			LRR Scenario 6 (sec)		
		Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A2 (Moor Street to Sovereign Boulevard)	538	629	91	17%	674	136	25%	619	81	15%
A2 (Sovereign Boulevard to Moor Street)	321	341	20	6%	341	20	6%	336	16	5%

Table 14 Subnetwork 3 Path travel time PM

Path	2028 Reference Case AM	LRR Scenario 4 (sec)			LRR Scenario 5 (sec)			LRR Scenario 6 (sec)		
		Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A2 (Moor Street to Sovereign Boulevard)	433	747	314	72%	734	301	69%	734	278	64%
A2 (Sovereign Boulevard to Moor Street)	372	409	38	10%	423	51	14%	419	48	13%

3.2.1 Subnetwork 3 Summary

Initially, the subnetwork average statistics showed that even though there is an increase in average travel time, delay and queue between the reference case 2028 and the development scenarios, it is smaller than the increase observed in subnetwork 2.

Furthermore, demand at Junction 2 (A2 (Otterham Quay Lane/Merersborough Road) in the new LRR scenarios exceeds capacity, an effect which is not present in the reference case scenario. Finally, an increase of 2 and 5 minutes (65-70% and 61% accordingly) is observed for A2 (Moor Street to Sovereign Boulevard) in subnetwork 3 in both the AM and the PM peak scenarios. Overall, no substantial difference was observed between the results of the new LRR scenarios.

3.3 Subnetwork 7

Initially, the Subnetwork 7 statistics for AM and PM peak times are presented in Table 15 and Table 16 accordingly. It is observed that even though there is a very large increase in queue between reference case and all the scenarios where the development is present (LRR Scenario 4,5 and 6), the results between the development scenarios do not show big fluctuations. The statistics results are presented graphically in Figure 12 and Figure 13. It is observed that in the scenarios where the development is present, the travel time remains almost constant in the PM Peak scenarios.

Table 15 Subnetwork 7 Statistics AM Peak

Statistic	AM Peak (0800 to 0900)				
	Units	2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	139	163	163	158
Delay	sec/km	59	83	83	78
Speed	km/h	36.1	34.0	34.0	34.3
Mean Queue	veh	54	151	157	136

Table 16 Subnetwork 7 Statistics PM Peak

Statistic	PM Peak (1700 to 1800)				
	Units	2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	123	150	153	152
Delay	sec/km	42	69	72	71
Speed	km/h	37.9	36.2	36.0	36.3
Mean Queue	veh	27	57	61	59

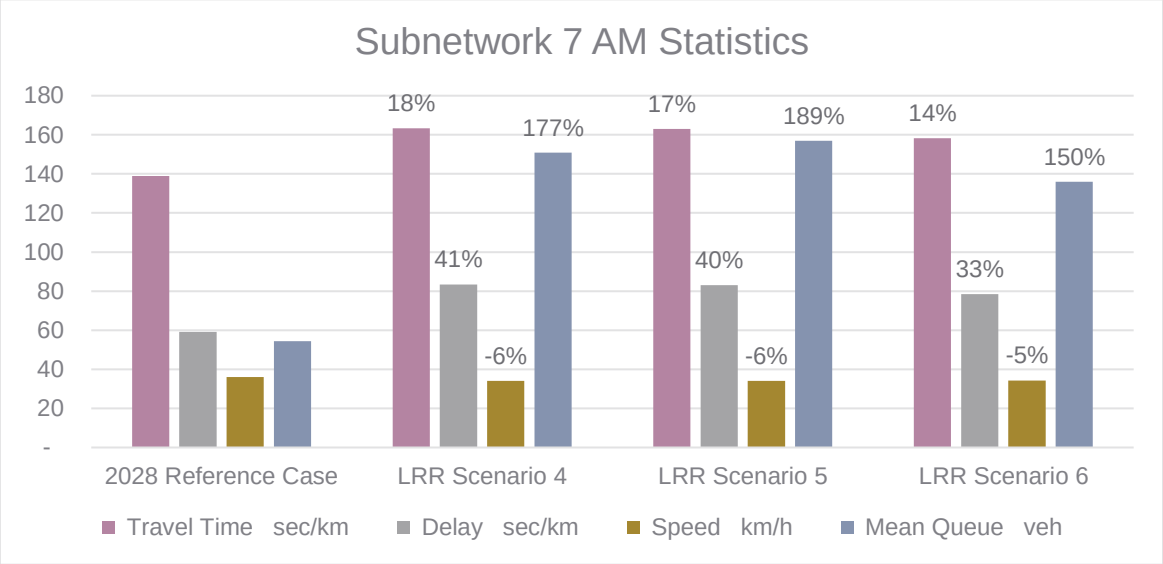

Figure 12 Subnetwork 7 Statistics AM

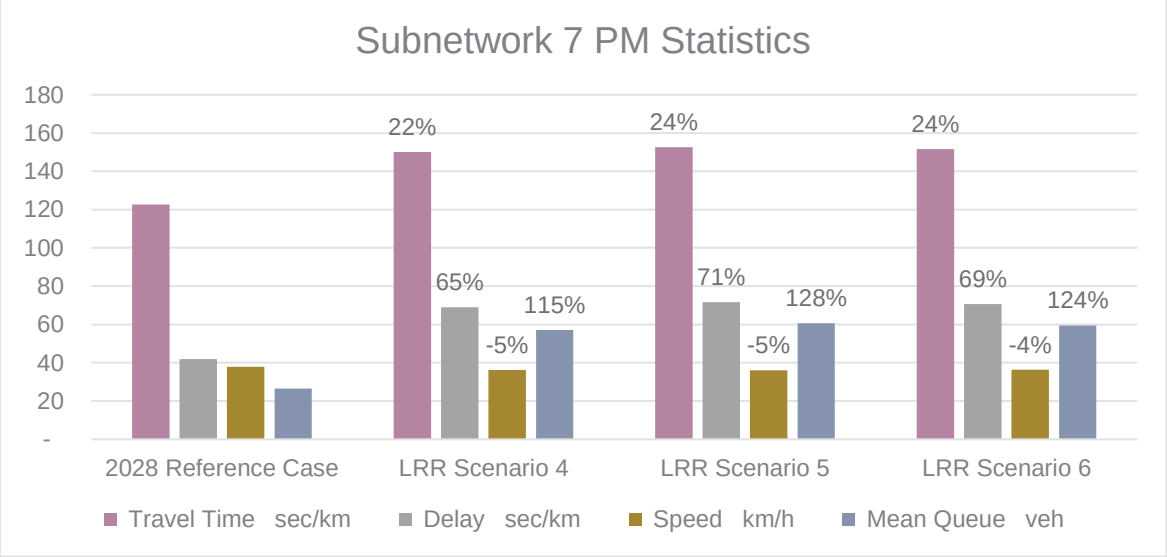

Figure 13 Subnetwork 7 Statistics PM

Table 17 and Table 18 present the Level of Service results for key junctions in Subnetwork 7. The location of each junction and roundabout is shown in Figure 14.

Figure 14 Subnetwork 7 Junctions and Roundabouts

The level of service results are consistent across the reference case and development scenarios. This can be attributed to the fact that subnetwork 7 is less congested overall than the other two subnetworks presented above. There is no substantial difference between the 2028 results and the 2037 results presented in the previous Sweco Pump Lane and Lower Rainham Transport Impact Appraisal Addendum.

Table 17 Subnetwork 7 Junction Level of Service AM Peak

Junction	Reference Case 2028 AM	LRR Scenario 4 AM	LRR Scenario 5 AM	LRR Scenario 6 AM
B2004 Lower Rainham Road / Pump Lane	A	A	A	A
Beechings Way / Pump Lane (North)	A	A	A	A
Beechings Way / Pump Lane (South)	A	A	A	A
B2004 Lower Rainham Road / Berengrave Lane	C	C	C	C
B2004 Lower Rainham Road / B2004 Station Road	A	A	A	A
Lower Rainham Road / Otterham Quay Lane	A	A	A	A

Table 18 Subnetwork 7 Junction Level of Service PM Peak

Junction	Reference Case 2028 PM	LRR Scenario 4 PM	LRR Scenario 5 PM	LRR Scenario 6 PM
B2004 Lower Rainham Road / Pump Lane	A	A	A	A
Beechings Way / Pump Lane (North)	A	A	A	A
Beechings Way / Pump Lane (South)	A	A	A	A
B2004 Lower Rainham Road / Berengrave Lane	C	C	C	C
B2004 Lower Rainham Road / B2004 Station Road	A	A	A	A
Lower Rainham Road / Otterham Quay Lane	A	A	A	A

Finally, Figure 15 shows the location of paths analysed in subnetwork 7, while Table 19 and Table 20 present the travel time results. The most outstanding finding from these tables is the increase in the travel time for Lower Rainham Road Westbound, where the travel time increases by 131% to 156% between the Reference case and the development scenarios. This increase can be translated to 10 minutes approximately increase in travel time for this specific path. This issue had been underlined in the original Sweco report, using the V/C plots around in the Lower Rainham Road westbound direction. This result should be combined with the Junction Level of Service results presented in Subnetwork 2 for A289 (Yokosuka Way Roundabout) which has a level of service F for all AM scenarios, including Reference case. It is clear that this roundabout, despite the mitigation scheme applied in the development scenarios, cannot accommodate the demand from the development.

The main difference between the 2037 presented in the previous Sweco Pump Lane and Lower Rainham Transport Impact Appraisal Addendum and the 2028 results presented in this report, is that the increase in travel time in Pump Lane northbound and southbound is slightly larger in the 2028 results but overall is relatively small in terms of absolute number of seconds.

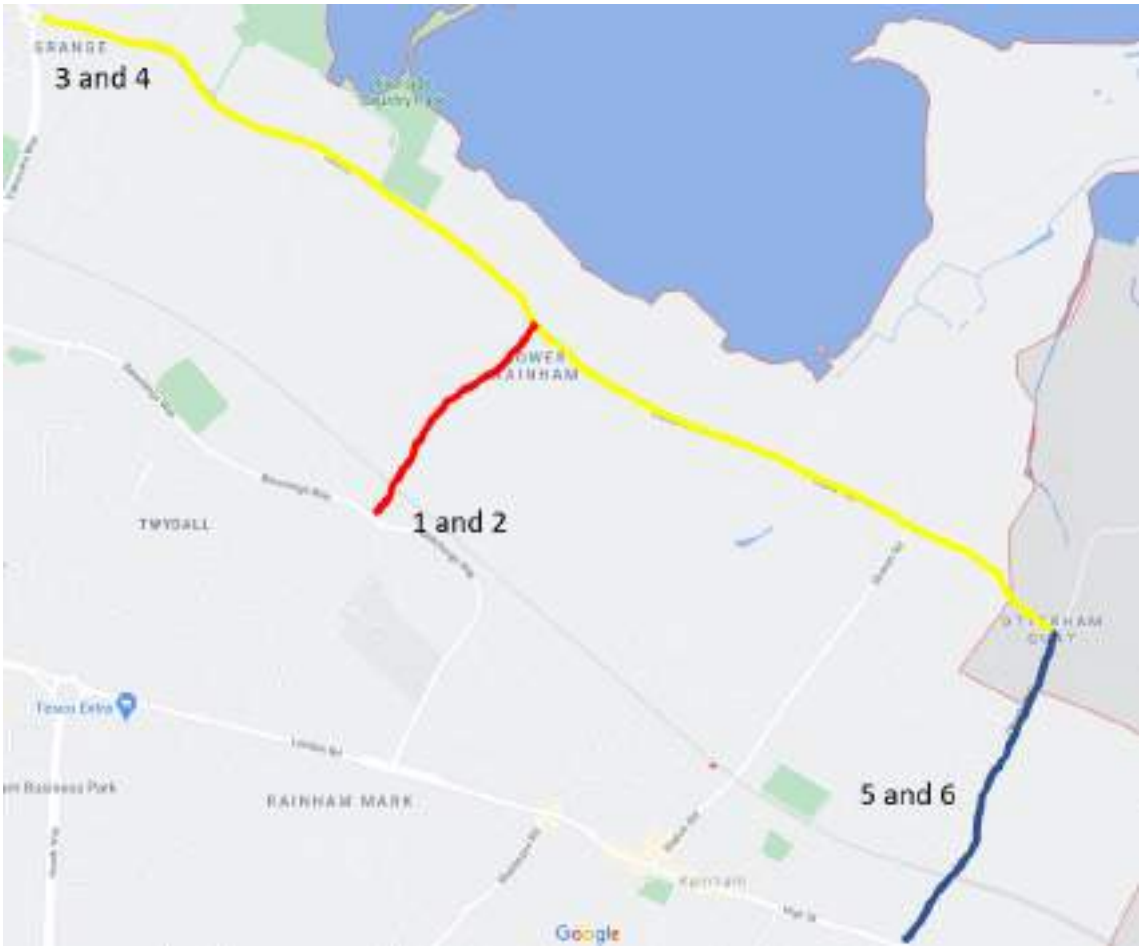

Figure 15 Subnetwork 7 Paths

Table 19 Subnetwork 7 Path travel time AM Peak

Path	2028 Reference Case AM	LRR Scenario 4 (sec)			LRR Scenario 5 (sec)			LRR Scenario 6 (sec)		
		Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
Pump Lane NB	80	101	21	26%	113	33	41%	102	22	28%
Pump Lane SB	86	94	7	9%	95	9	10%	95	9	10%
B2004 (Lower Rainham Road) WB	429	1,084	655	152%	1,098	669	156%	992	562	131%
B2004 (Lower Rainham Road) EB	450	452	2	0%	459	8	2%	452	2	0%
Otterham Quay Lane NB	99	100	1	1%	100	1	1%	100	1	1%
Otterham Quay Lane SB	98	98	-	0%	98	-	0%	98	-	0%

Table 20 Subnetwork 7 Path travel time PM Peak

Path	2028 Reference Case AM	LRR Scenario 4 (sec)			LRR Scenario 5 (sec)			LRR Scenario 6 (sec)		
		Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
Pump Lane NB	78	103	25	32%	102	24	31%	102	25	32%
Pump Lane SB	72	93	21	29%	93	21	29%	91	19	27%
B2004 (Lower Rainham Road) WB	401	452	51	13%	451	55	14%	454	53	13%
B2004 (Lower Rainham Road) EB	423	430	7	2%	432	8	2%	429	6	1%
Otterham Quay Lane NB	98	99	1	1%	99	1	1%	99	1	1%
Otterham Quay Lane SB	98	98	0	0%	98	0	0%	99	1	1%

3.3.1 Subnetwork 7 Summary

The subnetwork 7 statistics results showed that even though there is a very large increase in queue between reference case and all the scenarios where the development is present (LRR Scenario 4,5 and 6), the results between the development scenarios do not show big fluctuations.

The junctions analysed in subnetwork 7, do not show any problematic junctions, however, the travel time results indicated that Lower Rainham Road westbound direction shows a large increase in travel time (approximately 10-11 minutes) between the reference case and the development scenarios in the AM peak. These results should be combined with the A289/Yokosuka Way roundabout results presented in Subnetwork 2 where, despite the mitigation scheme, the level of service indicates that the demand in this roundabout exceeds capacity even in the reference case. This problem was underlined as well in the analysis of the 2037 results presented in the Sweco Pump Lane and Lower Rainham Transport Impact Appraisal Addendum (2037 results).

4 Summary

This report presented the results of a new set of additional modelling scenarios for the year 2028 around the development area in Pump Lane in Lower Rainham. These scenarios examined the sensitivity between different centroid configurations and trip rates, employed by the strategic model developed by Sweco and the developer.

The results showed that there is no improvement in terms of congestion hotspots between the results provided in the scenario where the developer trip rates are used (Scenario 6) and the scenarios where the strategic model trip rates are used (Scenario 4 and 5). The junctions that were proven problematic in the previous original Sweco report, remain problematic in LRR Scenarios 4, 5 and 6.

When comparing the 2037 with the 2028 results, no significant difference in terms of congestion hotspots can be observed. The problems in the road network underlined in the Pump Lane and Lower Rainham Transport Impact Appraisal Addendum (2037 results) remain, despite the reduction in traffic growth.

More specifically, the results showed the issues in the following road network elements:

Junctions

The following junctions reach level of service F in the AM Scenarios:

- A2 (Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction)
- A2 (Bowater Roundabout)
- A289 (Ito Way / Sovereign Boulevard)
- A2 (Otterham Quay Lane / Merersborough Road)

The following junctions reach level of service F in the PM Scenarios:

- A289 (Pier Road / Maritime Way Roundabout)
- A289 (Pier Road / Gillingham Gate Road West)
- A2 (Bowater Roundabout)
- Eastcourt Lane / South Avenue
- A2 (Otterham Quay Lane / Merersborough Road)

In all the aforementioned junctions the demand exceeds capacity in the corresponding peak development scenario. This practically means that the functionality of the junction breaks, ultimately causing long queues and additional delays.

Path travel time

The following paths show significant increase in travel time:

- Lower Rainham Road westbound direction shows a large increase in travel time (approximately 10-11 minutes) between the reference case and the development scenarios in the AM peak.

- A2 (Moor Street to Sovereign Boulevard) shows an increase of 2 and 5 minutes (65-70% and 61% accordingly) in subnetwork 3 in both the AM and the PM peak scenarios
- Paths A289 (Church Street) to A278 (Hoath Way) and A2 (Watling to Sovereign Boulevard) in the AM peak show a substantial increase in travel time in subnetwork 2
- Paths A289 (Church Street) to A278 (Hoath Way), A278 (Hoath Way) to A289 (Church Street) and A2 (Watling to Sovereign Boulevard) show a substantial increase in travel time in subnetwork 2 in the PM peak. The significant increase in A2 path was not observed in the 2037 results.

Appendix A – Detailed Subnetwork Statistics

Subnetwork 2 Statistics	Units	AM Peak (0800 to 0900) 2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	193	245	246	246
Delay	sec/km	119	172	173	173
Flow	veh/h	11,316	11,418	11,361	11,344
Speed	km/h	28	26	27	26
Stop Time	sec/km	106	159	160	159
Mean Queue	veh	489	861	861	854
Mean Virtual Queue	veh	144	563	580	505
Waiting Time in Virtual Queue	sec	45	174	180	156
Total Statistics					
Total Travelled Time	h	2,206	2,955	2,943	2,938
Total Travelled Distance	km	52,485	53,062	52,915	52,897
Average travel time per vehicle	s/veh	351	466	466	466
Total Waiting Time in Virtual Queue	h	2	551	567	492
Total travel time including virtual queue	h	2,207	3,505	3,510	3,430
Total Queue	veh	633	1,424	1,441	1,359
Throughput					
Vehicles Out	veh	22,633	22,835	22,722	22,688
Vehicles In	veh	6	6	6	6
Vehicles Waiting to Enter	veh	-	-	-	-
Total	veh	22,639	22,841	22,727	22,694
Vehicles In and Waiting to Enter	veh	6	6	6	6

Subnetwork 2 Statistics	Units	PM Peak (1700 to 1800) 2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	165	205	206	206
Delay	sec/km	93	132	134	133

Flow	veh/h	10,877	11,291	11,336	11,260
Speed	km/h	31	28	28	28
Stop Time	sec/km	81	118	120	119
Mean Queue	veh	284	559	557	563
Mean Virtual Queue	veh	169	268	290	290
Waiting Time in Virtual Queue	sec	56	84	91	91
Total Statistics					
Total Travelled Time	h	1,693	2,370	2,377	2,367
Total Travelled Distance	km	50,297	53,009	53,343	52,722
Average travel time per vehicle	s/veh	280	378	377	378
Total Waiting Time in Virtual Queue	h	3	6	7	7
Total travel time including virtual queue	h	1,696	2,377	2,384	2,375
Total Queue	veh	453	827	848	853
Throughput					
Vehicles Out	veh	21,753	22,582	22,672	22,519
Vehicles In	veh	6	6	6	6
Vehicles Waiting to Enter	veh	-	-	-	-
Total	veh	21,759	22,588	22,678	22,525
Vehicles In and Waiting to Enter	veh	6	6	6	6

Subnetwork 3 Statistics		**AM Peak (0800 to 0900)**			
	Units	2028 Reference Case	**LRR Scenario 4**	**LRR Scenario 5**	**LRR Scenario 6**
Travel Time	sec/km	239	245	252	245
Delay	sec/km	153	160	166	160
Flow	veh/h	2,474	2,500	2,486	2,493
Speed	km/h	19	19	20	20
Stop Time	sec/km	138	144	150	144
Mean Queue	veh	63	71	75	70
Mean Virtual Queue	veh	8	28	39	35
Waiting Time in Virtual Queue	sec	12	41	57	51
Total Statistics					

Total Travelled Time	h	236	259	266	254
Total Travelled Distance	km	3,608	3,789	3,764	3,740
Average travel time per vehicle	s/veh	172	186	192	184
Total Waiting Time in Virtual Queue	h	0	0	1	1
Total travel time including virtual queue	h	236	259	266	255
Total Queue	veh	71	100	114	105
Throughput					
Vehicles Out	veh	4,949	5,000	4,973	4,987
Vehicles In	veh	2	1	1	2
Vehicles Waiting to Enter	veh	-	-	-	-
Total	veh	4,950	5,001	4,974	4,988
Vehicles In and Waiting to Enter	veh	2	1	1	2

Subnetwork 3 Statistics	**PM Peak (1700 to 1800)**				
	Units	2028 Reference Case	**LRR Scenario 4**	**LRR Scenario 5**	**LRR Scenario 6**
Travel Time	sec/km	255	279	287	277
Delay	sec/km	169	193	201	192
Flow	veh/h	2,486	2,610	2,578	2,579
Speed	km/h	18	18	18	18
Stop Time	sec/km	154	176	184	175
Mean Queue	veh	65	95	97	95
Mean Virtual Queue	veh	7	68	51	57
Waiting Time in Virtual Queue	sec	11	94	71	80
Total Statistics					
Total Travelled Time	h	245	321	321	319
Total Travelled Distance	km	3,802	4,131	4,076	4,103
Average travel time per vehicle	s/veh	177	221	224	223
Total Waiting Time in Virtual Queue	h	0	2	1	1
Total travel time including virtual queue	h	245	322	322	321
Total Queue	veh	72	163	147	152
Throughput					
Vehicles Out	veh	4,973	5,219	5,156	5,157

Vehicles In	veh	2	2	2	2
Vehicles Waiting to Enter	veh	-	-	-	-
Total	veh	4,975	5,221	5,158	5,159
Vehicles In and Waiting to Enter	veh	2	2	2	2

Subnetwork 7 Statistics		**AM Peak (0800 to 0900)**			
	Units	2028 Reference Case	**LRR Scenario 4**	**LRR Scenario 5**	**LRR Scenario 6**
Travel Time	sec/km	139	163	163	158
Delay	sec/km	59	83	83	78
Flow	veh/h	5,898	6,190	6,168	6,076
Speed	km/h	36	34	34	34
Stop Time	sec/km	50	72	71	67
Mean Queue	veh	54	151	157	136
Mean Virtual Queue	veh	5	65	48	21
Waiting Time in Virtual Queue	sec	3	37	27	12
Total Statistics					
Total Travelled Time	h	437	687	700	643
Total Travelled Distance	km	12,956	14,135	14,160	13,770
Average travel time per vehicle	s/veh	133	200	204	190
Total Waiting Time in Virtual Queue	h	0	1	0	0
Total travel time including virtual queue	h	437	688	700	643
Total Queue	veh	60	216	205	157
Throughput					
Vehicles Out	veh	11,796	12,381	12,336	12,152
Vehicles In	veh	2	2	2	2
Vehicles Waiting to Enter	veh	-	-	-	-
Total	veh	11,798	12,383	12,338	12,154
Vehicles In and Waiting to Enter	veh	2	2	2	2

Subnetwork 7 Statistics	Units	PM Peak (1700 to 1800)			
		2028 Reference Case	LRR Scenario 4	LRR Scenario 5	LRR Scenario 6
Travel Time	sec/km	123	150	153	152
Delay	sec/km	42	69	72	71
Flow	veh/h	5,434	5,935	5,935	5,800
Speed	km/h	38	36	36	36
Stop Time	sec/km	34	59	62	61
Mean Queue	veh	27	57	61	59
Mean Virtual Queue	veh	2	27	46	50
Waiting Time in Virtual Queue	sec	1	17	28	31
Total Statistics					
Total Travelled Time	h	347	440	453	443
Total Travelled Distance	km	11,866	12,798	12,996	12,708
Average travel time per vehicle	s/veh	115	133	137	138
Total Waiting Time in Virtual Queue	h	0	0	0	0
Total travel time including virtual queue	h	347	440	453	444
Total Queue	veh	28	84	106	110
Throughput					
Vehicles Out	veh	10,867	11,869	11,870	11,600
Vehicles In	veh	2	2	2	2
Vehicles Waiting to Enter	veh	-	-	-	-
Total	veh	10,869	11,871	11,872	11,602
Vehicles In and Waiting to Enter	veh	2	2	2	2

Appendix B – Macro model Flow Plots

The macro model flow plots are included in the PDF attachments in the “Flow_plots.zip” folder.

Appendix C – Macro model Select link analysis plots

The select link analysis plots for the centroid containing the demand of the development are included in the PDF files of the “SLA_plots.zip” folder.

Appendix D – Macro model section V/C plots

The section V/C plots are included in the PDF files of the “VC_sections.zip” folder.

Appendix E – Macro model turn V/C plots

The turn V/C plots are included in the PDF files of the “VC_turns.zip” folder.

Appendix F – Micro model section delay plots

The turn V/C plots are included in the PDF files of the “Simulated Delays.zip” folder.

Appendix H

Report

Pump Lane and Lower Rainham Transport Impact Appraisal Addendum – Interim report (2037 results)

On behalf of Medway Council

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16/12/2020
Project Reference: [0]
Document Reference: [3]
Revision: [1]
Prepared For: Medway Council

Status / Revisions

Rev.	Date	Reason for issue	Prepared		Reviewed		Approved	
[1]	16.12.2020	First Draft	AP	16.12.2020	DH	17.12.2020	AG	18.12.2020

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Appendices

1 Introduction

This report is an addendum to the “Pump Lane and Lower Rainham Transport Impact Appraisal Report” produced by Sweco in October 2020. This report was produced as a result of the discussions between Medway Council and the developer. As a result of these discussions, several additional modelling scenarios were developed and are presented below. The following sections present the amendments to the model, the demand used for each scenario and the results from the microsimulation for the selected subnetworks around the development area.

2 Model amendments

The two main differences between the modelling undertaken in this report and the previous report are:

i) The trip rates used for the demand to and from the development area and
ii) The centroid configuration around the development area.

2.1 Development Demand

The development demand as calculated by the developer along with the demand calculated by Sweco is presented in Table 1. It is observed that the demand calculated by the developer is 26% (214 two-way trips) and 31% (245 (two-way trips) lower than the strategic model demand that Sweco calculated in the AM and PM scenarios accordingly. The trip rates used to derive the strategic model demand have been presented in detail in the previous report and technical notes produced by Sweco (Note name “Pump_Farm_Lower_Rainham_ref_MC. 19.1566_Sweco_Response.docx on the 10th of December 2020).

This report will present the results of an Aimsun scenario using the demand calculated by the developer.

Table 1 Development demand

Demand	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Developer Demand	187	398	585	365	193	558
Strategic Model Demand	175	624	799	497	306	803

2.2 Development zone configuration

The second issue around the modelling of the development area in the previous report, was the fact that the demand of the development zone was added on top of an existing centroid (Aimsun vehicle input and output) which included the demand of the reference case scenario and had a connection to Lower Bloors Lane as shown in Figure 1.

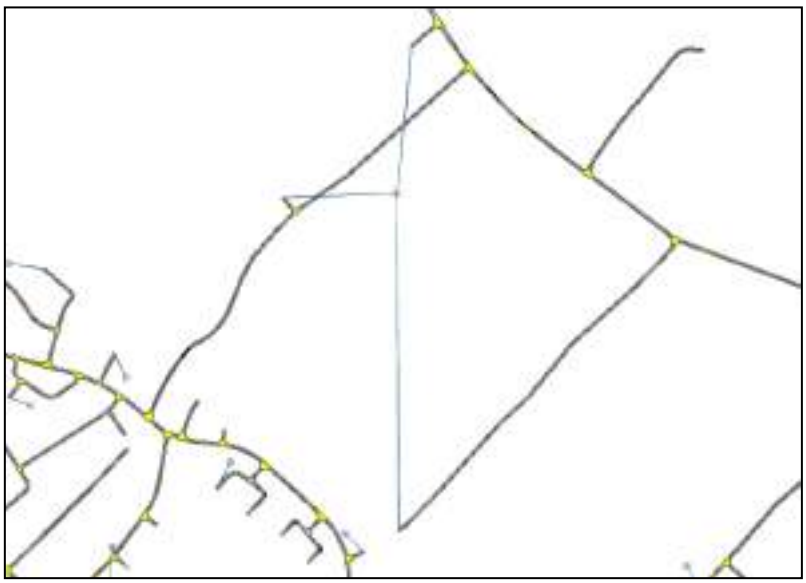

Figure 1 Original report development zone configuration in Aimsun

This report will present the results of the following new additional scenarios:

A) The **LRR Scenario 1** where the demand of the development is still added on top of the reference case demand in the same centroid, but the centroid connection to Lower Bloors Lane is removed, because, as proved by the select link analysis plots provided together with the previous report, the reference case traffic was not using the centroid connection to Lower Bloors Lane. The LRR Scenario 1 configuration is shown in Figure 2 (LRR Scenario 1)

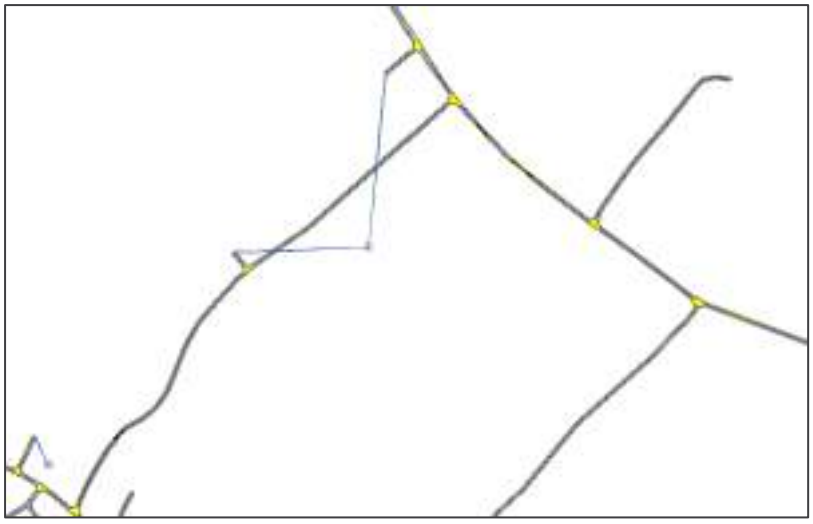

Figure 2 LRR Scenario 1 development zone configuration in Aimsun

B) The **LRR Scenario 2** and **LRR Scenario 3** where the demand of the development is assigned to a new standalone development zone (centroid), solely used for the modelling of the development, as shown in Figure 3. In Scenario 2, the development strategic model demand is used, while in Scenario 3, the developer demand is used.

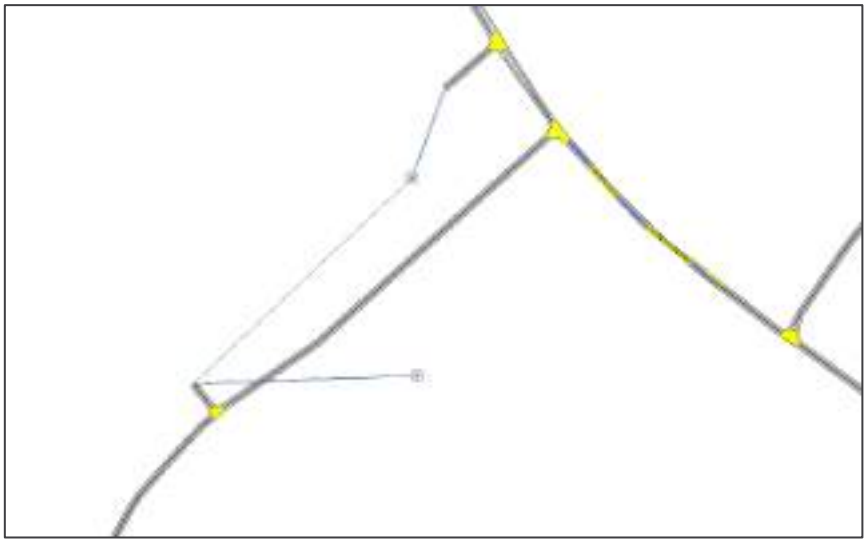

Figure 3 LRR Scenario 2 and 3 development zone configuration in Aimsun

2.3 Scenarios

The scenarios produced as a result of the aforementioned model amendments are presented in Table 2. This report will also repeat the Sensitivity test 1 results from the previous report, to provide a more comprehensive comparison.

Table 2 Additional Pump Lane development evaluation scenarios

Scenario No	Year	Trip rates for development at Pump Lane (centroid 442792)	Development zone used	Centroid Configuration
RC37	2037	N/A	N/A	N/A
Sensitivity test 1	2037	Strategic Model Trip rates	Existing strategic zone	Three access points
LRR Scenario 1	2037	Strategic Model Trip rates	Existing strategic zone	Two access points
LRR Scenario 2	2037	Strategic Model Trip rates	Standalone development zone	Two access points
LRR Scenario 3	2037	Developer Trip rates	Standalone development zone	Two access points

2.4 Additional output analysis

In addition to the results provided in the previous report produced by Sweco, this report will present the following additional results:

- Three additional junctions have been added to the Level of Service results presented in this report to provide a direct comparison between the results presented in the developer's report and Sweco's report. The methodology used to calculate the Level of Service results has been analysed in the original report.
- The travel time results for several key paths in the three subnetworks around the development area are presented in this report in order to underline the impacts of the development on traffic. The travel times have been extracted both for the reference case and the new additional scenarios. In order to calculate the travel time for the paths, the appropriate Subpaths have been defined in the Aimsun model, by selecting the corresponding sections for each of them. The path travel time results shown in the following subnetwork sections will also show the absolute difference and percent difference compared to the reference case scenario.

3 Results

3.1 Subnetwork 2

Initially, the Subnetwork 2 statistics for AM and PM peak times are presented in Table 3 and Table 4 accordingly. A large increase in average travel time, delay and queue is observed between the 2037 Reference case and the scenarios including the development (Sensitivity test 1, LRR Scenarios 1,2 and 3). Consequently, a decrease in average speed is observed between the reference case and the development scenarios. It needs to be underlined that the difference in travel time, delay, speed and mean queue between the development scenarios is small and can be attributed to the stochasticity of the microsimulation. For example, the difference in travel time between LRR Scenario 2 and 3 is 5 seconds per kilometer which can be considered negligible. The percent change for each statistic is presented graphically in Figure 4 and Figure 5 for the AM and PM peak times accordingly.

Table 3 Subnetwork 2 Statistics AM peak

Statistic	AM Peak (0800 to 0900)					
	Units	2037 RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	193	244	254	253	253
Delay	sec/km	120	172	181	181	181
Speed	km/h	28.1	27.0	26.2	26	26.4
Mean Queue	veh	503	860	919	929	905

Table 4 Subnetwork 2 Statistics PM Peak

Statistic	PM Peak (1700 to 1800)					
	Units	2037 RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	171	210	207	206	204
Delay	sec/km	98	138	135	133	132
Speed	km/h	30.4	27.0	27.3	27	27.6
Mean Queue	veh	325	581	571	563	556

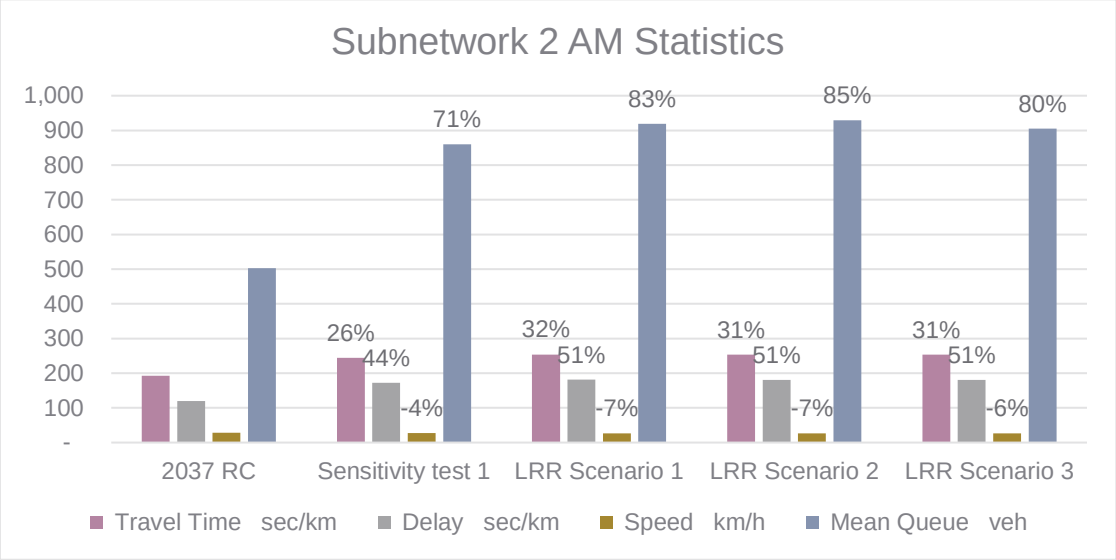

Figure 4 Subnetwork 2 AM Statistics

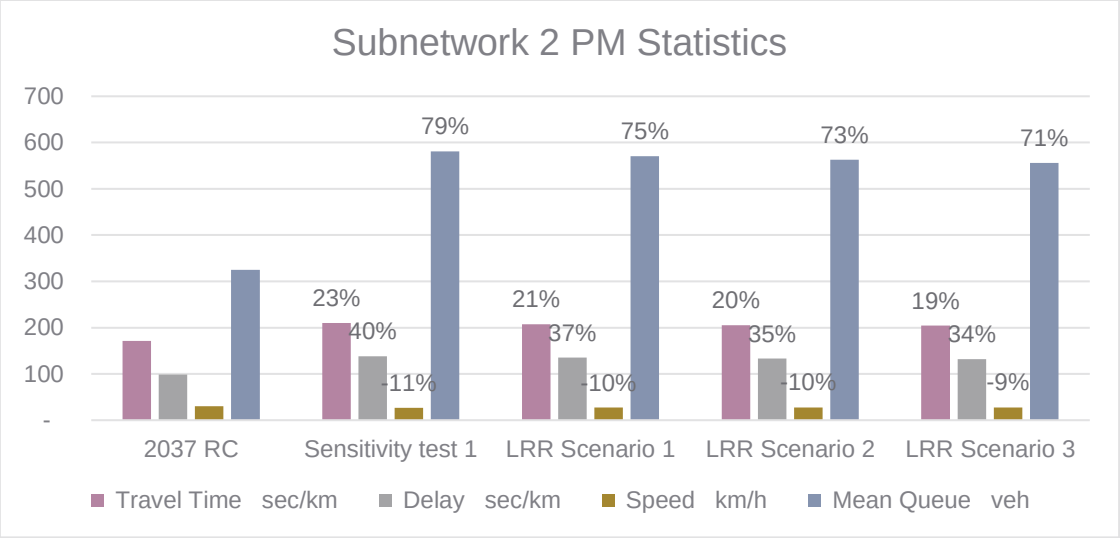

Figure 5 Subnetwork 2 PM Statistics

Table 5 and Table 6 present the Level of Service results for key junctions in Subnetwork 2. The location of each junction and roundabout is shown in Figure 6.

Figure 6 Subnetwork 2 Junctions and Roundabouts

It is observed that:

- Junctions number 8, 9 and 12 Level of Service goes to F where the demand of the junction exceeds capacity, in the AM scenarios where the development is present
- Junctions number 2, 4 ,9 and 10 Level of Service goes to F in the PM scenarios where the development is present
- Very small to no change is observed between the development scenarios (Sensitivity test 1, LRR Scenarios 1, 2 and 3)

Table 5 Subnetwork 2 Junction Level of Service AM Peak

Junction	ID	Ref AM	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Pembroke/Dock Road/Western Avenue/ Maritime Way Roundabout	1	C	C	C	C	C
A289 (Pier Road/ Maritime Way Roundabout)	2	C	C	C	C	C
A289 (Pier Road / Gillingham Gate Road)	3	D	D	D	D	D
A289 Pier Road / Gillingham Gate Road West	4	D	E	E	E	E
A289 Pier Road / Gillingham Gate Road East	5	C	C	C	C	C

A289 Pier Road / Church Street / Strand Junction	6	C	C	D	C	C
A289 (Yokosuka Way Roundabout)	7	F	F	F	F	F
A2 (Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction)	8	D	F	F	F	F
A2 (Bowater Roundabout)	9	C	E	F	F	F
Eastcourt Lane / South Avenue	10	F	F	F	F	F
A2 (London Road / Bloors Lane Junction)	11	D	D	D	D	D
A289 (Ito Way / Sovereign Boulevard)	12	B	F	F	F	F
A2 (Yokosuka / Ito / Beechings Way Roundabout)	13	A	A	A	A	A
A2 / Pump Lane	14	A	E	E	E	E

Table 6 Subnetwork 2 Junction Level of Service PM Peak

Junction	ID	Ref PM	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Pembroke/Dock Road/Western Avenue/ Maritime Way Roundabout	1	A	B	B	B	B
A289 (Pier Road/ Maritime Way Roundabout)	2	E	F	F	F	F
A289 (Pier Road / Gillingham Gate Road)	3	D	D	E	E	E
A289 Pier Road / Gillingham Gate Road West	4	E	F	F	F	F
A289 Pier Road / Gillingham Gate Road East	5	B	C	C	C	C
A289 Pier Road / Church Street / Strand Junction	6	C	C	C	C	C
A289 (Yokosuka Way Roundabout)	7	A	A	A	A	A
A2 (Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction)	8	C	E	E	E	E
A2 (Bowater Roundabout)	9	D	F	F	F	F
Eastcourt Lane / South Avenue	10	D	F	F	F	F
A2 (London Road / Bloors Lane Junction)	11	C	D	D	D	D
A289 (Ito Way / Sovereign Boulevard)	12	A	B	B	B	B
A2 (Yokosuka / Ito / Beechings Way Roundabout)	13	A	A	A	A	A
A2 / Pump Lane	14	A	D	D	D	D

Figure 7 shows the paths analysed in terms of travel time in subnetwork 7, while Table 7 and Table 8 present the path travel time results for the AM and PM Peak periods accordingly. The most outstanding difference is observed in:

- A289 (Church Street) to A278 (Hoath Way) and A2 (Watling to Sovereign Boulevard) where the travel time increases by 14-16% and 22-25% accordingly in the AM scenarios. This increase is around 3 minutes for Path 1 and 4-5 minutes for Path 4. It is considered a significant increase.

- A289 (Church Street) to A278 (Hoath Way) and A278 (Hoath Way) to A289 (Church Street) where the travel time increases by 28 to 41% and 48 to 49% accordingly in the PM scenarios. This increase is around 3 minutes and 3-4 minutes accordingly and can be considered significant.
- The differences between the path travel time results of the development scenarios are considered small and can be attributed to the stochasticity (randomness) of the microsimulation.

Figure 7 Subnetwork 2 Paths

Table 7 Subnetwork 2 Path travel time AM Peak

Path	ID	2037 Reference Case AM	LRR Scenario 1 (sec)			LRR Scenario 2 (sec)			LRR Scenario 3 (sec)		
			Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A289 (Church Street) to A278 (Hoath Way)	1	1,275	1,456	181	14%	1,483	208	16%	1,475	200	16%
A278 (Hoath Way) to A289	2	605	630	25	4%	685	80	13%	653	48	8%

(Church Street)											
A2 (Sovereign Boulevard to Watling Road)	3	403	425	22	5%	433	30	8%	430	27	7%
A2 (Watling to Sovereign Boulevard)	4	1,235	1,517	282	23%	1,548	313	25%	1,512	277	22%
A289 (Church Street to Lower Rainham)	5	141	140	- 1	-1%	141	0	0%	141	0	0%
A289 (Lower Rainham to Church Street)	6	123	132	9	7%	127	4	2%	123	0	0%

Table 8 Subnetwork 2 Path travel time PM Peak

Path	ID	2037 Reference Case PM	LRR Scenario 1 (sec)			LRR Scenario 2 (sec)			LRR Scenario 3 (sec)		
			Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A289 (Church Street) to A278 (Hoath Way)	1	562	719	157	28%	791	229	41%	786	224	40%
A278 (Hoath Way) to A289 (Church Street)	2	403	599	196	49%	597	194	48%	595	192	48%
A2 (Sovereign Boulevard to Watling Road)	3	405	407	2	0%	407	2	1%	405	-	0%
A2 (Watling to Sovereign Boulevard)	4	746	808	62	8%	870	124	17%	865	119	16%
A289 (Church Street to Lower Rainham)	5	157	166	9	6%	168	11	7%	163	6	4%
A289 (Lower Rainham to Church Street)	6	125	123	-2	-2%	124	- 1	-1%	123	-2	-2%

3.1.1 Subnetwork 2 Summary

Initially, the subnetwork 2 statistics results showed that traffic conditions in the subnetwork deteriorate in all the scenarios where the development exists, and a substantial increase in delay, travel time and queue is observed between those scenarios and the reference case. The difference between the scenarios using the strategic model demand and the scenarios using the developer demand seems to be small compared to the difference between the reference case and the development scenarios.

Additionally, Junction level of service results showed that the demand for Junctions number 8, 9 and 12 Level of Service exceeds capacity in the AM development scenarios. In the PM development scenarios, the demand for Junctions number 2, 4 ,9 and 10 exceeds capacity. Very small to no change is observed between the development scenarios in terms of Junction Level of Service.

Finally, path travel time results underlined that the travel time for paths A289 (Church Street) to A278 (Hoath Way) and A2 (Watling to Sovereign Boulevard) in the AM peak and paths A289 (Church Street) to A278 (Hoath Way) and A278 (Hoath Way) to A289 (Church Street) in the PM peak increases substantially between the 2037 case scenario and the development scenarios. Again, the travel times results seemed to not show significant differences among the development scenarios.

3.2 Subnetwork 3

Initially, the Subnetwork 3 statistics for AM and PM peak times are presented in Table 9 and Table 10 accordingly. It is observed that even though there is not a big increase between reference case and Sensitivity 1 scenario, an more substantial increase in average travel time, delay and queue is observed between the 2037 Reference case/Sensitivity 1 and the three new additional LRR scenarios including the development (LRR Scenarios 1,2 and 3). Consequently, a decrease in average speed is observed between the reference case and the development scenarios. It needs to be underlined that the difference in travel time, delay, speed and mean queue between the three new LRR scenarios is small and can be attributed to the stochasticity of the microsimulation. For example, the difference in travel time between LRR Scenario 1 and 3 is 5 seconds per kilometer in the AM peak scenario which can be considered negligible. The percent change for each statistic is presented graphically in Figure 8 and Figure 9 for the AM and PM peak times accordingly.

Table 9 Subnetwork 3 Statistics AM Peak

Statistic	AM Peak (0800 to 0900)					
	Units	2037 RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	247	248	260	259	255
Delay	sec/km	161	162	174	174	169
Speed	km/h	18.7	20.0	19.0	18.8	19.2
Mean Queue	veh	66	72	80	79	77

Table 10 Subnetwork 3 Statistics PM Peak

Statistic	PM Peak (1700 to 1800)					
	Units	2037 RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	272	284	296	294	288
Delay	sec/km	186	199	211	209	202
Speed	km/h	18.0	18.0	17.5	17.6	18.0
Mean Queue	veh	72	96	104	105	97

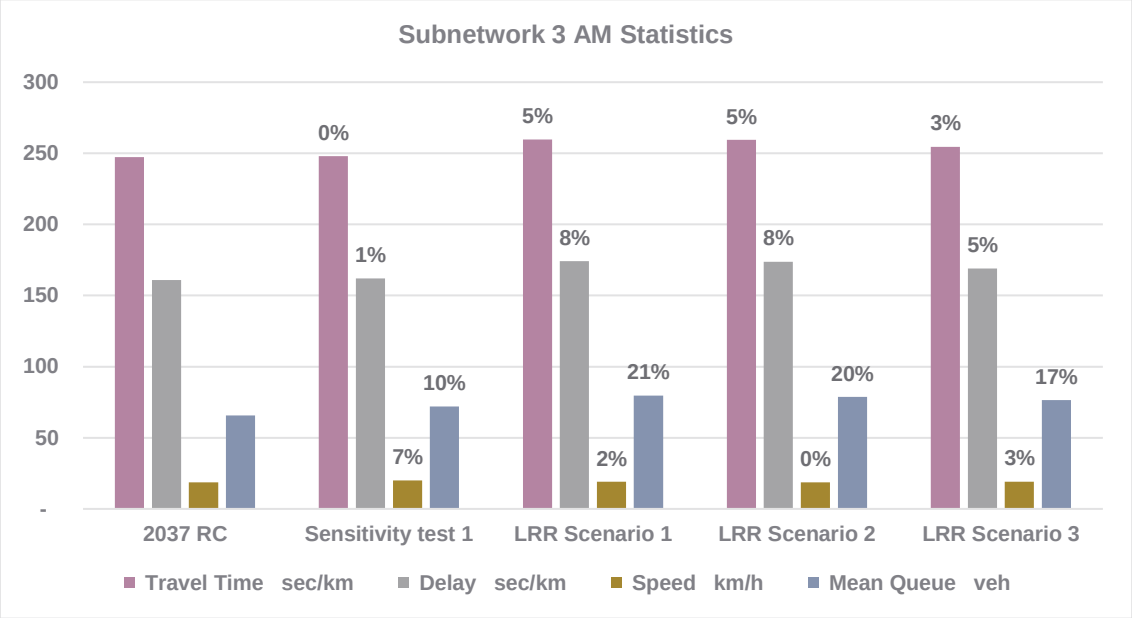

Figure 8 Subnetwork 3 Statistics AM

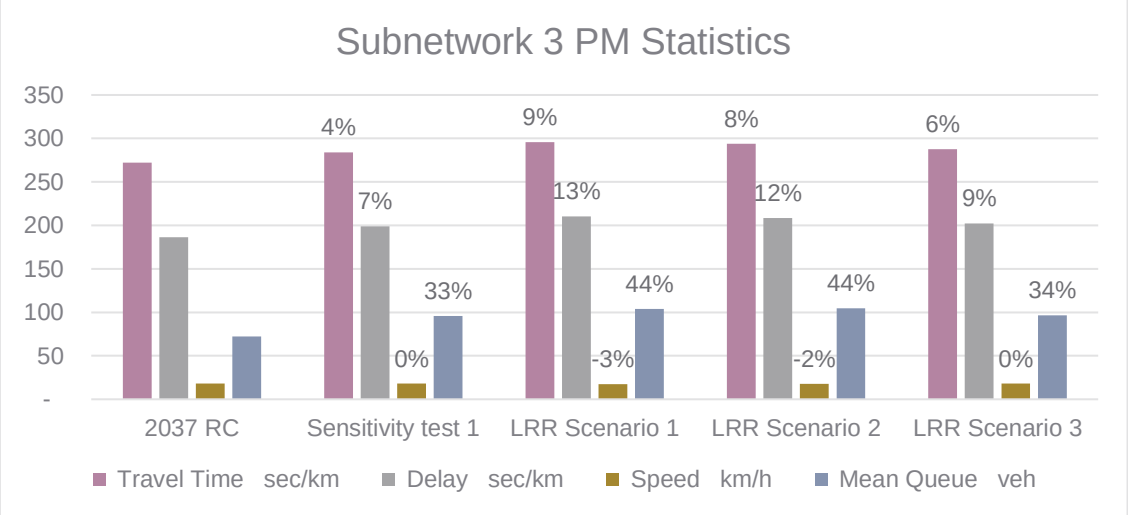

Figure 9 Subnetwork 3 Statistics PM

Table 11 and Table 12 present the Level of Service results for key junctions in Subnetwork 3. The location of each junction and roundabout is shown in Figure 10.

Figure 10 Subnetwork 3 Junctions and Roundabouts

It is observed that the demand at Junction 2 (A2 (Otterham Quay Lane/Merersborough Road) in the new LRR scenarios exceeds capacity, an effect which is not present in the reference case scenario. A small increase from D to E is observed between LRR Scenario 1 and LRR Scenario 2 in Junction 4 in the PM scenario but the demand does not exceed capacity in either of them. The results between the new LRR scenarios do not show any other difference than the one mentioned above.

Table 11 Subnetwork 3 Junction Level of Service AM

Junction	ID	2037 RC AM	Sensitivitiy test 1	LRR Scenario 1 AM	LRR Scenario 2 AM	LRR Scenario 3 AM
A2 (Mierscourt Road_High Street Junction)	1	C	E	E	E	E
A2 (Otterham Quay Lane_Meresborough)	2	D	D	F	F	F
A2 (Sovereign Bd & Maidstone Rd)	3	C	D	D	D	D
A2 (Sovereign Bd & Station Rd)	4	C	D	D	D	D

Table 12 Subnetwork 3 Junction Level of Service PM

Junction	ID	2037 RC PM	Sensitivity test 1	LRR Scenario 1 PM	LRR Scenario 2 PM	LRR Scenario 3 PM
Mierscourt Road_High Street Junction	**1**	D	E	E	E	E
Otterham Quay Lane_Meresborough	**2**	D	F	F	F	F
Sovereign Bd & Maidstone Rd	**3**	C	C	C	C	C

Sovereign Bd & Station Rd	**4**	C	D	D	E	D

Finally, Figure 11 shows the location of the subnetwork 3 paths which is analysed in terms of travel time, while the travel time results are presented in Table 13 and Table 14 for the AM peak and PM peak scenarios accordingly. A large increase is observed for the path A2 (Moor Street to Sovereign Boulevard) in both the AM and the PM peak scenarios. More specifically, in the PM peak scenario travel time for the A2 corridor (WB) is increased by 271 (56%) to 293 (61%) seconds which is approximately 5 minutes.

Figure 11 Subnetwork 3 Paths

Table 13 Subnetwork 3 Path travel time AM

Path	ID	2037 Reference Case AM	LRR Scenario 1 (sec)			LRR Scenario 2 (sec)			LRR Scenario 3 (sec)		
			Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A2 (Moor Street to Sovereign Boulevard)	1	548	667	119	22%	684	136	25%	679	131	24%
A2 (Sovereign Boulevard to Moor Street)	2	321	340	19	6%	341	20	6%	351	30	9%

Table 14 Subnetwork 3 Path travel time PM

Path	ID	2037 Reference Case PM	LRR Scenario 1 (sec)			LRR Scenario 2 (sec)			LRR Scenario 3 (sec)		
			Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
A2 (Moor Street to Sovereign Boulevard)	1	483	754	271	56%	776	293	61%	761	278	58%
A2 (Sovereign Boulevard to Moor Street)	2	395	446	51	13%	438	43	11%	426	31	8%

3.2.1 Subnetwork 3 Summary

Initially, the subnetwork average statistics showed that even though there is not a big increase between reference case and Sensitivity 1 scenario, a more substantial increase in average travel time, delay and queue is observed between the 2037 Reference case/Sensitivity 1 and the three new additional LRR scenarios including the development (LRR Scenarios 1,2 and 3). This can be attributed to the fact that since the traffic now does not enter through Lower Bloors lane, it selects alternative routes to reach its destination ultimately worsening traffic conditions in the portion of the A2 included in subnetwork 3.

Furthermore, demand at Junction 2 (A2 (Otterham Quay Lane/Merersborough Road) in the new LRR scenarios exceeds capacity, an effect which is not present in the reference case scenario. Finally, an increase of 2 and 5 minutes (56% and 61% accordingly) is observed for A2 (Moor Street to Sovereign Boulevard) in subnetwork 3 in both the AM and the PM peak scenarios. Overall, no substantial difference was observed between the results of the new LRR scenarios.

3.3 Subnetwork 7

Initially, the Subnetwork 7 statistics for AM and PM peak times are presented in Table 15 and Table 16 accordingly. It is observed that even though there is an increase in travel time, delay and queue between reference case and all the scenarios where the development is present (Sensitivity 1, LRR Scenario 1,2 and 3), the results between the development scenarios do not show big fluctuations. The statistics results are presented graphically in Figure 12 and Figure 13. It is observed that in the scenarios where the development is present, the travel time remains almost constant in the PM Peak scenarios.

Table 15 Subnetwork 7 Statistics AM Peak

Statistic	AM Peak (0800 to 0900)					
	Units	2037 RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	140	162	172	162	162
Delay	sec/km	61	82	93	82	82
Speed	km/h	35.7	34.0	33.6	34.0	34.2

Mean Queue	veh	57	155	159	169	143

Table 16 Subnetwork 7 Statistics PM Peak

Statistic	PM Peak (1700 to 1800)					
	Units	2037 RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	123	154	153	154	154
Delay	sec/km	42	74	72	73	74
Speed	km/h	37.9	36.0	36.0	36.0	36.0
Mean Queue	veh	28	68	62	63	62

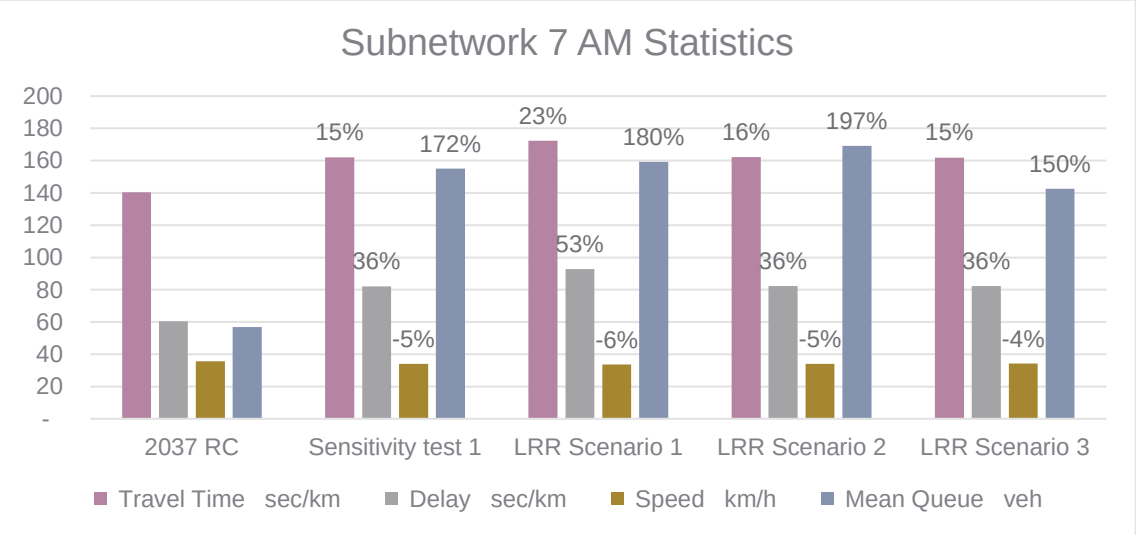

Figure 12 Subnetwork 7 Statistics AM

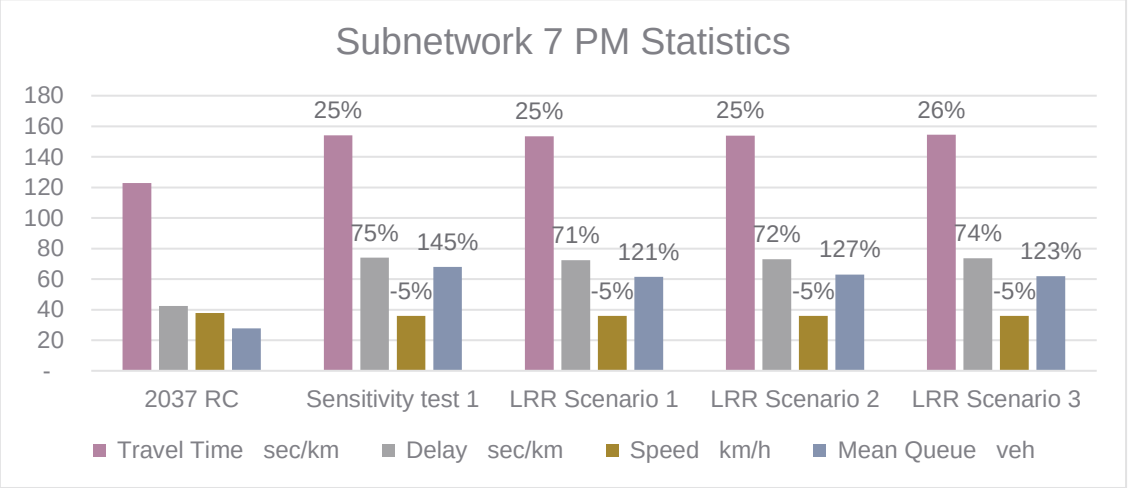

Figure 13 Subnetwork 7 Statistics PM

Table 17 and Table 18 present the Level of Service results for key junctions in Subnetwork 7. The location of each junction and roundabout is shown in Figure 14.

Figure 14 Subnetwork 7 Junctions and Roundabouts

The level of service results are more or less consistent across the reference case and development scenarios. A small difference is observed in Scenario 2 in Junctions 1 and 4, but it needs to be underlined that the demand does not exceed capacity in any scenario. Except this, there is no other difference between the development scenarios.

Table 17 Subnetwork 7 Junction Level of Service AM Peak

Junction	ID	Reference Case AM	Sensitivity test 1	Scenario 1 AM	Scenario 2 AM	Scenario 3 AM
B2004 Lower Rainham Road / Pump Lane	1	A	A	A	B	A
Beechings Way / Pump Lane (North)	2	A	A	A	A	A
Beechings Way / Pump Lane (South)	3	A	A	A	A	A
B2004 Lower Rainham Road / Berengrave Lane	4	C	C	C	D	C
B2004 Lower Rainham Road / B2004 Station Road	5	A	A	A	A	A
B2004 Lower Rainham Road / Otterham Quay Lane	6	A	A	A	A	A

Table 18 Subnetwork 7 Junction Level of Service PM Peak

Junction	ID	Reference Case PM	Sensitivity test 1	Scenario 1 PM	Scenario 2 PM	Scenario 3 PM
B2004 Lower Rainham Road / Pump Lane	1	A	A	A	A	A
Beechings Way / Pump Lane (North)	2	A	A	A	A	A
Beechings Way / Pump Lane (South)	3	A	A	A	A	A
B2004 Lower Rainham Road / Berengrave Lane	4	C	C	C	C	C
B2004 Lower Rainham Road / B2004 Station Road	5	A	A	A	A	A
Lower Rainham Road / Otterham Quay Lane	6	A	A	A	A	A

Finally, Figure 15 shows the location of paths analysed in subnetwork 7, while Table 19 and Table 20 present the travel time results. The most outstanding finding from these tables is the increase in the travel time for Lower Rainham Road Westbound, where the travel time increases by 119% to 153% between the Reference case and the development scenarios. This increase can be translated to 10 minutes increase in travel time for this specific path. This issue had been underlined in the original Sweco report, using the V/C plots around in the Lower Rainham Road westbound direction. Even though an increase in travel time in Pump Lane (both directions is observed, it is not as significant as the increase in Lower Rainham Road. This result should be combined with the Junction Level of Service results presented in Subnetwork 2 for A289 (Yokosuka Way Roundabout) which has a level of service F for all AM scenarios, including Reference case. It is clear that this roundabout, despite the mitigation scheme applied in the development scenarios, cannot accommodate the demand from the development.

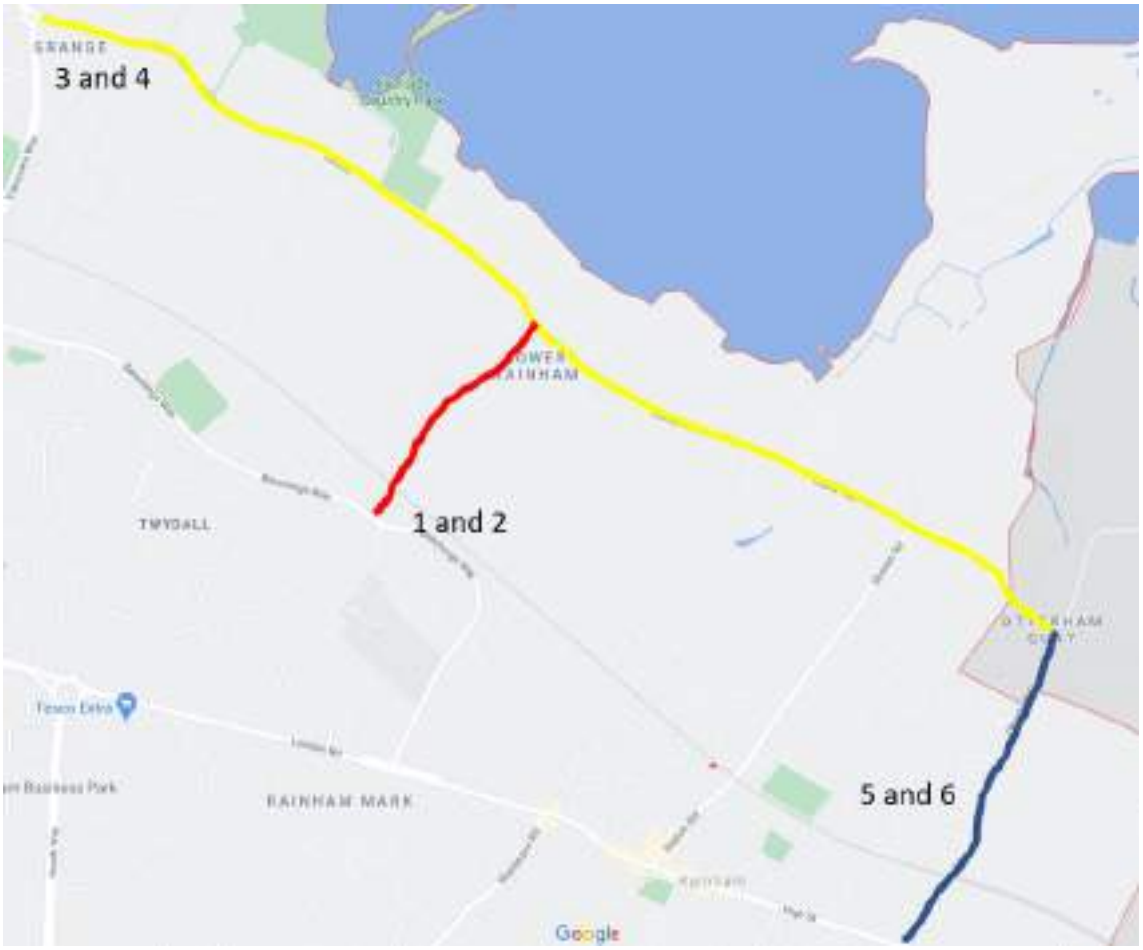

Figure 15 Subnetwork 7 Paths

Table 19 Subnetwork 7 Path travel time AM Peak

Path	ID	2037 Reference Case AM	LRR Scenario 1 (sec)			LRR Scenario 2 (sec)			LRR Scenario 3 (sec)		
			Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
Pump Lane NB	1	90	100	10	11%	131	41	46%	113	23	26%
Pump Lane SB	2	87	94	7	8%	96	9	10%	95	8	9%
B2004 (Lower Rainham Road) WB	3	462	1,049	587	127%	1,167	705	153%	1,014	552	119%
B2004 (Lower Rainham Road) EB	4	477	451	-26	-5%	478	1	0%	462	-15	-3%
Otterham Quay Lane NB	5	99	100	1	1%	101	2	2%	101	2	2%

Otterham Quay Lane SB	6	99	106	7	7%	98	-1	-1%	98	-1	-1%

Table 20 Subnetwork 7 Path travel time PM Peak

Path	ID	2037 Reference Case PM	LRR Scenario 1 (sec)			LRR Scenario 2 (sec)			LRR Scenario 3 (sec)		
			Value	Abs Diff	% Diff	Value	Abs Diff	% Diff	Value	Abs Diff	% Diff
Pump Lane NB	1	84	102	18	21%	104	20	24%	100	16	19%
Pump Lane SB	2	79	92	13	16%	94	15	19%	95	16	20%
B2004 (Lower Rainham Road) WB	3	437	449	12	3%	456	19	4%	450	13	3%
B2004 (Lower Rainham Road) EB	4	460	430	- 30	-7%	433	-27	-6%	430	- 30	-7%
Otterham Quay Lane NB	5	99	100	1	1%	100	1	1%	100	1	1%
Otterham Quay Lane SB	6	98	99	1	1%	99	1	1%	98	-	0%

3.3.1 Subnetwork 7 Summary

The subnetwork 7 statistics results showed that even though there is an increase in travel time, delay and queue between the reference case and the development scenarios, the results between development scenarios do not differ significantly.

The junctions analysed in subnetwork 7, do not show any problematic junctions, however, the travel time results indicated that Lower Rainham Road westbound direction shows a large increase in travel time (approximately 10 minutes) between the reference case and the development scenarios in the AM peak. These results should be combined with the A289/Yokosuka Way roundabout results presented in Subnetwork 2 where, despite the mitigation scheme, the level of service indicates that the demand in this roundabout exceeds capacity even in the reference case.

4 Summary

This report presented the results of a new set of additional modelling scenarios around the development area in Pump Lane in Lower Rainham. These scenarios examined the sensitivity between different centroid configurations and trip rates, employed by the strategic model developed by Sweco and the developer.

The results showed that there is no improvement in terms of congestion between the results provided in the development scenario (Sensitivity 1 scenario) presented in the previous Sweco report in October 2020 and the new LRR scenarios 1, 2 and 3 examined in this report. On the other hand, the new scenarios revealed a new issue in the A2 (Otterham Quay Lane_Meresborough Road) Junction in Subnetwork 3 that can be attributed to the re-routing of the demand due to the loss of the connection to Lower Bloors Lane. The junctions that were proven problematic in the previous Sweco report, remain problematic in the new LRR Scenarios.

When comparing LRR Scenarios 1 and 2 with LRR Scenario 3 where the developer trip rates are used, no significant difference in terms of congestion hotspots can be observed. The problems in the road network underlined in the previous Sweco report remain, despite the reduction in the development demand.

More specifically, the results showed the issues in the following road network elements:

Junctions

The following junctions reach level of service F in the AM Scenarios:

- A2 (Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction)
- A2 (Bowater Roundabout)
- A289 (Ito Way / Sovereign Boulevard)
- A2 (Otterham Quay Lane / Merersborough Road)

The following junctions reach level of service F in the PM Scenarios:

- A289 (Pier Road / Maritime Way Roundabout)
- A289 Pier Road / Gillingham Gate Road West
- A2 (Bowater Roundabout)
- Eastcourt Lane / South Avenue
- A2 (Otterham Quay Lane / Merersborough Road)

In all the aforementioned junctions the demand exceeds capacity in the corresponding peak development scenario. This practically means that the functionality of the junction breaks, ultimately causing long queues and additional delays.

Path travel time

The following paths show significant increase in travel time:

- Lower Rainham Road westbound direction shows a large increase in travel time (approximately 10 minutes) between the reference case and the development scenarios in the AM peak.
- A2 (Moor Street to Sovereign Boulevard) in subnetwork 3 shows an increase of 2 and 5 minutes (56% and 61% accordingly) in the AM and the PM peak scenarios accordingly.
- Paths A289 (Church Street) to A278 (Hoath Way) and A2 (Watling to Sovereign Boulevard) in the AM peak show a substantial increase in travel time in subnetwork 2
- Paths A289 (Church Street) to A278 (Hoath Way) and A278 (Hoath Way) to A289 (Church Street) show a substantial increase in travel time in subnetwork 2 in the PM peak

Appendix A – Detailed Subnetwork Statistics

Subnetwork 2 Statistics	Units	AM Peak (0800 to 0900) 2037 RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	193	244	254	248	253
Delay	sec/km	120	172	181	175	181
Flow	veh/h	11,266	11,380	11,407	11,391	11,359
Speed	km/h	28	27	26	27	26
Stop Time	sec/km	107	158	167	161	167
Mean Queue	veh	503	860	919	890	905
Mean Virtual Queue	veh	146	574	608	578	577
Waiting Time in Virtual Queue	sec	46	178	188	178	178
Total Statistics						
Total Travelled Time	h	2,236	2,951	3,087	3,013	3,039
Total Travelled Distance	km	52,434	53,374	53,762	53,544	53,336
Average travel time per vehicle	s/veh	357	467	487	476	482
Total Waiting Time in Virtual Queue	h	143	561	594	564	562
Total travel time including virtual queue	h	2,379	3,512	3,681	3,577	3,601
Total Queue	veh	648	1,435	1,527	1,467	1,482
Throughput						
Vehicles Out	veh	22,531	22,761	22,813	22,783	22,719
Vehicles In	veh	6	7	6	6	6
Vehicles Waiting to Enter	veh	-	-	-	-	-
Total	veh	22,538	22,768	22,819	22,789	22,725
Vehicles In and Waiting to Enter	veh	6	7	6	6	6

Subnetwork 2 Statistics	Units	PM Peak (1700 to 1800) 2037 Rainham RC	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	171	210	207	202	204
Delay	sec/km	98	138	135	130	132

Flow	veh/h	11,124	11,495	11,546	11,557	11,349
Speed	km/h	30	27	27	28	28
Stop Time	sec/km	87	124	121	116	118
Mean Queue	veh	325	581	571	535	556
Mean Virtual Queue	veh	180	342	310	300	271
Waiting Time in Virtual Queue	sec	58	105	95	92	85
Total Statistics						
Total Travelled Time	h	1,817	2,445	2,430	2,354	2,371
Total Travelled Distance	km	51,350	53,893	54,173	54,242	53,371
Average travel time per vehicle	s/veh	294	383	379	367	376
Total Waiting Time in Virtual Queue	h	3	10	8	8	6
Total travel time including virtual queue	h	1,820	2,455	2,438	2,362	2,378
Total Queue	veh	505	924	880	835	826
Throughput						
Vehicles Out	veh	22,247	22,990	23,092	23,115	22,697
Vehicles In	veh	6	6	6	6	6
Vehicles Waiting to Enter	veh	-	-	-	-	-
Total	veh	22,253	22,996	23,098	23,121	22,703
Vehicles In and Waiting to Enter	veh	6	6	6	6	6

Subnetwork 3 Statistics	**AM Peak (0800 to 0900)**					
	Units	2037 Reference Case	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	247	248	260	259	255
Delay	sec/km	161	162	174	174	169
Flow	veh/h	2,475	2,502	2,550	2,533	2,523
Speed	km/h	19	20	19	19	19
Stop Time	sec/km	146	146	158	158	153
Mean Queue	veh	66	72	80	79	77
Mean Virtual Queue	veh	8	43	64	44	40
Waiting Time in Virtual Queue	sec	12	62	91	63	57

Total Statistics						
Total Travelled Time	h	242	260	280	276	271
Total Travelled Distance	km	3,607	3,785	3,881	3,842	3,802
Average travel time per vehicle	s/veh	176	187	198	196	193
Total Waiting Time in Virtual Queue	h	-	1	2	1	1
Total travel time including virtual queue	h	242	261	282	277	271
Total Queue	veh	74	115	144	123	117
Throughput						
Vehicles Out	veh	4,950	5,005	5,101	5,066	5,047
Vehicles In	veh	1	1	1	1	2
Vehicles Waiting to Enter	veh	-	-	-	-	-
Total	veh	4,952	5,006	5,102	5,067	5,048
Vehicles In and Waiting to Enter	veh	1	1	1	1	2

Subnetwork 3 Statistics	PM Peak (1700 to 1800)					
	Units	2037 Reference Case	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	272	284	296	294	288
Delay	sec/km	186	199	211	209	202
Flow	veh/h	2,529	2,649	2,654	2,645	2,615
Speed	km/h	18	18	18	18	18
Stop Time	sec/km	171	182	193	191	185
Mean Queue	veh	72	96	104	105	97
Mean Virtual Queue	veh	12	127	58	80	62
Waiting Time in Virtual Queue	sec	16	173	79	109	85
Total Statistics						
Total Travelled Time	h	264	324	341	341	322
Total Travelled Distance	km	3,896	4,165	4,199	4,193	4,094
Average travel time per vehicle	s/veh	188	220	232	232	221
Total Waiting Time in Virtual Queue	h	-	6	1	2	1
Total travel time including virtual queue	h	264	330	343	344	323
Total Queue	veh	84	223	162	184	159

Throughput						
Vehicles Out	veh	5,058	5,297	5,308	5,291	5,229
Vehicles In	veh	2	2	2	2	2
Vehicles Waiting to Enter	veh	-	-	-	-	-
Total	veh	5,060	5,299	5,310	5,292	5,231
Vehicles In and Waiting to Enter	veh	2	2	2	2	2

Subnetwork 7 Statistics	AM Peak (0800 to 0900)					
	Units	2037 Reference Case	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	140	162	172	162	162
Delay	sec/km	61	82	93	82	82
Flow	veh/h	5,853	6,170	6,377	6,200	6,106
Speed	km/h	36	34	34	34	34
Stop Time	sec/km	51	70	81	71	71
Mean Queue	veh	57	155	159	169	143
Mean Virtual Queue	veh	4	69	132	57	37
Waiting Time in Virtual Queue	sec	2	39	74	32	22
Total Statistics						
Total Travelled Time	h	445	701	712	733	662
Total Travelled Distance	km	13,043	14,357	14,396	14,443	13,913
Average travel time per vehicle	s/veh	137	205	201	213	195
Total Waiting Time in Virtual Queue	h	-	1	3	-	-
Total travel time including virtual queue	h	445	702	715	734	662
Total Queue	veh	61	224	291	226	179
Throughput						
Vehicles Out	veh	11,705	12,340	12,753	12,400	12,211
Vehicles In	veh	2	2	2	2	2
Vehicles Waiting to Enter	veh	-	-	-	-	-
Total	veh	11,707	12,342	12,755	12,402	12,213
Vehicles In and Waiting to Enter	veh	2	2	2	2	2

Subnetwork 7Statistics	PM Peak (1700 to 1800)					
	Units	2037 Reference Case	Sensitivity test 1	LRR Scenario 1	LRR Scenario 2	LRR Scenario 3
Travel Time	sec/km	123	154	153	154	154

Delay	sec/km	42	74	72	73	74
Flow	veh/h	5,542	5,964	5,980	6,016	5,937
Speed	km/h	38	36	36	36	36
Stop Time	sec/km	35	64	63	63	64
Mean Queue	veh	28	68	62	63	62
Mean Virtual Queue	veh	2	87	38	50	47
Waiting Time in Virtual Queue	sec	1	53	23	30	29
Total Statistics						
Total Travelled Time	h	358	484	452	461	451
Total Travelled Distance	km	12,201	13,572	12,940	13,155	12,847
Average travel time per vehicle	s/veh	116	146	136	138	137
Total Waiting Time in Virtual Queue	h	-	1	-	-	-
Total travel time including virtual queue	h	358	486	453	462	451
Total Queue	veh	30	155	100	113	109
Throughput						
Vehicles Out	veh	11,084	11,927	11,960	12,032	11,874
Vehicles In	veh	2	2	2	2	2
Vehicles Waiting to Enter	veh	-	-	-	-	-
Total	veh	11,086	11,929	11,962	12,033	11,876
Vehicles In and Waiting to Enter	veh	2	2	2	2	2

Appendix B – Macro model Flow Plots

The macro model flow plots are included in the PDF attachments in the “Flow_plots.zip” folder.

Appendix C – Macro model Select link analysis plots

The select link analysis plots for the centroid containing the demand of the development are included in the PDF files of the “SLA_plots.zip” folder.

Appendix D – Macro model section V/C plots

The section V/C plots are included in the PDF files of the “VC_sections.zip” folder.

Appendix E – Macro model turn V/C plots

The turn V/C plots are included in the PDF files of the “VC_turns.zip” folder.

Appendix F – Micro model section delay plots

The turn V/C plots are included in the PDF files of the “Simulated Delays.zip” folder.

Appendix I

As the appointed Principal Transport Planning at Medway Council, I am a consultee for planning applications with regards highway matters. In my role, I have been in discussions with the appellants Transport Consultants (David Tuckers Associates (DTA) in relation to impacts on the highway network.

In appendix A, I have provided a summary of the interactions between Medway Council and DTA over the course of this application until the appeal hearing.

Email correspondents were sent between colleagues at Medway Council and Simon Tucker (DTA) regarding the use of Medways Aimsun Model after the initial pre application meeting was held.

On the week commencing 2nd September, telephone discussion between myself and Jacequline Aggisss (DTA) regarding the overall development site and outlining concerns regarding the access arrangements.

Initial draft comments regarding the application were sent to the planning case officer (Hannah Gunner), which were subsequently passed onto the application. Within this report several concerns were raised.

Which can be summarised as;

- Trip distribution
- NMU Audit
- Trip generation
- PIA study area and further commentary
- Access arrangements Pump Lane
- Background traffic growth (TEMPRO)
- Sensitivity testing taking into consideration emerging local plans
- Updated junction assessment
- Road Safety Audit Stage 1
- Further information for improved bus services
- Updates to the Framework Travel Plan

A Highways meeting was held on 17th September between the planning authority and the applicants. Prior to the meeting the DTA provided a Framework Travel Plan, Walking, Cycling Horse Riding Assessment and attached an email in regards to trip generation with the new primary school.

The 10th October 2019, the applicants provided Technical Note 1, to address some of the initial comments raised. Due to Annual leave, I outlined to Simon Tucker that I had not had chance to review the Technical Note and suggested we arranged a meeting later in October

2019. It should be noted, at the request of myself, DTA revised Technical Note 1 to remove Appendix A (initial draft response), as it was agreed that this was not a formal response provided to the case officer.

A further meeting was held on the 28th October 2019, subsequent to that meeting Jacqueline Aggiss provided a summary of the additional junction surveys to be surveyed. *It is noted that these survey/modelling results do not appears to ever have been provided for consideration*.

A response was provided within an email dated on the 29th October 2019 confirming scenarios to be set out and requested additional junctions. It was at this stage, concerns were noted regarding the trip levels, in particular that the overall development would generate just 350 vehicles in a peak hour.

Following the above comments, Jacqueline Aggisss then provides Technical Note 2, with a updated TRICS assessment and summary note of meeting from the 28th October. The meeting note confirms under point 4 that additional surveys were requested and DTA confirmed that these will be undertaken.

Jacqueline Aggisss provides in her follow up email's additional context for the TRICS assessment in form of Scatter Plot

At this stage, Medways Modelloing assessment "Presentation_Medway_Lower_Rainham_Sensitivity 1" is provided to Duncan Parr and then shortly provided to Jacqueline and Simon Tucker. Requests from DTA were received in terms of provided traffic flows and Trip Rates, these were provided with an email sent on 19th December 2019 to confirm that they need no further information before the Christmas recess.

At the beginning of January, DTA provided Technical Note 3, to overcome the concerns raised in Medway's Modelling report. A meeting was then arranged to discuss both Technical Note 3 and Medway's Modelling assessment. Jacqueline provides an additional assessment of the TRICS assessments without bungalow sites at the request of myself.

As discussed within the meeting on 22nd January, the modelling report identified 5 junctions that showed severe impacts, during the beginning of February, I had provided the data for those junctions for DTA to review, Jacqueline Aggiss requests whether these are the only junctions that need to be considered for mitigation. I responded whilst those junctions show significant impacts, it was also noted that the link corridors needed to be reviewed aswell. It is important to note that it was made clear to the applicants;,

…….. that if wish to revert to your own modelling, that a new assessment needs to be done, due to the changes of the level of internal trips. Regarding junctions those covered, It would at minimum need to cover the areas of concern as raised within the local authorities modelling assessment. As discussed, it would be beneficial to cover the Three Mariners Shuttle Corridor as this is a concern for members and likely to be raised in any subsequent planning committee. It is noted that this modelling assessment would need to be reviewed to ascertain if there are any further impacts on the highway, which may need to be mitigated.

Dialogue between Duncan Parr and myself was opened up regarding matters outstanding and these were responded to in my email on the 18th February 2020. It is important to clarify that under point 6, it was outlined

…….. If you are wishing to revert to your own modelling, then you will have to carry surveys out to cover the junctions previously requested, as you will not be able to mix and match your own modelling with our modelling assessment (in essence these are two separate entities and must be treated as such)

2nd April Technical Note 3 was reissued by DTA. It was also at this stage that I sent an email to confirm the drawings for the access onto Pump Lane, with a quick response to outline that they were contained within the RSA Techincal Note 1.

Simon Tucker sends formal letter dated 7th July, which I provided an email response outlining that his letter can be seen in three parts, Modelling Data, Access Arrangements, Accident Data. A further formal letter was provided on the 23rd July by Simon Tucker concerning a number aspects, however it was considered a number of issues raised in those letters was inaccurate and a response from myself followed, outlining surprise at the tone of the letter.

An additional report was provided to Simon Tucker n 26th October **"Lower Rainham Report Final"** to address concerns that had been raised previously. In the following weeks Simon Tucker had further inquires and these were address by the Lower Road Clarification Note and additional PDF covering Centroids and Site references. on the 6th November, further reports and appendices were provided to help DTA understand the modelling exercise undertaken by the Council.

At the start of December the CMC was held virtually, it was agreed that Simon Tucker would provide a list of what they considered was outstanding information in the following week. It was stated at this Hearing, that the Council were refining the modelling assessment and these would be provided to the applicants as soon as they were available.

Whilst the outstanding matters list was received later than expected from the applicants, the council via Peter Canavan (at the request from Applicants that correspondents be via him) further information was provided on the 14th.vIt is also at this stage that Statement of Common Ground has been provided by DTA (which at time of writing is being ongoing)

At the beginning of the January 2021, the refined modelling assessment has been carried out and provided to Simon Tucker "*Pump Lane and Lower Rainham Transport Impact Appraisal Addendum (2037)"* with a further update regarding Highways England's position

on M2 J4. Furthermore, an additional report was provided to Simon Tucker *"Pump Lane and Lower Rainham Transport Impact Appraisal Addendum (2028)". It is considered that these two reports should be read in conjunction with the formal modelling report provided at the start of November 2020.*

Appendix A

Email Number	Date	Sent	Main Recipient
8	10/09/2019	Jacqueline Aggiss	Robert Neave
10a	20/08/2019	Robert Neave	Hannah Gunner
13	13/09/2019	Jacqueline Aggiss	Paul Clarke
14	16/09/2019	Simon Tucker	Robert Neave, Hannah Gunner
16A	26/09/2019	Robert Neave	Simon Tucker
17	10/10/2019	Simon Tucker	Robert Neave
17a	14/10/2019	Robert Neave	Simon Tucker
18	21/10/2019	Jacqueline Aggiss	Robert Neave
20	29/10/2019	Jacqueline Aggiss	Robert Neave
20A	29/10/2019	Robert Neave	Jaqueline Aggiss
20B	29/10/20219	Robert Neave	Jaqueline Aggiss
22	31/10/2019	Jacqueline Aggiss	Robert Neave
22A	01/11/2019	Robert Neave	Jaqueline Aggiss
23	08/11/2019	Jacqueline Aggiss	Robert Neave
25	22/11/2019	Jacqueline Aggiss	Robert Neave
32	03/12/2019	Hannah Gunner	Duncan Parr
34A	19/12/2019	Robert Neave	Jacqueline Aggiss
35	09/01/2020	Jacqueline Agis	Robert Neave
36	27/01/2020	Jacqueline Aggiss	Robert Neave
38	31/01/2020	Jacqueline Aggiss	Robert Neave
38A	12/02/2020	Robert Neave	Jacqueline Aggiss
39	14/02/2020	Jacqueline Aggiss	Robert Neave

39A	14/02/2020	Robert Neave	Jacqueline Aggiss
39B	14/02/2020	Robert Neave	Jacqueline Aggiss
41	17/02/2020	Jacquline Aggiss	Robert Neave
42	18/02/2020	Jacquline Aggiss	Robert Neave
42A	18/02/2020	Robert Neave	Duncan Parr
43	27/02/2020	Jacquline Aggiss	Robert Neave
45	02/04/2020	Jacquline Aggiss	Robert Neave
45A	07/04/2020	Simon Tucker	Robert Neave
47	09/04/2020	Robert Neave	Jacqueline Aggiss
47	09/04/2020	Jacqueline Aggiss	Robert Neave
45A	07/04/2020	Simon Tucker	Robert Neave
51A	20/07/2020	Robert Neave	Simon Tucker
52	23/07/2020	Simon Tucker	Robert Neave
53A	28/07/2020	Robert Neave	Simon Tucker
54	19/08/2020	Simon Tucker	Robert Neave
58	26/10/2020	Simon Tucker	Robert Neave
58A	26/10/2020	Robert Neave	Simon Tucker
59	27/10/2020	Simon Tucker	Robert Neave
60	30/10/2020	Simon Tucker	Robert Neave
Various	06/11/2020	Robert Neave	Simon Tucker
62	13/11/2020	Simon Tucker	Robert Neave
63	14/11/2020	Robert Neave	Simon Tucker
65	19/11/2020	Robert Neave	Simon Tucker
65	23/11/2020	Simon Tucker	Robert Neave
67	30/11/2020	Robert Neave	Simon Tucker
68	08/12/2020	Simon Tucker	Peter Caravan
69	09/12/2020	Peter Canavan	Simon Tucker
70	09/12/2020	Duncan Parr	Peter Canavan
71	09/12/2020	Duncan Parr	Dave Harris
72	09/12/2020	Peter Canavan	Duncan Parr
74	11/12/2020	Duncan Parr	Peter Canavan
77	14/12/2020	Peter Canavan	Simon Tucker
78	23/12/2020	Simon Tucker	Peter Canavan
79	23/12/2020	Dave Harris	Simon Tucker
80	23/12/2020	Peter Canavan	Simon Tucker
81	04/01/2020	Peter Canavan	Simon Tucker
82	04/01/2020	Dave Harris	Simon Tucker and Peter Canavan

85	14/01/2020	Robert Neave	Simon Tucker
86	15/01/2020	Simon Tucker	Peter Canavan
87	19/01/2020	Simon Tucker	Robert Neave

Appendix J

Development Proposals

This revised application for the land seeks for the permission for the following scale of development:

- Up to 1250 new homes
- 60 Bed extra care facility
- 80 Bed care home
- Land for a new 2 form entry primary school
- A local centre incorporating retail and community facilities

The site is located to the north of Rainham and east of the Yokoskua Way and is divided into two main parcels situated both sides of Pump Lane.

Accessibility

The existing pedestrian and cycling provisions in the vicinity of the site is limited due to the nature of the existing land use and current demand and need for pedestrian and cyclist connections to agricultural farm land.

A Non-Motorised User (NMU) audit should be undertaken by the applicant to establish suitable walking and cycling routes from the site to key facilities.

This should include routes to the nearest secondary schools. The NMU audit should also consider routes by external pupils travelling to the proposed on-site 2FE primary school. The applicant should contact Medway Councils Education department to establish where the catchment area for the school is forecast to be.

The proposed development is not considered to be easily accessible by public transport based on the proposals submitted within the Transport Assessment. The nearest bus stop is circa 10-minute walk from the commercial element of the site. The majority of the residential areas of the site are at least 15 minutes from bus stops with regular services. Existing bus services based on their current routeing are not considered to be agreeable without further assessment work.

The nearest railway station is Rainham and is approx 2.5km from the centre of the application site. The rail station provides services to London Waterloo to the east and Dover to the west. The station provides cycle and car parking, 64 and 233 spaces respectively, however no assessment has been provided to whether there is any spare capacity to accommodate any additional demand from the development. The applicant has suggested that rail could be used as a multi-modal journey with cycling. The applicant should provide more information on a suitable cycle route/improvements from the site to the rail station and may need to provide additional cycle parking for the highway authority to consider this as a realistic travel choice. This should be covered within the NMU audit.

Baseline Conditions

The applicant has undertaken ATC surveys to obtain the baseline conditions on the local road network. The surveys collected data over a 7 day period from the 4th September 2019 to the 10th September 2019.

The applicant has stated that the ATC surveys identified peak hours of 08:00 – 09:00 and 17:00 – 18:00. It is noted however that traffic spikes occur around 11am.

Regarding Manuel Classified Counts, the applicant undertook assessments at the following junctions,

- A289/lower Rainham Road/Yoksouka Way
- Yokosuka Way/Beechings Way/Ito/Conrwallis Avenue
- Bloors Lane/ A2 london Road/ Playfootball Gillingham
- Bedchings Way/Pump Lane
- Pump Lane/ Beechings Way
- Lower Rainham Road/ Pump Lane
- Pump Lane/A2 London Road
- A2/ Will Adams/ITO Way
- A2/Sovereign Boulevard/Hoath Way/Twydall Lane/ Courteney Road

For clarity, a map should be provided outlining the location of the ATC and the locations of the junction assessments

PIA

The applicant has included five years of recorded Personal Injury Accident data from June 2013 to May 2018 and this is considered acceptable to the Highway Authority, however the survey area is too narrow and due to the large scale nature of the development would need to cover the routes connecting to the main carriageways i.e A2 and Ito Way.

Trip Generation

The applicant has calculated trip using TRICS online database with a person trip rate for the residential and employment elements of this application. The highway authority is satisfied that these trip rates for the residential units are robust, however the trips for the commercial or care home facilities and the methodology to calculate the level of trips on the external highway is not agreed.

<u>Residential</u>

The applicant has outlined that some trips would be internalised between the different land uses on the site and would not route via the external highway network. For example, children living in the residential component of the development would attend the on-site primary school, and residents would use the on-site commercial units for shopping and leisure. However given that the

commercial units are generic (i.e no class has been provided) it is not considered that the level of reduction is acceptable.

Care Home

Concerns would be raised to the outputs selected, it is not considered that the application is on the edge of a town centre location or suburban area and therefore the assessment needs to be redone.

Education

This application proposes a 2FE school site, meaning external education trips will occur as set out in the Transport Assessment. TRICS has been used to establish a trip rate for the generation of trips from outside of the site to the school. The applicants have identified that 41% of these children would be driven, however this figure is considered too low given the location of the site to the existing residential areas. The proposed vehicle trip generation for the schools is therefore not agreed at this stage.

Commercial

Additionally, the Transport Assessment does not include any trip generation for the proposed commercial area, it is noted that within the TA, no indication to the class use has been provided. Further information should be provided by the applicant and evidence why all trips associated with these land uses will be internal or pass by trips to the site. It is noted that these land uses could range from independent take-aways/restaurants to large national companies which could contribute to external vehicular trips.

Trip Assignment

The distribution of residential and employment trips generated by the proposed development has been forecast using Census 2011 Location of Usual Residence and Place of Work data and has used the Middle Super Output Area (MSOA) Medway 018. Vehicular trips were then assigned to the various routes connecting the site to the identified workplace destinations. Assignment was based on the most likely or direct route.

The highway authority does not agree that the methodology used to calculate the internal trips as well as the trips resulting from the education use. The applicant should contact Medway's Council's Education department to establish the likely catchment area for the proposed 2FE primary and update trip rates travelling by car accordingly.

Future Year Scenario

The applicant has suggested that a future year scenario of 2029 will be used due to the scale and build out time of the development. The Highway Authority is not satisfied that a future year scenario of 2029 will capture the full impact of the proposals.

TEMPRO, an industry standard software tool, has been used to forecast the increase in the baseline vehicular trips on the local road network and the MSOA Medway 018 has been used. The below growth factors have been derived.

2018-2029 AM Peak	
2018-2029 PM Peak	

Waiting to review these rates

The applicant should provide commentary on Medways Council's Draft Local Plan 2035 which proposes a considerable development within the Medway Towns. Confirmation is therefore required that this and any other relevant emerging allocation is appropriately accounted for within the TEMPRO growth factors or propose alternative methods for how these emerging allocations are suitably accounted for and tested within the TA.

Committed Development
The applicant has included the following committed development traffic;

- Site 1 – Land at Station Road, Rainham, Kent ME8 7QZ – 90 Units. (Allowed)
- Site 3 – Land North of Moor Street, Rainham – 190 Units. (Refused, but identified in the Council's supply in SLAA)
- Site 4 – Land At Otterham Quay Lane Rainham Kent – 300 Units. (Approved)
- Site 6 – Berengrave Nursery, Berengrave Lane, Rainham, Gillingham ME8 7NL – 121 Units. (Approved)
- Site C - Land South Of Lower Rainham Road Rainham Gillingham Medway ME8 7UD – 202 Units. (Currently Live)

The applicant has mentioned TEMPRO has taken into account existing developments as outlined above and therefore does not need to provide a further up lift. The highway authority is not satisfied that this is the case and the applicant should provide a separate assessment with committed development and the proposed development.

Further developments the applicant need to take into account are

MC/18/3160 - Land off Lower Rainham Road (Approved)

Junction Assessment

The junctions were assessed against a number of scenarios which include:

- 2018 Surveyed base
- 2029 Surveyed base
- 2029 Base + Committed Developments; and Proposed Development

As set out in the committed development section, an additional scenario should be include

- 2029 Base + Committed Developments

The following junctions were assessed

- Site 1: A289/Lower Rainham Road/ Yokosuka Way (4-arm roundabout) –
- Site 2: Yokosuka Way/ Beechings Way/ Ito Way/ Cornwallis Avenue (4-arm roundabout) –
- Site 3: Bloors Lane/ A2 London Road/ Playfootball Gillingham (4-way cross roads) –
- Site 4: Beechings Way/ Pump Lane (3-arm roundabout) –
- Site 5: Pump Lane/ Beechings Way (T-junction) –
- Site 6: Lower Rainham Road/ Pump Lane (T-junction) –
- Site 7: Pump Lane/ A2 London Road (T-junction) –
- Site 8: A2/ Will Adams Way/ Ito Way (4-arm roundabout) –
- Site 9: A2/ Sovereign Boulevard/ Hoath Way/ Twydall Lane/ Courteney Road (5-arm signalised roundabout)

The junction modelling cannot be assessed by the Highway Authority until the vehicle trip generation and distribution for the site has been agreed. However it is noted that further junctions that need to be included are

Three Mariners Signalise shuttle corridor
Pump Lane/Lower Rainham Road (T Junction)
Eastcourt Lane/Lower Rainham Road (T Junction)
Lower Featherby Road/Lower Rainham Road (T Junction)
Hoath Way (RBT)
Berengrave Lane/Lower Rainham Road (RBT)
Station Road/ Lower Rainham Road (RBT)
Otterham Quay Lane/A2 (Junction)

Whilst it is noted that no assessment on the Strategic Road network has been done, this matter will be covered by Highways England.

Medway Own Modelling assessment (AIRSUM) to be added when available

Proposed Vehicular Accesses

Drawing 20230-05-02 shows an overview of the proposed vehicular access to the site from Lower Rainham Road with drawing 20230-05-Rev A demonstrating the proposed Pump Lane Railway Bridge Improvements to form the secondary access point.

Drawing 20230-05-02 shows a new priority junction onto Lower Rainham Road. Speed surveys have been undertaken in the vicinity of the access with 85th%ile speeds recorded as 35.1mph, Therefore appears the visibility splays would be acceptable. It is noted that it would be beneficial to move the 30mph further eastwards to reduce speeds near the access point.

Drawing 20230-05-Rev A - A shuttle working scheme through the bridge which would provide a 2.5m wide combined footway/ cycleway and a 3m wide running carriageway

An independent Stage One Road Safety Audit should be provided for the proposed highway works.

The Highway Authority would require the applicant to commit to providing additional traffic calming measures as required to ensure that speeds are in accordance with the revised speed limit proposals. This could be covered by condition.

It is noted that application only provides details with regards to the access of Lower Rainham Road and not access arrangements along Pump Lane. These will need to provided as this is not a matter that is reserved.

Bus Service Improvements

The applicant has proposed sustainable transport mitigation by way of providing an extended provisions

a) Extend the existing 191 to and through the site. This would provide a 20 minute service to serve to supplement the 191.

b) Consider connections between 191 and 182 to provide inter-working and potentially a clockwise and anti-clockwise combined service running through the site.

c) Diversions to Nos 120 / 121 to route through the site and provide a connection to Rainham High Street and Station.

Should the bus service providers be open to this, a patronage test should be provided by the applicant to ensure that the bus service would be self-sufficient without the need for bus subsidy from Medway Council.

The internal layout will need to reflect the above aspiration, however this will be dealt with during the reserved matters stage if granted approval.

Travel Plan

This Framework Travel Plan (FTP) has been assessed. Whilst the quality of this FTP is generally good, it still requires some amendments before it can be approved.

Background

A policy section should be added to the FTP which includes summaries of relevant national and local policy including, but not limited to: the National Planning Policy Framework (2018), Medway's Car parking Standards and Manual for Streets 2.

Consultation and Partnerships

The FTP should contain evidence of preliminary liaisons with local cycle shops and public transport operators to scope the possibility of arranging for discounts on equipment and services respectively. These communications can then form the basis for further negotiations between these companies and the Site-Wide Travel Plan Manager (SWTPM).

Site Audit

The travel plan has not provided any isotopes diagrams to demonstrate walking/cycling destinations within the vicinity, these should be provided to allow potential targets improvements to be provided.

Targets

The table of targets needs amending to provide clarification on what the objectives. A table of targets should be included in section 5 under “Indicative Targets”; please see the example table below. A percentage decrease or increase should be given to each travel mode. The baseline for these targets can be arrived at by using the MSOA data from the 2011 census or existing survey results for similar developments in the area.

	1st Year (Baseline)	3rd Year	5th Year
Car Driver Car Passenger			
Bus			
Train			
Foot			
Cycle			
Powered Two-Wheeler (PTW)			

Table 1 - Example table for displaying modal split targets

An explanation of how these targets have been developed should be included as well.

Measures

It is noted that the travel plan provides no financial incentives for residents to change their mode of transport. The price and nature of the voucher will be agreed via a Section 106 Agreement. However, we would anticipate that a cost estimate is included in the FTP; residential travel vouchers are typically estimated to cost around £50 per household and have an uptake rate of around 50%.

There are a number of additional measures for the residential portion of the development which should be considered for inclusion in the FTP:

- Promotion of free health/exercise apps for mobile phone,
- Formation of a Bicycle Users Group (BUG),
- Use of social media to promote the Travel Plan and disseminate sustainable travel information.

There are also a number of additional measures for the employment portions of the development which should be considered for inclusion in the FTP:

- Showers and lockers on site,

- Umbrella loan schemes for pedestrians,
- Including the FTP as an item on team meeting agendas,
- Use of social media to promote the Travel Plan and disseminate sustainable travel information.

An action plan should be included in the appendix which details each measure to be conducted as part of the site-wide Travel Plan (including resources to be allocated to the SWTPM role). The action plan should be similar in layout to the example table below.

Objective	Action	Start Date	Due Date	Responsibility	Mode affected	Cost Estimate

Table 2 - Example Action Plan

Monitoring

Monitoring should continue for a minimum of 5 years after full occupation; section 10 should be updated to include this commitment. Section 6 should also commit the monitoring reports to contain a summary of measures enacted over the previous year, and the resources expended on the Travel Plan over the same period.

A minimum 35% response rate must be attained in order for travel questionnaire surveys to be considered statistically significant. If this cannot be achieved, then discussions should be had with Integrated Transport regarding carrying out TRICS SAM or ATC surveys.

There are currently no measures in place to encourage members of staff or residents to complete a questionnaire survey. Entry into a prize draw could be offered to those who complete a survey, although it should be noted that the prize should not be travel-related (e.g., bus tickets, cycle vouchers, etc). Businesses could mandate that staff complete the survey, rather than offer entry into a prize draw.

A sample questionnaire survey should be provided in the appendices. An example residential questionnaire survey has been attached which could also be adapted to serve a commercial site.

Delivery and Enforcement

There should be a reference in the document to a means for enforcing the FTP. Typically, this is accomplished through a Section 106 agreement. Sanctions should be in place in the event of non-compliance with the terms of the FTP.

Others Matters

No reference within the travel plan has been provided with regards to the primary school or commercial aspect of the proposal. There should be a

commitment for the School Travel Plan Champion to liaise with Medways school travel plan team.

Conclusion

The FTP will require further amendments as set out above before it can be considered acceptable for submission in conjunction with the proposed site.

Recommendation

Additional information is required in order to fully assess the impact of the proposed development. This information should address the following matters as set out in detail within our response:

- Trip distribution
- NMU Audit
- Trip generation
- PIA study area and further commentary
- Access arrangements Pump Lane
- Background traffic growth (TEMPRO)
- Sensitivity testing taking into consideration emerging local plans
- Updated junction assessment
- Road Safety Audit Stage 1
- Further information for improved bus services
- Updates to the Framework Travel Plan

If the Planning Authority are minded to determine this application prior to the submission of the requested additional information please contact the highway authority for my recommendation.

It should be noted that even with the above information provided, serious concerns would be raised regarding the level of vehicles on the local network with may not be able to be overcome.

Appendix K

James Rand

From: neave, robert <robert.neave@medway.gov.uk>
Sent: 14 February 2020 14:43
To: Jacqueline Aggiss
Cc: gunner, hannah
Subject: RE: Pump Farm, Lower Rainham

Hi Jacqueline

Those are the junctions that within our model run demonstrated significant impacts and therefore need mitigation.

However it is noted as well that the link corridors need to be reviewed; see below,

Corridors

Network 2

Lower Rainham Road to Medway Tunnel **(**west bound**)**
A2 corridor EB (Watling Street to Sovereign Boulevard) (East Bound)
Medway Tunnel to Gillingham Gate Road (East Bound)
Medway Tunnel to Dock Road (East Bound)
Medway Tunnel to Hoath Way (East Bound)

Network 3

Otterham Quary Lane to Meresborough Road
Moor Street to High Dewar Road
Moor Street to Sovereign Boulevard

Network 7

Lower Rainham Road WB

The modelling has also highlighted areas of concerns, investigation should be sought to ascertain if any mitigation can be provided on these key strategic routes to reduce the cumulative impact of the development.

Junctions

Network 2

Yokosuka Way Roundabout
Eastcourt Lane / South Avenue Junction

Corridors

Network 3

Sovereign Boulevard to Maidstone road
Orchard Road to Station Road

Maidstone road to Sovereign Boulevard
High Dewar Road to Moor Street
High Dewar Road to Mierscourt Road

It is noted however that if wish to revert to your own modelling, that a new assessment needs to be done, due to the changes of the level of internal trips. Regarding junctions those covered, It would at minimum need to cover the areas of concern as raised within the local authorities modelling assessment. As discussed it would be beneficial to cover the Three Mariners Shuttle Corridor as this is a concern for members and likely to be raised in any subsequent planning committee. It is noted that this modelling assessment would need to be reviewed to ascertain if there is any further impacts on the highway, which may need to be mitigated.

Other matters raised at previous meeting

- In relation to the vehicle movements for sub network 1, this information is not available (this sub network covers highway that is covered by Highways England and not Medway) and therefore you would have to carry out your own assessment to the satisfaction of Highways England to cover their holding objection.

- With regards to the wording used by our consultants for the title of the document, I'm not sure what has caused concern but happy to amend the title going forward.

- In relation to Trips calculation. The trips have been estimated using average person trip rates derived from the TRICS Database. These are subsequently converted to vehicle trips by applying mode share which take into account a range of location dependent factors such as accessibility. In terms of distribution, the modelling assessment has used Origin and Destination data to help determine the direction of trips. In terms of growth The developments within the Reference Case in Medway have been assigned a model zone and where necessary, new zones have been created. The vehicle arrivals and departures are then summed for each zone and added to the respective destination and origin totals to provide the growth in traffic for each zone within the Medway local authority area. In this way, growth for trip ends within Medway are based solely of the projected development in the Reference Case Scenarios. With regards to growth for development outside of the Medway, the National Trip End Model Has been referenced which was been compared with the adopted local plans of the neighbouring authorities.

Regards

Robert Neave

Principal Transport Officer

Housing, Development and Transport
Medway Council
Civic Headquarters
Gun Wharf
Dock Road
Chatham
Kent
ME4 4TR

Tel: 01634 331586
Robert.Neave@medway.gov.uk

From: Jacqueline Aggiss <JA@dtatransportation.co.uk>
Sent: 14 February 2020 12:50
To: neave, robert <robert.neave@medway.gov.uk>
Cc: gunner, hannah <hannah.gunner@medway.gov.uk>; Duncan Parr <Duncan.Parr@rapleys.com>; Simon Tucker <sjt@dtatransportation.co.uk>
Subject: RE: Pump Farm, Lower Rainham

Hi Robert,

Thanks for the junction flows which include the following locations:

1. Rotary Gardens/ Woodlands Road/ Sovereign Boulevard;
2. London Road/ Bloors Lane;
3. Piers Road/ Maritime Way;
4. Bowater Roundabout; and
5. High Street/Station Road.

As per our meeting note, please can you confirm these are the only junctions that require further assessment and that assessment / mitigation at these junctions on the basis of the flows you have provided from the Council's model would be adequate to allow you to fully assess the implications of the development?

There were other actions on the Council from the meeting – can you let me know when we can expect those please?

Regards,

Jacqueline Aggiss
David Tucker Associates
Transport Planning Consultants

Forester House, Doctors Lane, Henley in Arden, Warwickshire B95 5AW
Tel: +44(0)1564 793598
Fax: +44(0)1564 793983
http://www.dtatransportation.co.uk

From: neave, robert [mailto:robert.neave@medway.gov.uk]
Sent: 14 February 2020 09:55
To: Jacqueline Aggiss <JA@dtatransportation.co.uk>
Cc: gunner, hannah <hannah.gunner@medway.gov.uk>; Duncan Parr

<Duncan.Parr@rapleys.com>
Subject: RE: Pump Farm, Lower Rainham

Good Morning Jacqueline,

Please find attached turning counts,

Regards

Robert Neave

Principal Transport Officer

Housing, Development and Transport
Medway Council
Civic Headquarters
Gun Wharf
Dock Road
Chatham
Kent
ME4 4TR

Tel: 01634 331586
Robert.Neave@medway.gov.uk

From: Jacqueline Aggiss <JA@dtatransportation.co.uk>
Sent: 12 February 2020 09:10
To: neave, robert <robert.neave@medway.gov.uk>
Cc: gunner, hannah <hannah.gunner@medway.gov.uk>; Duncan Parr <Duncan.Parr@rapleys.com>; Michael Birch <Michael.Birch@rapleys.com>; Simon Tucker <sjt@dtatransportation.co.uk>; 'Nick Brandreth' <Nick.Brandreth@lambertandfoster.co.uk>
Subject: RE: Pump Farm, Lower Rainham

Hi Robert,

I hope you had a good break.

Further to my email below please can you let me have an update on the further information?

Thanks.

Regards,

Jacqueline Aggiss
David Tucker Associates
Transport Planning Consultants

Forester House, Doctors Lane, Henley in Arden, Warwickshire B95 5AW
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Fax: +44(0)1564 793983
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From: Jacqueline Aggiss
Sent: 31 January 2020 12:35
To: 'neave, robert' <robert.neave@medway.gov.uk>
Cc: 'gunner, hannah' <hannah.gunner@medway.gov.uk>; 'Duncan Parr' <Duncan.Parr@rapleys.com>; 'Michael Birch' <Michael.Birch@rapleys.com>; Simon Tucker <sjt@dtatransportation.co.uk>; 'Nick Brandreth' <Nick.Brandreth@lambertandfoster.co.uk>
Subject: RE: Pump Farm, Lower Rainham

Hi Robert,

Please find attached the TRICS re-run with bungalows removed. This makes very little difference to the overall trip rates compared to those in the TA.

Please can you let me know when we can expect to receive the various information from Sweco?

Thanks.

Regards,

Jacqueline Aggiss
David Tucker Associates
Transport Planning Consultants

Forester House, Doctors Lane, Henley in Arden, Warwickshire B95 5AW
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From: Jacqueline Aggiss
Sent: 27 January 2020 14:01

To: 'neave, robert' <robert.neave@medway.gov.uk>
Cc: 'gunner, hannah' <hannah.gunner@medway.gov.uk>; Duncan Parr <Duncan.Parr@rapleys.com>; 'Michael Birch' <Michael.Birch@rapleys.com>; Simon Tucker <sjt@dtatransportation.co.uk>; 'Nick Brandreth' <Nick.Brandreth@lambertandfoster.co.uk>
Subject: Pump Farm, Lower Rainham

Hi Robert,

Please find attached our notes further to our meeting last week. Please can you review and confirm you are happy with the content?

We've included a list of actions and I would be grateful if you could let me know when we will receive the further information?

Thanks.

Regards,

Jacqueline Aggiss
David Tucker Associates
Transport Planning Consultants

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Appendix L

Department for Transport

TAG UNIT M4

Forecasting and Uncertainty

May 2019

Department for Transport

Transport Analysis Guidance (TAG)

https://www.gov.uk/transport-analysis-guidance-tag

This TAG Unit is guidance for the **MODELLING PRACTITIONER**

Technical queries and comments on this TAG Unit should be referred to:

Transport Appraisal and Strategic Modelling (TASM) Division
Department for Transport
Zone 2/25 Great Minster House
33 Horseferry Road
London
SW1P 4DR
tasm@dft.gov.uk

- an explanation of any results that may appear counterintuitive, such as very slow speeds, high junction delays and forecasts of flows above capacity.

6.2 Reporting the Alternative Scenarios

6.2.1 All alternative scenarios should be subject to a full appraisal, but they do not each require a separate AST. Exceptional results should be presented in the qualitative column of the AST (but quantifying the difference where possible).

7 Modelling a Scenario – Surface Schemes other than Rail

IMPORTANT NOTE: For modelling Rail schemes, please refer to section 8.

7.1 Introduction

7.1.1 This section sets out how to model a scenario (this applies to both core and alternative scenarios).

7.1.2 Before modelling future scenarios, it is essential to define the forecasting assumptions. Usually, the Department expects the following tools to be used to appraise major transport interventions:

- A transport model;
- NTEM (or PDFH (Rail schemes only)); and
- Uncertainty Log (This was set out in section 2).

Transport models

7.1.3 As a prerequisite to all model forecasting, it is assumed that the model will be developed and validated for a recent year (the base year). Validation to the standards given in TAG Unit M3.1 – Highway Assignment Modelling and TAG Unit M3.2 – Public Transport Assignment Modelling provides some assurance of the credibility of the model, and also against bias which would be transferred to the forecasts within the forecasting process.

7.1.4 The model also needs to be tested for realism and sensitivity to ensure it responds sensibly to changes in inputs. Further guidance on realism testing and sensitivity testing is given in TAG Unit M2 – Variable Demand Modelling.

NTEM dataset

7.1.5 The NTEM dataset represents the Department's standard assumptions about growth in demand, expressed in units of Trip Ends. Trip Ends (which are described further in TAG Unit M1.1 – Principles of Modelling and Forecasting) are an initial estimate of the total number of trips to or from a zone. In NTEM, these trip ends are split by trip purpose, mode and **either** time period **or** car availability. Spatially they are split into the NTEM zoning system, which covers the whole of Great Britain with at least one zone for each Local Authority / District area.

7.1.6 The NTEM dataset can be viewed using the TEMPRO software (Trip End Model Presentation Program). Both are available free of charge on the TEMPRO website: https://www.gov.uk/government/publications/tempro-downloads.

7.1.7 NTEM represents the Department's central assumption of growth in travel demand between any two given years. When modelling for business cases is submitted to the Department, scenarios assuming central growth in demand (such as the core scenario, described in section 3) **must** be controlled to the growth in travel demand in the NTEM dataset at an appropriate spatial area (usually Local Authority / District level). There is a standard way of adjusting growth in demand to represent high and low growth assumptions, described in section 4.