

Meopham Development Impact Analysis

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Meopham Development Impact Analysis

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1. Introduction

1.1 Introduction

Jacobs were commissioned by Kent County Council (KCC) on behalf of TTC developers to assess the impacts of a proposed residential led, mixed-use development in Meopham. The development is located between Meopham and Sole Street Rail Stations in Meopham, Kent and will incorporate a combination of the following:

- 730 residential dwellings;
- 420-pupil primary school;
- Retail;
- Sports pitches; and
- Local amenities.

Figure 1-1 shows the location of the proposed development.

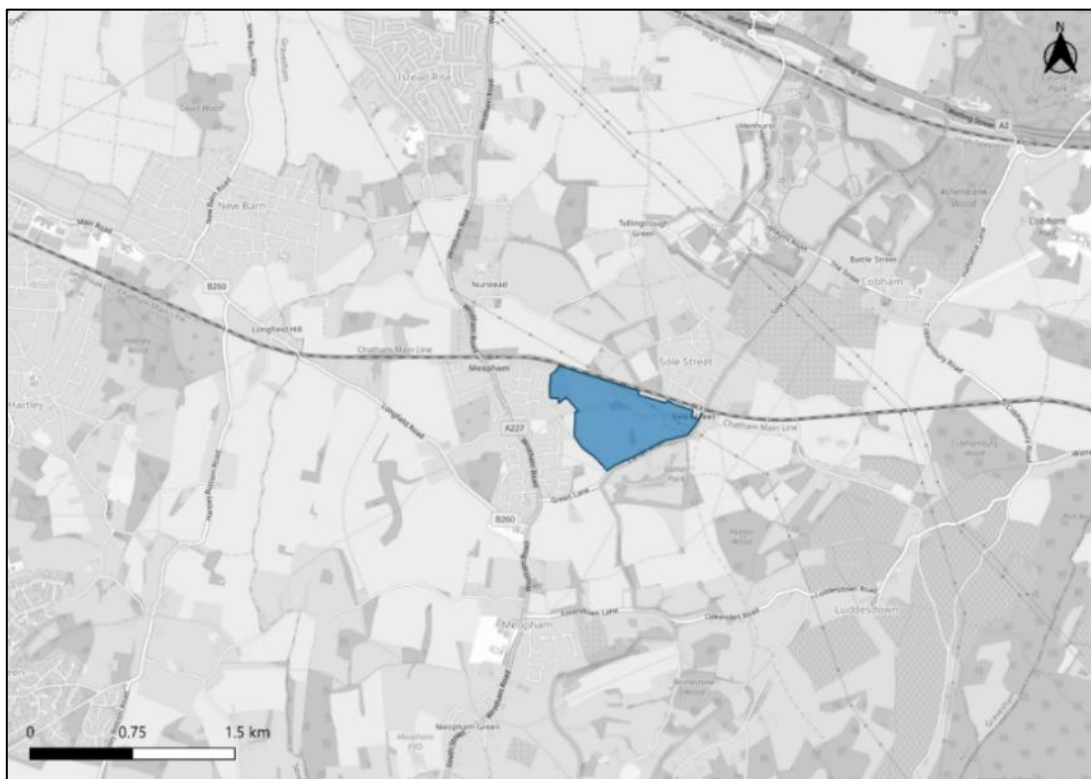


Figure 1-1: Location of the Proposed Development

The impact of the proposed development and associated infrastructure has been assessed using the Gravesham Transport Model (GTM) for both the AM (0800-0900) and PM (1700-1800) peak.

The remainder of this Technical Note sets out the assumptions and methodology for this assessment before presenting the results of the analysis.

2. Gravesham Transport Model Overview

Due to the location of the proposed site in Meopham, the Gravesham Transport Model (GTM) was determined as the most appropriate toolkit to assess the impact of the site.

The GTM, based on the Kent Transport Model (KTM) and has a 2019 Base Year which has been retained due to Covid-19 impacts and to be consistent with the observed 2019 Teletrac data the model was validated against. The 2019 GTM Base Model has been approved by National Highways and meets TAG criteria on a district level.

2.1.1 Study Area and Network Coverage

The GTM, derived from the Kent Transport Model (KTM), has been developed as the primary transport evidence base to inform the various Local Plan (LP) consultation stages and mitigation strategy development for the emerging growth. The GTM forms a single consistent toolkit which can be used to assess future development applications or network management studies in Gravesham.

The network detail and zoning system within the Gravesham area has been enhanced and refined as part of the GTM local model revalidation process. The Area of Detailed Modelling (AODM) has been defined using the Gravesham Borough Council boundary with the addition of a 2km buffer – which includes the next major junctions on the strategic road network, in agreement with National Highways (NH).

The AODM means that road links and junctions are modelled in more detail in terms of geometry and capacity, and with more granularity / depth of coverage. This detail increases further within the Gravesham urban area. The AODM of the GTM is illustrated in Figure 2-1.

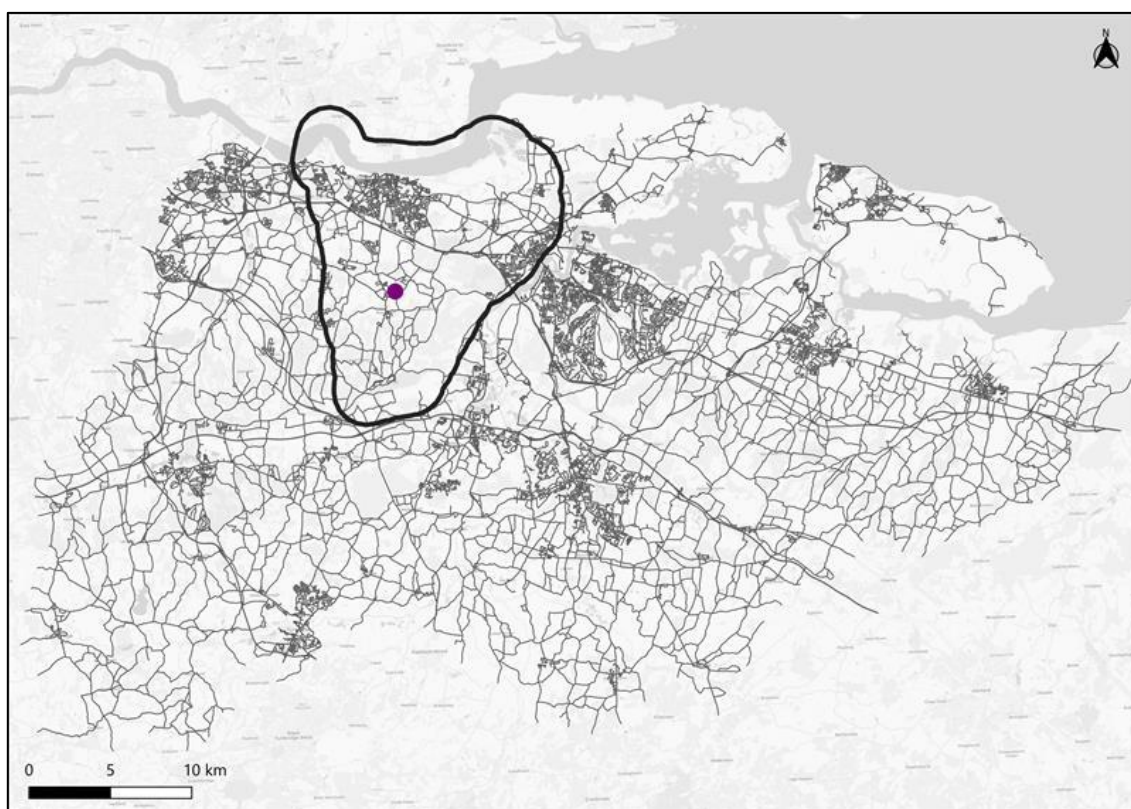


Figure 2-1: Extent of the GTM

The demand in the Gravesham Base VISUM model represents an average neutral weekday in 2019 during the morning peak hour (0800- 0900) and evening peak hour (1700 – 1800), obtained from the Kent County Model. The initial demand (prior to matrix estimation matrix) was cordoned from the KTM, and a matrix estimation process was undertaken for the local model to produce highway peak hour vehicle matrices required for the assignment.

The GTM 2019 Base Model has been used as the basis for developing a 2042 Reference Case (RC) (e.g. without the LP) scenario in which committed developments and infrastructure have been modelled, in addition to adjusted background growth (using TEMPro). Subsequently various iterations of a 2042 Do Something 'DS' model (e.g. with the LP option) have been developed to assess the proposed LP allocations as they have evolved through the Reg18 and Reg19 consultation stages.

2.1.2 Treatment of Lower Thames Crossing (LTC)

Further to the Development Consent Order (DCO) announcing the approval of the Lower Thames Crossing (LTC) in March 2025, all forecast scenarios of the GTM include the LTC as default.

2.1.3 Treatment of Galley Hill Road

Since the completion of the 2019 GTM base model development, a landslide resulted in the closure to Galley Hill Road from April 2023, with no fixed date as to when/if this will return to full operation. Due to the uncertainty surrounding the future operation of this route, forecast scenarios used to support Gravesham Regulation 19 Local Plan evidence base have been developed to reflect a network with "Galley Hill Road Closed" and "Galley Hill Road Open".

It was requested by KCC and the developer that the assessment of the proposed developments uses the "Galley Hill Road Closed" model scenario as this is considered a worst-case scenario.

3. Base Year Model Performance

The GTM Base has been developed with a 2019 base year and validated to on-ground conditions reflective of this time period. Whilst the 2019 GTM Base model has been approved by National Highways and meets TAG criteria on a district level, further base model checks were undertaken in the vicinity of The Site. These checks were undertaken to understand the model performance in terms of how the modelled flow matched the observed counts.

3.1 Count Data Checks

The model performance was analysed using existing count information available from the GTM and additional count information provided by the developer assessing the proposed site, as well as additional information made available since the development of the GTM.

There were ten new counts available and factored to 2019 conditions before they were included in the model for the base model check. The location of the additional counts is illustrated by the green links in Figure 3-1.



Figure 3-1: Counts used in the Base Model Check

The observed counts were compared against the 2019 base model flows with reference to TAG Unit M3.1, which provides guidelines on the criteria for individual links to check the quality of the assignment. Table 3-1 presents the criteria used for assessing the acceptability of the assignment and refers to the GEH Statistic measuring the difference between modelled and observed flows.

The GEH statistic is a form of the Chi-squared statistic that incorporates both relative and absolute errors, and is defined as follows:

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

where M is the modelled flow, and C is the observed flow.

Table 3-1: TAG Link Flow Validation Quality Criteria

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

3.2 Existing Base Model Performance

Further to the model review using the counts presented in Figure 3-1, it was determined that the model performance would benefit from localized enhancements. These enhancements were made through updated network coding and incorporation of additional count data into the model calibration process, which is further discussed below.

4. Base Model Network Refinement and Matrix Estimation

The checks outlined in Section 3 determined a limited base model enhancement would benefit the model performance.

At the time of commissioning this work, a neighbouring developer had completed a base model enhancement in the area to support their modelling work. It was determined that the enhanced model developed for the neighbouring site could be used to assess the impact of the proposed Meopham Site.

The process and model performance of the enhanced Base Model is detailed throughout this section.

4.1 Base Model Enhancements

The enhanced base model used the 2019 GTM as a starting network with the following enhancements to better reflect the travel patterns on the network; these changes included the following:

- Zone connector changes
- Link type updates

All changes made to the 2019 Base Model were then captured in the 2042 forecast scenarios.

4.2 Enhanced Base Model Performance

The model performance capturing the above enhancements is illustrated graphically in Figure 4-1 and Figure 4-2 for the AM Peak and Figure 4-3 and Figure 4-4 for the PM Peak.

A **green** bar illustrates that the link passes on criteria 1 or 2 (GEH <5 or Flow Pass) which considers the model to be a close match to observed flow, **orange** bars reflect a GEH between 5 and 10 and a **red** bar considers a GEH >10, which considers that the model is not reflective of observed conditions and does not meet TAG criteria.

The enhancements evidence that in the site proximity, all modelled flows are a close match to observed flows with a GEH <5 on all links for the AM and PM Peak. At a wider extent the key strategic routes such as A2, A226 Thames Way and B262 Wrotham Road are also a close match.

This analysis proves the model is sufficient basis for forecasting the impact of the development.

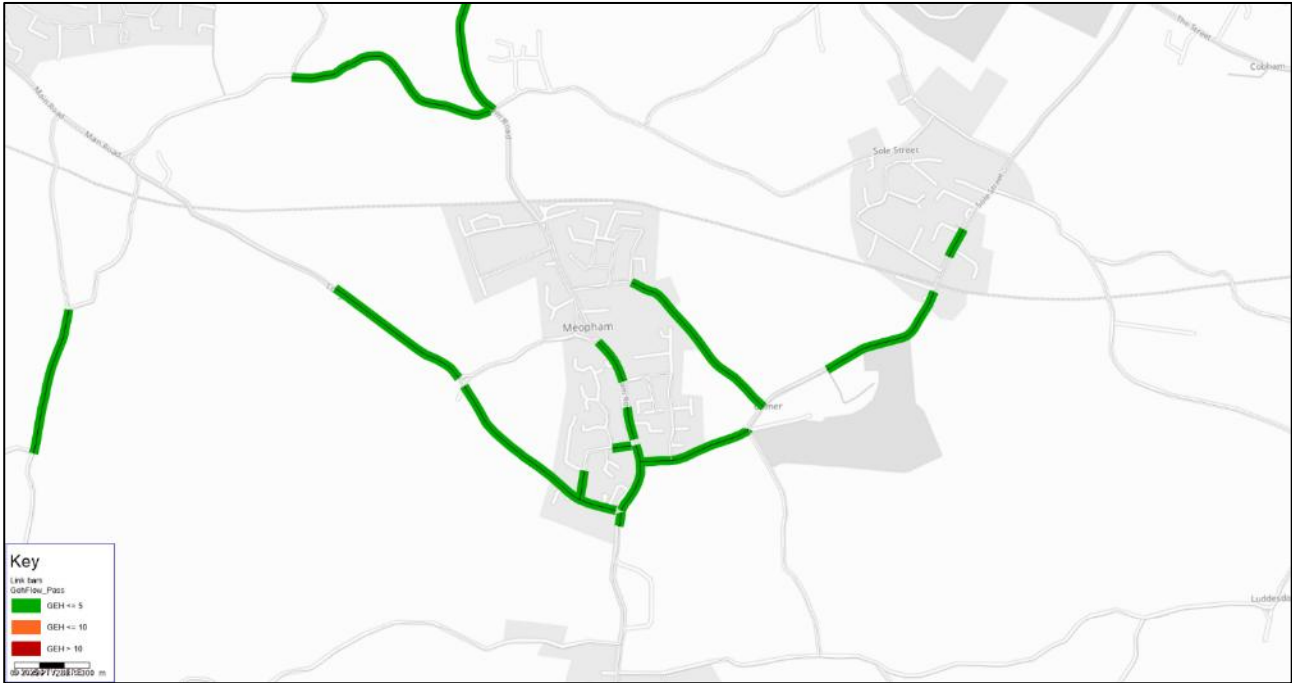


Figure 4-1: Enhanced 2019 GTM Base Model, AM Peak, Site Proximity



Figure 4-2: Enhanced 2019 GTM Base Model, AM Peak, Wider Extent

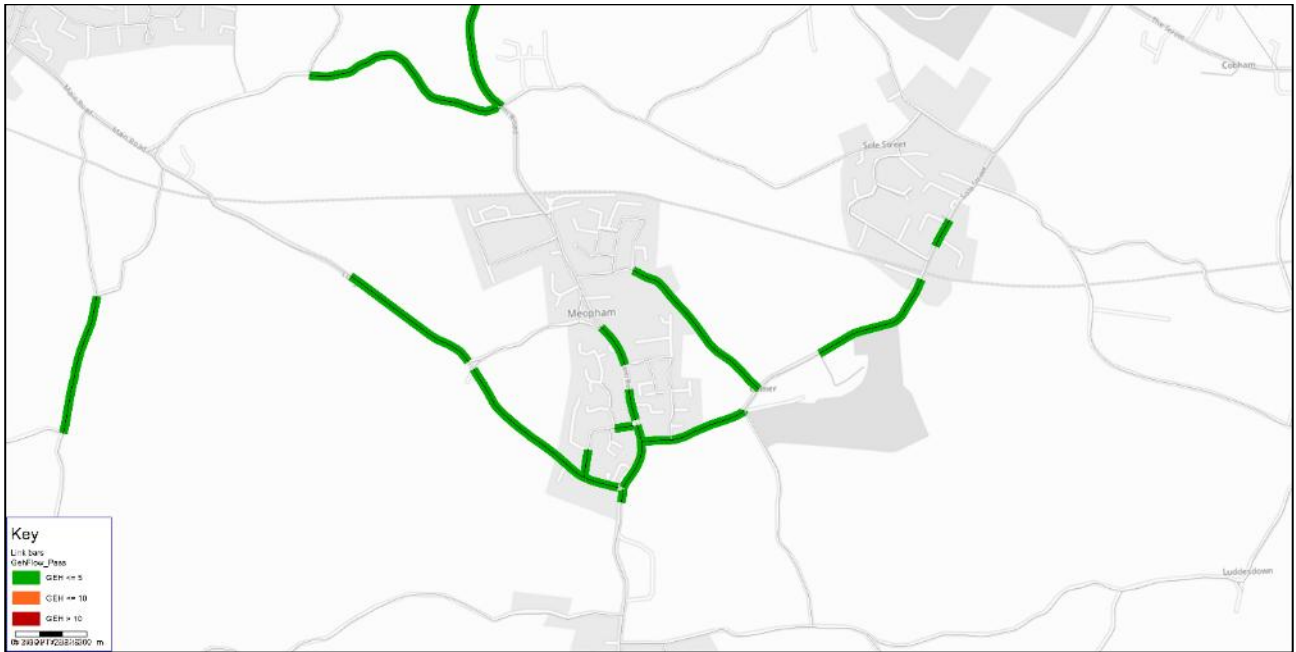


Figure 4-3: Enhanced 2019 GTM Base Model, PM Peak, Site Proximity



Figure 4-4: Enhanced 2019 GTM Base Model, PM Peak, Wider Extent

5. The Development Site Modelling

The impact of the proposed development has been assessed using the arrival profile provided by the developer and distributed using a neighbouring model zone of a similar land use. This methodology of this model development is discussed further in this section.

5.1 Assessment Scenarios

To understand the impact the proposed development would have on the network, the following scenarios have been utilised:

- Scenario 0 - Enhanced GTM Base Model: Utilises the 2019 GTM Base Model with the additional network changes and base model enhancements to better capture the travel patterns surrounding the development site.
- Scenario 1 - 2042 Reference Case (RC) **without** development: Utilises the 2042 Gravesham Transport Model. This includes the completed and committed development schemes within Gravesham between the 2019 Base Year and the 2042 Forecast Year. This model remains consistent with the 2042 RC developed to support the Gravesham Regulation 19 Local Plan assessment, except for the application of the Base model improvements detailed in Section 4.
- Scenario 2 - 2042 Reference Case **with** Development: Builds upon Scenario 1 with the addition of the development trips and associated infrastructure of the proposed Meopham development site.
- Scenario 3 - 2042 Do Something **with** Development **plus** Local Plan cumulative development: This scenario builds upon Scenario 2, including the Regulation 19 (Reg19) Local Plan allocations to understand the cumulative impact on the network.

Further to the Development Consent Order (DCO) announcing the approval of the Lower Thames Crossing (LTC) in March 2025, all scenarios include the LTC as default. Additionally, to assess a worst-case scenario, Galley Hill Road has been modelled as closed for all scenarios.

5.2 Development Quantum and Trip Generation

The developer provided the overall development quantum by land use type for the site, this is detailed below:

- 730 - Residential units;
- 420 - Pupil Primary School (32% catchment outside of the site);
- 500m² - Class E floor space
- 750m² - Class F2(b) floor space
- 2 - Sports pitches F2(c)

The total trip volumes at The Site by land use were agreed with KCC and TTC and added into the model. The origin and destination information is presented in Table 5-1 below.

Table 5-1: Trip generation of the proposed development

Land Use	Quantum	AM		PM	
		Origin	Destination	Origin	Destination
Residential Dwellings	730	417	122	128	253
Pupils – 2FE Primary School	420	39	87	19	14
Sqm Class E	500	0	0	0	0
Sqm Community Facilities	750	0	2	2	3
Sports pitches	2	0	0	25	25
Total		456	211	174	295

5.2.1 Development Distribution

In order to distribute the trip generation on the highway network, the donor zone method has been applied whereby trip patterns to/ from the development were distributed using a zone representative of a residential area.

School pupil trips in the were distributed using census data on primary school-aged children (*KS102EW - Age structure*). This assumed that school trips are re-directed trips, where parents would make the school drop off before continuing their journey to places of employment. To best reflect this, "User Class 1: Car Commute" was used to re-direct these trips and instead of a direct trip from home origin (zone A) to a place of employment (zone B), the model assumes a journey from home origin (zone A), via the school (zone C) before continuing on to a place of employment (zone B) – this is demonstrated in Figure 5-1.

Home origins for school trips (pupils) have been distributed only within the census output areas as the feasible catchment area for the proposed school.

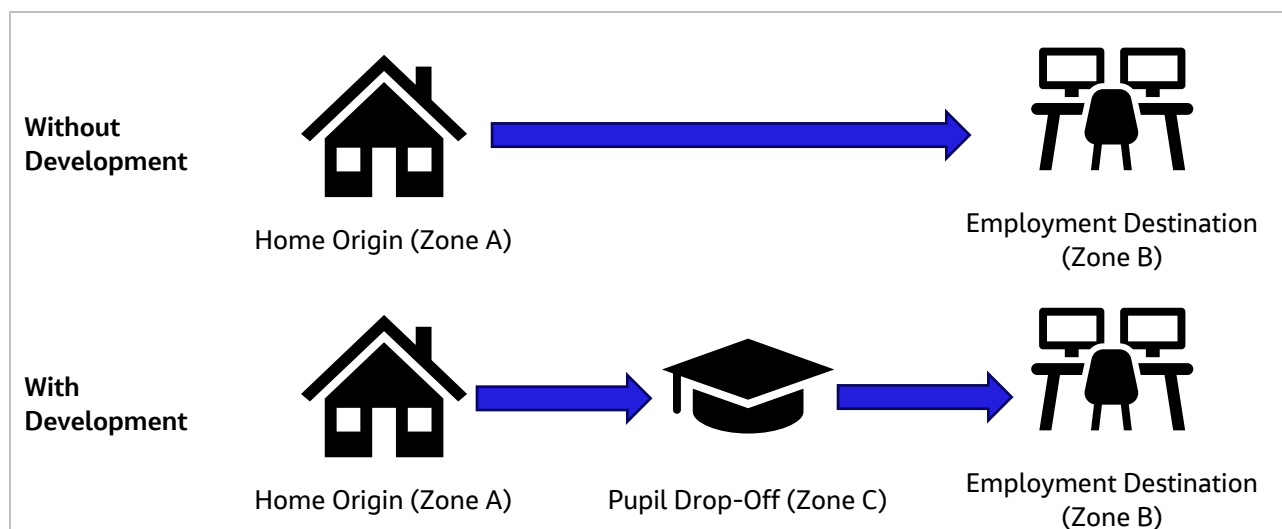


Figure 5-1- Re-Distribution of School Pupil Drop-Off Trips (AM Peak)

Flow bundles in VISUM are used to filter and graphically display loaded paths passing through specific link(s) or model zone(s) obtained from the assignment process. These paths are characterised by route paths from zone origins to zone destinations, mode of transport and traffic volume.

Two-Way flow bundle figures for the Do Something scenarios (Scenario 2 and Scenario 3) have been produced to demonstrate the distribution of total origins and destination trips (e.g all land uses) in the AM and PM Peak. The AM Peaks in Scenario 2 (Figure 5-2) illustrates a large proportion of the development flows travel to and from areas to the north via Camer Road and A227 Wrotham Road (322 two-way flows and 221 two-way flows respectively). Flows are also observed to travel south on A227 Wrotham Road (52 two-way flows) and west on Shipley Hills Road.

During the PM Peak of Scenario 2 (Figure 5-3), similar trends to the AM Peak are noted, but in the reverse direction. The largest volumes of flows are again noted on Camer Road with 318 two-way flows. The demand using A227 Wrotham Road is significantly less in this peak.

Scenario 3 presents the distribution of development trips on the network with the cumulative impact of the Local Plan allocations. Figure 5-4 illustrates that during the AM Peak there is a greater demand on the Camer Road route compared to Scenario 2, with flows avoiding the A227 Wrotham Road route.

The PM Peak presented in Figure 5-5 sees growth in development flows using A227 Wrotham Road northbound compared to Scenario 2 but decreases southbound.

Overall, the wider distribution remains the same of the development flows, but the cumulative impact of the Local Plan sites changes the behaviours of flow more locally (i.e dependence on A227 Wrotham Road or Camer Road).

Appendix A contains further flow bundle distribution figures at different extents of the model area.

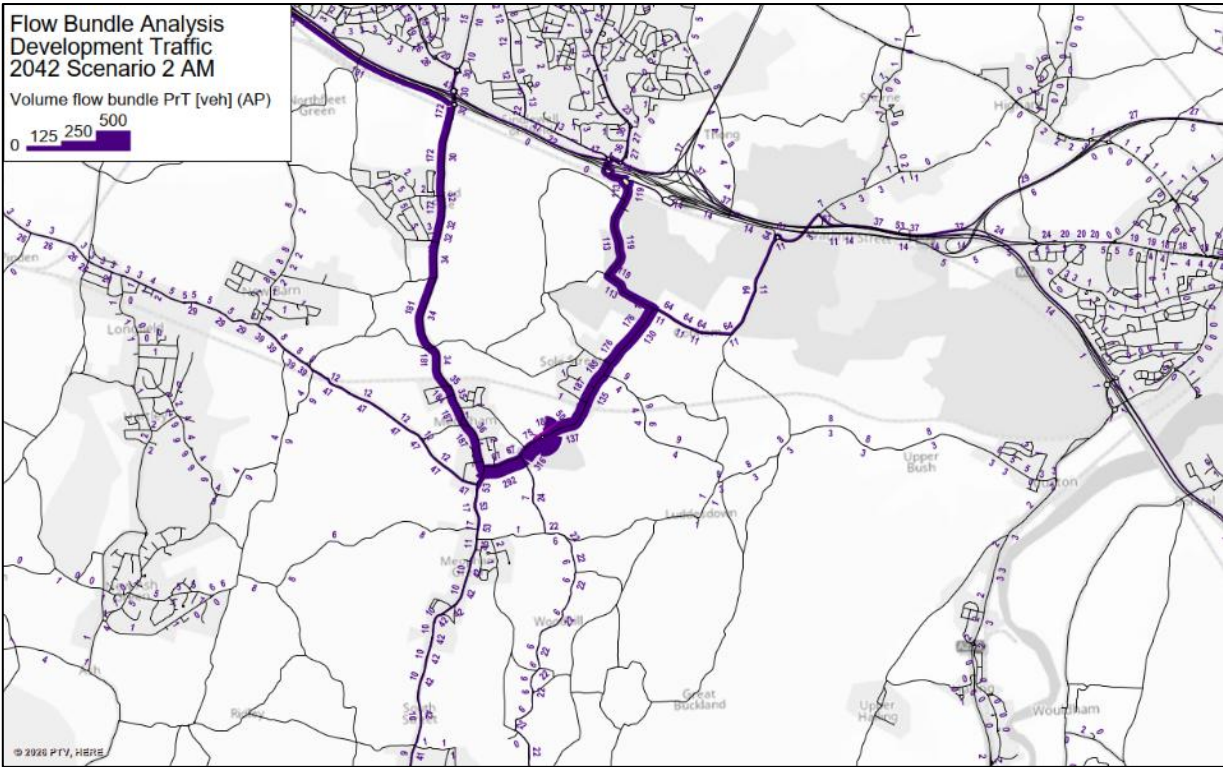


Figure 5-2: Scenario 2 Flow Bundle – AM Peak

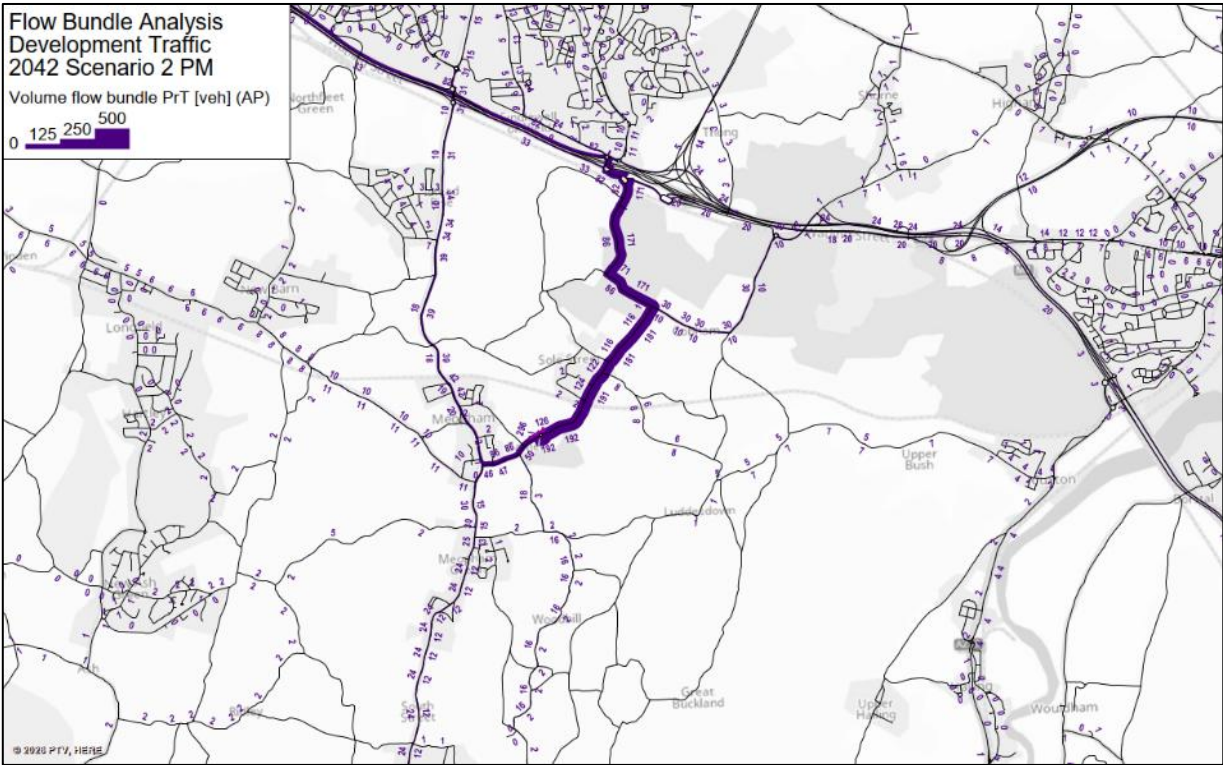


Figure 5-3: Scenario 2 Flow Bundle – PM Peak

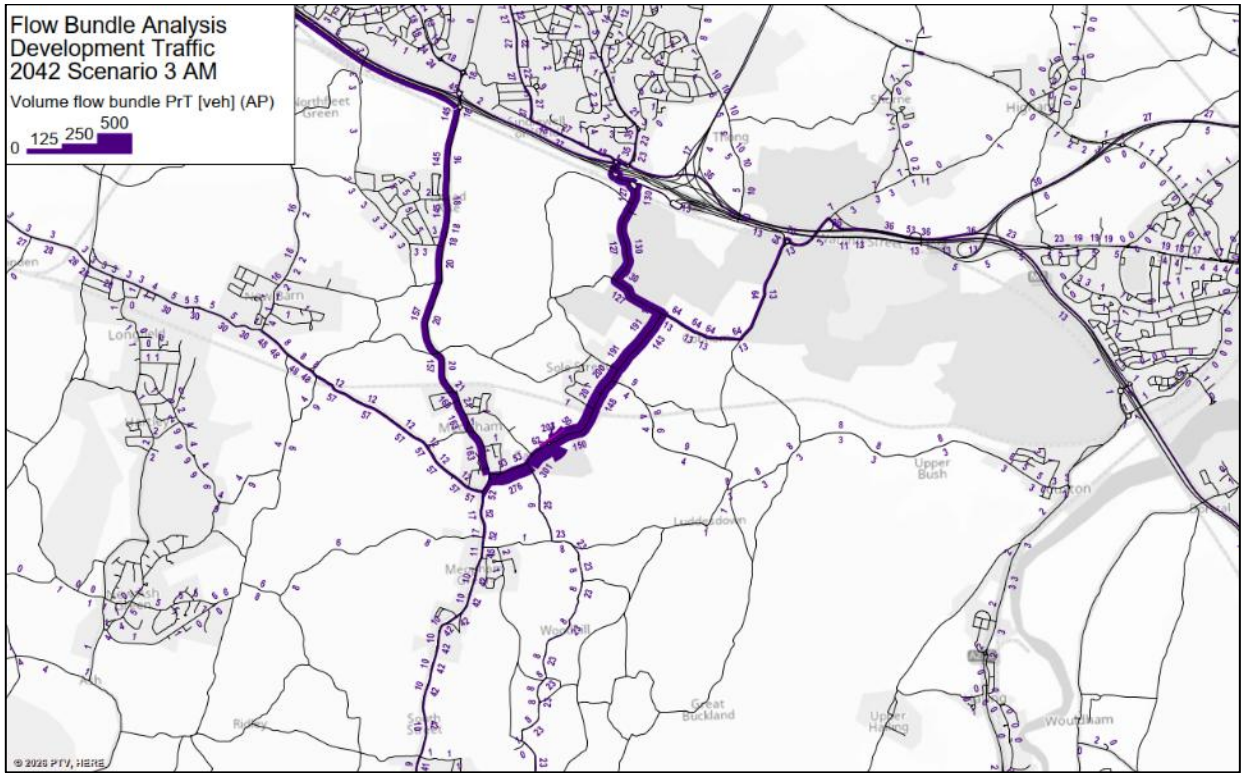


Figure 5-4: Scenario 3 Flow Bundle – AM Peak

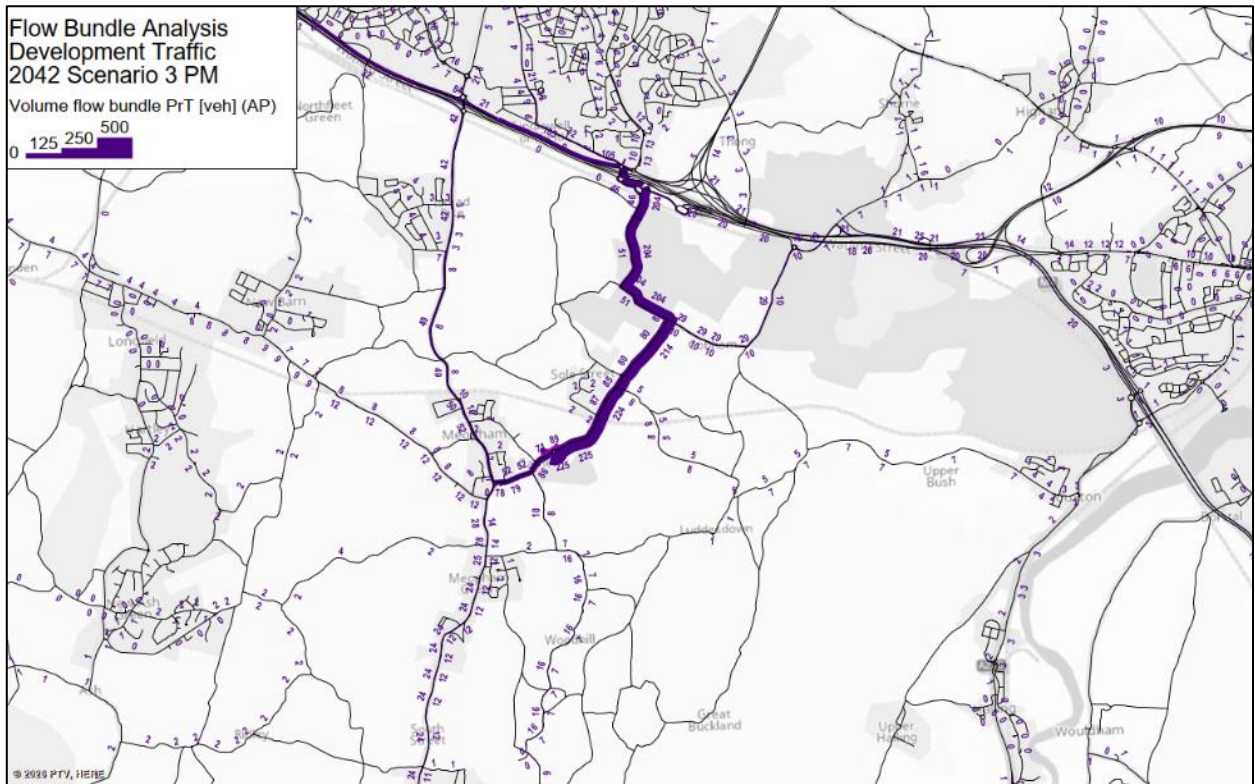


Figure 5-5: Scenario 3 Flow Bundle – PM Peak

5.3 Site Access

The Site has been modelled as four individual point zones to best reflect the different trip distribution associated with each land use detailed in Table 5-1. The model assumes a single access point for all vehicles via a three-arm roundabout off Camer Road. This location of this access is detailed by the pink arrow in Figure 5-6.

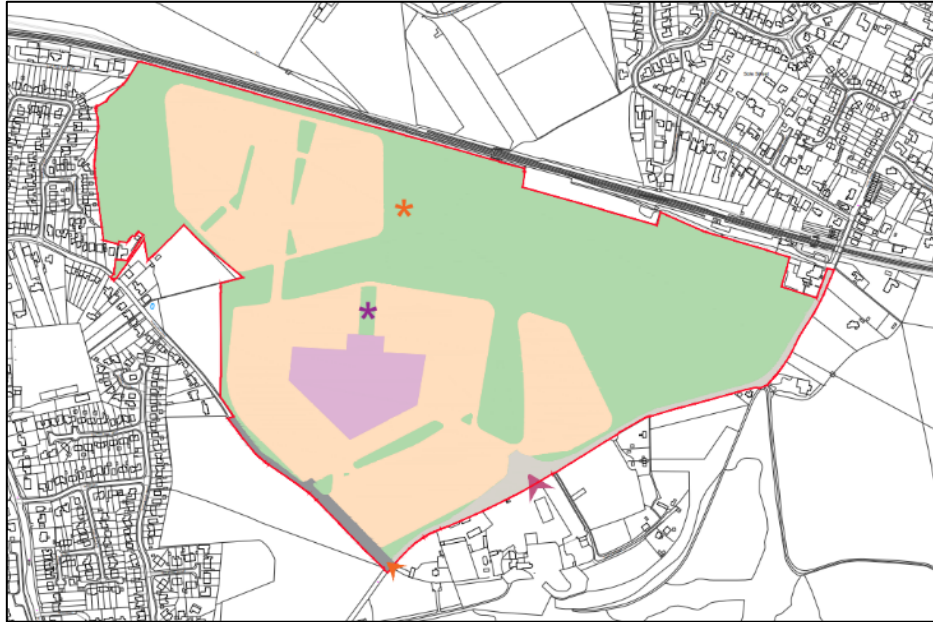


Figure 5-6: Site Access

In addition to the site access infrastructure, the site will widen Camer Road slightly and proposals have been made to close Norwood Lane to through traffic. The dashed yellow line in Figure 5-7 reflects the closure on Norwood Lane. The route will allow access for buses and emergency vehicles only; however, it is assumed that pedestrian and cycle facilities are still available on this route.



Figure 5-7: Norwood Lane Closure

6. Forecast Results

The impact the Meopham development will have on the network was determined using the trips shown in Table 5-1. These trips were added to the Scenario 2 and Scenario 3 (Do Something) networks and compared against Scenario 1 (Reference Case). The following outputs plots were produced to measure the impact of the site:

- Actual Flow (Appendix B)
- Actual Flow Differences (Appendix C)
- Delays (Appendix D)
- Junction Level of Service (Appendix E)
- Link Volume Capacity (Appendix F)
- Junction Turning Counts at 8 junctions in the vicinity of the site (Appendix G)

Outputs within this report have been presented at a close extent to the proposed site, further outputs at differing extent can be found within the respective Appendices.

6.1 2042 Reference Case

Scenario 1 - 2042 Reference Case (RC) **without** development: Utilises the 2042 Gravesham Transport Model. This includes the completed and committed development schemes within Gravesham between the 2019 Base Year and the 2042 Forecast Year. There is no change to this model compared to the 2042 RC presented for the Gravesham Regulation 19 Local Plan assessment, except for the application of the Base model improvements detailed in Section 4.

6.1.1 Actual Flows

Actual flow figures for the 2042 Reference Case Scenario are presented in vehicles for the AM and PM Peak respectively (Figure 6-1 and Figure 6-2). Larger volumes of flows are observed on key strategic routes such as;

- A227 Wrotham Road (two-way flow of 1,645 in AM and 1,705 in PM);
- A2 Watling Street west of Tollgate Interchange (two-way flow of 1,0435 in AM and 11,815 in PM)
- Camer Road, east of North Lane (two-way flow of 645 in AM and 630 in PM);

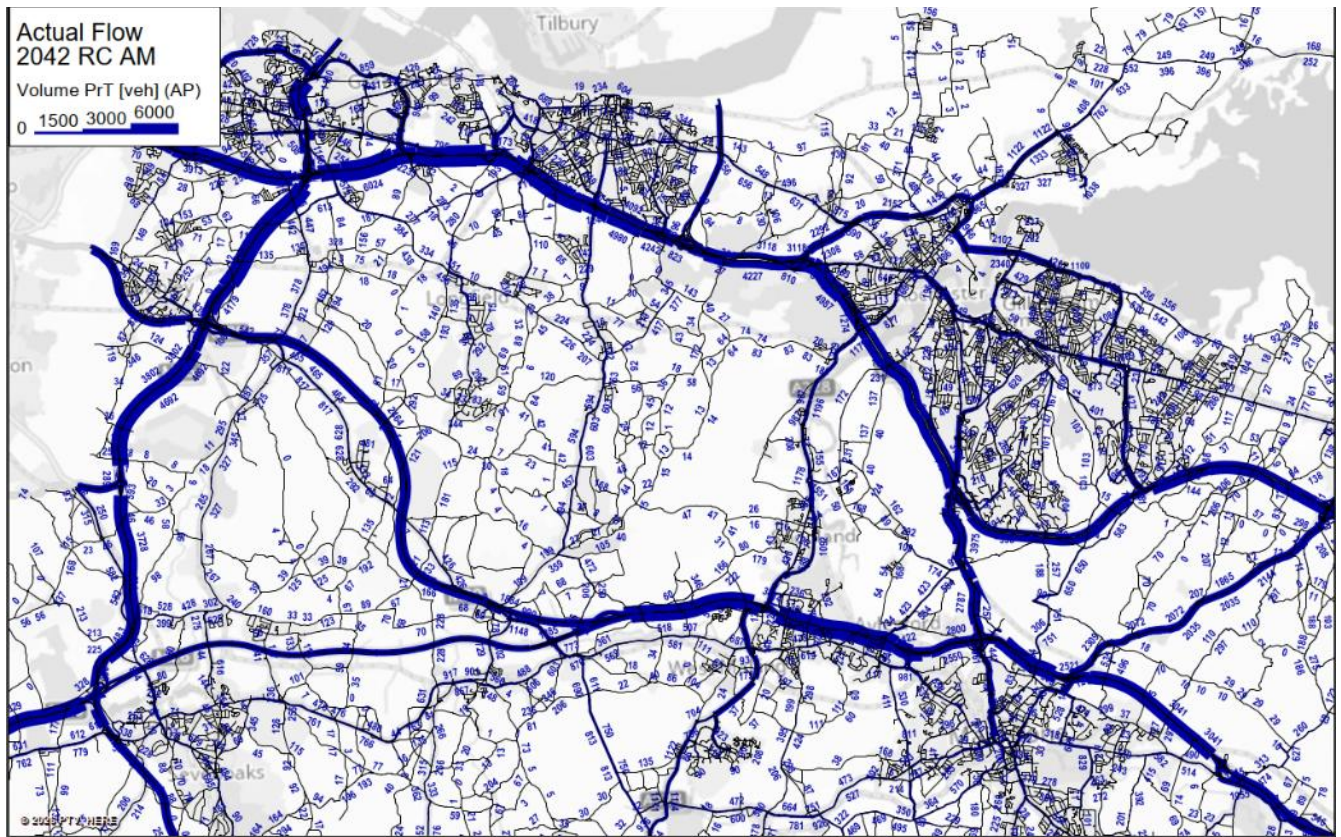


Figure 6-1: RC Actual Flows – AM Peak

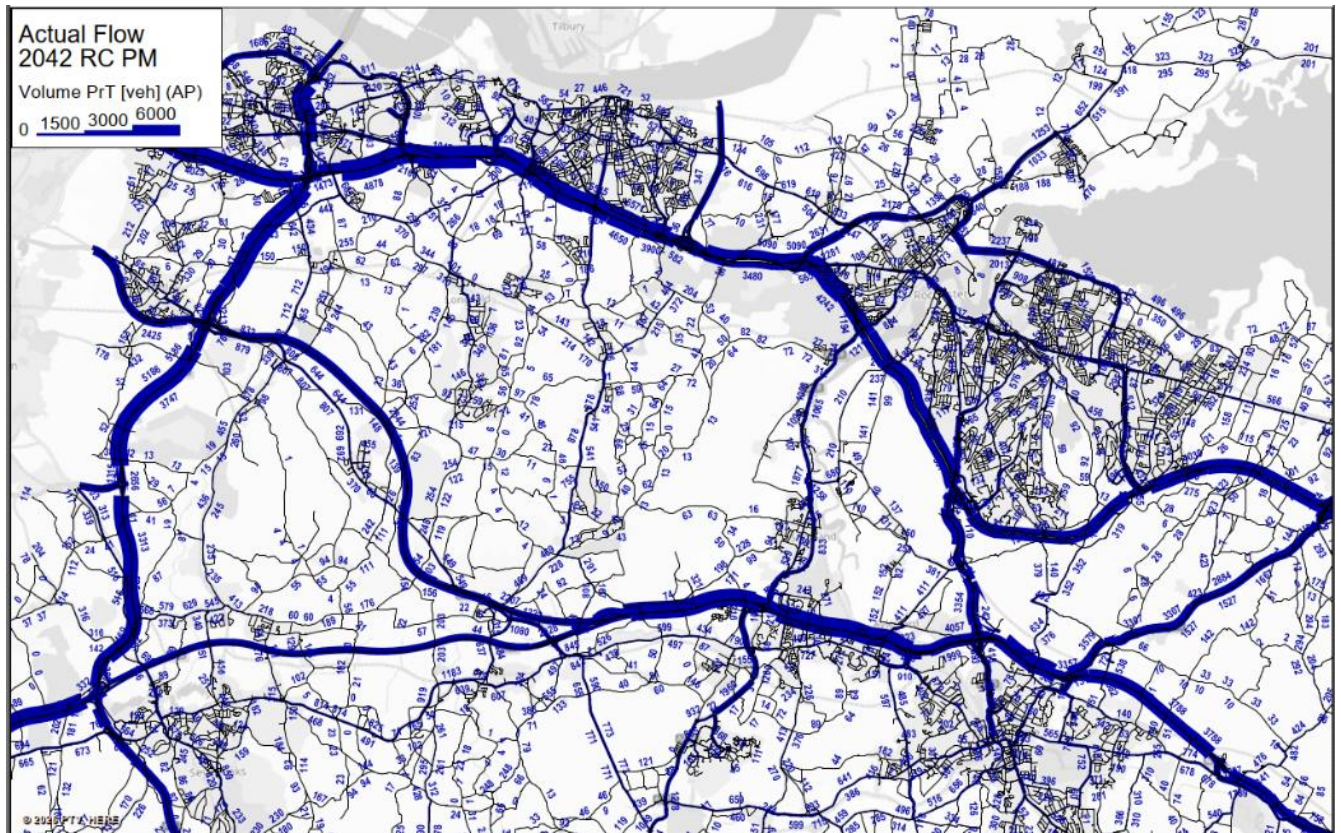


Figure 6-2: RC Actual Flows – PM Peak

6.1.2 Delay

Delay figures have been produced to understand areas on the network where slow moving traffic is anticipated, this is calculated using the difference between the journey time in an uncongested network compared to a congested network.

Figure 6-3 presents the delays in the 2042 Reference Case scenario during the AM Peak. This evidence delays on the A2 westbound travelling towards London, of over 1 minute approaching the Tollgate Interchange. Delays between 15 and 30 seconds are also present on the north-south corridor on A227 Wrotham Road and Camer Road westbound approaching Camer Park Road notes delays of approximately 15 seconds.

During the PM Peak (Figure 6-4) delays are noted in similar locations to the AM Peak, however the A2 eastbound is more constrained, which reflects the tidality of flow on the network. Delays on A227 Wrotham Road northbound through South Street see delay of up to 30 seconds.



Figure 6-3:RC Delay – AM Peak



Figure 6-4: RC Delay – PM Peak

6.1.3 Junction Level of Service

Junction Level of service (LOS) provides a qualitative measure of how good the forecast traffic situation is on a given junction, from the driver's perspective. As actual flow will vary for different days and different times in a day, LOS relates the traffic service quality to a given flow rate of traffic. VISUM defines the LOS based on the mean delay experienced by each vehicle. VISUM has the capability to calculate LOS for all types of junctions (priority, roundabouts, and signalised junctions). Table 6-1 below defines the LOS by six levels ranging from level A to level F.

Table 6-1: Level of Service Description

LOS Level	Description
A	Level A represents the best quality of traffic where the driver has the freedom to drive with free flow speed
B	Level B represents good traffic quality where driver can reasonably maintain and maneuverability within the traffic stream is slightly restricted.
C	Level C represents stable traffic flows, at or near free flow. Ability to manoeuvre through lanes is noticeably restricted and requires awareness.
D	Level D represents almost unstable traffic flows. Speeds slightly increase. On this level driver comfort decreases.
E	Level E represents unstable traffic flows, operating at capacity. Driver's level of comfort becomes poor.
F	Level F represents the worst traffic quality with forced or breakdown traffic flows. Travel time cannot be predicted, with generally more demand than capacity.

Figure 6-5 presents the maximum junction turn LOS in the AM Peak of the 2042 Reference Case network. In the vicinity of the site all junctions have an LOS of C or better. The B255 Whitehill Road/ Hook Green Road/ Highcross Road/ Westwood Road presents a turn LOS D.

There are numerous junctions/ junction approaches on the A2 which present a junction LOS F, this includes the Tollgate Interchange where the westbound off slip approach to the southern roundabout and the service

road approach to the northern roundabout present an LOS F. The LOS F in this locality is due to the high levels of demand on this route, giving way to opposing flow.

Similar pressure points are evidenced in the PM Peak (Figure 6-6), with numerous A2 junctions noting an LOS F. During this peak the Station Road/ Fox Hound Lane has a maximum turn of LOS C, this is due to the delay of up to 16 seconds the flow from the minor routes incur.

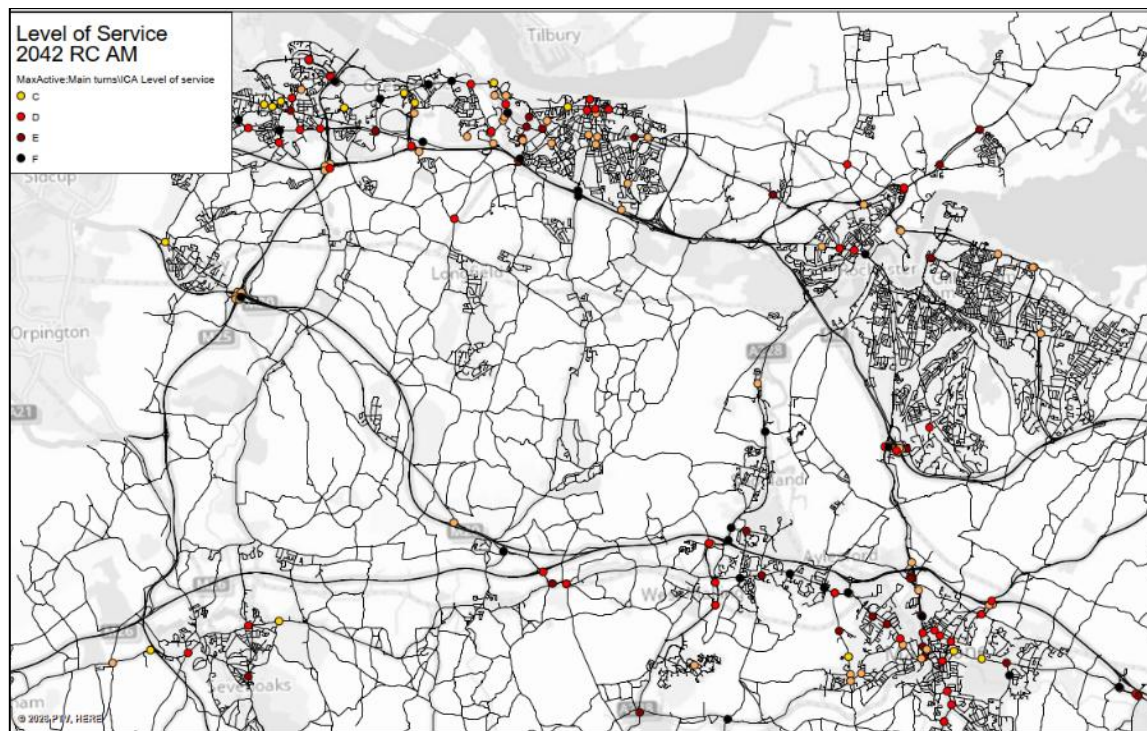


Figure 6-5:RC Level of Service – AM Peak

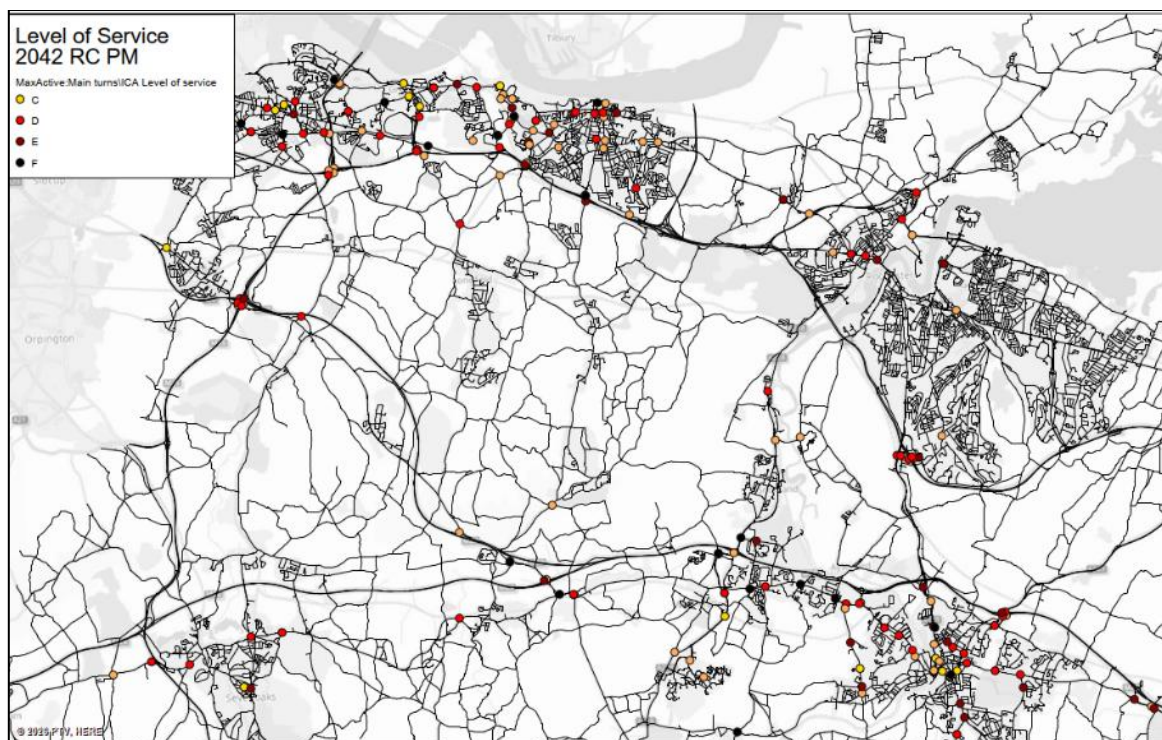


Figure 6-6:RC Level of Service – PM Peak

6.1.4 Volume Capacity Ratio

A Volume Capacity (V/C) assessment was undertaken to understand link and turn performance on those links closest to the development site. This considered the turn and link capacity, calculated using the volume of vehicles on a link/ turn and divided by the capacity. V/C was then summarised in one of the four categories detailed in Table 6-2.

Table 6-2: Volume over capacity thresholds

Volume over Capacity Thresholds		Impact Assessment
V/C < 75%		Operating within capacity
75% <= V/C < 85%		Operating within capacity but approaching 85%
85% <= V/C < 100%		Operating close to capacity
V/C >= 100%		Over capacity

Figure 6-7 and Figure 6-8 show the volume capacity ratio of links on the existing 2042 Forecast Baseline in the AM and PM, respectively.

During the AM Peak the A2 westbound presents links approaching capacity west of the Tollgate Interchange (link V/C >75%). Additionally, the A227 Wrotham Road southbound approach to the northern roundabout on the Tollgate Interchange exceeds capacity with a VC >100%.

The PM Peak sees the A2 eastbound links approaching capacity with the eastbound approach to the Watling Street junction at 98% capacity.

The links closest to the proposed site are all within capacity (VC <75%) in both peaks.



Figure 6-7: RC Volume of Capacity – AM Peak



Figure 6-8: RC Volume of Capacity – PM Peak

6.2 2042 Scenario 2

Scenario 2 - 2042 Reference Case **with** Development: Builds upon Scenario 1 with the addition of the development trips and associated infrastructure of the site.

6.2.1 Actual Flows

Actual flow figures for Scenario 2 are presented in vehicles for the AM and PM Peak respectively (Figure 6-9 and Figure 6-10).

Larger volumes of flows are observed on key strategic routes such as;

- A227 Wrotham Road (two-way flow of 1,770 in AM and 1,880 in PM);
- A2 Watling Street west of Tollgate Interchange (two-way flow of 10,535 in AM and 11,810 in PM)
- Camer Road, east of North Lane (two-way flow of 930 in AM and 600 in PM);

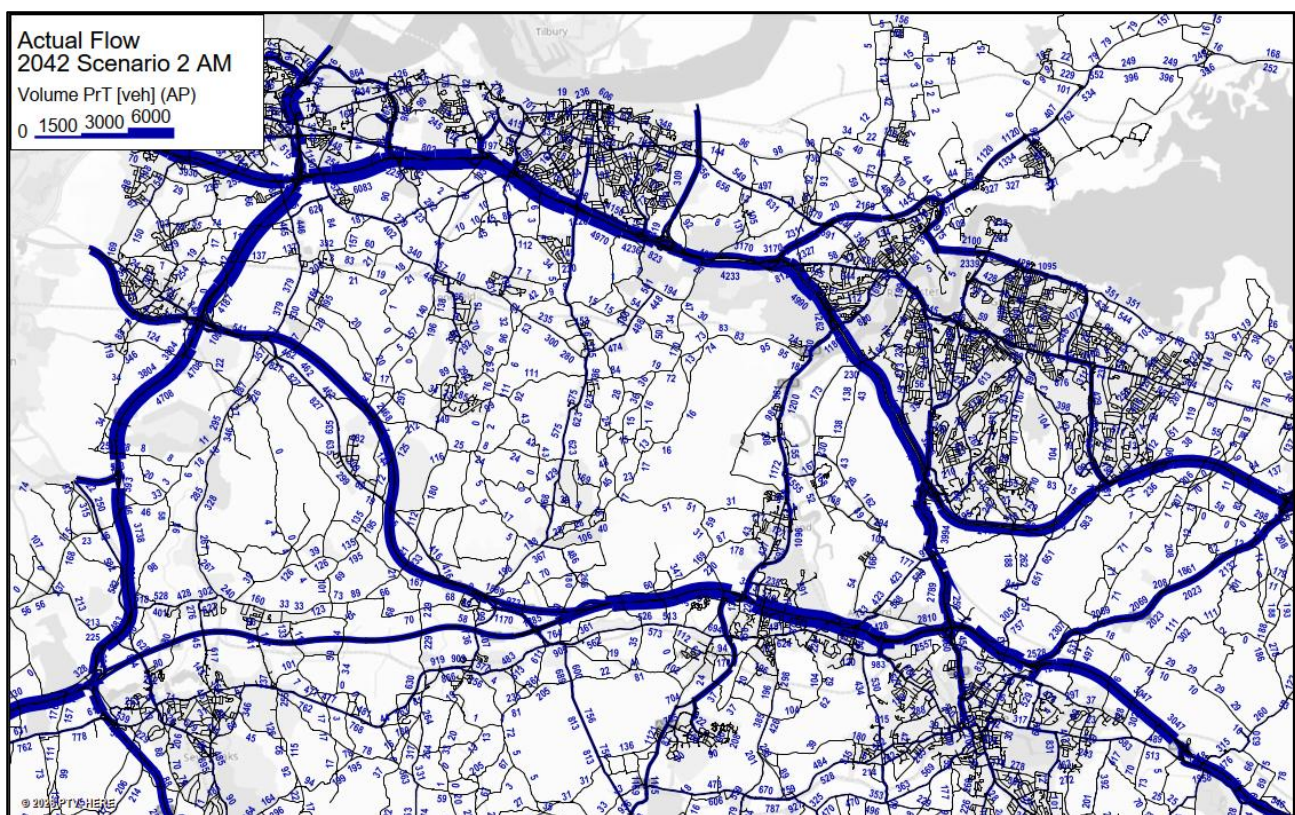


Figure 6-9: DS2 Actual Flows – AM Peak

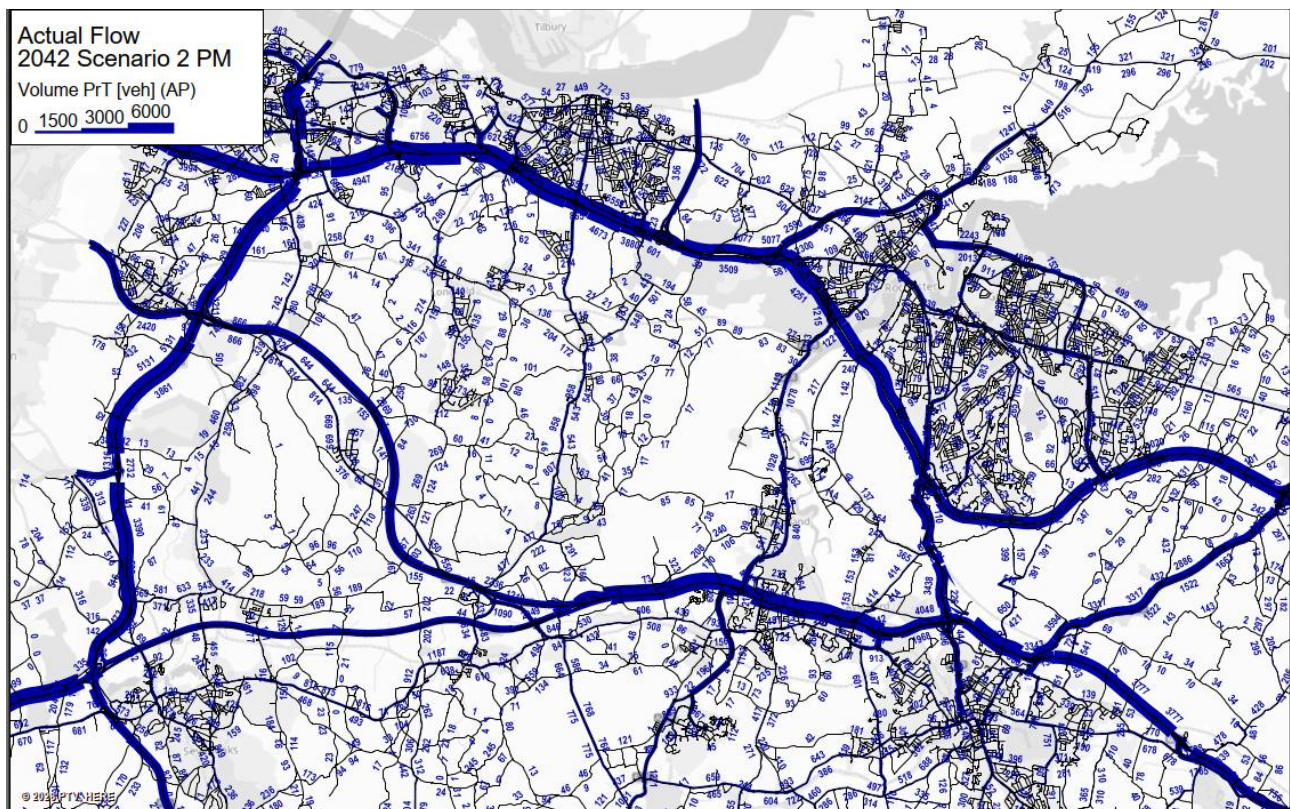


Figure 6-10: DS2 Actual Flows – PM Peak

6.2.2 Actual Flow Differences

Actual flow differences between Scenario 2 and the Reference Case are presented in Figure 6-11 and Figure 6-12 for the AM and PM Peak.

The AM Peak sees the largest growth of flows on A227 Wrotham Road (140 two-way flows), Sole Street (190 two-way flows) and Longfield Road (85 two-way flows). Reductions of flow using A227 Wrotham Road northbound approaching the Longfield Road junction are evidenced (approximately 30 vehicles), this is due to flows from West Peckham seeking alternative routes.

During the PM Peak, the development trips results in additional demand on Sole Street southbound (135 flows) and A227 Wrotham Road northbound, approaching Meopham (80 vehicles). As the site is residential led, during this peak many flows return to the site. Unlike the AM Peak, there are small reductions of flow noted on Longfield Road.

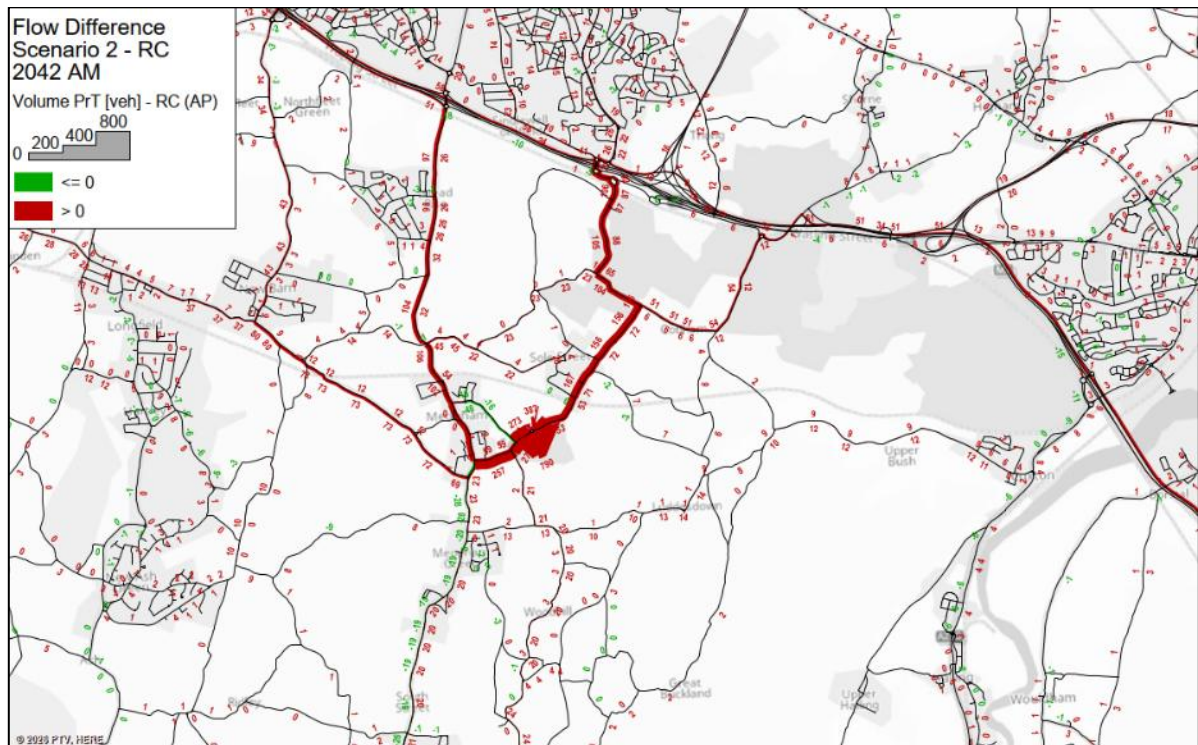


Figure 6-11: DS2 vs RC Flow Difference – AM Peak

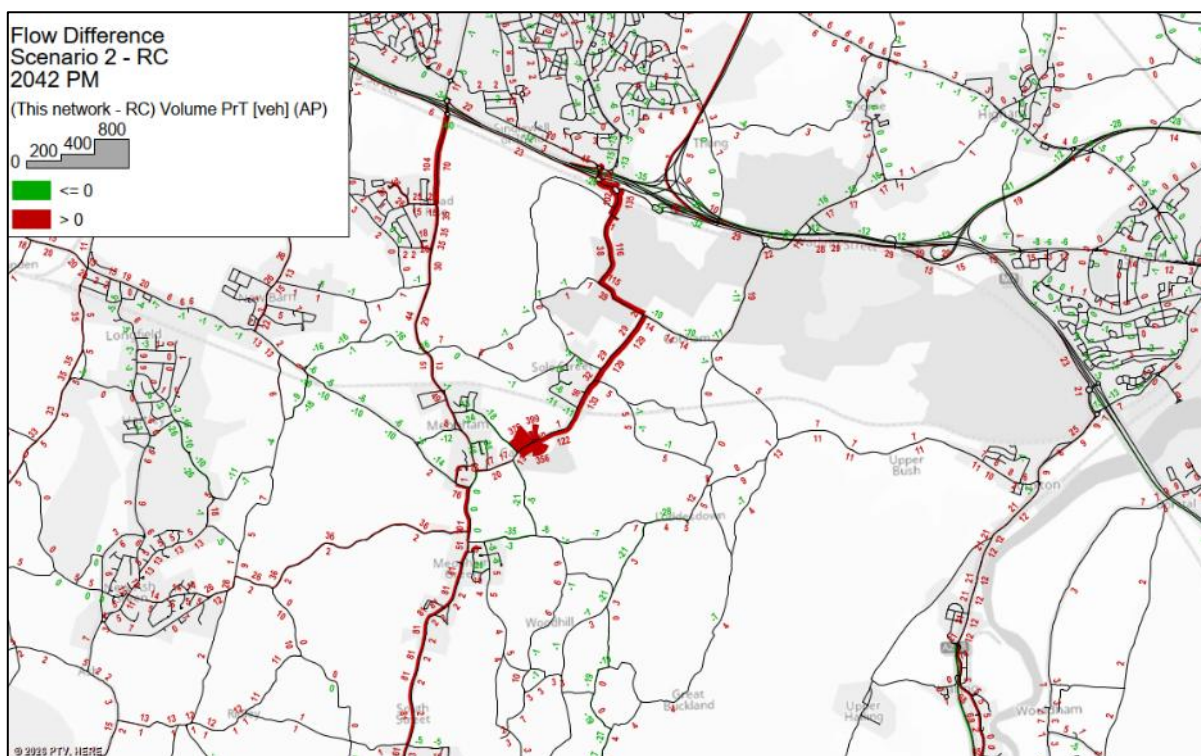


Figure 6-12: DS2 vs RC Flow Difference – PM Peak

6.2.3 Delays

Scenario 2 AM (Figure 6-13) sees an increase of mean delay time of 10 seconds on the A227 Wrotham Road northbound between Meopham and Istead Rise. During the PM Peak (Figure 6-14), the reverse trend is observed with the A227 Wrotham southbound whereby an additional 3 seconds of mean delay time on the

approach to Istead Rise is noted (total delay of 18 seconds). Henhurst Road/ Jeskyns Road eastbound also sees increases to delay of around 3 seconds due to the additional flow on this route.

Overall, the impact the development has on delays is minimal and the links within the immediate vicinity of the Site remain largely unchanged.



Figure 6-13: DS2 Delays – AM Peak



Figure 6-14: DS2 Delays – PM Peak

6.2.4 Level of Service

During the AM Peak of Scenario 2 (Figure 6-15) the Whitehill Road/ Westwood Road/ Highcross Road/ Hook Green Road illustrates a max turn LOS of E, which is a deterioration compared to the RC. This is due to the additional north/ south flow using this route resulting in additional delay for the minor turns. The new

junction to access the LTC is shown to operate with an LOS C in this scenario, changing from LOS better than C in the RC.

In the PM Peak (Figure 6-16) there are two junctions on the A2 which deteriorate compared with the RC, these are the Station Road/ Hall Road junction (LOS C to D) and the southern roundabout at the Tollgate Interchange (LOS E to F).

In both peaks, the junction LOS performance of junctions closest to the site remain unchanged to the RC.

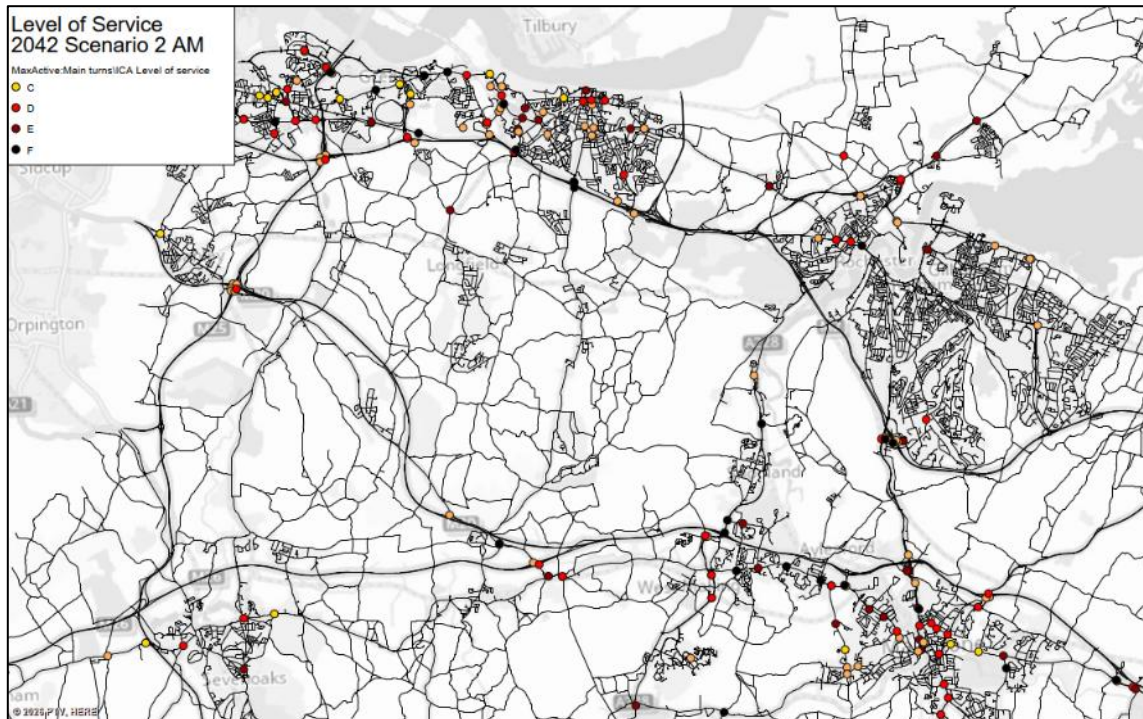


Figure 6-15: DS2, Level of Service – AM Peak

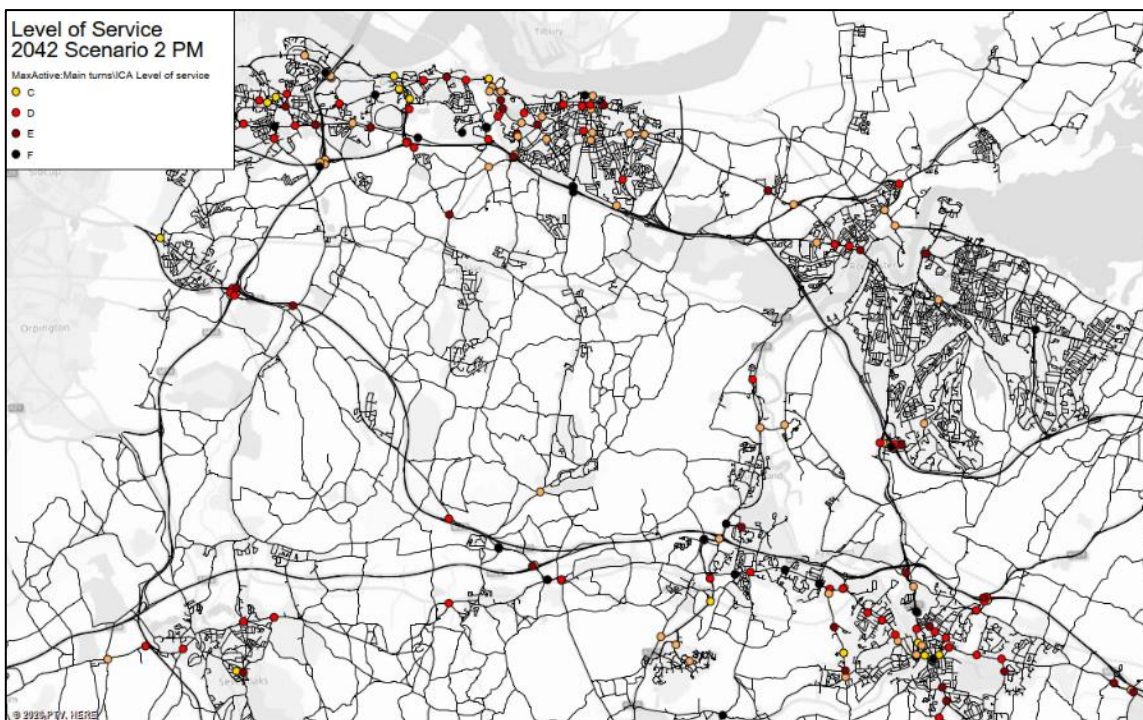


Figure 6-16: DS2, Level of Service – PM Peak

6.2.5 Volume Capacity

The additional trips in Scenario 2 AM Peak do not influence the available capacity during the AM Peak; with all links remaining in the same V/C category to the Reference Case.

During the PM Peak the A227 Wrotham Road approaching Meopham has a V/C of 77%, this is a decrease of available capacity of 6% compared to the RC.



Figure 6-17: DS2, Volume over Capacity – AM Peak



Figure 6-18: DS2, Volume over Capacity – PM Peak

6.3 2042 Scenario 3

Scenario 3 - 2042 Do Something **with** Development **plus** Local Plan cumulative development: This scenario builds upon Scenario 2, including the Regulation 19 (Reg19) Local Plan allocations to understand the cumulative impact on the network.

6.3.1 Actual Flows

Actual flow figures for Scenario 3 are presented in vehicles for the AM and PM Peak respectively (Figure 6-19 and Figure 6-20). Larger volumes of flows are observed on key strategic routes such as;

- A227 Wrotham Road (two-way flow of 2,000 in AM and 2,020 in PM);
- A2 Watling Street west of Tollgate Interchange (two-way flow of 10,700 in AM and 11,960 in PM)
- Camer Road, east of North Lane (two-way flow of 1,020 in AM and 800 in PM);

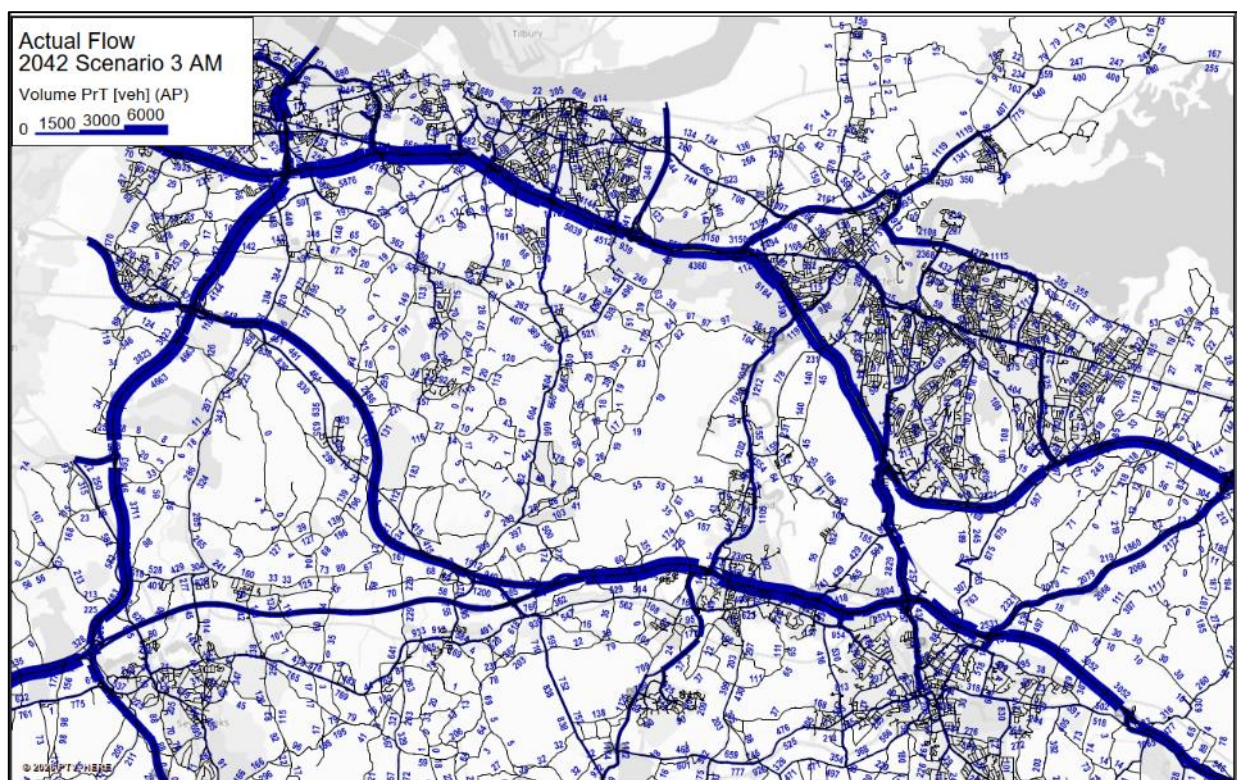


Figure 6-19: DS3, Actual Flows – AM Peak

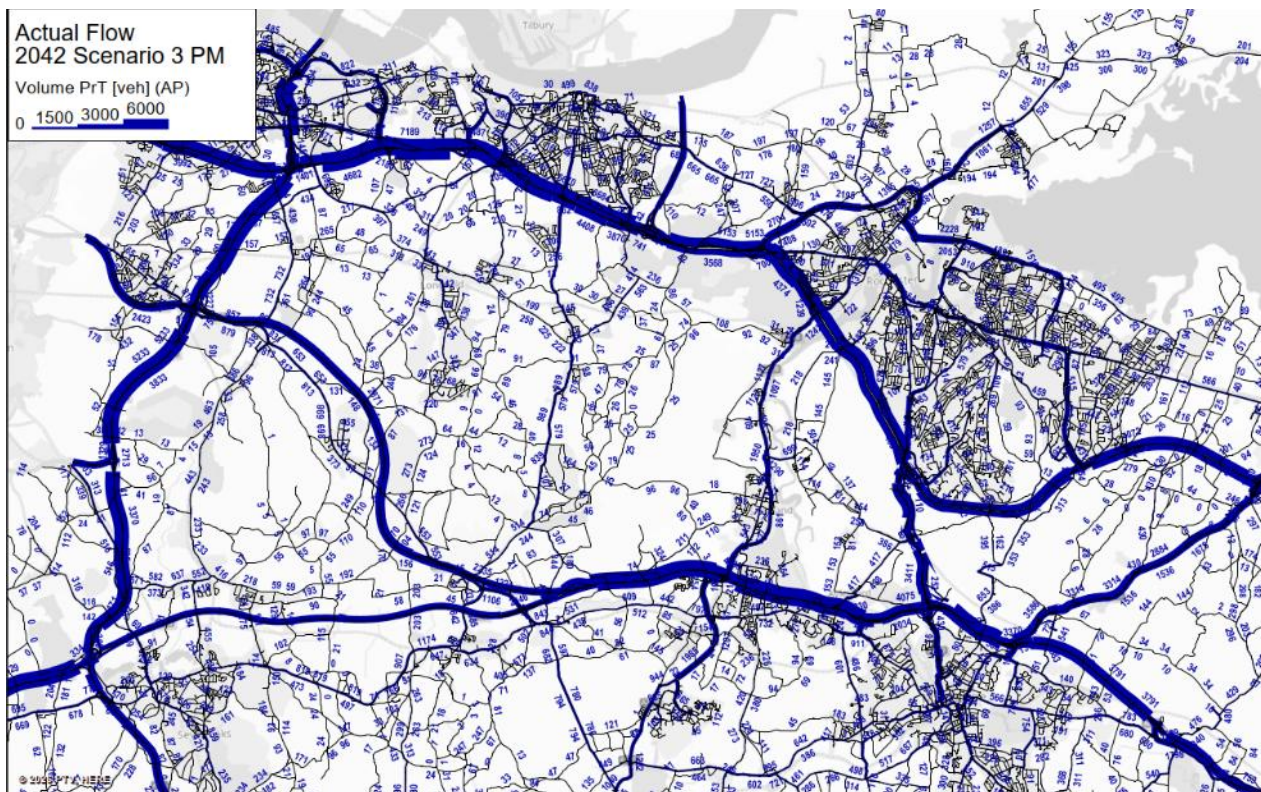


Figure 6-20: DS3, Actual Flows – PM Peak

6.3.2 Actual Flow Differences

The flow difference between Scenario 3 and the Reference Case identify the impact of the proposed site and the cumulative impact of the local plan sites on the network.

This comparison illustrates that during the AM peak (Figure 6-21) there is large growth in flow across the network. In the vicinity of the proposed site, growth of 360 two-way flows is noted on Camer Road, 305 two-way flows on A227 Wrotham Road and 180 two-way flows on Longfield Road. Growth in flows is also evidenced to the north in Gravesham.

During the PM Peak (Figure 6-22) growth of flows is observed on similar routes to those identified in the AM Peak; Camer Road 320 two-way flows, A227 Wrotham Road 320 two-way flows and Longfield Road 100 two-way flows. There are reductions of 240 vehicles travelling westbound on the A2, this is due to queues of 250 vehicles extending from the southern roundabout at the Tollgate Interchange. These queues are due to delay of 52 seconds of delay for those vehicles turning left at the junction.

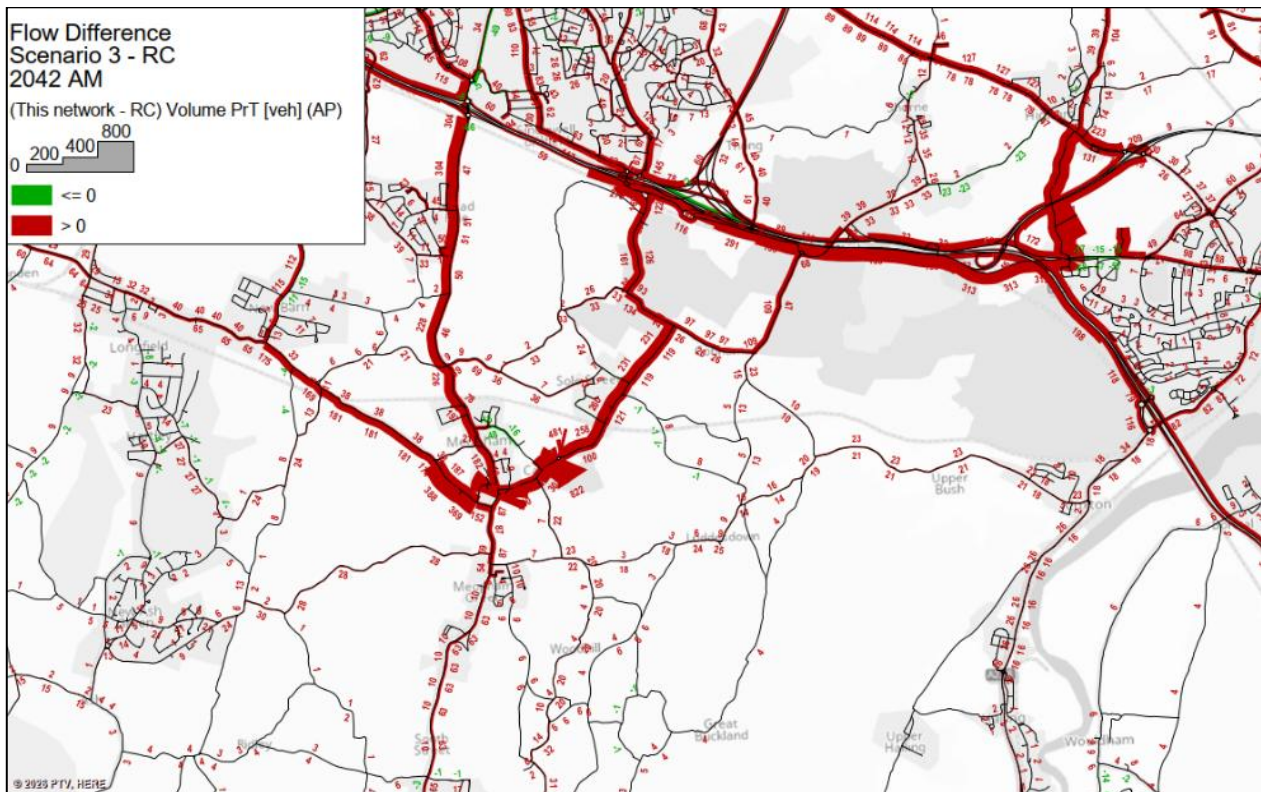


Figure 6-21: DS3 vs RC, Actual Flow Difference – AM Peak

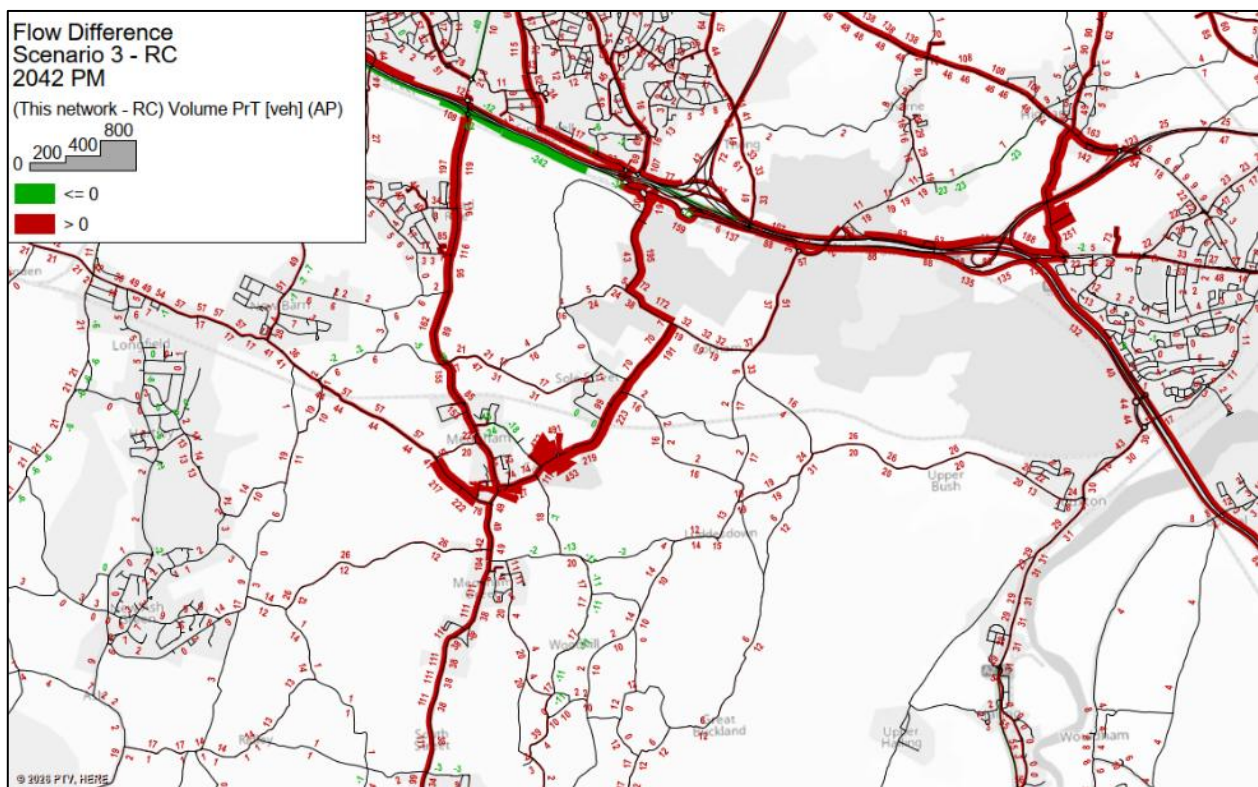


Figure 6-22: DS3 vs RC, Actual Flow Difference – PM Peak

6.3.3 Delay Plots

The impact on delays on the network when the Local Plan allocations are implemented are displayed in Figure 6-23 and Figure 6-24 for the AM and PM respectively.

During the AM Peak of Scenario 3, delays extend further east on Camer Road for westbound flows (this equates to an additional 58 seconds of delay between The Street and A227 Wrotham Road compared to the RC. The additional delay is due to the increases of 300 vehicles on this route. The A227 Wrotham Road northbound notes an additional 47 seconds of mean delay extending from Meopham to the Tollgate Interchange. Large delays are also noted in many areas on the network such as A226 Thames Way and A227 Wrotham Road southbound approach to the Tollgate Interchange.

The PM Peak sees the largest increase in mean delay time on the A2 westbound approach to the Tollgate Interchange whereby additional 1 minute and 14 seconds delay are noted. This is attributing to the reduced flow noted in this area (as presented in Figure 6-20).



Figure 6-23: DS3 Delays – AM Peak



Figure 6-24: DS3 Delays – PM Peak

6.3.4 Junction Level of Service

The cumulative impact of the Local Plan sites including the proposed development assessed in Scenario 3 AM (Figure 6-25) add pressure to A227 Wrotham Road/ Camer Road junction and Jeskyns Road/ The Street junction. Both of these junctions operate with an LOS C (previously better than C in the RC and Scenario 2); the change in junction performance is due to the additional demand using these routes.

The PM Peak (Figure 6-26) presents similar trends to the AM Peak whereby the Jeskyns Road/ The Street junction operates with an LOS C.

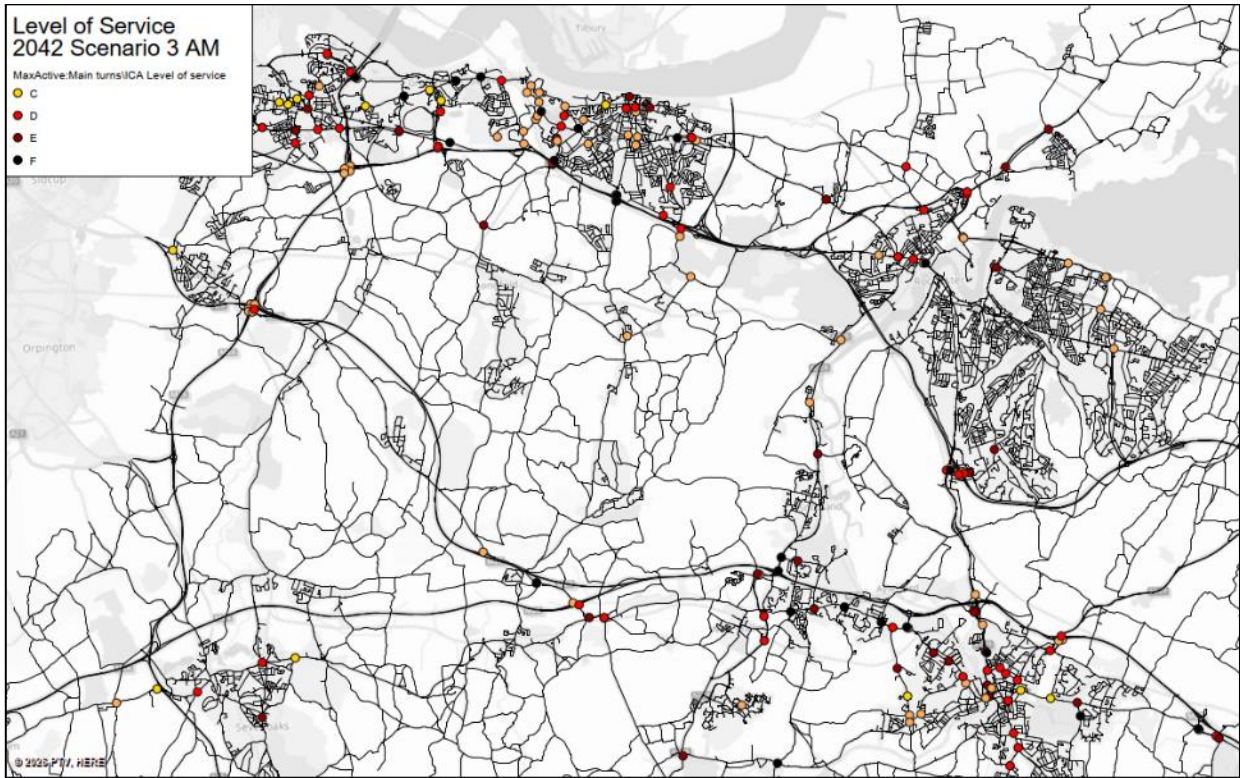


Figure 6-25: DS3, Junction Level of Service – AM Peak

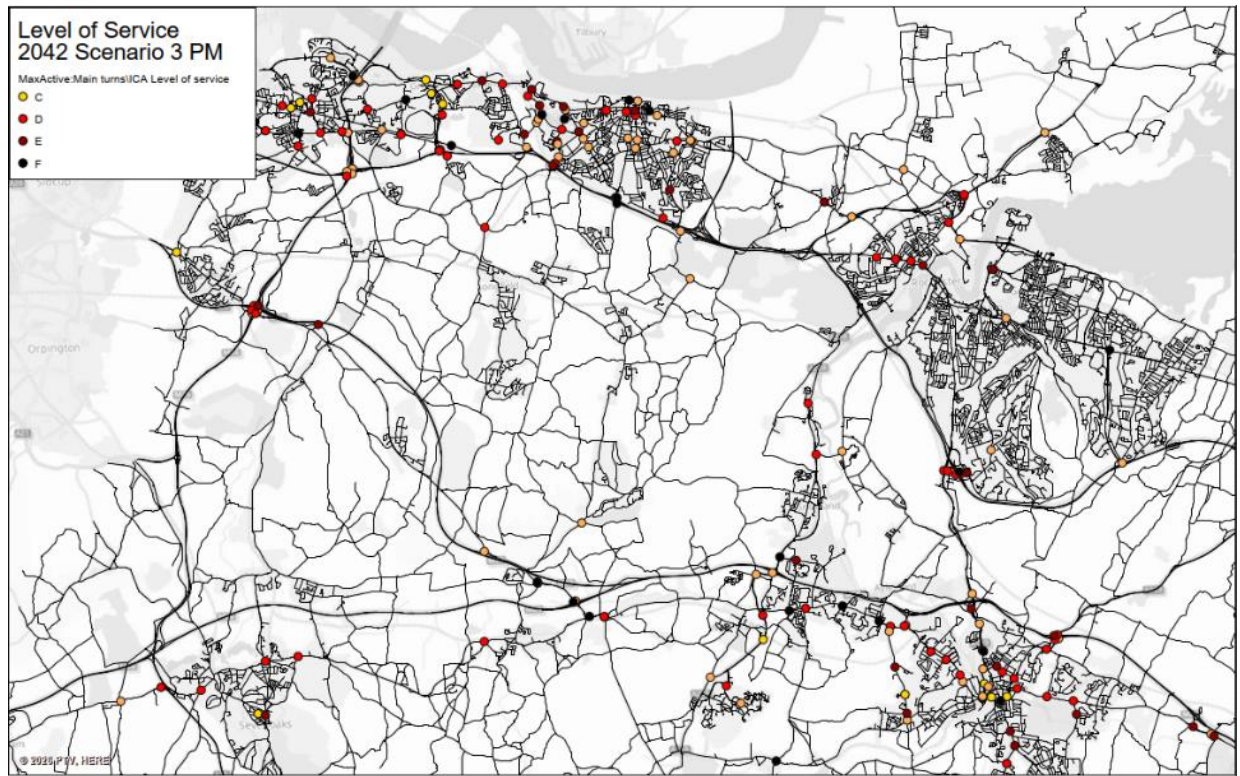


Figure 6-26: DS3, Junction Level of Service – PM Peak

6.3.5 Volume over Capacity Ratio

Figure 6-27 and Figure 6-28 show the link Volume over Capacity (V/C) Ratio for the AM and PM peak of Scenario 3. This sees A227 Wrotham Road with a volume capacity ratio of 78%, this is a deterioration to the RC and Scenario 2 (60% and 66% respectively). The new link associated with the LTC also sees an VC >75% in this scenario.

During the PM Peak, the A227 Wrotham Road northbound approaching Meopham has a VC of 84%, this is nearing capacity and approximately a 6% deterioration to Scenario 2 in this location.



Figure 6-27: DS3, Volume over Capacity – AM Peak



Figure 6-28: DS3, Volume over Capacity – PM Peak

As the KTM and GTM is strategic in nature, it is recommended that, detailed junction modelling is undertaken to understand the junction performance. The developer requested junction turning flows at the following locations (also presented in Figure 6-29):

- Junction 1 – Hall Road / A2 Watling Street
- Junction 2 – Wrotham Road / A2 Watling Street Roundabout South
- Junction 3 – Wrotham Road / A2 Watling Street Roundabout North
- Junction 4 – Henhurst Road / A2 Watling Street/Service Road Roundabout
- Junction 5 – A2 Watling Street / Bean Lane Roundabout North
- Junction 6 – A2 Watling Street / Bean Lane Roundabout South
- Junction 7 – A2 Watling Street / Southfleet Road Roundabout
- Junction 8 – Hever Court Road / Cobsdene

It is important to reiterate that the VISUM model is a strategic model and has not been validated at a turning flow level. It is proposed that the growth between the GTM Base and Forecast years (in terms of actuals) is applied to observed base turning counts (used to develop base year local junction models) for any junction models that are developed, this will ensure that the correct turning movements are captured and the growth on each link is correctly captured.



Figure 6-29: Junctions where turning flows have been extracted

7. Summary

This Technical Note summarises the assumptions and methodology applied to assess the impacts of the proposed Meopham development.

Across Scenarios 2 and 3, the modelling indicates increased traffic in areas surrounding and extending beyond the proposed development. In comparison to the RC scenario, traffic flows are predicted to rise along Camer Road, particularly in the vicinity of the new development, as well as on Wrotham Road, and Longfield Road. The results also show reductions in traffic flow in certain areas A2 Westbound in Scenario 2 AM Peak and Scenario 3 PM Peak due to increase of delays and queues in these areas.

The analysis highlights that whilst some junctions already operate with a poor Level of Service (LoS), and the proposed development is likely to exacerbate conditions at several of these locations (particularly along the A2 and the Highcross Road/ Westwood Road/ Hook Green Road/ B255 Whitehill Road junction). A deterioration in LoS can restrict the amount of traffic passing through affected junctions, which in turn contributes to flow reductions in parts of the wider network, as illustrated in the flow difference plots.

The results indicate that Scenario 3, which represents the cumulative impact of Local Plan development, generates the greatest level of stress on the network. The additional traffic flows worsen conditions at key junctions, including A2/Wrotham Road, and lead to further delays around the Hall Road junctions and the A2260 junctions.

Accompanying files have been prepared to include detailed information on turning flows, volume overcapacity ratio, and Level of Service for the junctions in the vicinity of the proposed development.

The scenarios presented in this Technical Note have been developed to assess the potential impacts of the proposed development on the surrounding network. However, it should be noted that the assumptions used in the analysis reflect information available at the time of modelling, and further review should be undertaken if additional or new information become available. Localised junction modelling is recommended to assess the junction performance in terms of queues, delay and LoS.

Appendix A

Flow Bundle Information

Appendix B

Actual Flows

Appendix C

Actual Flow Differences

Appendix D

Delays

Appendix E

Junction Level of Service

Appendix F

Volume over Capacity Ratio

Appendix G

Junction Turning Flows