

**East Grinstead Traffic
Management Study
Stage 3 Final Report**
West Sussex County Council

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Introduction

1. Study Context

1.1. Background

Congestion and delays in East Grinstead has been an issue in the town due to increasing development in the area. Previous work has shown that a bypass would be required to alleviate traffic within the town in order to accommodate increased development traffic, however due to a split in the community this was abandoned in the mid 1990s. However the need to address the capacity constraints on the highway network remained. For context, a location plan is presented as Figure 1 which demonstrates the merger of the A22 and A64 and sharing of road space of these routes from Felbridge junction in the north to Moat Road in the south.

The West Sussex County Council (WSCC) Structure Plan 2001-2016 included the allocation of 2,500 homes in the southwest of East Grinstead at Imberhorne Farm. The allocation was made on the basis that the strategic development would be accompanied by a transport package including a town relief road.

As part of a study commissioned by the Department for Transport (DfT), Atkins undertook an initial strategic study (Stage One Study) examining transport issues relating to the delivery of the Structure Plan allocation to ascertain the level of development that can be delivered without a relief road based on the identified capacity constraints of five key junctions on A22 London Road.

The following junctions were considered by Stakeholders formed of WSCC, Mid-Sussex District Council (MSDC), Three Tiers Group (3TG) and DfT as being the key constraints upon movement of vehicles along the A22 London Road and are highlighted in Figure 2:

- A22 London Road / A264 Copthorne Road (Felbridge Junction);
- A22 London Road / Imberhorne Lane;
- A22 London Road / Lingfield Road;
- A22 London Road / A22 Station Road; and
- A22 London Road / A264 Moat Road.

Atkins Study put forward an outline strategy for improving sustainable transport and upgrading of junctions that could be implemented to enable a proportion of development to come forward without the need for major transportation intervention. Meanwhile the South East Plan superseded the Structure Plan in May 2009 and listed East Grinstead (2,500 homes) as one of several locations previously identified in adopted development plans where development should be brought forward where possible.

Atkins was subsequently commissioned by WSCC and MSDC to provide further advice, evidence and understanding to inform decisions on development allocations within MSDCs emerging Core Strategy (Stage Two). It was recommended that the next steps should be refinement of the network solutions and junction capacity modelling to provide a more accurate indication of forecast spare capacity and thus with improvements, how much additional planned development traffic could be absorbed by the network. However further investigations into these issues were put 'on hold' after Mid Sussex District Council's work to progress its Core Strategy, in its then current form, slowed towards the end of 2009 and was formally abandoned in June 2010.

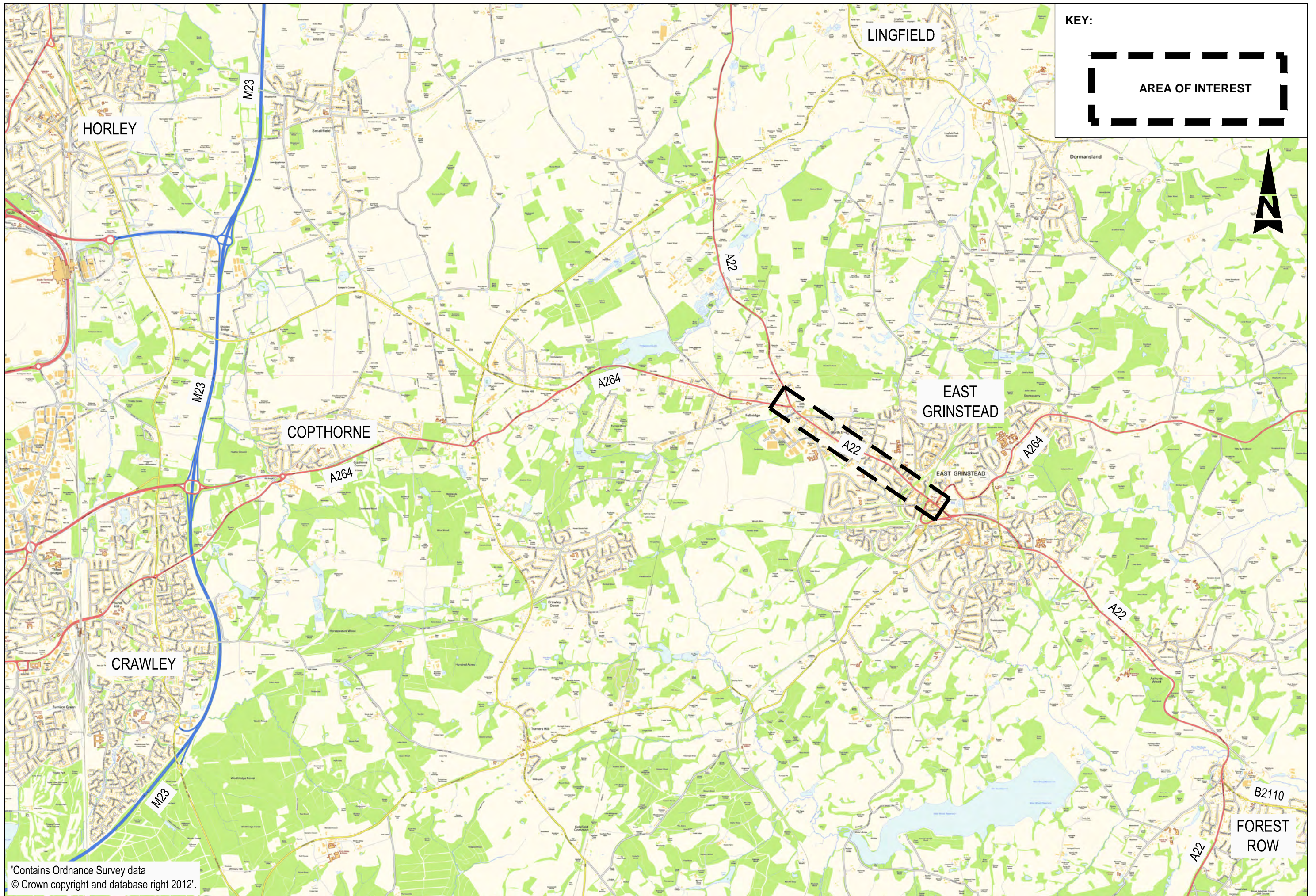
1.2. Purpose of Stage 3

A Stage 3 Study is also now required in the context of informing the decisions on development strategies in MSDC's District Plan and to assist East Grinstead Town Council (EGTC) in preparing a neighbourhood plan and in doing so strengthen the evidence base to provide the confidence on the appropriate scale of development that can be achieved as a result of highway capacity improvements.

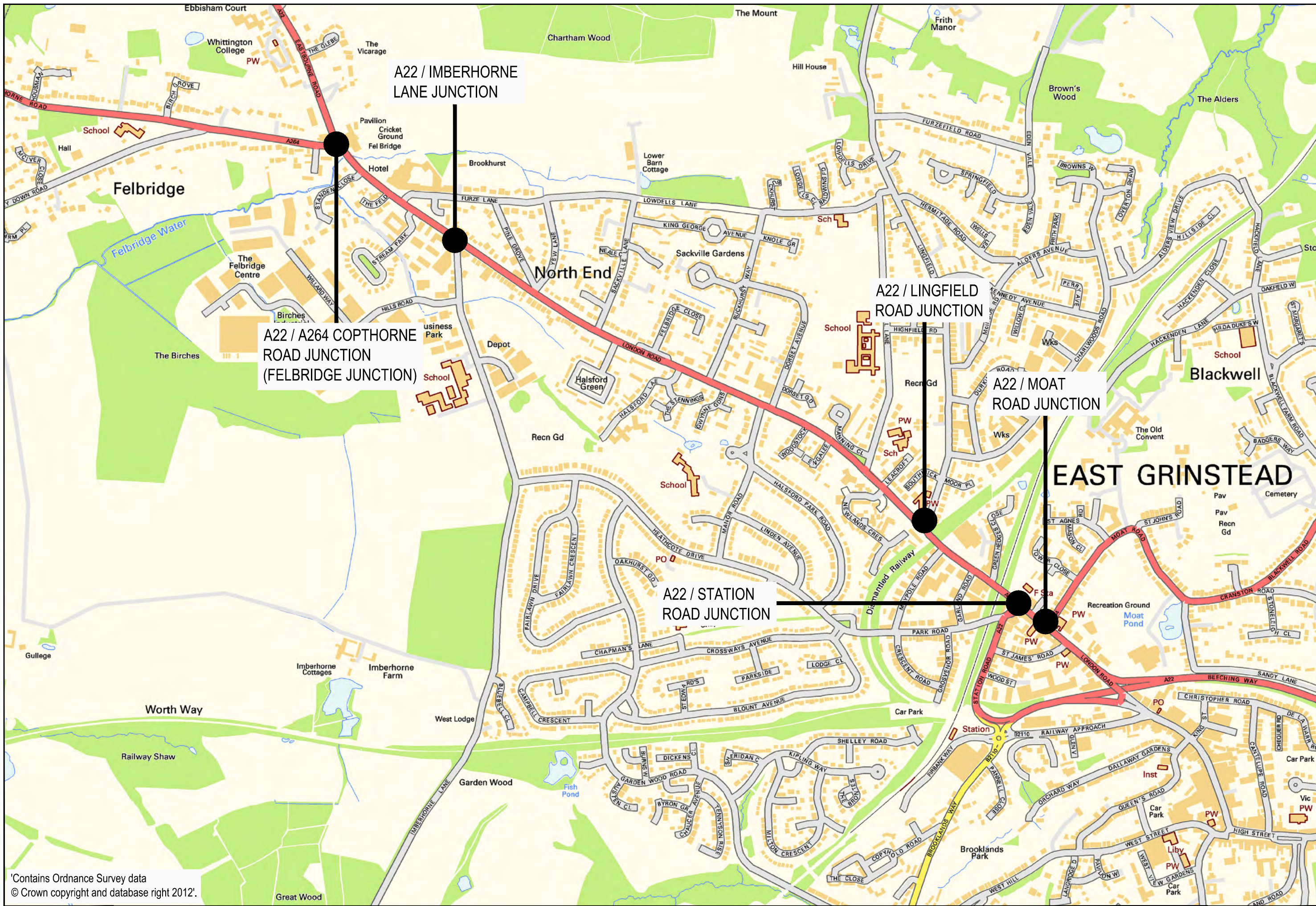
This Study is intended in response to the recommendations to build on the initial Stage One and Two studies through the assessment of the network capacity at the five key junctions on A22 London Road between Felbridge and Moat Road, identified as the Town Council's highest priority for improvement. It is therefore a design-led piece of work, supported by more refined modelling and high level scheme evaluation.

The impending revocation of the South East Plan means that there is no longer a requirement to deliver strategic development at East Grinstead. For the purpose of this study, it is assumed that 570 residential

units, as identified in SHLAA, and 341 jobs will not be provided on the strategic site at Imberhorne Farm and that the remaining quantum of development might be delivered on a spatially distributed basis around the town.



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LOCAL STUDY AREA (SCALE - NTS)

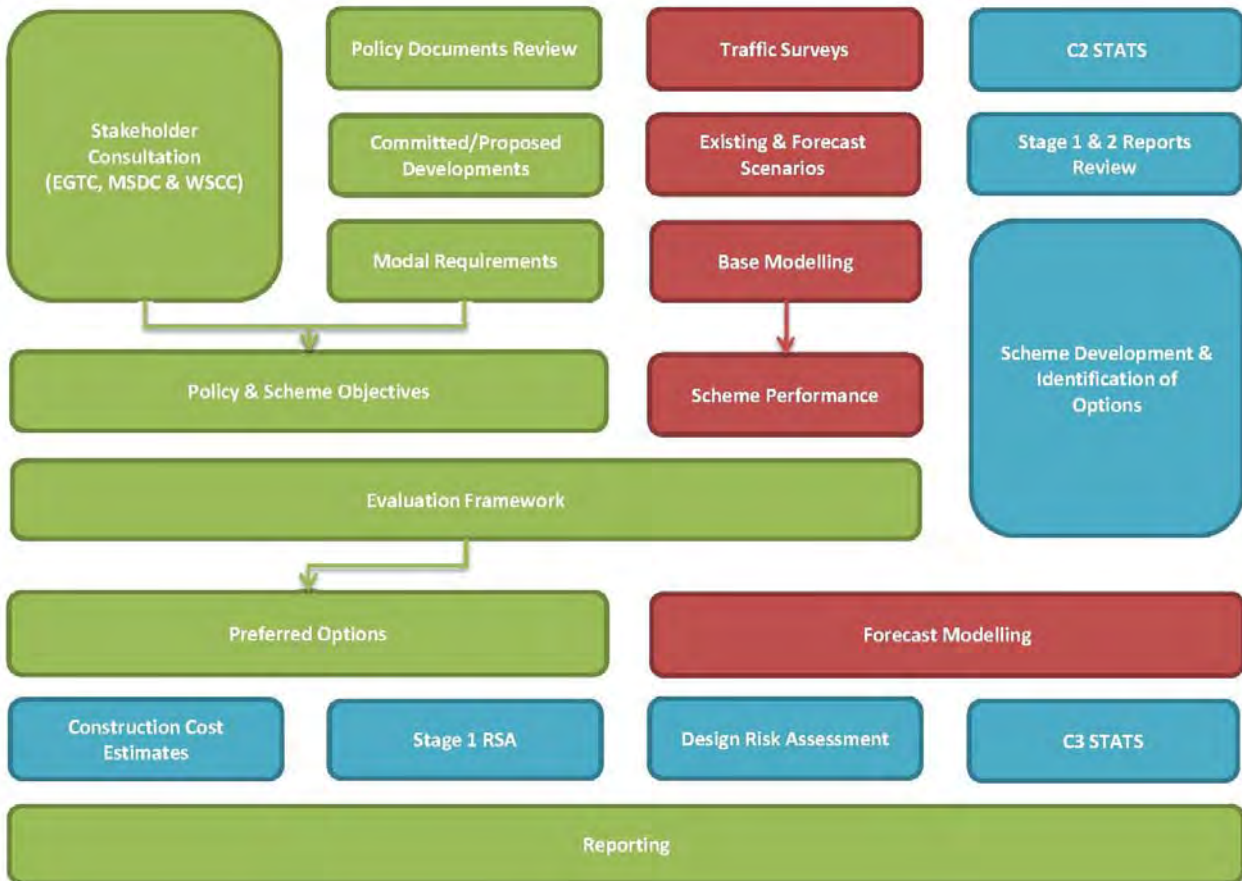
FIGURE/LP/002

2. Method of Approach

2.1. Overview

In recognition of the bespoke nature of the Study, the following methodology has been employed. This breaks the work down into three key streams of design (blue) modelling (red) and planning/strategy and assessment (green) in Figure 3.

Figure 3. East Grinstead Stage 3: Methodology Flow Diagram



In the first instance, the junction design work will build upon the initial solutions developed in Stage 1 and 2 and refine these in response to both modelled performance and identified policy and stakeholder requirements, encapsulated in the Evaluation Framework. This will provide some certainty as to the preferred package of measures to be taken forward to costing and technical assessment.

As highlighted above, traffic modelling will be a key element in understanding the potential benefits of the proposed schemes including the additional southbound traffic lane and associated junctions. As such, the following models have been developed:

- LINSIG models for the AM and PM Peak Hour at A22 London Road / Eastbourne Road / A264 Cophorne Road and A22 London Road / Imberhome Lane; and
- A VISSIM model for the AM and PM Peak Hour covering the A22 London Road / Lingfield Road (priority controlled roundabout) junction, A22 London Road / Station Road (priority controlled) junction and A22 London Road / A264 Moat Road (priority controlled – associated with pedestrian crossing) junction.

By developing a VISSIM model of three of the key junctions, this can be extended in future to include a wider area of the town centre and will allow other schemes to be assessed in terms of their network capacity impacts.

With the refinement of network solutions, the forecast modelling will then be used for sensitivity testing to review the assumptions in Stage 1 and 2 to provide a more accurate indication of forecast spare capacity

and thus with improvements, how much additional planned development traffic could be absorbed by the network as part of the final reporting to enable consideration of developer cost share towards the identified improvement schemes.

2.2. Report Structure

In response to the methodology outlined above, this report is formed of a further four sections:

- **Network Conditions.** This section of the report will review existing and future network conditions including base model development and validation, a review of committed and planned developments and transport and highway schemes and finally document forecasting assumptions;
- **Network Solutions.** This section of the report will detail stakeholder requirements for the A22 junction capacity improvements, the evolution of design from Stage 1 and 2 and their evaluation based on modelling results and a high-level evaluation framework informing the preferred package of measures for refinement and costing;
- **Development Enablement.** This section of the report will undertake sensitivity testing of the preferred measures to update the development enablement capacity estimates identified in Stage 1 and 2. It will document the assumptions relating to capacity constraints and provide a platform for ascertaining developer cost share; and
- **Summary and Conclusions.** Finally, this section of the report will draw together a summary of the work and present our conclusions included recommendations on the way forward based on the outcome of the work.

Network Conditions

3. Existing Network Conditions

3.1. Introduction

In Stage One and Two Reports, a qualitative review was undertaken of existing network conditions and arrived at preliminary solutions for key sections of the highway network as developed as part of this Stage Three work. As part of the Stage Three work, traffic models have been developed for the critical network peak hours to assess the existing condition of the following highlighted junctions:

LINSIG Models

- Felbridge Junction (signal controlled) ; and
- A22 London Road / Imberhorne Lane (signal controlled).

ARCADY Model

- A22 London Road / Lingfield Road (roundabout).

PICADY Model

- A22 London Road / Moat Road.

VISSIM Model

- A22 London Road / Lingfield Road (priority controlled roundabout);
- A22 London Road / Maypole Road (priority controlled);
- A22 London Road / Garland Road (priority controlled);
- A22 London Road / Station Road (priority controlled);
- A22 Station Road / Park Road (priority controlled); and
- A22 London Road / A264 Moat Road (priority controlled – associated with pedestrian crossing).

3.2. Method of Approach

These models provide a quantitative assessment of existing network conditions in order to assess the suitability of proposed network solutions and form a package of 'East Grinstead Traffic Models' (EGTM).

The EGTMs have been fully calibrated and validated based on the DMRB standards for link flows, turning movements, journey times and queue lengths. The Local Model Validation Report (LMVR) is presented in Appendix B of this Report.

LINSIG Models were developed to evaluate the queue lengths, delays, and Degree of Saturation (DoS) at both Felbridge Junction and the A22 London Road / Imberhorne Lane junction. 'DoS' is a quantitative analysis of the level of congestion on the network and is used as the primary indicator of the operational performance of the junction. Generally, when a junction reaches 90% DoS it is considered to be at practical capacity and when it reaches 100%, at theoretical capacity. Lingfield Road has also been included in the isolated junction assessment with ARCADY for roundabouts, with equivalent capacity indicator of Ratio Flow to Capacity (RFC).

The queues are presented in terms of an average maximum queue in vehicles from the surveys and the mean max queue (MMQ) in passenger car units (PCUs) in LINSIG. The PCUs are comparable to vehicles, with one PCU representing one car unit.

In addition to the isolated junction capacity assessments, a VISSIM Micro-simulation Model has been developed covering the A22 London Road / Lingfield Road, A22 London Road / A22 Station Road and A22 London Road / Moat Road in order to better understand the interaction of these junctions on the more compact highway network on the edge of the Town Centre and in order to assess the implication of amendments to links as well as junctions in the future year assessments.

3.3. Modelling Results

The modelling results are summarised here as a commentary on existing network conditions at each identified location.

3.3.1. Felbridge Junction

The LINSIG modelling results for Felbridge Junction are summarised in Table 1.

Table 1. Felbridge Junction: Existing Situation (2011)

Junction	Queue (pcus)	DoS (%)	Average Delay (s/pcu)
AM Peak Hour			
A264 Copthorne Road	30	96	62
A22 Eastbourne Road (N)	9	84	46
A22 London Road (S)	10	80	14
PM Peak Hour			
A264 Copthorne Road	26	91	45
A22 Eastbourne Road (N)	16	77	37
A22 London Road (S)	12	86	19

These results demonstrate that in both peak hours of assessment, the A264 Copthorne Road is operating in excess of practical capacity with DoS at 96% leading to significant delays and extended queuing. It's observed that the A22 is also operating close to practical capacity with DoS of 84% on the Northern arm of the junction in the AM Peak Hour and 86% on the southern arm of the junction in the PM Peak Hour indicates that there is minimal reserve capacity in the junction in its current formation. This is considered to be consistent with observations made on site.

3.3.2. A22 London Road / Imberhorne Lane

The LINSIG modelling results for A22 London Road / Imberhorne Lane junction are summarised in Table 2.

Table 2. A22 London Road / Imberhorne Lane: Existing Situation (2011)

Junction	Queue (pcus)	DoS (%)	Average Delay (s/pcu)
AM Peak Hour			
Imberhorne Lane	15	75	45
A22 London Road (N) Ahead	6	42	5
A22 London Road (N) Right Turn	19	95	97
A22 London Road (S) Ahead / Left	23	76	27
PM Peak Hour			
Imberhorne Lane	16	78	48
A22 London Road (N) Ahead	10	57	6
A22 London Road (N) Right Turn	17	91	84
A22 London Road (S) Ahead / Left	20	72	26

These results demonstrate that in the existing situation, the A22 London Road Right Turn into Imberhorne Lane is operating in excess of practical capacity in both AM and PM Network Peak Hours. It's noted that whilst the remainder of the junction is seen to be currently operating with some reserve capacity, with maximum DoS of 78% on the Imberhorne Lane arm in the PM Peak Hour, queuing occurs on all arms leading to vehicular delay passing through the junction on the A22 London Road.

3.3.3. A22 London Road / Lingfield Road

The ARCADY Modelling results for the A22 London Road / Lingfield Road roundabout are summarised in Table 3.

Table 3. A22 London Road / Lingfield Road: Existing Situation (2011)

Junction	Queue (pcus)	RFC	Delay (mins)
AM Peak Hour			
Lingfield Road	57	1.18	7
A22 London Road (N)	101	1.28	11
A22 London Road (S)	141	1.25	9
PM Peak Hour			
Lingfield Road	48	1.16	6
A22 London Road (N)	109	1.28	11
A22 London Road (S)	215	1.34	13

On review of the modelling results for the A22 London Road / Lingfield Road roundabout, it is evident that this is currently the most congested node on the A22 London Road into East Grinstead, which is considered to be consistent with on site observations.

Each arm is operating in excess of capacity with a maximum RFC of 1.28 on the northern arm of the A22 London Road in the AM Peak Hour, and 1.34 on the southern arm of the A22 London Road in the PM Peak Hour. With each arm over capacity, there is currently no reserve capacity on the roundabout and indicates that re-formation is required in the existing situation as the over-saturation of this junction results in significant queuing and delays during network peak hours.

3.3.4. A22 London Road / A264 Moat Road

The PICADY Modelling results for the A22 London Road / Moat Road priority junction are summarised in Table 4 and demonstrate that the Ratio of Flows to Capacity (RFC), queues and delays in the Base model are over capacity with significant queues. The model output shows that the junction exceeds the capacity with highest RFC of 1.21 in the AM peak period and 1.34 in the PM peak period.

Table 4. A22 London Road / Moat Road: Existing Situation (2011)

Junction	Queue (pcus)	RFC	Delay (secs)
AM Peak Hour			
Moat Road	45	1.21	503
A22 London Road (N)	63	1.08	745
PM Peak Hour			
Moat Road	19	1.01	264
A22 London Road (N)	224	1.34	853

3.3.5. VISSIM Model: A22 London Road / Lingfield Road to A22 London Road / A264 Moat Road

The VISSIM Model covers the A22 London Road / Lingfield Road Roundabout, A22 London Road / A22 Station Road and A22 London Road / Moat Road.

3.3.5.1. Journey Times

The journey time routes and location of measurement points are shown in Appendix B. Table 5 presents a summary of the overall journey times to (Route One) and from (Route Two) East Grinstead. This includes general traffic and derivation of bus journey times.

These results demonstrate that total journey times through the study area are quicker for general vehicles than buses in both directions, reflective of the buses dwelling at stops on the route. Generally, it is observed that journey times are slower in the AM Peak Hour for both general traffic and buses than the PM Peak Hour. It is also noted that in both instances journey times are more expedient on route into than out of East Grinstead.

Table 5. VISSIM Model Journey Time Analysis: Existing Situation (2011)

Segments	AM Peak Hour (seconds)		PM Peak Hour (seconds)	
	Traffic	Buses	Traffic	Buses
Route One				
JTS3-S4 (E)	47.8	37.1	46.8	60.2
JTS4-S5 (E)	13.0	28.0	12.9	23.9
JTS5-S6 (E)	30.3	32.3	31.2	29.9
Total	91.1	97.4	90.8	114.0
Route Two				
JTS6-S4 (W)	138.4	154.2	97.3	84.6
JTS4-S3 (W)	62.0	64.1	45.6	45.1
Total	200.4	218.3	142.9	129.7

4. Development Review

This section of the note outlines the updated development information and associated trip generation and distribution that was undertaken in order to derive future year models for assessment of forecast network conditions as a design year against which the highway schemes developed in the Study can be assessed.

4.1. Stage One and Two Review

Atkins' Stage 1 work considered the impact of strategic development at Imberhorne Farm. Two quantum of development were considered, comprised of a reduced level (1,500 dwellings) and full level (2,500 dwellings) of development, both of which included a proportional level of school and employment development. Four scenarios were considered as follows:

- Baseline – based on previous work undertaken by Peter Brett Associates (PBA);
- An elevated sustainable mode share;
- An elevated level of trip internalisation; and
- The maximum scale of development possible without major transport intervention.

Trip rates from PBA's East Grinstead multi-modal Local Model Validation Report (LMVR) were applied to the levels of strategic development at Imberhorne Farm. The results of a cordon survey of East Grinstead undertaken in 2006 were used to distribute trips and growthed to predict the impact of the strategic development at Imberhorne Farm on the road network in East Grinstead for a future (2021) scenario.

In order to determine the maximum scale of development possible without major transport intervention, an indicative ceiling of five percent was set for acceptable growth on the future (2021) traffic flows. As a result, it was predicted that the maximum scale of development that could be accommodated on the network from the strategic site at Imberhorne Farm would be 571 dwellings and 341 jobs.

Atkins' Stage 2 work involved examining the assumptions used as part of the Stage 1 work in more detail, and concluded that the Stage 1 work was robust based on the information available. It recommended that the next step would be to undertake traffic surveys and junction modelling of the existing and future situations at the five key junctions on the A22 to provide a more accurate indication of spare capacity.

4.2. East Grinstead Future Development

It is noted at the outset that any network growth forecasts are considered to be entirely representative of future development in East Grinstead only, therefore the development of forecast traffic models detailed in this report has been undertaken without any additional background traffic growth. As agreed with WSCC, the following has therefore been applied as the sole source of traffic growth in the future baseline year of assessment, indicatively assumed for the purpose of this analysis as 2021.

4.2.1. Information received from Mid Sussex District Council

MSDC has provided the following information, from which the committed and planned development scenarios have been determined for input to the modelling.

- Updated MSDC Strategic Housing Land Availability Assessment (SHLAA) developments;
- Committed development (large sites – six units or more) as at 1st April 2011; and
- Committed development (small sites – less than six units) as at 1st April 2011.

A detailed list of committed development sites is included as Appendix F.

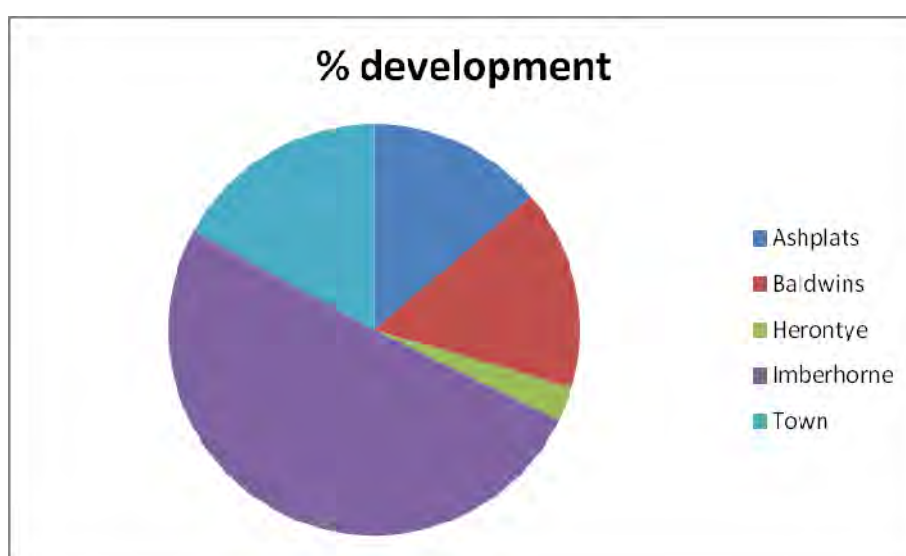
4.2.1.1. Updated MSDC SHLAA Developments

Previously, Appendix 3 of MSDC's Strategic Housing Land Availability Assessment (SHLAA) was used to predict the quantum of future development in the five East Grinstead wards (Ashplats, Baldwins, Herontye, Imberhorne and Town). Since the SHLAA was prepared in 2009, plans for future development in East Grinstead have been updated. MSDC has provided updated SHLAA development information, which is shown in Table 6 and graphically in Figure 4 below.

Table 6. Updated MSDC SHLAA Development Data

Ward	Number of Dwellings	% Development
Ashplats	243	13.8
Baldwins	278	15.8
Herontye	48	2.7
Imberhorne	895	50.7
Town	300	17.0
Total	1,764	100.0

Figure 4. Proportion of Updated MSDC SHLAA Development by Ward



This shows a total of 1,764 dwellings in East Grinstead, with the highest quantum of development in the Imberhorne ward (over 50%), followed by the Town (17%), Baldwins (16%), Ashplats (14%) and Herontye (3%) wards.

While some of the SHLAA sites are already committed through previous allocations either in the Local Plan (2004) or the Small Scale Housing Allocations DPD (2008) and/or planning consents, the allocation of others is being considered through the preparation of the Mid Sussex District Plan and East Grinstead Neighbourhood Plan.

For the purposes of this study, therefore, all uncommitted sites in the SHLAA as updated by MSDC are referred to as planned development.

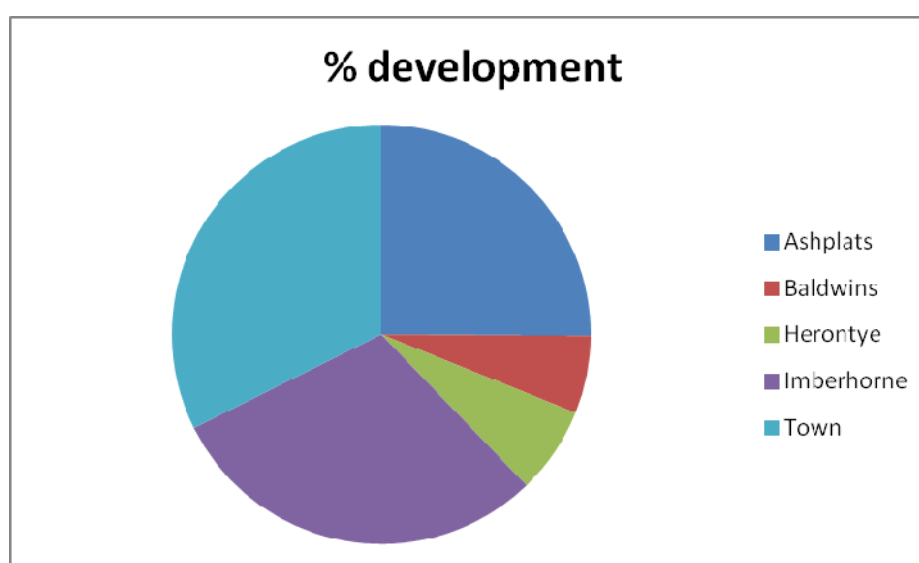
4.2.1.2. Committed Developments (2011)

MSDC has provided information on committed developments which are included within the updated MSDC SHLAA development data. This information is summarised in Table 7 and Figure 5.

Table 7. Committed SHLAA Developments

Ward	Number of Dwellings	% Development
Ashplats	180	25.1
Baldwins	43	6.0
Herontye	48	6.7
Imberhorne	214	29.8
Town	232	32.4
Total	717	100.0

Figure 5. Proportion of committed SHLAA Developments by Ward



This shows that there are 717 committed dwellings in East Grinstead within the SHLAA, with the greatest proportion in the Town ward (32%), followed by Imberhorne (30%) the Ashplats (25%), Herontye (7%) and Baldwins (6%) wards.

4.2.1.3. Small Development Sites

In order to feed into the modelling, the committed development scenario has been calculated by adding the committed SHLAA developments (2011) to the small development sites, omitted from the SHLAA data, which are outlined below (48 dwellings in total):

- Ashplat: five dwellings;
- Baldwins: five dwellings;
- Herontye: five dwellings;
- Imberhorne: one dwelling; and
- Town: 32 dwellings.

4.3. Trip Generation and Distribution

4.3.1. Trip Generation

The trip rates used in PBA's East Grinstead multi-modal Local Model Validation Report (LMVR) were compared with rates in the TRICS trip generation database for England outside of Greater London. The results are summarised in Table 8 and show that the trip rates used previously are comparable to up to date data in TRICS.

Table 8. Vehicle Trip Rates per Household

Scenario	AM Peak Hour			PM Peak Hour		
	Arr	Dept	Total	Arr	Dept	Total
2007 PBA EG Area Transport Model Stage 2 LMVR (rates used previously)	0.15	0.41	0.56	0.39	0.22	0.61
TRICS private housing (England-Greater London)	0.159	0.402	0.561	0.383	0.237	0.620

The rates used previously have therefore been applied to the committed development quantum outlined above, with the resulting trips shown in Table 9 for modelling the East Grinstead road network.

Table 9. Vehicle Trips Associated with Committed Development in East Grinstead

Ward	No. of houses	AM			PM		
		Arr	Dept	Total	Arr	Dept	Total
Ashplats	185	28	76	104	72	41	113
Baldwins	48	7	20	27	19	11	29
Herontye	53	8	22	30	21	12	33
Imberhorne	215	32	88	120	84	47	131
Town	264	40	108	148	103	58	161
Total	765	115	314	429	298	168	467

4.3.2. Trip Distribution

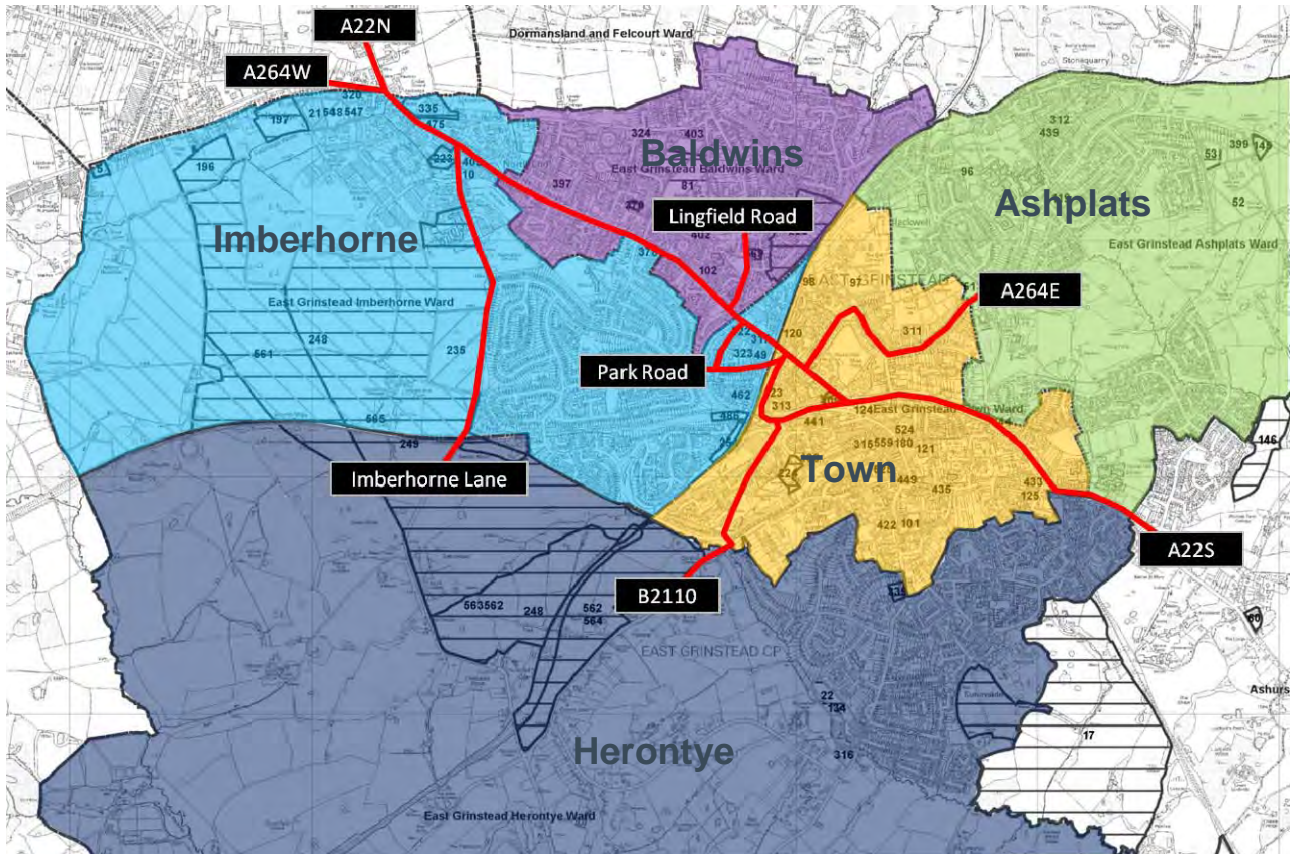
4.3.2.1. Ward Assignment

In order to distribute trips associated with each ward to and from the modelled road network, each ward was assigned an appropriate road as shown in Table 10 and Figure 6. Each ward has a single obvious entry/exit road leading to the A22, with the exception of the Imberhorne Ward, which was split between the two-way Imberhorne Lane and one-way Park Road. Generated trips associated with committed development in these wards have been assigned to the respective roads.

Table 10. Assignment of Trips to the Modelled Network from East Grinstead Wards

Ward	Entry/Exit arm	Percent (%)	
		Arrivals	Departures
Ashplats	A264E	100	100
Baldwins	Lingfield Road	100	100
Herontye	A22S	100	100
Imberhorne	Imberhorne Lane	100	60
	Park Road	0	40
Town	A22S	100	100

Figure 6. Assignment of Trips to the Modelled Network from East Grinstead Wards



4.3.2.2. Origin / Destination Distribution

In order to distribute committed development trips to and from each ward, information from the 2001 Census Travel to Work data has been used. The data used was for all car drivers for all five wards within East Grinstead.

Trips were distributed to the relevant roads according to the geographical position of the destination (comprised of the remainder of wards in the Mid Sussex district along with all other English Local Authorities). This information is summarised in Table 11 below.

Table 11. 2001 Census Car Driver Destinations Assigned to Relevant Roads

Road	Trips	Percentage (%)
A264W	2,583	36.2
A264E	576	8.1
A22N	1,381	19.4
A22S	1,337	18.8
B2110	460	6.5
Lingfield Road	312	4.4
Imberhorne Lane	478	6.7
Total	7,127	100.0

The trip distribution principles in Table 10 and 11 were applied to the committed development trips in Table 9 to derive flow diagrams for use in the modelling.

With the application of this trip distribution methodology, 71 trips in the AM Peak Hour (17%) and 76 trips in the PM Peak Hour (16%) do not load onto the modelled extent of network routing directly out of the Study Area without passing onto the A22 London Road. This includes trips originating in:

- Ashplats routing eastbound on the A264 Moat Road (8 trips in the AM Peak Hour and 9 in the PM Peak Hour);
- Baldwins routing northbound on Lingfield Road (1 trip in the AM Peak Hour and 1 trip in the PM Peak Hour);
- Herontye routing south on the A22 (6 trips in the AM Peak Hour and 6 trips in the PM Peak Hour) and south on the B2110 (2 trips in the AM Peak Hour and 2 trips in the PM Peak Hour);
- Imberhorne routing south on Imberhorne Lane (8 trips in the AM Peak Hour and 8 trips in the PM Peak Hour) and south on the B2110 (8 trips in the AM Peak Hour and 9 trips in the PM Peak Hour); and
- Town routing south on the A22 South (27 trips in the AM Peak Hour and 30 trips in the PM Peak Hour) and south on the B2110 (10 trips in the AM Peak Hour and 11 trips in the PM Peak Hour).

The resulting trips used in the modelling are summarised in Table 12 below.

Table 12. Trips Used in Flow Diagrams for Modelling

Road	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
A264W	42	114	108	61
A264E	7	19	18	10
A22N	22	61	58	33
A22S	13	34	33	18
B2110	2	6	6	3
Lingfield Road	5	13	12	7
Imberhorne Lane	6	15	14	8
Total	96	262	250	141

In total, 358 additional development trips are loading the network in the AM Peak Hour and 391 in the PM Peak Hour. Table 12 demonstrates a predominance in orientation of this traffic to the A264 (West) and A22 (North) in both AM and PM Peak Hours.

4.3.3. Potential Vehicular Trip Reduction

To ensure a robust assessment, these numbers represent a conservative estimate of vehicular trip generation. The implementation of a sustainable transport strategies and measures as recommended in the Stage 2 Report (Appendix A) would reduce the volume of private vehicles generated by the developments, reducing the stress placed on the surrounding highway network and specifically the critical A22 London Road. This would consequently provide more reserve capacity for additional development.

These options are summarised in Section 9 of this report; the viability of delivering these sustainable transport responses to minimise the traffic impact of planned development in East Grinstead is important to explore in support of the highway capacity improvements. It's recognised that to achieve maximum benefit of such measures, critical mass of development is important such that a comprehensive response can be realised. As such, the progression of development as a strategic site rather than dispersed would better enable this to be captured and effect strategies to achieve substantial change; otherwise quantum of development would be further constrained.

5. Forecast Network Conditions

5.1. 2011 Base Model Adoption

The validated 2011 EGTMs have been developed to form future year models with the assignment of traffic associated with identified developments to a nominal design year 2021 for the assessment of highway schemes. It has been agreed that no other background growth will be applied.

It also includes the planned junction amendments to the A22 London Road / Imberhorne Lane Junction 9 (Drawing No. C1070 Rev B) tied to the development of the nearby Bridge Park site for non-food retail use.

5.2. Design Year Modelling Results

5.2.1. Felbridge Junction

The design year modelling results for the Felbridge Junction are summarised in Table 13.

Table 13. Felbridge Junction: Future Baseline Scenario (2021)

Junction	Queue (pcus)	DoS (%)	Average Delay (s/pcu)
AM Peak Hour			
A264 Copthorne Road	33	97	66
A22 Eastbourne Road (N)	10	81	43
A22 London Road (S)	28	97	39
PM Peak Hour			
A264 Copthorne Road	33	95	54
A22 Eastbourne Road (N)	23	92	58
A22 London Road (S)	25	96	37

This suggests that the DoS is predicted to increase on Copthorne Road and A22 London Road to a maximum DoS of 97% in the worst case AM Peak Hour- therefore will be operating well in excess of practical capacity and close to theoretical capacity. These results suggest that in the design year of assessment, interventions are required to return the Felbridge Junction to acceptable operation conditions.

5.2.2. A22 London Road / Imberhorne Lane

The design year modelling results for the A22 London Road / Imberhorne Lane Junction are summarised in Table 14. It's noted that this includes the planned junction improvements for Imberhorne Lane.

The modelling results show that during the AM Peak Hour, Imberhorne Lane will operate at Practical Capacity on the London Road Right Turn into Imberhorne Lane and A22 London Road southern approach, however is seen to offer improvements over the existing scenario with reductions in DoS and queuing. In the PM Peak Hour, the junction is returned to within practical capacity on all arms representing acceptable and improved operating conditions over the existing situation.

Table 14. A22 London Road / Imberhorne Lane: Future Baseline Scenario (2021)

Junction	Queue (pcus)	DoS (%)	Average Delay (s/pcu)
AM Peak Hour			
Imberhorne Lane	19	87	59
A22 London Road (N) Ahead	7	46	5
A22 London Road (N) Right Turn	20	96	99
A22 London Road (S) Ahead / Left	34	92	43
PM Peak Hour			
Imberhorne Lane	18	81	50
A22 London Road (N) Ahead	14	66	7
A22 London Road (N) Right Turn	17	87	68
A22 London Road (S) Ahead / Left	27	85	36

5.2.3. A22 London Road / Lingfield Road

The design year modelling results for the A22 London Road / Lingfield Road roundabout are summarised in Table 15.

Table 15. A22 London Road / Lingfield Road: Future Baseline Scenario (2021)

Junction	Queue (pcus)	RFC	Delay (mins)
AM Peak Hour			
Lingfield Road	67	1.22	9
A22 London Road (N)	149	1.39	18
A22 London Road (S)	168	1.29	12
PM Peak Hour			
Lingfield Road	52	1.18	8
A22 London Road (N)	142	1.37	16
A22 London Road (S)	232	1.38	15

This table shows that with the addition of committed development traffic in the design year of assessment, the existing overcapacity network conditions are exacerbated with increased RFCs to 1.39 in the AM Peak Hour in the northern arm of London Road and 1.38 on the southern arm in the PM Peak Hour.

This indicates that significant interventions in the form of highway schemes will be required to improve the network in this location and return operation conditions within acceptable parameters.

5.2.4. A22 London Road / A264 Moat Road

The design year modelling results for the A22 London Road / A264 Moat Road junction are summarised in Table 16.

In the Future Baseline scenario A22 London Road/Moat Road junction is over capacity with exacerbation of the existing network conditions. This is mainly because of the addition of the committed development traffic, however the assignment is static and in reality, some traffic would re-assign to other routes therefore this is considered a conservative assessment.

The Future Baseline model output shows that the junction exceeds the capacity with highest RFC of 2.21 in AM peak period and 1.42 in the PM peak period.

Table 16. A22 London Road / Moat Road: Future Baseline Scenario (2021)

Junction	Queue (pcus)	RFC	Delay (mins)
AM Peak Hour			
Moat Road	177	2.25	1688
A22 London Road (N)	179	1.27	1977
PM Peak Hour			
Moat Road	29	1.04	342
A22 London Road (N)	567	1.42	7412

5.2.5. A22 London Road / Lingfield Road to A22 London Road / A264 Moat Road

An assessment of 2021 design year journey times from the VISSIM Model are presented in Tables 16 and 17 respectively. Full details of this analysis are presented in the Model Forecasting Report in Appendix B of this Report.

5.2.5.1. Journey Times

Table 17 presents a summary of the overall journey times to (Route One) and from (Route Two) East Grinstead. This includes general traffic and derivation of bus journey times.

Table 17. VISSIM Model Journey Time Analysis: Future Baseline Scenario (2021)

Segments	AM Peak Hour (seconds)		PM Peak Hour (seconds)	
	Traffic	Buses	Traffic	Buses
Route One				
JTS3-S4 (E)	48.2	52.1	49.7	54
JTS4-S5 (E)	12.8	20.0	13.6	27.3
JTS5-S6 (E)	30.8	32.5	31.1	32.8
Total	91.8	104.6	94.6	114.1
Route Two				
JTS6-S4 (W)	180.4	149	158.1	135.5
JTS4-S3 (W)	63.8	66.4	56.8	70.2
Total	244.2	215.4	214.9	206

As is evident in Table 17, a marginal increase in journey times is expected all routes however in comparison with Table 5 remain broadly consistent with the existing scenario with Route 2 journey times slower in the AM Peak Hour for both general traffic and buses than the PM Peak Hour. It is also noted that in both instances journey times are more expedient on route into than out of East Grinstead.

The most notable increase in journey times from existing to design year is on the westbound route out of East Grinstead, in the PM Peak Hour with average journey times increasing for general traffic by 50% from 143 to 215 seconds and more significantly for buses by 58% from 130 to 206 seconds.

6. Option Development Considerations

6.1. Scheme Objectives

6.1.1. Stakeholder Requirements

The following groups were all consulted as key stakeholders on the project:

- West Sussex County Council ;
- Members for East Grinstead and North Mid Sussex;
- Mid Sussex District Council;
- East Grinstead Town Council; and
- 3-Tier Group (representatives from EGTC, MSDC & WSCC).

Stakeholders were all invited to provide a statement of their requirements for the A22 London Road package of measures via distribution of a template spreadsheet to enter any key requirements they foresee for the project under categories 'Travel Modes' and 'Government Objectives' and is generally consistent with the DFT's guidance on the conduct of transport studies (<http://www.dft.gov.uk/webtag/overview/index.php>).

Stakeholders were asked to enter as few or as many under each category as they see fit. These were all recorded as stakeholder requirements and consolidated as a concise list of scheme objectives for inclusion in the evaluation framework to be ranked in order of priority (low/medium/high) as Scheme Objectives.

6.1.1.1. Modes

The key modes highlighted were based around personal rather than freight movement as the later would be picked up under economy. The modes were categorised thus:

- Traffic;
- Public Transport; and
- Pedestrians & Cyclists.

6.1.1.2. Government

This is supported further in the appraisal of the schemes based on the New Approach to Appraisal (NATA) and thereby against the Government's five objectives for transport as outlined in the White Paper 'A New Deal for Transport: Better for Everyone' (DETR, 1998) as below:

- Environment;
- Safety;
- Economy;
- Accessibility; and
- Integration.

6.1.1.3. Policy

A policy review has been undertaken as part of the Study, however key local policy objectives were also been included for stakeholders to draw attention to any specific areas they feel due account should be given.

6.1.2. Scheme Objectives

Feedback from the Stakeholder consultation process was received from the East Grinstead Town Council neighbourhood plan working group. Table 18 summarises the resultantly identified requirements derived from the stakeholder consultation process to feed into the evaluation framework.

Table 18. Scheme Objectives

Ref no.	Objective	Priority
Modal Objectives		
Traffic		
T1	To improve the flow of traffic around the town particularly on these main routes of access to the town where new housing development is planned	High
Public Transport		
PT1	Over a dozen Bus routes pass through here and can be caught up in congestion. Public transport to be seen as a viable and attractive alternative should be able to pass through more conveniently.	Medium
Pedestrians & Cyclists		
PC1	As cycling and sustainable transport is encouraged the ability to safely cycle around the town through the adequate provision of connecting cycle lanes, must be addressed along this busiest of routes	Medium
Government Objectives		
Environment		
En1	The congestion leads to poor air quality. East Grinstead is a rural area that must be affected by the increased engine emissions on these busy routes where traffic queues are common.	High
En2	The congestion results in higher pressure on neighbouring villages as motorists seek to avoid the town traffic. Heightening concerns for safety and environmental damage to outlying rural settlements and the less suitable roads for heavy volumes and speeds of traffic.	Medium
Economy		
Ec1	The ability to move more freely through the town would improve the visitor experience and encourage trade in to the town centre.	Medium
Safety		
S1	The safe co-existence of vehicular traffic / cycles and pedestrians needs to be ensured on this busy stretch of road. Or the ability to deviate the pedestrian and cyclist to other, shorter and safer routes.	High
S2	The congestion results in higher pressure on neighbouring villages as motorists seek to avoid the town traffic. Heightening concerns for safety and environmental damage to outlying rural settlements and the less suitable roads for heavy volumes and speeds of traffic.	Medium

6.2. Policy Objectives

6.2.1. Policy Review

A comprehensive review has been undertaken of policy from national to local level in order to derive some key policy objectives for the scheme.

It's noted that this Stage 3 Study is intended to inform MSDC's District Plan and EGTC in preparing a Neighbourhood Plan for adoption by MSDC. In advance of this, a review of the following documents has been undertaken:

- MSDC Local Plan (May 2004)
- MSDC Supplementary Planning Document 'East Grinstead Town Centre Masterplan' (July 2006);
- MSDC Local Development Framework: Consultation Draft District Plan (October 2011);
- WSCC Structure Plan 2001-2016;
- WSCC Local Transport Plan 3 2011-2026; and

- PPG13 Transport (update 2011).

Given the rise of the Localism Bill and decline in regional level bodies, the Regional Planning Guidance published in March 2001 and specifically the Regional Transport Strategy for the South East has appropriately not been considered further here.

6.2.1.1. MSDC Local Plan 2004

MSDC's Local Plan sets out general policies, consisting of a Written Statement setting out the authority's policies and proposals for the plan area and a Proposals Map defining those sites allocated for development or where particular policies apply. It's intended to set out the authority's policies for the control of development and make proposals for development, use of land and allocation of land for specific purposes.

It highlights East Grinstead as one of the three main towns in Mid Sussex, experiencing a period of expansion in the 1980s and early 1990s however also that since the pace of development has slowed considerably reflecting the environmental and infrastructure constraints affecting the town, in particular roads as the provision of highways has not kept pace with the rate of development.

The Local Plan therefore considers that significant improvements are required and without which further large scale development will only exacerbate the situation; indeed the Local Plan highlights that only very modest levels of development can be accommodated in the short term as the existing infrastructure will continue to be a constraint, at odds with the allocation of 2,500 units in the WSCC Structure Plan and later with the South East Plan allocation.

This includes a series of junction improvements along the A22 which currently suffer from congested conditions impeding the flow of local and through traffic. Addressing this is seen to improve highway safety generally, as well as the environment and local economy. Identified junctions include:

- A22 London Road / Lingfield Road;
- A22 London Road / Station Road; and
- A22 London Road / Moat Road.

The Local Plan also refers to improvements to the cycle route network within east Grinstead, including Worth Way linking East Grinstead to Crawley and Forest Way running south east to Forest Road and into East Sussex. Whilst not on the A22, further work is required to define the line of the national cycle route through East Grinstead to be considered as part of traffic and highways studies relating to the A22.

6.2.1.2. MSDC Supplementary Planning Document (SPD) 2006

MSDC's East Grinstead Town Centre Masterplan is intended to guide the revitalisation and redevelopment of East Grinstead town centre, forming additional guidance to supplement their statutory planning policies as set out in their Local Plan. It is the result of a collaborative process between MSDC, WSCC, EGTC, Thornfield Properties plc (MSDC's appointed development partner at the time) and the local community and sets out the policy context, background information and a vision for the development of the town to 2026.

'The East Grinstead Town Centre Masterplan also includes seven objectives that new development should accord with to meet this vision and have been extracted for consideration against the A22 London Road transport improvements and assess how these schemes directly or indirectly contribute to the long term vision for the development of East Grinstead.

6.2.1.2.1. MSDC Consultation Draft District Plan 2011

Approved for consultation from 24th October 2011 for a period of 12 weeks, the consultation draft District Plan is intended to supersede most of the policies contained within MSDC's Local Plan as part of the Local Development Framework (LDF). The District Plan will be the main planning document used by the Council when considering planning applications.

Whilst not yet adopted this will not be considered for the evaluation framework however is given due consideration here to ensure consideration in the development of the emerging highway schemes, as it has been written in the context of the Localism Bill and the changes to the planning system being introduced by the Coalition Government. Key strategic objectives to take forward the District Plan's vision and apply it to planning issues are summarised in Table 19.

Table 19. Strategic Objectives for the District Plan (Draft)

Priority Themes	Strategic Objectives for the District Plan
Protecting and enhancing the environment	<ul style="list-style-type: none"> • Promote sustainable development that makes the best use of resources and increases the 'self-sufficiency' of communities within Mid Sussex, and its ability to adapt to climate change • Promote well located and designed development that reflects our distinctive towns and villages, retains their separate identity and character and prevents coalescence • To protect valued landscapes for their visual, historical and biodiversity qualities • Maintain easily accessible green corridors and spaces around and within the towns and villages to act as wildlife corridors and sustainable transport links • Ensure that development is accompanied by the necessary • infrastructure in the right place at the right time that meets needs, supports development and creates sustainable communities
Promoting economic vitality	<ul style="list-style-type: none"> • Promote a place which is attractive to business, and where local enterprise thrives • Provide opportunities for people to live and work within their communities, reducing the need for commuting • Create and maintain town and village centres that are vibrant, attractive and successful and that meet the needs of the community • Support a healthy rural economy in the villages and the countryside • Support and enhance the attractiveness of Mid Sussex as a visitor destination
Ensuring cohesive and safe communities	<ul style="list-style-type: none"> • Develop sustainable communities which are safe, healthy and inclusive • Provide the amount and type of housing that meets the needs of all sectors of the community • Create environments that are accessible to all members of the community
Supporting healthy lifestyles	<ul style="list-style-type: none"> • To create places that encourage a healthy and enjoyable lifestyle by the provision of first class cultural and sporting facilities, informal leisure space and the opportunity to walk, cycle or ride to common destinations.

6.2.1.3. WSCC Structure Plan 2001-2016

The West Sussex Structure Plan 2001 – 2016 Deposit Draft sets out a range of policies relating to development and transport for the period to 2016. It places great importance on development being sustainable in terms of environmental capacity, the efficient use of land, materials and energy, location and access to public transport routes. The Structure Plan also includes the East Grinstead Relief Road associated with strategic development.

With regard to new housing development proximity to education, employment, shopping, leisure and health facilities is particularly important: the opportunity to reduce both the length and number of journeys is important in considering the suitability of development sites. The opportunities for improving facilities for public transport, cycling and walking are considered equally important to making development more sustainable.

Although the Structure Plan no longer has a formal status in the statutory planning system it remains the County Council's strategic policy statement on development in the future. Therefore the aims of the County Council, expressed in the West Sussex Structure Plan 2001 – 2016, have been included as policy objectives for the AST.

6.2.1.4. WSCC Local Transport Plan (LTP3) 2011-2026

The plan includes four strategies that guide our approach to maintaining, managing and investing in transport, and meeting our main objective of improving quality of life for the people of West Sussex. The plan is intended to provide strategic direction for transport within the county, but aim to align itself closely with other major strategies including the County Strategy and the Local Community Strategies and as such is the result of an extensive consultation process with both the public and strategic partners.

The most important roads are included in the County Strategic Road Network (SRN) that are expected to cater for longer distance traffic, traffic passing completely through the County without stopping, between the main urban centres in and outside the County and Heavy Goods Vehicles (HGVs). The SRN includes both the A264 (from the M23 to A22 at Felbridge and the A22).

It's observed that there are high levels of rat-running on unsuitable rural roads in the East Grinstead Area (especially between Crawley and East Grinstead caused by delays on the A22 and A264 therefore as part of the long term strategy to tackle issues on the SRN proposed a comprehensive and wide-ranging package of measures on the A22, A264 and other roads in the East Grinstead area to deal with the demand generated by new development.

It is also noted that East Grinstead suffers from congestion and safety issues at peak and off-peak periods due to the car-orientated travel. The alignment of the A22 through the centre of the town is also seen to cause community severance and concerns for road safety due to high traffic volumes and shortage of safe places to cross; therefore as part of the LTP3 Implementation Plan it is recognised that there is a need to mitigate the impact of future development to assist the Town Centre Masterplan which contains aspirations as detailed above that remain largely undelivered.

6.2.1.5. PPG13 – Transport

At the outset, it's noted that national level policy aspirations as covered in the Department for Communities and Local Governments' document 'PPG13: Transport' (updated January 2011) are reflected in WebTAG and intended to integrate planning and transport at the national regional and local level therefore are largely embedded in local policy aspirations, therefore are considered to be largely captured in associated documents. Accordingly, while considered as part of the AST these to minimise double-counting are not considered in significant detail here.

The Government has recognised that forecast levels of travel growth will not be able to be met in full and that simply building more roads may, in some cases, be environmentally unacceptable and not be a sustainable solution. Meeting the objectives set out in PPG13 depends on influencing the location of new development so that the need to travel is reduced and ensuring that the development is highly accessible by means other than the private car. However, it is recognised in the guidance that the car will continue to have an important part to play and for some journeys, particularly in rural areas, it will remain the only real option for travel

Complementary transport measures are encouraged which include a balance of provision for, and constraints on, private motorists. Such constraints include the use of parking controls and charges and traffic management. PPG13 also encourages the promotion and improvement of conditions for alternative means of travelling including facilities for cyclists and pedestrians and priority measures for buses.

6.2.2. Policy Objectives

Table 20 summarises the above policy review to draw together a consolidated list of policy objectives to feed into the AST. It's noted that whilst much of the list don't represent transport-specific objectives, these are important in relating the assessed impact of any improvements on the A22 London Road to wider development aspirations for East Grinstead in balance to the scheme objectives derived from stakeholder requirements.

Table 20. Policy Objectives

Ref no.	Source	Objective
Local Policy		
EG1	East Grinstead	Making East Grinstead a place that is safe and easy to get around – policy E1 and 2
EG2	Town Action Plan (2003)	A Place of sensitive change and development, and a place to care about - policy D1
MS1	MSDC SPD 'East Grinstead Town Centre Masterplan'	Provide a robust structure to the town centre that ensures that future development complements and integrates with the unique character of the town.
MS2		Improve accessibility and permeability within the town centre by providing safe, direct and attractive routes that encourage walking, cycling and use of public transport.
MS3		Create opportunities for new retail and associated parking within the town centre that dramatically improves the quality and offer of the shopping experience.
MS4		Provide a greater mix of uses and residential accommodation, including affordable housing, within the town centre, to increase and diversify its resident, visitor and workplace populations and giving family orientated evening vitality.
MS5		Enhance the public realm and create a new town square.
MS6		Ensure new development respects and builds on East Grinstead's special identity and character.
MS7		Create a sustainable town.
MS8	MSDC Local Plan	Relieve congestion on the A22 to improve highway safety, environment and local economy.
MS9		Support long distance cycle routes including completion of the national cycle route through East Grinstead.
WS1	WSCC Structure Plan 2001-2016	Encourage efficient movement of traffic by the implementation and completion of the planned improvements to the highway network in the District.
WS2		Reduce energy consumption and pollution by reducing traffic congestion.
WS3		Reduce the level of road accidents by implementing road safety and traffic calming measures.
WS4		Integrate land use and transport policies so that any new development proposals can be accessed by public transport, cyclists and pedestrians; and are located in, or adjacent to, existing urban areas.
WS5		Encourage a reduction in car use through traffic management and integrated parking measures.
WS6		Encourage alternatives to car use by improving the environment and facilities for pedestrians and cyclists and encouraging greater coordination and provision of public transport services.
WS7	WSCC LTP3 2011-2016	Promote economic growth.
WS8		Tackle climate change.
WS9		Provide access to services, employment and housing.
WS10		Improving safety, security and health.
WS11		Develop and implement a traffic management strategy using contributions from development to optimise the A22/A264 route through East Grinstead, improving access and managing congestion.
National Policy		
N1	PPG13	Promote more sustainable transport choices for both people and for moving freight.

N2		Promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling.
N3		Reduce the need to travel, especially by car.

6.3. Modal Requirements

The results from the model development process have been adopted to include as scheme performance indicators for the AST:

- **Journey Times** – general vehicular traffic and buses; and
- **Static Indicators** – queue lengths, delay and Degrees of Saturation (DoS).

Collectively these capture the impact of the schemes for vehicles travelling through the network and the performance of junctions in dealing with the volumes of traffic within design capacity. These are summarised in Table 21.

Table 21. Scheme Performance Indicators

Ref no.	Local Modelling
Journey Times	
M1	Vehicles
M2	Buses
Static Indicators	
M3	Queue Lengths
M4	Delays
M5	Degrees of Saturation

7. Design Evolution

This section of the report sets out the results of the review of the Stage 2 design proposals for the five key junctions along the A22 that form part of the Stage 3 study. The junctions are:

- Felbridge Junction signal controlled junction;
- A22 London Road / Imberhorne Lane signal controlled junction;
- A22 London Road / Lingfield Road mini roundabout;
- A22 London Road / A22 Station Road – part of the one way system; and
- A22 London Road / Moat Road priority junction, adjoining the one way system.

The design evolution process has been iterative, picking up planned schemes already identified for Imberhorne Lane and Lingfield Road and consolidating the concept schemes from the Stage 1 and 2 Reports. As the designs progressed, traffic modelling tools developed in tandem during Stage 3, were used to test a range of options at each location to assess the suitability of each option thus forming a set of Do Minimum (DM) and Do Something (DS) schemes, aimed at arriving at two solutions at each location, one within the constraints of the highway boundary and a second that seeks to achieve more significant highway capacity improvements.

The pros and cons of each option were considered qualitatively in discussion with WSCC and subsequently the preferred DM and DS scenarios identified for evaluation against a multi-modal framework and additional testing to confirm development enabling assumptions concluded during Stage 2. This process is also summarised in this section of the report.

As part of the review, further on site measurements and observations have been made and a C2 statutory undertakers' enquiry has been completed. The proposed designs are based on OS mapping. This has been verified by on site measurements which indicate that the OS mapping is reasonably accurate for the majority of locations.

The highway boundary information supplied by West Sussex County Council (WSCC) has been reviewed as part of the design process. It has been agreed to develop Do Minimum and Do Something schemes at each junction. In general the Do Minimum schemes aim to retain any proposed works within the existing highway boundary. The Do Something schemes typically involve works outside of the existing highway boundary.

7.1. Accident Review

The Personal Injury Accident (PIA) records for the five years to 31 October 2011 were supplied by WSCC. An initial review of the accidents has been completed to understand any key trends which may influence the development of proposed schemes. The results of the review are detailed below by junction.

7.1.1. Felbridge Junction

There were two accidents recorded at the A22 / Copthorne Road junction:

- A pedestrian with a dog stepped out from the central reservation in front of a car. The vehicle swerved to avoid the pedestrian but the wing mirror struck the pedestrian knocking her to the ground. The severity of the PIA was slight.
- A car travelling northwest on the A22 about to turn left onto A264 Copthorne Road when a car in the offside lane appeared to try to change lanes and hit the side of the car in the nearside lane. The severity of the PIA was slight.

7.1.2. A22 London / Imberhorne Lane

There were two accidents recorded at the A22 / Imberhorne Lane junction:

- In a queue of stationary traffic (northwest bound) at red lights Vehicle 1 saw lights turn green and started to pull forwards at the same time Vehicle 2 stopped and due to not paying attention Vehicle 1 hit the rear of Vehicle 2. The severity of the PIA was slight.
- Car travelling south attempted a U-turn and entered the opposite side of the carriageway pulling into the path of on-coming motorcycle travelling north on A22 causing the motorcycle to hit the side of the car.

7.1.3. A22 London Road / Lingfield Road

There were two accidents recorded in the vicinity of the A22 / Lingfield Road junction:

- Vehicle 2 travelling west along the A22 and indicated to turn right at the roundabout to head north on Lingfield Road. Vehicle 1 travelling east along the A22 failed to slow when approaching the roundabout and collided with the passenger side of Vehicle 2 as Vehicle 2 was pulling off the roundabout. The severity of the PIA was slight.
- Car stopped at a pedestrian crossing as the lights were on red. Motorcycle did not realise vehicle had stopped and failed to take avoiding action resulting in a collision with the rear of the car. The severity of the PIA was serious.

7.1.4. A22 London Road / A22 Station Road

There were two accidents recorded in the vicinity of the A22 / Station Road junction:

- A car travelling south along the A22 collided with a pedestrian crossing from the west side of the A22. The severity of the PIA was slight.
- A car was emerging from Park Road onto Station Road when a pedestrian ran across in front of the car which caught the pedestrian as the car began to move off from the junction. The severity of the PIA was slight.

7.1.5. A22 London Road / Moat Road

There were two accidents recorded in the vicinity of the A22 / Moat Road junction:

- Vehicle 1 was travelling along London Road (A22) in the left hand lane of the one way system heading towards East Grinstead town centre when driver went to move across into right hand lane. Realised there was a vehicle close beside and clipped the rear of Vehicle 2. Then turned back into left hand lane and collided into rear of Vehicle 3 which in turn went into rear of Vehicle 4. The severity of the PIA was slight.
- An elderly lady walked out from behind a HGV into an oncoming vehicle.

7.1.6. General

Overall, an initial review of the accident data indicates that there are no significant issues based on the reported incidents. However, it should be noted that both of the reported accidents in the vicinity of the A22 / Station Road junction involved pedestrians. One of these was at the Station Road / Park Road junction which is close to the A22 / Station Road junction. Nonetheless, the data highlights there may be issues that need to be addressed.

7.2. Committed and Other Schemes

A number of schemes have been identified along the A22 corridor that needs to be considered as part of this study and these are listed below.

7.2.1. AIP 2011/12 Route Management Strategy

WSCC has provided detailed design drawings for the proposed works as part of the A22 London Road (East Grinstead) Route Management Strategy. These works extend from the Surrey County Council boundary near the A22 / Copthorne Road junction to Beeching Way in East Grinstead town centre. The proposed works are detailed on drawing numbers 13252/-/249_1 and 13252/-/249_2 and include:

- New / refreshed road markings;
- New high friction surfacing;
- New yellow box markings;
- New signs; and
- Vegetation clearance.

The proposed works are not expected to impact on the operation of the junctions considered in this study, although the implementation of new yellow box markings may increase the length of queues along the A22.

7.2.2. Imberhorne Lane Development

There are committed proposals to develop a site to the west of Imberhorne Lane close to the junction with the A22. The proposal is for the development of the nearby Bridge Park site for non-food retail use and improvements to the A22 / Imberhorne Lane junction have been produced as part of the development. The proposals are detailed on WSP drawing number C1070 Rev B and include:

- Carriageway widening to the west of Imberhorne Lane to allow the provision of a right turn pocket into the development; and
- Controlled pedestrian crossing facilities across Imberhorne Lane at the junction with the A22.

7.2.3. A22 London Road / Lingfield Road Junction

WSCC has developed a scheme to replace the existing mini-roundabout at the A22 / Lingfield Road junction with traffic signals. The scheme is detailed on WSCC drawing number 13823 and includes the following main features:

- Carriageway widening to the east of the A22 to provide two lanes on the southbound approach to the junction. This would result in the southbound bus stop being located on the main carriageway;
- Carriageway widening to the west of the A22 to provide an additional northbound lane through the junction. This would result in the relocation of the existing northbound bus stop;
- Provision of two lanes on the Lingfield Road approach;
- Implementation of Advanced Stop Lines (ASL's) for cyclists on all approaches; and
- Implementation of controlled pedestrian crossing facilities across the southern and eastern arms of the junction and uncontrolled facilities across the northern arm.

7.3. Scheme Optioneering Process

In addition to the schemes identified in the Stage 2 study and based on the design review, a number of options were considered and tested using the traffic models developed as part of the Stage 3 study. This section details the range of schemes that were investigated as part of this more detailed optioneering process.

A set of Do Minimum (DM) and Do Something (DS) schemes have been derived from this process and these are summarised towards the end of this section. In general, the DM schemes aim to deliver improvements to capacity and non-motorised users whilst keeping works within the existing highway boundary. The DS scenarios typically consider benefits that could be achieved with more extensive works.

7.3.1. Felbridge Junction

Discussions have been held between WSCC and Surrey County Council (SCC) with a view to implementing a scheme funded by developer contributions at Felbridge Junction. The schemes considered in this study include:

Signal Optimisation

The existing junction may not be operating as efficiently as possible at present as the existing signal equipment may prevent optimisation of the timings. The changes aim to improve the operation of the existing signal timings based on the traffic flows in the traffic model. As the junction is situated in SCC this proposal would need to be discussed with the relevant department within SCC.

Link Signals to A22 / Imberhorne Lane Junction

Linking the two sets of signals at the Felbridge Junction and the A22 London Road / Imberhorne Lane junction should help improve the flow of traffic between the two junctions. However, the Felbridge Junction is within SCC and discussions will need to be held between WSCC and SCC to determine if the two sets of signals can be linked as they may be on different systems.

Provide Two Right Turn Lanes on A264 Copthorne Road

There are extensive queues in the existing situation on the Copthorne Road approach to the A22 junction. Currently, the nearside lane is designated for vehicles turning left only. It is proposed to allow vehicles turning right to also use the nearside lane to improve throughput. Associated with the above proposal it would be necessary to provide two lanes on the A22 southbound exit from the junction to permit two lanes of turning traffic to complete this manoeuvre safely.

Provide Improved Pedestrian Crossing Facilities

The current pedestrian crossing facilities at the junction are limited. All arms have a small island (1.2m wide) which provides a refuge for pedestrians; however, there are no controlled facilities. Various options have been considered to improve the pedestrian environment, including the implementation of larger pedestrian refuges and controlled pedestrian crossings.

Increase the Length of the Two Lane A22 Northbound Approach

There are two lanes on the A22 northbound approach to the Copthorne Road junction which extend back to Standen Close. There is potential to increase the length of the two lanes and therefore increase capacity on this approach. There is a wide verge within the highway boundary south of The Feld which could accommodate any widening. However, north of The Feld there is a stone wall which would need to be relocated to achieve the carriageway widening whilst providing a footway. There may be restrictions placed on the wall which will require further investigation and WSCC have advised that it would be necessary to discuss any restrictions relating to the wall with the District Council. The stone wall is shown in Figure 7.

Figure 7. A22 Looking North with Stone Wall to Left by Directional Sign



The above proposals have been tested using LINSIG and the results indicate that the implementation of controlled pedestrian crossing facilities would require an all red phase. As a result the junction would be over capacity. To prevent the implementation of an all red stage staggered pedestrian crossings have been considered but these could not be implemented on the required arms within the existing highway boundary and any carriageway widening would require compulsory purchase of affected properties. As a result it is concluded that controlled pedestrian crossing facilities could not be implemented at the junction without significant detriment to the junction capacity as it detailed in Appendix B of this report.

However, pedestrian crossing facilities can still be improved by implementing wider islands on each arm. It is possible to implement 1.5m wide islands on all arms whilst providing two lanes on the southbound exit of the junction. This meets the minimum width requirement specified in the Design Manual for Roads and Bridges (DMRB) TD50 and can be achieved without any carriageway widening.

The implementation of 2m wide islands would further improve the comfort for pedestrians crossing at the junction and would meet recommendations. To achieve this it would be necessary to widen the A22 to the east on the southbound exit from the junction. This would require land outside of the existing highway boundary and would result in the reconstruction of the bridge over the stream. However, any widening would also offer the opportunity to increase the lane widths on the southbound exit of the junction. In liaison with WSCC it has been identified that the bridge is maintained by Surrey County Council (SCC). If this scheme is to be progressed it would be necessary to investigate the status of the bridge with SCC. The bridge over the stream is shown in Figure 8.

Figure 8. A22 Looking North with Bridge over Stream to Left



Swept path analysis of articulated vehicles has been completed for the proposed layouts. This indicates that it would not be possible for two articulated vehicles to complete the right turn from Copthorne Road on the A22 southbound simultaneously. However, traffic flow data indicates that HGV flows completing this manoeuvre are relatively low and it is unlikely that two HGV's would try to complete this movement side by side. The left turn from Copthorne Road onto the A22 northbound would also be difficult with the proposed 1.5m or 2m wide island on the northern arm of the junction. However, with minor kerb changes the swept path analysis indicates the manoeuvre can be completed.

The LINSIG modelling indicates that the proposals to provide two right turn lanes on Copthorne Road and extend the length of the two lanes on the A22 northbound approach would improve capacity on these approaches.

7.3.2. A22 London Road / Imberhorne Lane

The existing committed development on Imberhorne Lane has associated highways improvements to the A22 / Imberhorne Lane junction. In addition to these proposals we have considered the following schemes.

Signal Optimisation

As per the A22 / Copthorne Road junction

Link Signals to A22 / Imberhorne Lane Junction

As per the A22 / Copthorne Road junction

Provide an Additional Southbound Lane on A22

To improve southbound throughput at the junction the provision of an additional lane has been suggested through the junction. It is proposed to implement the additional lane south of Furze Lane which would enable two straight ahead lanes to be provided on the southbound approach. South of the junction the two lanes would merge over approximately 70m.

The LINSIG modelling indicates that this would provide a significant increase in capacity. However, to achieve the proposed design significant carriageway widening would be required and the purchase of third party land would be necessary.

There is a large oak tree in the grounds of The Felbridge Hotel and Spa (Figure 9) which is close to the highway boundary. It is likely that the proposed carriageway widening would impact on the root system of the tree. This would require further investigation should this option be progressed.

Figure 9. A22 Looking South of Large Oak Tree in the Grounds of Felbridge Hotel and Spa



Provide an Additional Northbound Lane on A22

There is currently a short nearside flare on the A22 northbound approach to the Imberhorne Lane junction which is dedicated for vehicles turning left. This could potentially be used for straight ahead traffic, although carriageway widening north of the junction would be required to accommodate two lanes of traffic. This can be achieved within the highway boundary and would require the repositioning the existing parking bay outside The Parade.

The LINSIG modelling indicates that this proposal would not significantly improve throughput at the junction and this is largely because the flare on the northbound approach is relatively short.

Increase the Length of Two Lanes on the Imberhorne Lane Approach

The highways proposals associated with the development on Imberhorne Lane will result in a revised highway layout on Imberhorne Lane. The plans indicate that there may be potential to further widen the carriageway to the west to allow the provision of two lanes north of property number 4 on Imberhorne Lane. This would still permit the implementation of a right turn pocket and the provision of a footway on the western side of Imberhorne Lane.

The results of the LINSIG modelling indicate that the proposal would not reduce queues on this approach. Traffic flow data indicates that the predominant movement on this approach is the left turn onto the A22 and so the provision of a longer flare would only benefit vehicles turning right. There are a limited number of vehicles completing this manoeuvre and the long queue of traffic turning left may prevent access to the right turn lane. As a result the scheme is unlikely to increase throughput on this approach.

Improved Pedestrian Crossing Facilities

The development proposals include the provision of controlled pedestrian crossing facilities across Imberhorne Lane in addition to the existing controlled crossing across the A22 northern arm. The implementation of an additional controlled crossing across the A22 southern arm was tested in LINSIG. However, this would require an all red stage and consequently the junction would operate over capacity.

7.3.3. A22 London Road / Lingfield Road

As part of a previous study a scheme has been developed by WSCC to signalise the A22 / Lingfield Road junction as detailed in Section 7.2 (see Drawing No. 13823). In addition to these proposals we have considered the following schemes:

Roundabout with Extended Two Lanes on Each Approach

It was identified that the existing method of control at the junction could be retained and capacity improved through the provision of two lanes on each approach over a greater distance than the current arrangement. This would require carriageway widening on the A22 similar to the WSCC proposals.

The proposed scheme was tested in ARCADY and the results indicated that there would be a reduction in delays, but the junction would still operate above capacity.

Carriageway Widening on the Bridge across Dismantled Railway

With the relocation of footways, there is potential to widen the carriageway on the bridge across the dismantled railway on the A22 south of the Lingfield Road junction. The design assessment completed for this option indicates that the provision of an additional lane across the bridge would require both footways to be removed (Figure 10).

Figure 10. A22 Looking South across Bridge over Dismantled Railway



The traffic modelling assessment indicates that the greatest benefit would be gained if two lanes are provided for northbound traffic. There is currently a relatively high proportion of traffic turning right from the A22 onto Lingfield Road and therefore it is proposed to implement a straight ahead and right turn lane over the bridge. As per the WSCC scheme it is proposed to implement a straight ahead lane and a separate left turn lane on the A22 southbound approach.

To maintain footways over the bridge it is proposed to provide cantilever footways on either side of the bridge. An alternative solution would be to construct separate bridges for the footways which are not attached to the existing bridge structure. WSCC have advised that the bridge is owned by BRB (Residuary) Ltd and therefore any proposals to be taken forward that affect the bridge would need to be discussed with the owners. In particular it would be necessary to confirm:

- The most appropriate form of footway provision; and
- That the bridge structure could accommodate an additional lane of traffic or whether strengthening works would be required.

There is currently an electricity substation on the south-east corner of the A22 / Lingfield Road junction. The proposed carriageway widening would result in the loss of adjacent footway provision. To avoid relocation of the substation, it's proposed to re-route the footway around the eastern side of the plot and to provide a connection to the proposed cantilevered or free standing footway.

This would require land from property number 1a Lingfield Road and the embankment of the dismantled railway and would also be necessary to consider the potential for anti-social behaviour or the risk of ambush as a result of routing the footway behind the substation. If this design is progressed suitable measures to improve visibility of this area would need to be investigated.

To the south of the bridge over the dismantled railway it is proposed to tie in to the existing layout in the vicinity of Maypole Road. The proposals would require third party land on both sides of the A22 enable the cantilevered or free standing footways to connect with the existing footways, however, the scheme has been designed to minimise the requirement for third party land. There is potential to extend the provision of three lanes further south but this would require significant third party land.

Advanced Stop Lines

The proposed WSCC scheme includes the provision of ASLs for cyclists on all approaches to the junction. Whilst providing additional facilities for cyclists these measures would reduce the capacity at the junction therefore as agreed with WSCC for the purpose of assessment for this Stage 3 Report, the implementation of signals at the junction without ASLs has been considered to maximise junction capacity.

7.3.4. A22 London Road / A22 Station Road

The schemes considered at the A22 London Road / A22 Station Road junction include:

Signalisation of the Junction

The existing junction forms the start/end of the one way system in the town centre. There is currently a single southbound traffic lane that widens to two lanes south of the Station Road junction. The fire station is also located to the east of the A22 at the junction. Emergency vehicles returning to the fire station from the south access the station through the centre of the traffic island at the junction. There are also wig-wag signals on the Station Road and A22 southbound approaches.

The existing layout does not provide any controlled crossing facilities for pedestrians and the accident review highlighted two pedestrian accidents in the vicinity of the junction. There are pelican crossings on all approaches at the following locations:

- A22 to the north (by Homebase) – 200m from the A22 / Station Road junction;
- A22 to the south (by Moat Road) – 60m from the A22 / Station Road junction; and
- Station Road to the west (by Park Road) – 50m from the A22 / Station Road junction.

To improve pedestrian facilities at the junction full signalisation of the junction was considered. The proposals included carriageway widening to the east of the A22 to provide an additional southbound lane for a short distance on the approach to the Station Road junction.

The results of the traffic modelling indicate that the proposal would be of significant detriment to general traffic with an increase in queues and delays. The introduction of traffic signals would require either traffic on the A22 southbound or traffic turning right from Station Road to be stopped at any one time, compared to the existing free flow conditions.

The proposals would also require a slight change to the layout outside the fire station to maintain access for emergency vehicles. Feedback from the Fire Service has indicated concerns that the proposal to implement signals and associated measures would:

- Delay emergency vehicles;
- Result in the loss of an already small drill yard used for training and testing of equipment and this could result in possible Health & Safety issues with members of the public; and
- Affect the operation of the station as due to the volume of traffic the keep clear area may not be observed by traffic.

Consequently, the existing arrangement is seen as preferred and should therefore remain in this location; without improvements to Station Road, the viability of improvements at Moat Road are also limited.

Pelican Crossings

To improve pedestrian crossing facilities whilst reducing the impact on general traffic the implementation of pelican crossings to the central island was investigated. It would be possible to achieve a layout that

maintains free flow when the signals are not in use, but the traffic modelling indicates that there would still be significant delay to general traffic.

There are currently pelican crossings near Park Road and Maypole Road which appears to be associated with existing desire lines. If these are retained and further crossings added at the Station Road junction the high density of crossings and frequency of use may cause significant disruption to the general traffic flow.

Zebra Crossings

To further minimise delay to general traffic whilst still enhancing pedestrian facilities at the A22 / Station Road junction the implementation of zebra crossings was considered. However, the result would be an inconsistency in crossing types along the corridor which could cause confusion for motorists.

The investigation of measures to improve pedestrian crossing facilities at the junction indicates that the implementation of any additional controlled crossings will be to the detriment of general traffic as the current layout provides free flow conditions.

7.3.5. A22 London Road / A264 Moat Road

The schemes considered at the A22 London Road / A264 Moat Road junction include:

Carriageway Widening to Provide Left Turn Flare

Vehicles on Moat Road can miss opportunities to exit onto the A22 due to vehicles turning left from the A22 onto Moat Road indicating close to the junction. To reduce delays on Moat Road it is suggested that the A22 could be widened to the east and west to provide a short left turn flare. A new pedestrian refuge island could be implemented on Moat Road to allow the give way line to be moved further west. This aims to clarify when vehicles on the A22 would be turning onto Moat Road.

Traffic modelling indicates that there would be marginal benefits to general traffic as a result of the scheme. However, as the left turn flare is relatively short it is anticipated that vehicles on the A22 may straddle the centre and nearside lanes when turning left and therefore vehicles exiting Moat Road may still hesitate. In addition, the proposals result in some disadvantages to pedestrians as detailed below:

- The distance to cross at the pelican crossing on the A22 would increase; and
- The footway widths would be reduced. As this crossing was observed to be well used and the junction is in the town centre it is expected that any footway reduction would be of significant detriment.

Uncontrolled Crossing on Moat Road

As highlighted above a new pedestrian refuge on Moat Road was considered as part of the scheme detailed above. However, the design review has indicated that it would be difficult to implement this measure in accordance with standards. The swept path analysis indicates that an 11m rigid vehicle and an articulated vehicle would only be able to complete the left turn into Moat Road from the centre lane to avoid conflict with the proposed island.

In addition, site measurements indicate the eastern footway on the A22 at the junction with Moat Road is narrower than shown on the OS mapping. As a result a suitable alignment for the proposed uncontrolled crossing across the proposed island at the mouth of the junction could not be achieved without compromising the safety of pedestrians. An alternative would be to provide an uncontrolled crossing on Moat Road set back from the A22; however, this would not be along the pedestrian desire line.

Additional Lane on A22 between Station Road and Moat Road

It would be possible to implement an additional southbound lane on the A22 between Station Road and Moat Road. However, there are likely to be a number of disadvantages:

- Upstream of the three lane section on the A22 there would still only be a single lane due to the bridge over the existing railway line. Therefore, capacity benefits may be limited;
- Vehicles from Station Road turning onto Moat Road would need to cross two lanes of traffic, therefore making this manoeuvre more difficult;
- Vehicle speeds may increase over this section, which is expected to be undesirable in the town centre;
- The bus stop outside property numbers 201 to 203 would need to be placed on the carriageway and when in use the benefits of the additional lane may not be realised;
- The area for loading outside property numbers 196-200 London Road would be significantly reduced; and

- Footway widths would be reduced due to the carriageway widening necessary to accommodate three lanes. This is particularly an issue as this part of the network is in the town centre.

Based on the design assessment for the A22 / Moat Road junction the measures considered are unlikely to significantly improve traffic capacity without significant amendments to the formation of the junction with land take of adjacent properties to re-align and signalise the junction.

The modelling results show that while offering increased capacity at the Moat Road junction, the addition of a third lane creates unacceptable weaving issues over this short length of highway for the downstream merger of A22 London Road and A22 Station Road traffic.

This restricts improvements to the junction to two lanes. Accordingly, a scheme has been developed that introduces carriageway widening to provide a left turn flare from the A22 to Moat only, requiring land take of the corner property to gain required road width and achieve improvements to the pedestrian crossing on Moat Road to acceptable design standards.

7.4. Scheme Options

As detailed above, a number of schemes have been considered for each junction within the study area. An assessment of these various options that took place as part of the iterative design evolution process is included in the forecasting report (Appendix B) and the derivation of the final DM and DS schemes summarised in Table 22.

Table 22. Consolidated Scheme Options

Junction	Do Nothing Future Baseline	Do Minimum Network Optimisation	Do Something Capacity Enhancement
Felbridge Junction	<ul style="list-style-type: none"> • As per existing 	<p>Drawing No. 5107918/TP/PD/101</p> <ul style="list-style-type: none"> • Signal optimisation • Widen pedestrian islands to DM 1.5m/ DS 2m width" to remove references to controlled facilities • Implement two lanes on A22 southbound exit from the junction 	<p>Drawing No. 5107918/TP/PD/102 & 103</p> <ul style="list-style-type: none"> • Signal optimisation • Widen pedestrian islands to DM 1.5m/ DS 2m width" to remove references to controlled facilities • Widen A22 carriageway to the east to permit implementation of two lanes on southbound exit from the junction • Widen A22 carriageway to the west to allow extension of two lane northbound approach on A22
A22 London Road / Imberhorne Lane	<ul style="list-style-type: none"> • Improvements tied to development of the Bridge Park site for non-food retail use (Drawing No. C1070 Rev B) 	<ul style="list-style-type: none"> • Signal optimisation 	<p>Drawing No. 5107918/TP/PD/201 & 202</p> <ul style="list-style-type: none"> • Signal optimisation • Widen A22 carriageway to the east through the junction to create an additional southbound traffic lane
A22 London Road / Lingfield Road	<ul style="list-style-type: none"> • As per existing 	<p>Drawing No. 5107918/TP/PD/301</p> <ul style="list-style-type: none"> • Proposed WSCC signalisation scheme as per Drawing No. 13823, without ASLs 	<p>Drawing No. 5107918/TP/PD/302 & 303</p> <ul style="list-style-type: none"> • Proposed signalisation • Widen A22 carriageway to the east to provide a two lane southbound

Junction	Do Nothing Future Baseline	Do Minimum Network Optimisation	Do Something Capacity Enhancement
		<ul style="list-style-type: none"> Proposed dimensions match the proposed WSCC scheme 	<ul style="list-style-type: none"> approach (as per the WSCC scheme) Provide two lanes on the Lingfield Road approach (as per the WSCC scheme) Widen A22 carriageway on both sides over the bridge over the dismantled railway to provide three lanes Implement cantilevered footways (or on free standing structures) on both sides of the bridge
A22 London Road / A22 Station Road	<ul style="list-style-type: none"> As per existing 	<ul style="list-style-type: none"> As per existing 	Drawing No. 5107918/TP/PD/401 <ul style="list-style-type: none"> Proposed signalisation Widen A22 to the east on the southbound approach to provide two lanes Implement controlled pedestrian crossing facilities
A22 London Road / A264 Moat Road	<ul style="list-style-type: none"> As per existing 	<ul style="list-style-type: none"> As per existing 	Drawing No. 5107918/TP/PD/402 <ul style="list-style-type: none"> Carriageway widening on A22 to provide left turn flare Implement controlled pedestrian crossing facilities across Moat Road

7.4.1. Derivation of Scenarios

As detailed above, a number of schemes have been considered for each junction within the study area. These were refined as part of the iterative design process to a 'Do Minimum' and 'Do Something' scheme at each location. The progression of these options was then subject to consultation with the Client in a meeting dated 19th December 2011, intended to confirm the progress of these as preferred scenarios for the A22 Corridor.

In all instances, it was considered that for the purpose of continuity in assessment cycle infrastructure would not be included in the schemes given the compromise to network capacity; however versions of each scheme including these facilities is retained for future inclusion in response to any emergent cycling strategy for the area.

7.4.1.1. Felbridge Junction

Both Do Minimum and Do Something options were seen to offer benefits to all road users. Based on the outcomes of Stage 2, The Do Something Option presents the opportunity to practically gain further improvements to the performance of the junction and therefore was considered to offer sufficient network enhancements to be taken forward as a valid scheme within the preferred Do Something scenario.

Felbridge falls within the administrative boundary of Surrey County Council (SCC). In consultation with SCC regarding the scheme proposals, an acknowledgement of existing problems with the operation of the junction was provided; however do not have any plans to make improvements due to budgetary constraints.

7.4.1.2. A22 London Road / Imberhorne Lane

It was concluded that the works required to achieve improvement beyond the currently proposed A22/Imberhorne Lane scheme (Drawing No. C1070 RevB) offer minimum additional improvement; it is therefore considered optimal in the currently proposed configuration. However it's also noted that in the future, additional capacity enhancements could be achieved above that assessed in this report with the linking of the signals to the Felbridge Junction

The best performing 'Do Something' scheme would come at more significant costs in terms of finance and land take requirements to achieve any additional capacity at this location without practically improving the performance of the network in this location therefore has been discounted in favour of maintaining the planned Imberhorne Lane scheme.

7.4.1.3. A22 London Road / Lingfield Road

The proposed WSCC signalisation scheme for Lingfield Road has been identified as the optimal arrangement for the Lingfield Road junction without widening. A review of the Do Something options as a progression of the Stage 2 scheme has found that to achieve vehicular swept path requirements, the electricity sub-station in the south west corner of the junction is compromised.

With the movement of footways to cantilevered or free standing structures on both sides of the bridge, the ability to provide an additional lane of traffic across the dismantled railway line is seen to enhance the performance of the network however potentially at significant cost.

7.4.1.4. A22 London Road /Station Road & A22 London Road / A264 Moat Road

The current arrangement of the A22 at Station Road is in its free-flowing format optimal and the iterative design process has found that any amendment to this arrangement to include signalisation is not without compromise to the movement of traffic and buses. Further, consultation with the Fire Service has found that with access to the Fire Station located immediately to the west of the junction, their preference is for existing traffic management arrangements which is considered a constraint on the ability to deliver any modifications to this section of the highway network.

In addition, it is understood that improvements for pedestrians that would represent the primary purpose for signalisation of this junction are not necessary; it is considered by WSCC that the existing signal controlled crossing to the south of the Park Road junction caters satisfactorily for existing demand from pedestrians wishing to cross Station Road, and also serves to aid the movement of traffic itself providing gap seeking opportunity for traffic joining Station Road from Park Road. With this in mind, if measures are required a detailed survey of pedestrian demand and desire lines in the vicinity of the junction should be completed to determine if additional crossings are required and if existing crossings can be removed or relocated.

Given the proximity of the junctions, the ability to effect change on the network at Moat Road without improvements to Station Road are considered limited in a Do minimum intervention approach. On review of the Stage 2 work, the option for Moat Road to include a left turn flare from the A22 and improve the pedestrian crossing is not considered viable for various reasons including the short length of flare that can be achieved and restricted turning radii that can be achieved to get traffic in and out of Moat Road.

Accordingly, in the context of retention of the existing arrangement at Station Road it is considered that the status quo is a preferred scenario on this part of the network in the Do Minimum scenario. However, with significant levels of land take, some improvements to the currently sub-standard Moat Road junction can be achieved therefore have been considered further.

7.4.2. Design Confirmation

Based on an assessment of the options the Do Minimum and Do Something scenarios have been identified and these are summarised in Table 23 and presented in Appendix D.

On the balance of the constraints, cost estimate, deliverability and in mind of the iterative junction capacity assessments, further improvements have been omitted from the Preferred Scenario for the A22 London Road / Imberhorne Lane.

These are also considered to be the locations where improvements are needed to relieve existing and forecast levels of congestion, with the scheme proposed presenting the opportunity for improved conditions for all road users, particularly the movement of pedestrians.

Table 23. Preferred Scenarios

Junction	Do Minimum	Do Something
Felbridge Junction	Drawing No. 5107918/TP/PD/101	Drawing No. 5107918/TP/PD/102 & 103
A22 London Road / Imberhorne Lane	Drawing No. C1070 Rev B	Drawing No. C1070 Rev B
A22 London Road / Lingfield Road	Drawing No. 5107918/TP/PD/301	Drawing No. 5107918/TP/PD/302 & 303
A22 London Road / A22 Station Road	Do Nothing	Do Nothing
A22 London Road / A264 Moat Road	Do Nothing	Drawing No. 5107918/TP/PD/402

7.4.3. Road Safety Audit

Each preferred scenario has been subject to a Stage One Road Safety Audit. The findings of this audit and designers' response are included in Appendix E.

7.5. Scheme Deliverability

In the derivation of preferred scenarios, consideration has been given to the deliverability of each scheme on a scale of 1-5 where 1 is viewed with few obstacles and comparative ease of implementation and 5 containing significant levels of risk. These are summarised in Table 24.

Table 24. Scheme Option Deliverability

Junction	Do Minimum	Do Something
Felbridge Junction	3	4
A22 London Road / Imberhorne Lane	1	1
A22 London Road / Lingfield Road	2	4
A22 London Road / A22 Station Road	N/A	N/A
A22 London Road / A264 Moat Road	N/A	5

There are a few key risks to the deliverability of the identified schemes. These include:

- Felbridge Junction sited in Surrey; SCC who have stated are not currently in a financial position to consider improvements in this location. Further, widening of the Felbridge Junction in Do Something will require third Party land and the re-location of a stone wall owned by MSDC;
- Road widening improvements to achieve an additional lane of traffic northbound on the A22 London Road into the junction with Lingfield Road, is compromised by the presence of a bridge over the dismantled railway owned by BRB (Residuary) Ltd; and
- The delivery of any schemes at the A22 London Road / Moat Road Junction is dependent upon widening that will require CPO of adjacent retail units

Improvements to Imberhorne Lane are committed and Do Minimum solutions for Lingfield Road can be delivered within the highway boundary therefore both score well on scheme deliverability.

7.6. Cost Estimates

Preliminary construction cost estimates have been prepared for each of the proposed schemes and are summarised in Table 25. As the Do Something scheme for the A22 London Road / A22 Station Road and

A22 London Road / A264 Moat Road are connected and cannot be considered in isolation a single cost has been provided. The Do Something assumes scenario assumes no change at the A22 London Road / A22 Station Road therefore there is zero cost associated here.

Table 25. Preliminary Construction Cost Estimates

Junction	Do Minimum	Do Something
Felbridge Junction	£350,000	£720,000
A22 London Road / Imberhorne Lane	£0	£0
A22 London Road / Lingfield Road	£550,000	£1,260,000
A22 London Road / A22 Station Road	£0	£0
A22 London Road / A264 Moat Road	£0	£270,000
Total	£900,000	£2,250,000

In total, the costs of Do Minimum improvements are estimated at £900,000. Do Something improvements are estimated at £2,250,000, indicating an increase of 2.5 times the costs of the Do Minimum schemes.

The construction cost estimates are based on rates of recent projects. The following assumptions have been made:

- New signal equipment to be implemented at the Felbridge Junction in the DM and DS scenarios;
- The carriageway is to be re-surfaced over the full extent of the scheme at each junction;
- No costs have been included for the reconstruction of the stone wall to the west of the A22;
- No costs have been included for the acquisition of third party land and associated accommodation works;
- No costs have been included for the optimisation of signals;
- At this stage there is no information on the bridge structure across the dismantled railway to determine the cost of implementing cantilevered or free standing footway structures. Therefore, the cost estimate for the A22 / Lingfield Road junction is based on the implementation of separate foot bridges. It is anticipated that the implementation of a cantilevered structure may result in diversion of statutory undertakers' equipment and therefore may result in higher costs than for a free standing structure. Further investigation is required to determine the most appropriate structure.
- Excludes third party land, accommodation works and stats;
- Professional fees are excluded; and
- A contingency of 20% has been included.

The preliminary construction cost estimates detailed above include approximate costs for the anticipated diversion of statutory undertakers' equipment. These costs are based on the replies from C3 enquiries submitted for the DS schemes. A summary of costs received to date are detailed below:

Table 26. C3 Statutory Undertakers' Replies

Junction	Scenario	Statutory Undertaker	Estimated Diversion Cost
Felbridge Junction	DS	UK Power Network	£70,000
		Instalcom	£37,238.59
A22 London Road / Imberhorne Lane	DS	UK Power Network	£45,000
		Instalcom	£64,805.55
A22 London Road / Lingfield Road	DS	UK Power Network	£57,000
A22 London Road / A264 Moat Road	DS	Unknown at this stage*	

* A C3 estimate was obtained for an earlier version of the scheme at the A22 London Road / A264 Moat Road junction and indicated that diversionary costs for UK Power Networks was £35,000 based on an earlier iteration of the scheme.

At this stage we are still awaiting replies to the C3 enquiries from:

- BT Openreach;
- Southern Gas Networks; and
- Network Rail.

All three companies have apparatus in the area which may be affected by the proposals. Network Rail has advised that they will assess the submission and would then like to meet with WSCC to discuss the proposals and agreements for undertaking further investigation.

8. Evaluation of Preferred Scenarios

8.1. Network Scenarios

The key criteria governing the development of the package of interventions on the A22 London Road include national and local level policy objectives, statement of stakeholder requirements and the process of local traffic modelling forming the key evidence base as to the performance of the network.

These criteria have been used to form a high level evaluation framework, serving to assess the package of interventions against a 'Do Nothing' scenario reflecting a forecast base. This provides both a qualitative and ranked Assessment Summary Table (AST) similar to those included within the WebTAG appraisal methodology, formed around **policy objectives** and **scheme objectives**, informed by the review of policy documentation and stakeholder consultation for qualitative analysis. It is also informed by **scheme performance** derived from traffic models to provide quantitative indicators. The scenarios feeding into the evaluation are summarised below:

Do Nothing (DN): Future Baseline

- Includes improvements to A22 London Road / Imberhorne Lane based on improvements tied to development of the nearby Bridge Park site for non-food retail use.

Do Minimum (DM): Network Optimisation

- Junction improvements;
- Integration of sustainable infrastructure improvements;
- No amendments beyond bounds of existing highway; and
- Lower cost solution.

Do Something (DS): Capacity Enhancement

- Junction capacity enhancements;
- Integration of sustainable infrastructure improvements;
- Includes road widening; and
- Higher cost solution.

8.2. Highway Network Changes

The highway network changes associated with these scenarios are summarised in Table 26 below as have been replicated in the localised modelling assessment. This highlights the inclusion of the scheme for A22 London Road / Imberhorne Lane associated with the committed development of the nearby Bridge Park site for non-food retail use in all scenarios, which is noted to be broadly consistent with the scheme detailed in the Atkins Stage 2 Report.

Do Minimum provides optimisation of the network within existing boundary. It delivers the upgrade of all junctions to signals coordinated on a SCOOT system to control the progression of traffic flow on the A22 London Road, with a premise towards the integration of improvements to the highway for all road users including provision for cyclists and traffic management.

Do Something represents an advancement of DM as a high capacity scenario. It is a higher cost package of measures intended to achieve maximum development enablement potential with road widening. In keeping with the Stage 1 and 2 Report premise towards provision for sustainable transport for the delivery of housing, DS2 includes pedestrian, cycling and bus infrastructure however only where maximisation of capacity is not unduly compromised.

Table 27. Highway Network Changes: Summary Comparison of Scenarios

Location	Street Network Changes	DN	DM	DS
Felbridge Junction	Pedestrian crossing enhancements	x	✓	✓
	Widening	x	x	✓
A22 London Road / Imberhorne Lane	Bridge Park Development Improvements	✓	✓	✓
A22 London Road / Lingfield Road	Pedestrian Crossing enhancements	x	✓	✓
	Widening	x	x	✓
	Signalisation	x	✓	✓
A22 London Road / A22 Station Road	Signalisation	x	x	x
	Widening	x	x	x
A22 London Road / A264 Moat Road	Signalisation	x	x	✓
	Widening	x	x	✓

8.3. Modelling Assessment

8.3.1. Network Development

The future baseline (Do-Nothing) LINSIG and micro-simulation VISSIM networks have been developed from the validated base 2011 models with a committed junction improvement at Imberhorne Lane considered in the DN models. Details of these and other network changes carried out in the DN future year model are provided below.

- Imberhorne Lane committed scheme has been included in the future base LINSIG models;
- VISSIM network highway links have been extended, in particular A22 London Road (West), Lingfield Road, Moat Road, A22 Station Road and Park Road, to allow the identified development demand to be entered onto the network; and
- Lane change distances have been adjusted to reflect the above extended links, particularly at A22 Station Road.

All the network driving behaviour parameters have been retained as per the validated base models.

The Future Baseline modelled flows and an associated trip distribution, the committed development flows and other modelling assessments are documented in Appendix B of this Report.

The DM LINSIG and micro-simulation VISSIM networks have been developed from the Future Baseline (Do-Nothing) models with the committed development trips. The future DS LINSIG and micro-simulation VISSIM networks have been developed from the Do-Minimum networks.

All the modelling scenarios evaluated within the Do-Minimum and Do-Something models were fully presented in Appendix B of this Report. This section only summarises preferred Do-Minimum and Do-Something scheme modelling evaluation.

8.3.2. Scheme Performance

As part of the iterative design process, a variety of scheme modelling evaluations has taken place and these results are summarised in the Forecasting Report, Appendix B. From these, a preferred Do-Minimum and Do Something scheme has been identified at all the junctions as detailed in Section 7 of this Report. These are summarised in Table 27.

Table 28. Scheme Performance Recommendations

Junction Improvement Scheme	Do Minimum	Do Something
A22 London Road / A264 Copthorne Road	DM (scenario B)	DS (scenario B)
A22 London Road / Imberhorne Lane	Imberhorne Lane scheme	Imberhorne Lane scheme
A22 London Road / Lingfield Road	DM (scenario B)	DS (scenario D)
A22 London Road / A22 Station Road	Existing	Existing
A22 London Road / A264 Moat Road	Existing	DS (scenario D)

8.3.3. Isolated Junction Capacity Assessments

The LINSIG results comparing preferred scheme scenarios at the Felbridge (A22 London Road / A264 Copthorne Road) and A22 / Imberhorne Lane junctions are presented in Table 29 and Table 30 for the AM and PM Peak Hours respectively. This also includes LINSIG Modelling results for the proposed signalisation of Lingfield Road and the A22 London Road / A264 Moat Road.

Table 29. DM and DS Scenario Junction Capacity Assessments: AM Peak Hour

Link	Do Nothing			Do Minimum			Do Something		
	DoS (%)	Q (pcu)	Delay (secs)	DoS (%)	Q (pcu)	Delay (secs)	DoS (%)	Q (pcu)	Delay (secs)
Felbridge Junction									
A264 Copthorne Rd	97	33	66	88	18	43	66	9	19
A22 Eastbourne Rd (N)	81	10	43	82	9	40	67	10	38
A22 London Rd (S)	97	28	39	90	14	20	73	13	42
A22 London Road / Imberhorne Lane									
Imberhorne Lane	87	19	59	87	19	59	87	19	61
A22 London Rd (N) Ahead	46	7	5	46	7	5	24	3	5
A22 London Rd (N) RT	96	20	99	96	20	99	97	21	109
A22 London Rd (S)	92	34	43	92	34	43	94	36	51
A22 London Road / Lingfield Road									
Lingfield Road	1.22	67	9	99	22	3	87	14	1
A22 London Road (N)	1.39	149	18	85	16	0	90	18	1
A22 London Road (S)	1.29	168	12	97	37	2	66	7	0
A22 London Road / A264 Moat Road									
Moat Road	2.25	177	1,688	2.25	177	1,688	69	8	3
A22 London Road (N)	1.27	179	1,977	1.27	179	1,977	89	16	7

Note: DoS is Degree of Saturation. Delay is average delay per PCU (in s/pcu)

As seen in Table 29, in each instance the preferred Do Minimum Options returns each junction to within Theoretical Capacity in the AM Peak Hour, with the exception of Moat Road where no schemes are deliverable without Do Something intervention. The Felbridge Junction is further improved to within practical capacity in this scenario. It is noted that although the A22 London Road / Lingfield Road is predicted to remain with some congestion at over 90% DoS, this is a significant improvement over the existing situation.

In offering highway capacity enhancements, the preferred Do Something Options offers greater improvements in network performance at each location in the AM Peak Hour. This is most evident at

Felbridge with maximum DoS of 67%, however the A22 London Road / Lingfield Road is also returned to within practical capacity implying some room for reserve capacity may be achieved, although it's noted with Lingfield Road at 87% this is not likely to be significant. Significant improvements are seen at A22 London Road / A264 Moat Road with highest DoS of 89% compared to 127% in the Do Nothing Scenario.

Table 30. DM and DS Scenario Junction Capacity Assessments: PM Peak Hour

Link	Do Nothing			Do Minimum			Do Something		
	DoS (%)	Q (pcu)	Delay (secs)	DoS (%)	Q (pcu)	Delay (secs)	DoS (%)	Q (pcu)	Delay (secs)
Felbridge Junction									
A264 Copthorne Rd	95	33	54	85	17	35	79	14	29
A22 Eastbourne Rd (N)	92	23	58	72	16	31	78	17	33
A22 London Rd (S)	96	25	37	84	12	15	55	11	29
A22 London Road / Imberhorne Lane									
Imberhorne Lane	81	18	50	81	18	50	83	18	53
A22 London Rd (N) Ahead	66	14	7	66	14	7	34	5	5
A22 London Rd (N) RT	87	17	68	87	17	68	91	18	80
A22 London Rd (S)	85	27	36	85	27	36	86	28	38
A22 London Road / Lingfield Road									
Lingfield Road	1.18	52	8	87	17	1	85	15	1
A22 London Road (N)	1.37	142	16	90	22	1	90	22	1
A22 London Road (S)	1.38	232	15	82	24	0	70	9	0
A22 London Road / A264 Moat Road									
Moat Road	1.04	29	342	1.04	29	342	72	7	3
A22 London Road (N)	1.42	567	7,412	1.42	567	7,412	88	18	7

During the PM Peak Hour, Do Minimum Scenario returns each junction to within practical capacity and reduced queuing and delays over the Do Nothing Scenario, with the exception of the A22 London Road / A264 Moat Road junction where no improvements are presented in the Do Minimum Scenario. There is a small amount of reserve capacity evident at each junction in the Do Something Scenario with significant reductions in each performance indicator and capacity to accommodate some additional volumes of traffic with relatively evenly balanced DoS on each arm of the respective junctions.

8.3.4. Network Modelling Assessments

This section only summarises the preferred schemes appraisal based on VISSIM models' key evaluation indicators for journey times of both general vehicles and buses.

The model coverage extends from the A22 London Road / Lingfield Road Junction in the north through the A22 London Road / Station Road and A22 London Road / Moat Road Junction towards the town centre in the South. Delays are largely indicative of Journey Times therefore are included in the appendices only.

8.3.4.1. Journey Times

The modelled journey time results for the preferred scenarios are presented below in Tables 30 and 31 for the AM and PM Peak Hours respectively. Journey time segment locations are presented in Appendix B.

The result shows an improvement in journey times that with the preferred DM Scenario on routes into East Grinstead, however increase on the route from East Grinstead in the AM Peak Period. This is considered

attributable to the introduction to stop lines at the Lingfield Road junction and traffic queuing on the short right turn flare lane in the northbound direction at A22 London Road / Lingfield Road junction. This pattern is reflected with a slight increase in the PM Peak Hour, however not of significance in scale.

The PM Peak Hour journey times demonstrate a similar in pattern of results to the AM Peak Hour with the preferred DM model, with more tangible decreases journey times by eight and two per cent in the Routes One and Two respectively. The preferred Do Something scenario illustrates journey time benefits of 58% in the Route Two compared to the Do Nothing Scenario.

Table 31. DM and DS Scenario Journey Time Assessments (Traffic): AM Peak Hour

Segments / Seconds	Do Nothing	Do Minimum	Do Something
Route One			
JTS3-S4 (E)	48.2	24.5	27.3
JTS4-S5 (E)	12.8	13.2	26.4
JTS5-S6 (E)	30.8	29.2	30.8
Route 1 Total	91.8	66.9	84.5
Percent diff. (%)	-	-27	-8
Route Two			
JTS6-S4 (W)	180.4	365.3	197.9
JTS4-S3 (W)	63.8	112.4	41.4
Route 2 Total	244.2	477.7	239.3
Percent diff. (%)	-	96	-2

Table 32. DM and DS Scenario Journey Time Assessments (Traffic): PM Peak Hour

Segments / Seconds	Do Nothing	Do Minimum	Do Something
Route One			
JTS3-S4 (E)	49.7	29.2	41.4
JTS4-S5 (E)	13.6	16.1	25.3
JTS5-S6 (E)	31.1	30.9	30.5
Route 1 Total	94.6	76.2	97
Percent diff. (%)	-	-19	3
Route Two			
JTS6-S4 (W)	158.1	64.5	68.5
JTS4-S3 (W)	56.8	39.7	21.5
Route 2 Total	214.9	104.2	90
Percent diff. (%)	-	-52	-58

The bus journey time comparisons for the preferred scheme are presented in Tables 32 and 33 for both the AM and PM Peak Hour respectively.

Table 33. DM and DS Scenario Journey Time Assessments (Buses): AM Peak Hour

Segments / Seconds	Do Nothing	Do Minimum	Do Something
Route One			
JTS3-S4 (E)	52.1	13.4	24.4
JTS4-S5 (E)	20.0	29.6	48.6
JTS5-S6 (E)	32.5	30.1	32.9
Route 1 Total	104.6	73.1	105.9
Percent diff. (%)	-	-30	1
Route Two			
JTS6-S4 (W)	149	394.8	223.2
JTS4-S3 (W)	66.4	112.6	55.8
Route 2 Total	215.4	507.4	279
Percent diff. (%)	-	136	30

Table 34. DM and DS Scenario Journey Time Assessments (Buses): PM Peak Hour

Segments / Seconds	Do Nothing	Do Minimum	Do Something
Route One			
JTS3-S4 (E)	54	16.9	35.7
JTS4-S5 (E)	27.3	32.3	40.3
JTS5-S6 (E)	32.8	32	30.4
Route 1 Total	114.1	81.2	106.4
Percent diff. (%)	-	-29	-7
Route Two			
JTS6-S4 (W)	135.5	63.4	106.6
JTS4-S3 (W)	70.2	73.2	27.8
Route 2 Total	206	136.6	134.4
Percent diff. (%)	-	-34	-35

The Route One bus journey times are predicted to improve in the preferred Do-Minimum scenarios with the highest reduction in journey times in the AM Peak Hour. Nevertheless the model is showing significant increases in the Route Two journey times. The preferred Do-Something model predicted bus journey times decreases compared to the Future Baseline for Route One and Route Two in the PM Peak Hour only.

8.3.5. Summary

Isolated junction assessments at the Felbridge, Imberhorne Lane and Lingfield Road junctions demonstrates that the preferred Do Minimum and Do Something highway improvement schemes provide significant improvements to performance of the highway network, largely relieving existing congestion. Some reserve capacity is provided in the Do Something Scenario.

Generally, the situation is more complicated in proximity to the Town Centre as the free-flowing arrangement in the existing scenario only compromised by future development traffic and any interventions at Station Road. The preferred Do Minimum and particularly Do Something Scenarios improve Journey Times on key routes, however queuing on adjoining roads notably Lingfield Road, Moat Road and Station Road are predicted to increase as shown in the Model Forecasting Report, Appendix B.

At a detailed design stage, the benefits achieved for the A22 in seeking to improve the movement of traffic in and out of East Grinstead may need to be considered and balanced against increased delays on side roads adjoining the A22.

8.4. Evaluation Framework

The overall approach to the scheme assessment for the A22 London Road improvements is based on the development of a high level evaluation framework. The evaluation framework will be a simple spreadsheet list of performance indicators to enable the 'Do Minimum' (DM) and 'Do Something' (DS) scenario forming the A22 London Road improvements to be assessed against a DN baseline scenario as a tick-box exercise.

The performance indicators will be set around criteria of **scheme objectives** and **policy objectives**, derived from stakeholder consultation and the review of policy documentation respectively for qualitative analysis. It will also be informed by **scheme performance** derived from traffic models to provide quantitative indicators. Scoring is high level and qualitative and is measured against the DN which is assessed as non-performing. A 5-point scale will be used as indicated below:

1. Very Positive Impact (+ +)
2. Positive Impact (+)
3. Neutral (0)
4. Adverse Impact (-)
5. Very Adverse Impact (- -)

8.4.1. Assessment

A DM and DS scheme will be identified at each of the five junctions on the A22 Corridor to deliver a package of DM and DS measures to form the basis of assessment against the DN Scenario. Each indicator will be totalled to provide a score for each of the Scheme Objectives, Policy Objectives and Scheme Performance and weighted thus:

- Scheme Objectives: 1
- Policy Objectives: 1
- Scheme Performance: 2

This provides a maximum score of 8 for each option with 50% available for objectives and 50% available for performance criteria. The overall scheme appraisal is presented in Appendix C, and summarised in Table 35.

Table 35. Appraisal Summary Scores

Scenario	Performance Indicator	Assessment	Base Score	Weighted
Do Minimum	Scheme Objectives	✓	1	1
	Policy Objectives	✓	1	1
	Scheme Performance	✓	1	2
	Total	✓	3 / 6	4 / 8
Do Something	Scheme Objectives	✓	1	1
	Policy Objectives	✓	1	1
	Scheme Performance	✓✓	2	4
	Total	✓	4 / 6	6 / 8

On review of Table 35, it can be seen that both Do Minimum and Do Something are considered offer improvements under each of the three key performance indicators of scheme objectives, policy objectives and scheme performance; accordingly offer holistic improvements to all users of the transport corridor and significantly unlocking congestion to improve the flow of traffic in and out of East Grinstead.

It's noted that in terms of the assessment, improvements to Imberhorne Lane occur in the Do Nothing scenario against which Do Minimum and Do Something are scored, limiting reporting of the actual benefits that can be derived in the qualitative and quantitative aspects of the appraisal. It is also noted that the quantitative assessment doesn't capture Journey Time benefits to the north the Lingfield Road Junction.

Improvements to the A22 London Road / A22 Station Road junctions are not included in the assessment as the existing situation offers the best arrangement in terms of highway capacity, and more significant levels of intervention are not possible as consultation with the Fire Service has indicated preference for the existing traffic management arrangement in the vicinity of this junction.

In terms of scheme and policy objectives both scenarios score positively. The extent of improvement is limited to the A22 corridor and without any practical improvement around A22 Station Road without compromising the movement of traffic, limited from the A22 Lingfield Road to Felbridge Junction, reflected in the assessment of improvement works associated with both DM and DS Scenarios.

Both Do Minimum and Do Something scenarios offer enhancements for pedestrians with signal crossings introduced at Lingfield Road and Moat Road, and enhancements to the points of crossing at Felbridge Junction to bring these inline to current design standards. Each scheme offers potential for improvements to cyclists; with full signalisation ASLs can be incorporated on appropriate approaches as part of a wider cycling strategy.

Improved network conditions will provide a commensurate improvement in journey times and reliability of bus services, reflected in the scoring. However, given the few bus routes on this part of the network (maximum frequency of one bus every twenty minutes during network peak hours), as discussed with WSCC investment in additional physical bus infrastructure is not seen to be warranted at this point in time.

Do Something offers more reserve highway capacity therefore returns better modelling results and consequently scores higher on the critical Scheme Performance criteria, that carries 50% weighting in the assessment. Clearly these benefits need to be considered in the context of the additional costs incurred to deliver them, particularly as DS represents benefit to enable future development rather than addressing existing and forecast congestion which is achieved with Do Minimum.

Do Something therefore performs better in unlocking more capacity for future development, however as explored in Section 7 of this Report at greater costs and risks to deliverability. This would however also need to be reviewed firstly in terms of whether that meets the aspirations for East Grinstead and once planned development sites are better understood with the progression of the neighbourhood action plans. This is considered further in the next section of the report.

Development Enablement

9. Development Enablement

The findings of this Study have shown that with the implementation of highway network improvements associated with the Do Minimum Scenario, congestion on the A22 London Road can be addressed largely returning the network to within theoretical capacity. However it is observed that there are likely to be increases in journey times and some queuing on the right turn into Lingfield Road from the A22 London Road owing to the introduction of signals here and without Do Something Interventions, no improvements are achievable at the Moat Road junction.¹

There is no spare capacity beyond accommodation of the current quantum of committed developments for additional development in the Do Minimum Scenario (765 residential units). More significant Do Something Interventions are required to return the network within practical capacity and alleviate congestion to deliver improvements to journey times. Whilst there is some reserve capacity offered in the Do Something Scenario this section aims to quantify how much additional planned development could be accommodated in that scenario.

9.1. Stage Two Findings

As part of the work forming Stage One and Two, indicative spreadsheet analysis was undertaken of the network including the strategic development site at Imberhorne Farm and concluded that a further 571 dwellings and 341 jobs could be accommodated on the highway network with the implementation of highway schemes to increase capacity on the A22 London Road. This has been indicatively calculated to represent an additional 367 AM Peak Hour and 336 PM Peak Hour two-way vehicular trips on the A22 London Road corridor and relates to a maximum development scenario of five percent growth and has formed the basis of Stage Three assessment.

The Stage Three assessment has reviewed housing quantum only, and with the 765 residential units has modelled 358 and 391 two-way vehicular trips in the AM and PM Peak Hours respectively². Consequently, this is considered to represent a largely commensurate comparison with 98% validation of the Stage Two findings in the AM Peak Hour and 116% in the PM Peak Hour, a like-comparison for this high-level analysis.

9.2. Planned Development in East Grinstead

The developments that are planned beyond the committed developments in East Grinstead are those which are in the updated MSDC SHLAA but are not committed. Figure 11 shows the planned development in East Grinstead for input to the modelling, summarised in Table 36.

Table 36. Planned Developments in East Grinstead

Ward	No. of units	% development
Ashplats	63	6.0
Baldwins	235	22.5
Herontye	0	0.0
Imberhorne	681	65.0
Town	68	6.5
Total	1,047	100.0

² Table 3.11 Page.22'East Grinstead Strategic Development Transport Advice' (April 2009) – Appendix A

Figure 11. Proportion of Planned Developments in East Grinstead by Ward

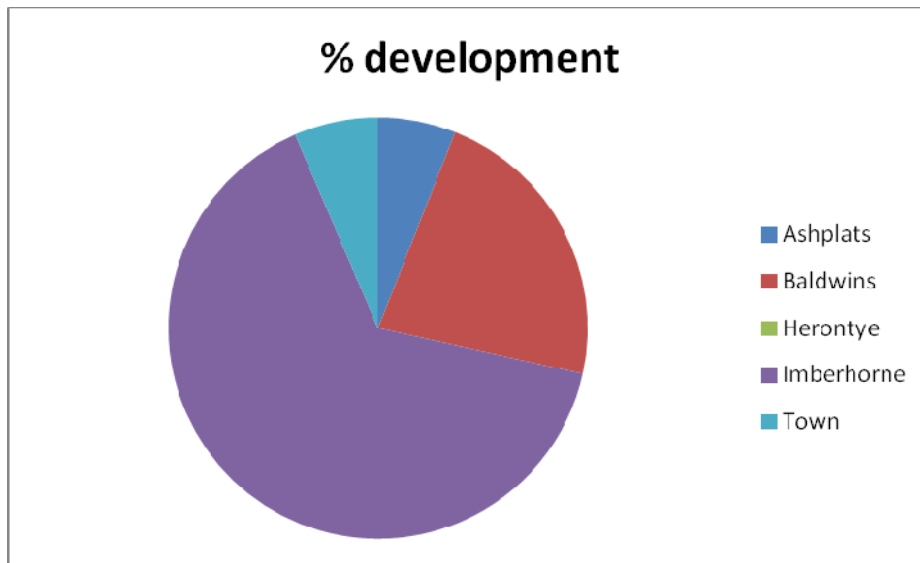


Figure 11 shows that there are 1,047 dwellings planned in East Grinstead, with the majority in the Imberhorne ward (65%), followed by the Baldwins (23%), Town (7%) and Ashplats (6%).

9.3. Network Capacity

Both the Do Minimum and Do Something Scenarios present significant improvements to the highway network, returning the network within theoretical capacity with 765 units associated with the current raft of committed developments identified in consultation with MSDC.

However, Do Something measures are required to return the network to within practical capacity with this quantum of development.

On the A22 London Road, additional development enablement above the 765 units identified in the design year is therefore likely to be linked to the realisation of highway network capacity solutions beyond the Do Something Scenario; and clearly need to be further considered in the context of additional Town Centre enhancements.

However, the Stage One and Stage Two studies included a strategic development site at Imberhorne Farm, and this planning context is no longer considered appropriate. For context, this provides a benchmark for comparison with the likely quantum of residential development currently understood as planned status in East Grinstead, which are now considered likely to be more dispersed across the town.

9.4. Accommodating Planned Development

9.4.1. Sensitivity Testing

The results of this Study would suggest preference for the realisation of development where there is more reserve capacity enabled to the north-west of the town. In view of previous proposals a sensitivity test has been undertaken with development additional to the 765 units expected to be delivered on committed sites. As shown in Table 36 there is planned development totalling 1,047 units on uncommitted sites and it is assumed, for the purposes of this study, that development of the strategic site of 570 residential units, as identified in SHLAA, and 341 jobs does not proceed. Therefore in the interim the performance of the network has been tested with the remaining quantum of 477 units as follows:

- Ashplats- 63 units (13%);
- Baldwins- 235 units (49%);
- Imberhorne- 111 units (24%); and
- Town- 68 units (14%).

Ideally, conditions across the road network should experience no additional congestion as a result of development plus required transport measures (nil detriment). For road junctions, the onset of congestion occurs before the absolute limits of capacity are reached. Thus a junction has a theoretical capacity which is rarely achievable in practice, a practical capacity which is usually taken as 85-90% of theoretical and considered as an upper limit, and a point at which congestion starts to occur which may be lower still. The latter depends very much on the type of junction and local conditions.

For the purpose of this sensitivity test with planned development, the benchmark has been set to within 100% representing theoretical capacity; as there is less certainty around the realisation of these developments it is considered acceptable to be less rigorous in this regard.

The operational performance of the preferred Do Something Scenario has therefore been tested with the 477 residential units at the Felbridge Junction, A22 London Road / Imberhorne Lane, A22 London Road / Lingfield Road and A22 London Road / A264 Moat Road junctions. The results of this are presented in Table 37 below.

Table 37. Do Something Sensitivity Test: 477 Planned Residential Units

Link	AM Peak Hour			PM Peak Hour		
	DoS (%)	Q (pcu)	Delay (secs)	DoS (%)	Q (pcu)	Delay (secs)
Felbridge Junction						
A264 Copthorne Rd	68	9	19	85	18	33
A22 Eastbourne Rd (N)	70	10	40	82	19	36
A22 London Rd (S)	79	15	46	58	11	29
A22 London Road / Imberhorne Lane						
Imberhorne Lane	85	18	58	82	17	52
A22 London Rd (N) Ahead	25	3	5	37	6	6
A22 London Rd (N) RT	95	20	98	88	17	73
A22 London Rd (S)	105	75	157	92	34	48
A22 London Road / Lingfield Road						
Lingfield Road	88	15	56	86	16	63
A22 London Road (N)	96	25	58	104	52	137
A22 London Road (S)	69	8	8	72	9	7
A22 London Road / A264 Moat Road						
Moat Road	72	9	24	74	8	30
A22 London Road (N)	92	18	35	93	21	32

Table 37 shows that with the 477 units, the A22 London Road / Imberhorne Lane and A22 London Road / Lingfield Road junctions operate with a Degree of Saturation (DoS) of over 100%. Therefore an incremental series of sensitivity tests were undertaken to determine how many units could be accommodated to keep the DoS below 100% at each location.

This series of tests determined that 40% of the planned 477 units could be accommodated. The results of this sensitivity testing are shown in Table 38 below, which shows that the A22 London Road (S) arm at the A22 London Road / Imberhorne Road junction in the AM Peak Hour is the critical arm.

Table 38. Do Something Sensitivity Test: 40% of the 477 Planned Residential Units

Link	AM Peak Hour			PM Peak Hour		
	DoS (%)	Q (pcu)	Delay (secs)	DoS (%)	Q (pcu)	Delay (secs)
Felbridge Junction						
A264 Copthorne Rd	67	9	19	82	16	30
A22 Eastbourne Rd (N)	68	10	39	80	18	34
A22 London Rd (S)	75	14	44	56	11	29
A22 London Road / Imberhorne Lane						
Imberhorne Lane	84	18	56	81	17	52
A22 London Rd (N) Ahead	24	3	5	36	5	6
A22 London Rd (N) RT	94	19	95	87	16	71
A22 London Rd (S)	100	49	82	89	31	42
A22 London Road / Lingfield Road						
Lingfield Road	88	15	55	85	15	63
A22 London Road (N)	93	21	46	97	32	63
A22 London Road (S)	67	7	7	71	9	7
A22 London Road / A264 Moat Road						
Moat Road	71	8	23	73	8	30
A22 London Road (N)	90	17	33	90	19	28

Based on this analysis, a total of 190 additional planned developments can be accommodated before the network reaches theoretical capacity and after which exponential increases in congestion can be expected. Even with planned development constrained to 190 units the analysis shows some individual approaches operation at or close to the limit of theoretical capacity. The assignment of these 190 units has been weighted according to the SHLAA data, proportionately to the following wards:

- Ashplats- 25 units;
- Baldwins- 94 units;
- Imberhorne- 44 units; and
- Town- 27 units.

9.4.2. Delivery Assumptions

It has been identified that the network will continue to struggle to accommodate traffic without interventions. A package of measures has been identified that addresses anticipated congestion (Do Minimum Scenario) within the boundary of the existing highway. It is considered that this does not offer any reserve capacity to accommodate future developments.

The ability for the future network to offer reserve capacity for any planned development is therefore associated with the Do Something Scenario. This additional capacity is minimal although, in the case of the Moat Road junction, it could result in substantially reduced queuing and delays. However given the level of intervention required to deliver these, the development enablement on the A22 London Road is broadly constrained to 765 residential units as a ceiling to growth in the town for the network to operate within acceptable operating conditions.

However, a sensitivity test has been undertaken that has shown an additional 190 units can be accommodated for the network to operate within theoretical capacity. This assumes no background traffic growth and is considered to be indicative given the high0-level nature of the review. Overall, it is considered

that development enablement is between 765 units if junction improvements are limited to the Do Minimum scenario and 955 units if the delivery and affordability issues associated with the Do Something scenario can be overcome.

The ability of the network to accommodate this traffic will fundamentally be dependent upon where the planned development materialises and particularly in the context of movement within the town centre. Therefore this needs to be considered and assessed in the future based on emerging Neighbourhood Plans as and when they come forward.

A review of the PBA document 'East Grinstead Area Transport Model Stage 2 – Strategic Development Transport Package Appraisal Report' dated July 2007 highlights that rural rat-running occurs with traffic avoiding the A22 Corridor. Clearly any additional reserve capacity offered in these solutions for development enablement is likely to be occupied by this, rather than traffic associated with new development and as new development is realised, traffic will be pushed back onto the rural routes. Consequently the strategic implications should also be borne in mind in determination of development enabling schemes going forward.

9.5. Developer Cost Share

The Infrastructure Development Plan will form part of the evidence for the draft District Plan and will inform the setting of a Community Infrastructure Levy Charging Schedule.

The Planning Act 2008 provides a wide definition of the infrastructure which can be funded by the Levy. It can include schools, sports facilities, transport, culture, green infrastructure, community, health and social care facilities among other things. The District Council is working with Town and Parish Councils and other stakeholders to understand what infrastructure is necessary, where and when it needs to be provided and how much it will cost.

This will enable the Council to collect a Levy from most new development to pay towards infrastructure.

9.6. Sustainable Transport Responses

It is however noted that highway solutions are not the only response, and as reported during Stage One and Two investment in sustainable infrastructure is of equal importance in consideration to manage potential development traffic on the network in the future.

The derivation of the Preferred Scenarios on the A22 London Road has been undertaken on a holistic basis, accounting for all road users and in addressing congestion improving conditions for buses and improving crossings and walkways for pedestrians. However, whilst for continuity in comparison of network capacity achieved from each scenario the assessment ASLs have been omitted from the preferred Scenarios, their inclusion as part of a comprehensive cycling strategy will encourage cycling within East Grinstead. This would help achieve mode shift and support integration of new development to sustainable transport infrastructure that will minimise stress incurred on the local highway network for this key route into the town centre.

It is therefore equally important that investment from development is assigned to public transport, walking and cycling to ensure the long term viability of the solutions proposed for the A22 Corridor. Specific measures might include:

- **Public Transport:** Improved integration of services at Station, bus priority measures, real time information systems and marketing
- **Walking & Cycling:** Signing, marketing, storage and route infrastructure as part of a comprehensive town-wide movement/cycling strategy;
- **Streetscape:** Good quality design to encourage sustainable travel in new development supported by sensitive land use planning;
- **Smarter Choices:** Travel Planning, Transport Management Associations, appointment of sustainable travel champions locally and for new development;
- **Parking Management:** Managing supply and introducing parking controls, provision in new developments.

Summary and Conclusions

10. Report Summary and Conclusions

10.1. Summary

Background

Congestion and delays in East Grinstead has been an issue in the town due to increasing development in the area, notably from the Felbridge junction in the north to Moat Road in the south resulting from the merger of the A22 and A64 and sharing of road space between these junctions.

Previous work has shown that a bypass would be required to alleviate traffic within the town in order to accommodate increased development traffic, however due to a split in the community this was abandoned in the mid 1990s. However the need to address the capacity constraints on the highway network remained.

As part of earlier stages of study, Atkins put forward an outline strategy for improving sustainable transport and upgrading of junctions that could be implemented to enable a proportion of development to come forward without the need for major transportation intervention. The highway interventions included work at the following locations:

- A22 London Road / A264 Copthorne Road (Felbridge Junction);
- A22 London Road / Imberhorne Lane;
- A22 London Road / Lingfield Road;
- A22 London Road / A22 Station Road; and
- A22 London Road / A264 Moat Road.

It was concluded that based on a series of improvements to the key junction on the A22 London Road, 571 residential units could be provided at the strategic Imberhorne Farm Site and recommended that these schemes are refined with further junction capacity modelling to provide a more accurate indication of forecast spare capacity and thus with improvements, to ascertain how much additional planned development traffic could be absorbed by the network.

Design Assessment

This Report has therefore intended to present the findings of a detailed iterative design and modelling process intended to refine the identified network solutions and align these to future planned development recognising that Imberhorne Farm Site is no longer considered strategic in nature thereby changing the presumption towards development in this location and assumptions that can be drawn relating to the development enablement of the solutions.

The Stage 3 work has the details of the results of the iterative modelling and design investigation completed for five key junctions along the A22 between Copthorne Road and Moat Road in East Grinstead in progression of the concept design solutions developed during Stage 1 and 2. With this in mind, this stage of Study has developed a range of solutions through a design optioneering process and arrived at preferred Scenarios to improve conditions for all road users as follows:

- Do Minimum: Changes within the highway network boundary (network optimisation); and
- Do Something: Changes involving capacity enhancements.

A range of options were identified at each location with preference for the Do Minimum and Do Something scenarios at each forming the preferred network solutions for all road users. These have taken account of identified developments in a nominal 10-year design horizon of 2021.

In consultation with WSCC, it was agreed that on review of the modelling results the current planned scheme at the A22 London Road / Imberhorne Lane was the preferred scenario in both the Do Minimum and Do Something scenarios. It was also observed that consultation with the Fire Service indicated preference for existing arrangements at the A22 London Road / A22 Station Road without tangible improvements to pedestrians any amendments to this junction are likely to result in worsening highway conditions therefore the existing, or 'Do Nothing' arrangement is preferred at this point in time.

Preferred Scenarios

A number of scheme options have been considered and design assessments completed. The proposed schemes have also been tested using traffic modelling software to better understand the impact of the schemes on highway capacity. As a result of this process design proposals have been selected for the Do Minimum and Do Something scenarios. These are summarised in Table 39.

Table 39. Summary of Preferred Scenarios

Junction	Do Minimum	Do Something
Felbridge Junction	Drawing No. 5107918/TP/PD/101	Drawing No. 5107918/TP/PD/102 & 103
A22 London Road / Imberhorne Lane	Drawing No. C1070 Rev B	Drawing No. C1070 Rev B
A22 London Road / Lingfield Road	Drawing No. 5107918/TP/PD/301	Drawing No. 5107918/TP/PD/302 & 303
A22 London Road / A22 Station Road	Do Nothing	Do Nothing
A22 London Road / A264 Moat Road	Do Nothing	Drawing No. 5107918/TP/PD/402

Evaluation

These preferred scenarios have been assessed in a high level evaluation Framework against scheme objectives derived from statements of stakeholder requirements, policy objectives and scheme performance indicators weighted 25% / 25% / 50% respectively. This is summarised in Table 40.

Table 40. Summary of Appraisal Scores

Scenario	Performance Indicator	Assessment	Base Score	Weighted
Do Minimum	Scheme Objectives	✓	1	1
	Policy Objectives	✓	1	1
	Scheme Performance	✓	1	2
	Total	✓	3 / 6	4 / 8
Do Something	Scheme Objectives	✓	1	1
	Policy Objectives	✓	1	1
	Scheme Performance	✓✓	2	4
	Total	✓	4 / 6	6 / 8

Both Do Minimum and Do Something scenarios offer enhancements for pedestrians with signal crossings introduced at Lingfield Road and Moat Road, and enhancements to the points of crossing at Felbridge Junction to bring these inline to current design standards. Each scheme offers to potential for improvements to cyclists; with full signalisation ASLs can be incorporated on appropriate approaches as part of a wider cycling strategy.

Improved network conditions will provide a commensurate improvement in journey times and reliability of bus services, reflected in the scoring. However, given the few bus routes on this part of the network (maximum frequency of one bus every twenty minutes during network peak hours), as discussed with WSCC investment in additional physical bus infrastructure is not seen to be warranted at this point in time.

Both scenarios are considered to offer improvements under each of the three key performance indicators of scheme objectives, policy objectives and scheme performance; accordingly offer holistic improvements to all users of the transport corridor and significantly unlocking congestion to improve the flow of traffic in and out of East Grinstead. Greater improvements are seen with the Do Something scheme however these come at higher cost and risk of deliverability.

10.2. Conclusions and Recommendations

10.2.1. Preferred Scenarios

The Do Minimum and the Do Something scenarios present an improvement for all road users over the Do Nothing Scenario. This is because they address (only partially in the Do Minimum) the predicted 2021 levels of congestion on the main route through East Grinstead assuming that all committed housing developments are in place. However some capacity issues remain on the gyratory at the junction with Moat Road without more significant 'Do Something' interventions.

The Do Something scenario performs better than the Do Minimum. In total, the costs of Do Minimum improvements are estimated at £900,000. Do Something improvements are estimated at £2,250,000.

The Do Minimum Scenario presents solutions that address existing and forecast congestion issues at those junctions where a Do Minimum level of intervention is feasible. Additional capacity is provided in the Do Something Scenario which significantly improves the performance of the highway network, although there are substantial deliverability and affordability issues with achieving this. There are also consequent risks of traffic generation and reassignment from other routes onto the A22 London Road to take advantage of any capacity improvements. However the potential for this to happen would have to be assessed in detail across the network, as it is outside the scope of this study.

10.2.2. Development Enablement

The Do Minimum Scenario broadly accommodates the 765 units already committed with the network operating within theoretical capacity, but congestion will not be eliminated. Whilst the Do Something Scenario offers a small amount of reserve capacity the modelled assessments indicate that, given the level of intervention required to deliver this, the development enablement on the A22 London Road is constrained to 765 residential units as a ceiling to growth in the town.

A sensitivity test has been undertaken that has shown an additional 190 units can be accommodated by the Do Something scenario for the network to operate within theoretical capacity. This assumes no background traffic growth and is considered to be indicative given the high-level nature of the development enablement review. Overall, it is considered that the development enablement is between 765 residential units (if junction improvements are limited to the Do Minimum scenario) and 955 residential units (if the deliverability and affordability issues associated with the Do Something scenario can be overcome).

The derivation of the Preferred Scenarios on the A22 London Road has taken account of the needs of all road users through addressing congestion and improving conditions for buses and pedestrians with recommendations for cycling. It is therefore equally important that investment from development is assigned to sustainable transport to ensure the long term viability of the solutions proposed for the A22 Corridor. Specific measures might include:

- **Public Transport:** Improved integration of services at Station, bus priority measures, real time information systems and marketing;
- **Walking & Cycling:** Signing, marketing, storage and route infrastructure as part of a comprehensive town-wide movement/cycling strategy;
- **Streetscape:** Good quality design to encourage sustainable travel in new development supported by sensitive land use planning;
- **Smarter Choices:** Travel Planning, Transport Management Associations, appointment of sustainable travel champions locally and for new development; and
- **Parking Management:** Managing supply and introducing parking controls, provision in new developments.

The results of this Study also indicate that the realisation of development where there is more reserve network capacity (i.e. to the north-west of the town) would help to limit its impact on the A22 junctions although the impact on the wider network has not been assessed as part of this study. How future development proposals emerging from Neighbourhood Plans would affect the A22 junctions will need to be considered and assessed as sensitivity tests as and when they come forward.

10.2.3. Next Steps: Recommendations

Further investigation into the issues identified in our Study at each location on the A22 London Road corridor might be required as a further Study and as part of a comprehensive review of East Grinstead Town Centre and strategic implications. In particular it is also recommended that a more detailed review is undertaken of

the works associated with the improvements at the bridge south of Lingfield Roundabout in order that discussions can be held with Network Rail to confirm the viability of proposals to move pedestrian footways to the outside of the bridge in the 'Do Something' scenario.

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