Crawley Borough Council Local Plan Transport Strategy

LPTS Stage 2 Report
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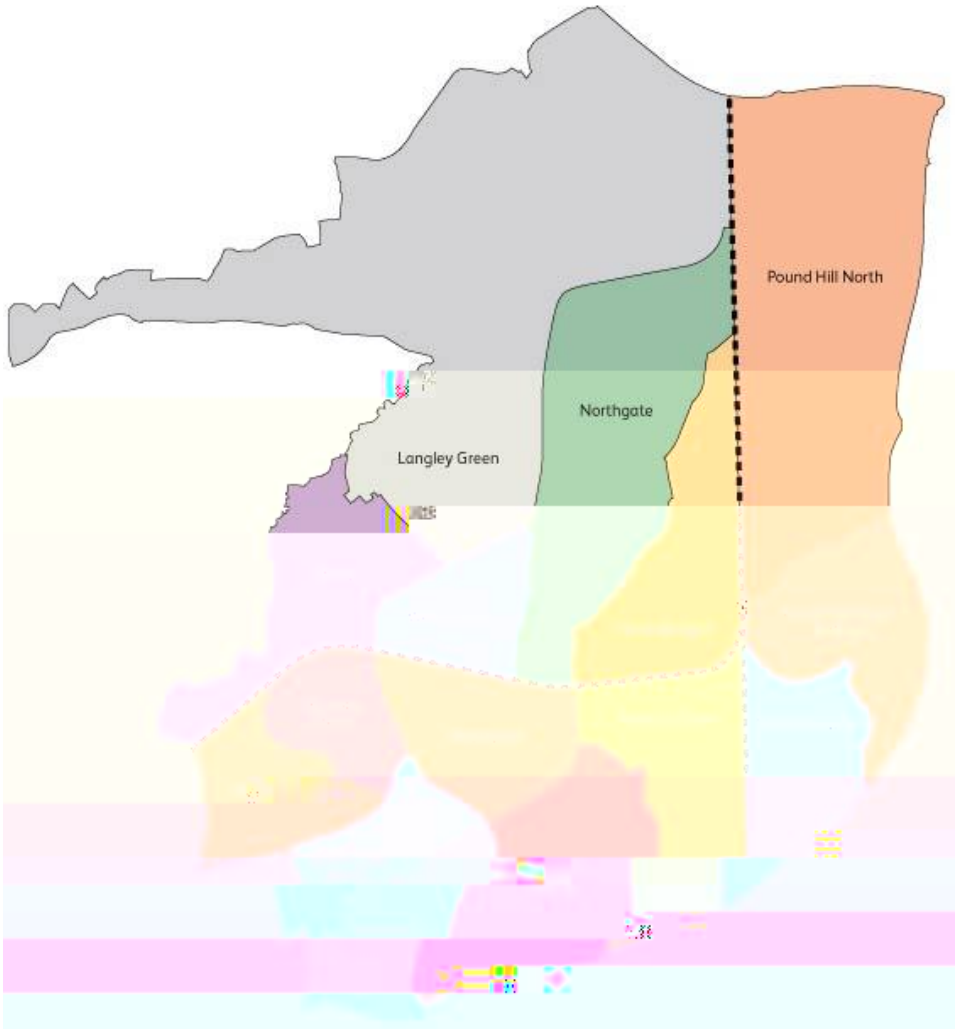

Document Control Sheet

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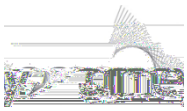

2.5.2. Regional traffic forecasts from the National Transport Model (RTF13) showed negligible traffic growth in the South East region between 2003 and 2010. Furthermore, traffic growth between 2006 and 2008 was only 0.19%pa, or 0.37% overall, so no growth adjustment was required in order to match the 2006 CTCM internal trips with the 2008 WSCTM Crawley Town external trips, in the hybrid 2008 model.

2.5.3. Matrix estimation was applied carefully to the hybrid 2008 AM matrix, to improve the representation of poorly observed movements and match observed traffic counts. The iterative process was controlled, to maximise the convergence between modelled and observed flows and by allowing only a small matrix adjustment factor (maximum of 3.0), to discourage creation of excess short-distance trips.

2.5.4. estimation and including heavy goods vehicles (HGV), are shown in Table 1 below.

Table 1: Final Matrix Totals

	AM Peak 2008 (All-Vehicle PCU)

2.6.2. The assignment outcome, for the core area of Crawley, showed the base year 2008 hybrid model to be reliable, as it achieved a close match between observed and modelled link flows, when compared with DfT criteria (WebTAG Unit 3.19). Some 90% out of 163 calibration links had a GEH of 5.0 or less (target 85%). Also, across 12 directional validation cordons and screen-lines, over 90% of combined flows within each cordon and screen-line (target 85%), were within 5% of observed, whilst 92% had a GEH of 4.0 or less (target 80%).

2.6.3. In the wider county area of the hybrid model, across 138 highway links, it was found that 87% (120 links) had a GEH of 5.0 or less across the wider network (target 85%). This indicated acceptable model accuracy across West Sussex as well as within Crawley.

2.6.4. Journey time validation also showed acceptable accuracy in the hybrid model. In Crawley, 90% of routes (target 85%) had a modelled time within 15% of observed.

2.6.5. The 2008 hybrid AM peak model achieved a satisfactory level of convergence, in terms of

indicated that the base model outcome is reliable and would not change if it was subject to further iterations.

2.6.6. The public transport segment of the WSCTM was also enhanced to incorporate local detail within Crawley, from the CTCM, using the same method as for the highway model. Validation of the PT hybrid model was not verified, as passenger flow and journey time data within Crawley were not available.

2.6.7. A comparison of modal shares was made between the hybrid 2008 AM base model and 2011 Census data for West Sussex County, to confirm the accuracy of the model. Although the hybrid outcome excludes many shorter, local trips, the overall mode shares were comparable:

2011 Census for W Sussex 42,958 PT trips (15%); 247,790 car trips (85%);

2008 hybrid model for W Sussex 18,331 PT trips (11%); 150,339 car trips (89%).

2.6.8. The hybrid base 2008 multi-modal model was accepted by WSCC as being sufficiently accurate to be used for further forecasting and scheme impact appraisal tasks.

2.7. Future Year Model

2.7.1. The AM peak Crawley stage-2 model has been projected to forecast year 2029. It includes the following travel choice mechanisms to represent future changes in the level of trip demand, changes in available transport facilities and changes in travel costs:

Trip generation and attraction at O-D zones;

Trip distribution and deused40 g0 G>BT1 0 0 1 3

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3. Future Year Transport Supply Networks

3.1. Overview

3.1.1. This section describes the transport networks that have been included in the future year multi-modal model, under the respective Crawley stage-2 forecast scenarios. The network elements represent the supply side of the model, as defined in section 1.2.

3.1.2. Many of the network components are consistent with those in the stage-1 appraisal, but changes have been made to reflect the evolving CBC Local Transport Plan strategies.

3.2. Transport Network Scenarios

3.2.1. Three network scenarios have been modelled under stage-2 of the Crawley study, for the AM peak at 2029, with and without various transport scheme interventions to remedy congestion. These scenarios were as follows:

Reference Case, with committed schemes only;

Preferred Strategy, with planned improvements and also with new remedial schemes from the current study; and

Alternative Strategy with planned improvements and also with new remedial schemes from the current study.

3.2.2. Initially, the preferred and alternative strategy scenarios have undergone model assignment without inclusion of remedial schemes. This was in order to identify network locations where further intervention to mitigate development impact would be needed.

Reference Case

3.2.3. represented the supply situation if only committed transport schemes were introduced on to the current highway and PT network. This is the scenario against which the planned development impacts were to be judged, to identify if they would cause the network to become worse off, in terms of operational (i.e. congestion and delay).

Preferred Strategy

3.2.4. The preferred strategy supply scenario to be tested initially entailed all of the reference case schemes, plus some remedial schemes already proposed by WSCC / CBC. Subsequently it was revised to include newly identified remedial schemes. The new remedial schemes were aimed at reducing network stress to an acceptable level, at highway locations where the preferred strategy demand would cause significant congestion and delay, but where the network would operate satisfactorily, or within acceptable thresholds of stress, in the reference case.

Project Name:

Fastway route 100

Pegler Way single 2-lane two-way carriageway;tu38 14.28 reW 8.9gle 2

3.6. Model Assignment Packages

3.6.1. The future transport interventions, identified in section 3, have been combined with the forecast demand components, noted in section 4, to produce the CBC model assignment package outcomes shown in Table 2.

Table 2: Summary of Crawley Stage-2 Model Assignment Packages					
Assignment Content	**Model Assignment Package AM Peak 2029**				
	Reference Case	**Preferred Strategy**	**Alternative Strategy**	**Preferred Strategy with Remedial Schemes**	**Alternative Strategy with Remedial Schemes**
Travel Demand Components					
Committed					

4. Forecast Demand Scenarios

4.1. Overview

4.1.1. This section describes the sources of origin to destination trips, for the Local Plan stage-2 appraisal, which form the as defined in section 1.2. The key components are similar to, but slightly changed from, the stage-1 model.

4.2.6. Growth in goods vehicle movements has been calculated from the National Transport Model (NTM), which predicts vehicle kilometres by road type and location from the Road Traffic Forecasts 2013 (RTF13).

4.2.7. In the Reference Case scenario, the following site-specific committed land-use sites were included:

Housing completions in Crawley Borough since 2008 (1,363 dwellings);

Housing commitments in Crawley Borough 2,623 dwellings, comprising:

Housing commitments on preferred strategy key housing sites (2,289 dwellings; and

Housing commitments on preferred strategy H1 housing sites (334 dwellings;

Housing commitments in Horsham Borough (2,650 dwellings at Kilnwood Vale);

Overall reference case housing development **6,636 dwellings**.

Employment completions in Crawley Borough since 2008 (gross floor area: 136,671sqm gain; 90,811sqm loss; 45,860sqm net gain, or 3,511 jobs);

Employment commitments in Crawley Borough (gross floor area: 19,235sqm gain; 14,504sqm loss; 75,731sqm net gain, or 4,526 jobs); and

Employment commitments in Horsham Borough (gross floor area: 9,300sqm gain, or 698 jobs), at Kilnwood Vale;

Overall reference case employment development **8,037 jobs**.

- Segro West, London Road 12,360m^2 B1 business development area; (or 2,521sqm GFA);
- Thales, Gatwick Road 24,840m^2 B1 business development area; (or 5,067sqm GFA);
- BOC Edwards 22,860m^2 B1 business development area; (or 4,663sqm GFA); and
- Betts Way 12,238m^2 A1/B1/B2/B8 development area; (or 849sqm GFA of A1 retail, with 1,357sqm GFA of B1/B2/B8 business uses);

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Table 5: Stage-2 Base and Forecast Person-Trip Matrix Totals (All Travel Modes)								
AM Model Scenario								
		Base 2008	Reference Case 2029		Preferred Strategy 2029		Alternative Strategy 2029	
		No. Person Trips	No. Person Trips	% Change from Base Year	No. Person Trips	% Change from Base Year	No. Person Trips	% Change from Base Year
Demand Segment	Travel Mode							
Trips Within/To/ From Crawley	Highway	43783	48921	11.74%	50642	15.67%	52337	19.54%
	Public Transport	3285	5927	80.43%	6248	90.23%	6498	97.82%

Travel Mode Choice

4.9.5. Travel mode choice is applied by journey ce

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5. Model Results and Output Analysis

5.1. Overview

5.1.1. This section describes the findings from the Crawley stage-2 scenario modelling and analysis.

5.1.2. Overall network statistics and trip demand have been analysed from the stage-2 model runs and reported in attached spread sheets in Appendix B. The report analysis focuses on highway ratios of flow to capacity (RFC) at links and junctions suffering significant stress and also link traffic flows.

5.2. Forecast Model Reliability

5.2.1. The Crawley hybrid multi-modal forecast assignments at AM 2029 have been checked to ensure that the outcomes are robust and reliable, within the limitations of the model scope and content.

5.2.2. It is important that the results are derived from satisfactorily converged and stable model assignments for each scenario. Model convergence, proximity and stability are judged against the following WebTAG criteria:

> Proximity %GAP and %Delta (difference between total assigned/simulated costs and minimum route costs, as a proportion of total costs) Target <0.1%, over four successive iterations, for both of these criteria; and
>
> Stability %FLOWS (P proportion of assigned flows within 1% of values from previous iteration) Target >98%; and %RAAD (relative average absolute difference) Target <0.1%; over four successive iterations, for at least one of these two criteria.

5.2.3. The statistics in Table 6 summarise the model convergence, proximity and stability values that were achieved in the forecast Crawley model.

5.2.4. The values in table 6 confirm that Crawley model assignments achieved satisfactory convergence. The only slight variability was the %GAP value on the final iteration of the alternative strategy scenario assignment, which was greater than 0.1%, but this is compensated by the satisfactory value of %Delta at 0.1%. The analysis shows that the model outcomes, in each scenario, would not change significantly if further iterations were run.

[redacted]lti-Modal Model Summary Statistics (AM Peak) Entire West Sussex Network

			Base Year 2008	Forecast Scenario Year 2029				
Strategic Model Parameter	**Travel mode**	**Units**	**Existing**	**Reference Case**	**Preferred Strategy**	**% change from Reference case**	**Alternative Strategy**	**% change from Reference case**
Total Network Trips	Highway	Persons	195990	221124	221539	0.2%	224647	1.6%
	PT	Persons	18331	23596	24093	2.1%	24284	2.9%
	Combined	Persons	214320	244720	245631	0.4%	248931	1.7%
	Proportion of Highway Trips	%	91.4%	90.4%	90.2%		90.2%	
	Proportion of PT Trips	%	8.6%	9.6%	9.8%		9.8%	
Total Network Travel Distance	Highway	PCU-Kms	-	4109501	4086590	-0.6%	4114661	0.1%
	Bus	Person-Kms	-	246317	267487	8.6%	270025	9.6%
	Rail	Person-Kms	-	527221	519400	-1.5%	513626	-2.6%
	Combined	Net Kms1 18.1B/F1 8.04 Tf q359.57 234.05 [illegible]						

5.3.2. The model outcomes in Table 7 do not reveal anything unexpected. However, several characteristics are notable. Total network trips by combined highway and PT modes would increase marginally from the reference case through the preferred strategy to the alternative strategy, respectively, at AM peak 2029, reflecting the increasing scale of land-use development in Crawley. However, the largest increase would be only 2% at a strategic, county level. The proportion of PT trips would be very similar between 2029 forecast scenarios, at about 10%. This represents a small rise of about 2% from base year 2008, reflecting improved PT service provision, especially bus services within Crawley. It would also be a consequence of a greater rise in highway congestion and travel costs at 2029, relative to increasing PT costs.

5.3.3. Total network travel distance by all modes would change only marginally between the

5.4.3. The results from this analysis have been used to devise potential further remedial schemes, which could reduce the stress issues to an acceptable level. These further interventions have only been examined at an indicative, outline level and not developed as detailed designs.

5.4.4. The detailed outcomes of the model assignments are contained in Appendix B.

5.4.5. Locations of the highway junctions and links where performance has been analysed are shown, in Appendix C, in Figures 5 and 6, respectively, for the wider model area and in Figures 7 and 8, respectively, for Crawley Borough.

5.4.6. Please note that figures 5 and 6 do not include road links and junctions in Horsham District, whose performance has been analysed, because of the need to keep the diagram comprehensible. The analysis area included for Horsham broadly covers the A24 and A29 running north/south, between Capel and Worthing and also includes key routes in Horsham, Broadbridge Heath, Billingshurst, Pulborough and Storrington.

5.4.7. Diagrams showing the scale of RFC expected at key junctions within the core study area of Crawley Borough, at AM 2029, before remedial intervention, are provided in Figures 9, 10 and 11, in Appendix C, for the respective reference case, preferred strategy and alternative strategy scenarios.

Network Locations with Excessive Stress in Reference Case and Preferred and Alternative Strategies

5.4.8. In addition to the critical network locations referred to above, there are a number of road junctions and links where the RFC on the most congested arm is above 100% with 2029 preferred and alternative strategies and also with the reference case. These are junctions with the development strategy (i.e. RFC no more than 5% greater than in the reference case), but where some form of mitigation may be needed, to accommodate development.

5.4.9. None of these junctions shows significantly higher RFC in the preferred or alternative strategies than in the reference case and so should not be constraints on the Local Plan proposals being approved and implemented.

5.4.10. Table 8 shows details of these junctions and links.

5.4.11. There does appear, in table 8, to be a slight anomaly from the model at the junction of A264 / A22, Felbridge, East Grinstead. Here, the RFC is just above 100% in the reference case and preferred strategy, but about 10% less in the alternative strategy. This reduction in the alternative strategy is explained by heavier traffic flow on the A264 around Copthorne, which causes re-routing of traffic further east near East Grinstead, and hence less congestion on the A264 at the A22 junction.

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5.4.12. There is a roughly equal split, between the areas of Crawley Borough, Horsham District and the wider West Sussex County, of junctions that show stress in all scenarios, at AM 2029.

5.4.13. At present, no consideration has been given to how the congestion problems in Table 8 might be resolved, as they would be a result of background growth of trip demand, and not a consequence of specific land-use developments proposed in either the preferred or alternative strategies. Resolving these problems is therefore not within the remit of this study.

5.4.14. The network problem locations, where there would be excessiv where there wouldiv

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5.4.29. At A2220 Station Way / A2004 Southgate Avenue, an RFC of 100% was predicted in the preferred strategy only. However, this was the misleading result of a minor coding error in the original Crawley TCM which overlooked the shared northbound ahead and left turn lane from A2004 Southgate (south). Correcting this lane configuration in the model resolves the high RFC from this approach in the preferred strategy.

5.4.30. In the alternative strategy, there is likely to be adverse stress at M23 Junction 9 that would not arise in the reference case or preferred strategy. The RFC here in the alternative strategy would be 99%, on the M23 northbound exit slip to the roundabout. Although this RFC shows the peak AM average traffic flow to be below capacity, it would be likely to represent a congestion problev422 cmh.66 Tm 014(CM)-10( )-103e32(l)-6(ev422 cmh.66 Tm 015.4)4(..04

5.4.33. The model shows four locations in Crawley in the preferred strategy and two locations in Crawley in the alternative strategy, which would have excessive stress compared with the reference case. There would also be one location in Horsham with excessive stress, in the alternative strategy only, but none in the wider County area in either scheme scenario.

5.4.34. Of the identified locations in Table 11 with RFC below 100%, but markedly increased stress compared with the reference case, the strategy junctions with RFC of 90% or less should not require mitigation, as these will still have spare capacity. However, we have considered possible remedial interventions to resolve junctions with RFC of 95% or more. These interventions are discussed further in section 5.5, but are first outlined briefly below.

5.4.35. At A23 Crawley Avenue / Ifield Avenue, in the preferred strategy, the high RFC would arise on the eastbound ahead movement from Crawley Avenue (west). It is likely that the congestion

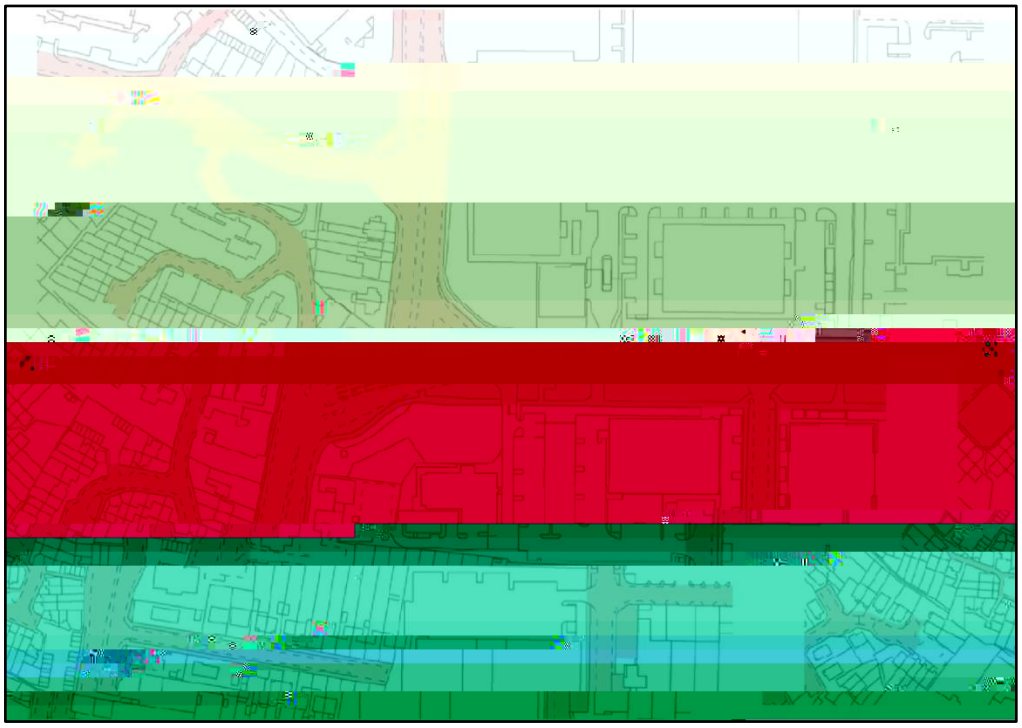

Figure 14: A23 London Road / Manor Royal Improved Right Turn Capacity and Localised Carriageway Widening

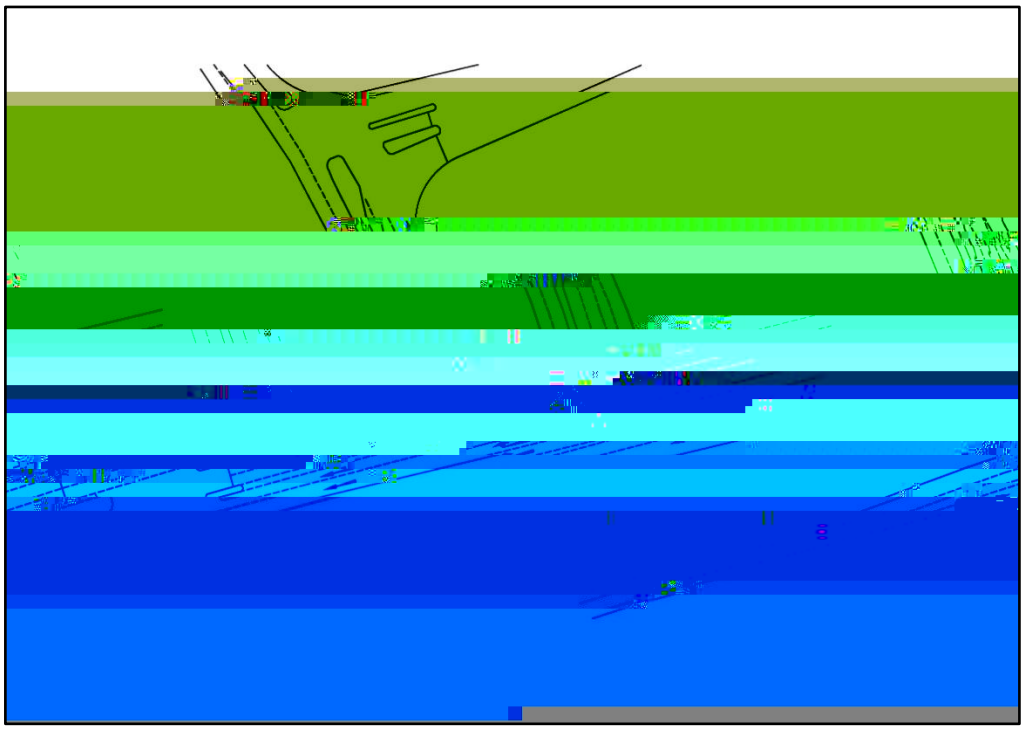

Figure 15: A2011 Crawley Avenue / B2036 Balcombe Road Improved Right Turn Capacity and Localised Carriageway Widening

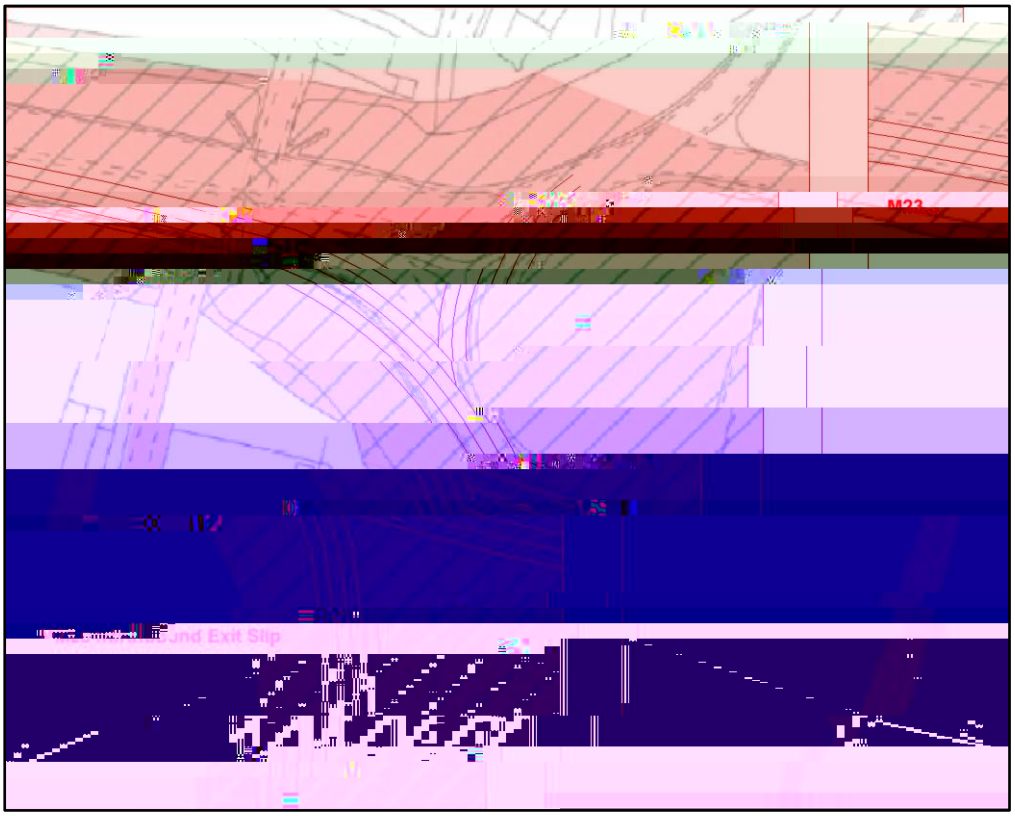

Figure 16: M23 Junction 9 Gatwick Airport Signal Approach Widening and Localised Carriageway Widening

5.5.9. It is expected that the schemes shown in Figures 12 16 could be accommodated within the available highway boundaries.

5.6. Analysis of Traffic Flows Through Ashdown Forest

5.6.1. An assessment has been made of whether or not the Crawley Local Plan would impact upon the local air quality of the environmentally sensitive area of Ashdown Forest Special Area of Conservation (SAC), lying to the south east of East Grinstead.

5.6.2. The Crawley hybrid transport model includes several key roads that access or cross Ashdown Forest, namely:

A275 (Lewes East Grinstead);

A22 (Uckfield East Grinstead);

A26 (Uckfield Crowborough);

B2110 (East Grinstead Royal Tunbridge Wells);

B2188 (Maresfield Groombridge);

B2026 (B2188 B2110); and

West through Ashdown Forest).

5.6.7. In the alternative strategy, there would also be fairly insignificant changes in AADT flow around Ashdown Forest at 2029. There would be modest increases in flow on A22 and A26 of less than 200 vehicles per day, relative to the reference case, but these would be well below the 1,000 vehicle AADT threshold. The increases probably reflect the larger amount of development and associated trips in the alternative strategy.

5.6.8. Overall, it is evident that the Crawley Local Plan would not cause traffic flows on the key routes to impact significantly upon Ashdown Forest.

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6.1.16. Potential outline remedial interventions have been tested in the hybrid model to mitigate the adverse stress caused by Local Plan development in the above scenarios and locations. The measures that have been tested and shown to perform satisfactorily comprise: A2011 Crawley Avenue / A2004 Northgate Avenue / Hazelwick Avenue signalised roundabout (localised carriageway widening and lane reconfiguration, on the circulating carriageway); A23 Crawley Avenue / Ifield Avenue signalised roundabout (localised carriageway widening and lane reconfiguration, on the circulating carriageway); A23 London Road / Manor Royal signals (improved right turn capacity on London Road and localised carriageway widening on Manor Royal); A2011 Crawley Avenue / B2036 Balcombe Road signals 2a27.46 6(ap)4(ac)-3(i)-6(t)-10(y)18( )-155(on)-20( )] TJETBT1 0 0 1 127

Appendix B

Appendix B: Analysis of Network Link and Junction Performance in Respective Model Scenarios

Appendix D

Appendix D: LINSIG traffic signal performance outcomes for remedial junction improvements