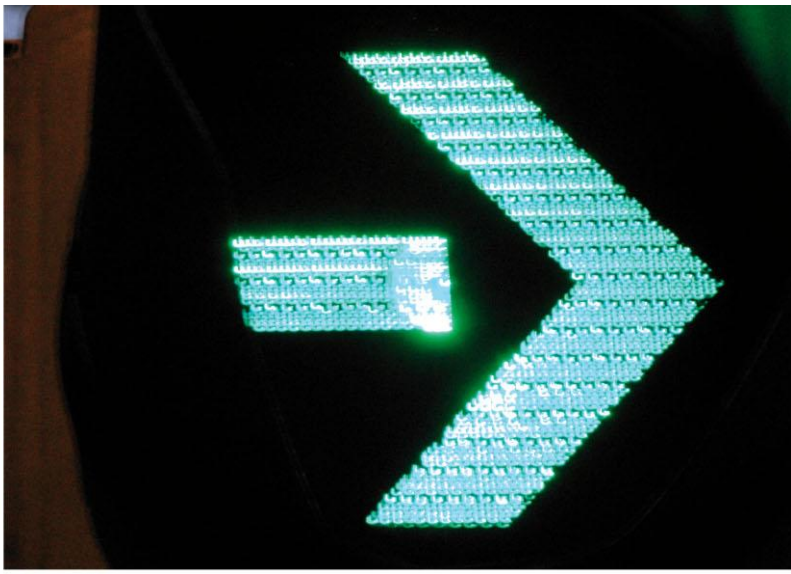
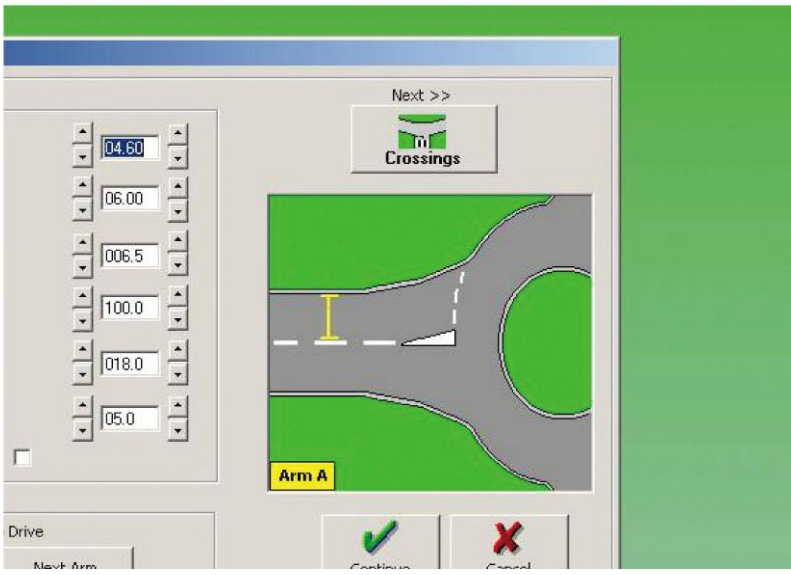
PROJECT CENTRE

Redhill Town Centre Traffic Modelling - Final Report

Reigate & Banstead Borough Council

February 2012





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Report Reference	Issue	Description	Originator	Checked	Authorised
TPREDAAP /FR	02	Final Report	David Field 02.03.12	Steven Wood (SIAS) 02.03.12	Neil Wisher (PCL) 02.03.12

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1. EXECUTIVE SUMMARY

Background

1.1 In November 2011 the Project Centre and SIAS Ltd were appointed by Reigate and Banstead Borough Council (RBBC) to carry out a study that developed a traffic model to aid formulation of a transport plan for Redhill town centre. The study is intended to support the evidence base for the Core Strategy and forthcoming Redhill Town Centre Area Action Plan (AAP), and in the assessment of future planning applications.

1.2 The principal objective for the study was to model the potential impact of traffic growth through the development and regeneration opportunities in Redhill town centre. This study addresses these issues and develops them further into a transport strategy, which is achieved through:

- Developing a do-minimum 2016 traffic forecast model using S-Paramics micro-simulation software that considers the development scenarios outlined in the consultation draft AAP for Redhill town centre
- Identifying, evaluating and testing a range of alternative traffic management solutions through the traffic model
- Preparing a concept design and indicative costs for the proposed scheme
- Gaining support for the short-listed traffic management solutions from key town centre stakeholders, including Surrey County Council and the elected Members in Redhill West and East wards.

Analysis Summary

1.3 The forecasts prepared for 2016 took into account the growth resulting from developments and infrastructure changes that have taken place within Redhill town centre since 2007, and those anticipated to occur by 2016. The additional traffic from the proposed developments resulted in a 22% increase in trips to and from Redhill in the AM peak, a 35% increase in the PM peak and a 38% increase in the Saturday peak.

1.4 The initial 'Do Minimum' forecasts for 2016 demonstrated a significant increase in congestion with conditions being particularly acute during the PM peak, with traffic being brought to a standstill within the town centre. However, following a more detailed examination, it was demonstrated that by minor changes (such as permitting right turning traffic on the southern approach of Lombard Roundabout to use both lanes instead of the right-hand lane only), a significant improvement in junction throughput could be achieved and the standstill problem was overcome. This modification was therefore included in the revised 'Do Minimum' model in order to prevent excessive congestion at the Lombard Roundabout blocking back through the one-way system.

1.5 The revised 'Do Minimum' forecasts showed that traffic congestion did increase during all modelled periods, particularly for traffic approaching from the A23 (North), where journey times to all destinations increased. Averaged across the network, and compared to the 2007 'Base' model, journey times increased by 40% for the AM peak, over 70% for the AM peak and over 150% for the Saturday peak.

1.6 A number of schemes have been developed to support the planned regeneration of the town centre and to mitigate the traffic impacts of the future developments. These included both improvements to the operation of the network, a reduction in congestion, and measures to improve conditions for cyclists and pedestrians, particularly with respect to access to the town centre.

1.7 The individual schemes were combined to form two main options:

- Option 1 (Highway Network) – focusing on improvements to the highway network that bring about journey time benefits for traffic in general, and so ease movements to, through and around the town centre
- Option 2 (Balanced Network) - measures that spread benefits of network changes identified in Option 1 to a wider range of travel modes to provide substantial improvements for walking, cycling and the public realm

1.8 Included in both options was the conversion of the current one-way system on the A25 between Cromwell Road/High Street junction and Lombard Roundabout to two-way working. The Balanced Network option also included measures to reduce the size of the Station roundabout as the key measure to enhance access between the rail station and the High Street. This measure has provided a significant opportunity to upgrade the public realm.

1.9 Tests of the individual schemes demonstrated that the most significant benefits were from conversion of the one-way system to two-way. There were substantial reductions in journey time, with a significant reduction in congestion on the A23 approaches from both the northern and southern directions, due to reduced flows through the Lombard, Station and Belfry roundabouts.

1.10 The model tests showed that a reduced Station Roundabout, with associated re-positioned pedestrian crossing facilities and a reduction of the westbound carriageway of Station Road to a single lane (forming part of the Balanced Network option), could increase journey times in the weekday peak periods as a result of the reduced capacity. However, the impact is more than offset by the benefits accrued for general traffic from the two-way working proposal for the A25 on the western side of the town centre.

Outcomes

1.11 While Option 1 (Highway Network) provides the greatest journey time savings for general traffic, Option 2 (Balanced Network) has clear additional benefits, as it achieves the overall town centre strategic objectives more comprehensively.

1.12 Option 1's operational benefits are largely due to the conversion of the one-way system on the A25 (between the Cromwell Road/High Street junction and Lombard Roundabout) to two-way working, and the rationalisation of traffic movements in and around the town centre achieved from this. This measure is also incorporated within Option 2.

1.13 Option 2, designed to provide benefits to cyclists and pedestrians, includes a re-modelled Station Roundabout and provides more modest improvements to the highway network. Predicted savings in journey times range between 15% for the AM and PM peak to nearly 50% for the Saturday peak.

1.14 The performance of Option 2 demonstrates that the conversion of the current one-way system to two-way opens up the opportunity for the introduction of improvements at the Station Roundabout that benefits pedestrians and cyclists, as well as opportunities to improve the public realm.

Recommendation

1.15 It is recommended that Option 2 (Balanced Network) should form the basis of a future transport plan for Redhill to meet the challenges and opportunities arising from the proposed redevelopment of the town centre

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2. INTRODUCTION

Background

2.1 In November 2011 the Project Centre and SIAS Ltd were appointed by Reigate and Banstead Borough Council (RBBC) to carry out a study that developed a traffic model to aid formulation of a transport plan for Redhill town centre. The study is intended to support the evidence base for the Core Strategy and forthcoming Redhill Town Centre Area Action Plan (AAP), and in the assessment of future planning applications. The consultancy brief is included as Appendix E of this report.

Study objectives

2.2 The principal objective for the study was to model the potential impact of traffic growth through the development and regeneration opportunities in Redhill town centre. This study addresses these issues and develops them further into a transport strategy, which is achieved through the following key tasks:

- Develop a do-minimum 2016 forecast model using S-Paramics micro-simulation software that considers the development scenarios outlined in the consultation draft AAP for Redhill town centre
- Identify, evaluate and test a range of alternative traffic management solutions for using the updated S-Paramics traffic model
- Prepare a short-list of these traffic management solutions, and support with a concept design and indicative costs for the proposed scheme
- Gain support for the short-listed traffic management solutions from key town centre stakeholders, including Surrey County Council and the elected Members in Redhill West and East wards

Purpose of report

2.3 This report covers all the technical work undertaken, including the modelling and forecasting process, options development and evaluation, and the recommended strategy.

2.4 3 technical reports have been produced covering key stages of the work namely:

- Redhill Town Centre Modelling – S-Paramics Model 2011.1 Validation (dated 2nd December 2011)
- Briefing Note 1 – Initial findings of the traffic modelling process (dated 25th January 2012); Included as Appendix D of this report
- Briefing Note 2 – Proposed options (dated 3rd February 2012)

2.5 These technical reports therefore provide the detailed background to the earlier stages of work and should be read in conjunction with this final report.

3. BASELINE ASSESSMENT

Introduction

3.1 The Baseline Assessment represents the forecast of future year conditions. This provides the benchmark for the evaluation of the transport options that were tested as part of the development of the preferred strategy.

3.2 The forecasts of future traffic conditions for 2016 have been achieved applying the following methodology:

- Review available 2007.1 S-Paramics model for Redhill
- Adjust parameters in the model to reflect prevailing traffic conditions and upgrade for S-Paramics software version 2011.1
- Develop forecasts for 2016 based on regeneration and development profiles agreed with Reigate & Banstead Borough Council and Surrey County Council (as promoted in the AAP)
- Determine background growth in baseline traffic to 2016
- Prepare 2016 initial 'Do Minimum' model
- Develop 2016 upgraded 'Do Minimum' model incorporating simple adjustments to the Highway Network – this is the Baseline Assessment Model

3.3 This section summarises the development of the traffic model, the forecasts and assumptions relating to future growth, and an assessment of future network conditions. A more detailed account of the development of the models and forecasts is provided in 'Briefing Note 1 – Initial findings of the traffic modelling process', which is included as Appendix D of this report.

Traffic model

3.4 The traffic model used to provide the forecasts for the study was developed from the Redhill Town Centre S-Paramics model that was initially created by Surrey County Council (SCC). This model was originally developed from observed data collected in 2007. The extent of the model coverage is shown in Figure 2.1 of Appendix B.

3.5 As the existing model was developed using a previous version of S-Paramics (2007.1), it was updated for the latest version of the S-Paramics software (2011.1). The relevant changes compared with 2007.1 in relation to the Redhill model are:

- Improvements in vehicle behaviour at roundabouts, and associated coding guidelines
- Extension to 'hazard' perpetuation which enables vehicles to be modelled in the correct lane approaching a junction earlier

- Interface with Analysis of Instantaneous Road Emissions (AIRE) software for analysing air quality

3.6 As part of the model update, a number of other modifications were incorporated, including the adoption of revised flow profiles that determines the release of vehicles onto the network during the peak period.

3.7 These changes necessitated a revalidation of the 2007 'Base' model. The model update, together with the results of the model revalidation is described in the 'S-Paramics Redhill Model 2011.1 validation' report dated 2nd December 2011.

Development of 2016 'Do Minimum' model

3.8 A 2016 'Do Minimum' forecast model was developed from the 2007 'Base' model. This 2016 model included estimated growth resulting from recent and anticipated developments within Redhill town centre, infrastructure changes that have taken place since 2007, and those that are anticipated to occur by 2016.

3.9 The developments included in the estimates of future growth included current committed developments since 2007, comprising:

- Conversion of 10A/B High Street to retail use - new trips assumed to use Belfry car park
- Conversion of Queensway House to primarily residential use with some retail floor area (construction now complete) – existing office trips removed from Clarendon Road car park. New residential trips assigned to a new zone and additional retail trips assigned to Belfry car park.

3.10 The following planned developments were also included from the RBBC development scenario to 2016 set out in the AAP:

- Conversion of former Liquid & Envy site to retail and residential use
- Extension of Sainsbury's site (replacing existing office accommodation), including gym and hotel use (resolution to grant planning permission)
- Conversion of Marketfield Road car park area to retail, leisure and residential use
- Conversion of existing retail, residential and office accommodation in Cromwell Road to supermarket use
- Conversion of Gloucester Road car park area to office and residential use
- Conversion of existing station car park in Princess Way to supermarket use
- Extension of existing station car park in Redstone Hill to accommodate displaced usage from Princess Way car park

3.11 Trip rates, derived from the TRICS database, were used to estimate the number of new and removed trips as a result of these developments. In all cases, 'town

centre' trip rates were assumed. Where estimated gross floor areas for supermarket and retail units have been provided, retail floor areas have been estimated by applying a factor of 0.5 to the gross floor area. This value is based on the corresponding ratio from the existing Sainsbury's store where the retail floor area is 2489 sq m out of a total internal floor area of 4986 sq m (49.9%) (Ref Sainsbury's Transport Assessment paragraph 2.6).

3.12 In order to determine an appropriate growth rate for non development related traffic, i.e. trips passing through the study area, an assessment of traffic growth on the strategic network in the Redhill area over the period 2005-2010 was carried out. For this purpose Automatic Traffic Count (ATC) data supplied by Surrey County Council was utilised for the following locations:

- A23 Horley Road approx 1 mile south of Redhill town centre
- A23 London Road approx 1 mile north of Redhill town centre
- A25 Nutfield Road approx ½ mile east of Redhill town centre

3.13 The percentage change for the period 2005 to 2009/2010 is shown in Table 2.1.

Table 3.1: Traffic growth 2005 to 2009/2010

ATC location	AM peak (07:00-10:00)	PM peak (16:00-19:00)	Saturday (10:00-16:00)
A23 Horley Road southbound 2005-2010	+12.1%	+2.2%	-0.3%
A23 Horley Road northbound 2005-2010	+5.2%	+5.1%	+0.7%
A25 Nutfield Road eastbound 2005-2010	+1.6%	-7.0%	-4.1%
A25 Nutfield Road westbound 2005-2010	-2.1%	-0.2%	-6.0%
A23 London Road southbound 2005-2009	-2.3%	+2.2%	-2.4%
A23 London Road northbound 2005-2009	+6.1%	-7.2%	+3.3%

3.14 This analysis indicates that there has been little overall growth in the area in recent years. On this basis, the 2016 'Do Minimum' model has assumed no background traffic growth. All predicted traffic growth between 2007 and 2016 is therefore assumed to be related to the recent, potential and anticipated town centre developments.

3.15 The change in the total number of trips between the 2007 'Base' and 2016 'Do Minimum' models is shown in Table 3.2.

Table 3.2: Demand matrix totals

Peak period	2007 Base	2016 'Do Minimum'	Growth
Weekday AM (07:30 to 09:30)	11113	11739	5.6%
Weekday PM (16:15 to 18:15)	10917	12067	10.5%
Saturday (10:30 to 12:30)	10845	12450	14.8%

3.16 It is noted that the majority of the trips in the model are through trips, i.e. external to external movements, which have had no growth applied. Table 3.3 shows the demand totals with external to external trips excluded.

Table 3.3: Demand matrix totals (excluding external to external trips)

Peak period	2007 Base	2016 'Do Minimum'	Growth
Weekday AM (07:30 to 09:30)	2904	3530	21.6%
Weekday PM (16:15 to 18:15)	3293	4443	34.9%
Saturday (10:30 to 12:30)	4219	5824	38.0%

Table 3.3 indicates a significant increase in trips to and from Redhill in the 'Do Minimum' model ranging between 22% in the AM peak to 38% in the Saturday peak.

3.17 The 2016 'Do Minimum' model network was developed from the 2007 'Base' model and included the following changes:

- The infrastructure associated with the proposed Sainsbury's development on Princess Way. This includes a new signalised junction opposite (but not including) Ladbroke Road, which expands the existing left-in/left-out Sainsbury's facilities into an all-movements junction.
- The revised layout for the bus station that was re-developed in 2008.

3.18 An initial 'Do Minimum' model was created to include the demand matrix and infrastructure changes as described above. Whilst the AM peak and Saturday models operated satisfactorily within the town centre, the PM peak was observed to have excessive congestion, particularly for northbound movements, with traffic coming to a virtual standstill after approximately 17:00.

3.19 It is a recognised procedure in future year models to apply, where practical, minor network changes to alleviate problems. One modification included in the upgraded 'Do Minimum' model involves permitting right turning traffic on the southern approach to Lombard Roundabout to use both lanes, rather than just the right-hand lane. As the eastern exit has two lanes, use of both approach lanes is feasible and enables a significant improvement in junction throughput. This

minor change has been necessary to prevent excessive congestion on the southern approach to Lombard Roundabout blocking back through the one-way system. The potential minor modifications are shown in Figure 2.2 of Appendix B.

2016 'Do Minimum' forecast

3.20 The 2016 'Do Minimum' model provided the forecasts for traffic conditions within Redhill, with the predicted conditions compared against the 2007 'Base' to assess the impact of the growth associated with the proposed developments.

3.21 The change in conditions between the 2007 'Base' and 2016 'Do Minimum' were assessed from an analysis of journey times and queues at key junctions within the town centre. The comparison for each of the three modelled time periods is described below.

3.22 Weekday AM Peak (07:30-09:30)

The 5.6% increase in trips in the 2016 'Do Minimum' resulted in a 40% increase in average journey time across the network compared with the 2007 'Base'. The network generally operates within capacity except on the A23 approaches where queues from the north extend to the edge of the modelled area and around 150 vehicles are queued off the network on the southern approach at the end of the modelled time period.

The average journey times in the 2016 'Do Minimum' for the AM Peak Hour are shown in Table 3.4 with the change from the 2007 'Base' shown in brackets.

Table 3.4: 2016 'Do Minimum' average journey times (Weekday 08:00-09:00) (mm:ss)

FROM \ TO	A23 north	A23 south	A25 west	A25 east	Belfry CP
A23 north	-	07:26 (+02:27)	07:39 (+03:07)	06:58 (+02:58)	06:18 (+02:11)
A23 south	10:43 (+01:39)	-	08:14 (+01:27)	09:16 (+01:32)	08:59 (+02:17)
A25 west	03:03 (+00:08)	04:48 (+00:02)	-	04:07 (+00:20)	04:10 (+00:20)
A25 east	04:31 (+00:20)	03:21 (-00:01)	03:07 (+00:05)	-	02:43 (+00:04)
Belfry CP	03:35 (+00:33)	04:58 (+01:29)	01:05 (-00:06)	04:19 (+00:56)	-

Table 3.4 demonstrates that the most significant increase is from A23 north, where journey times to all destinations increase by between 2 and 3 minutes on average. It should be noted that since these figures are averaged over the hour, they conceal some higher journey times that will occur within the peak hour.

3.23 Weekday PM Peak (16:15-18:15)

The 10.5% increase in trips in the 'Do Minimum' resulted in a 73% increase in average journey times when compared with the 2007 'Base'. A visual examination of the model simulation showed that the 2016 network is significantly

busier than the 2007 'Base'. Whilst the network generally operates within capacity, some difficulty was experienced by traffic accessing Princess Way from the underground car park and the station forecourt.

The average journey times in the 2016 'Do Minimum' for the PM Peak Hour are shown in Table 3.5, with the change from the 2007 'Base' shown in brackets.

Table 3.5: 2016 'Do Minimum' average journey times (Weekday 16:45-17:45) (mm:ss)

		TO				
		A23 north	A23 south	A25 west	A25 east	Belfry CP
FROM	A23 north	-	10:03 (+04:38)	09:46 (+04:53)	09:09 (+05:06)	08:39 (+04:21)
	A23 south	10:03 (+03:10)	-	06:35 (+02:34)	07:28 (+02:46)	06:30 (+03:01)
	A25 west	03:56 (+00:34)	06:44 (+00:13)	-	05:05 (-00:07)	05:41 (-00:02)
	A25 east	05:15 (+00:36)	03:43 (+00:08)	03:02 (+00:05)	-	02:42 (+00:04)
	Belfry CP	04:32 (+00:42)	07:16 (+02:34)	01:13 (+00:06)	05:35 (+00:17)	-

3.24 Table 3.5 shows that the most significant increase is from A23 north, where journey times to all destinations increase by between 4 and 5 minutes on average when compared to 2007. There are also significant increases on A23 south, ranging from 2.5 minutes to over 3 minutes.

3.25 Saturday Peak (10:30-12:30)

The 14.8% increase in trips resulted in an increase in journey times of 157% across the network compared to the 2007 'Base'. Whilst traffic flows were reasonably smooth within the town centre, extensive queues were noted on the A23 approaches from both directions. Queues from the north extended beyond the modelled area by around 100 vehicles, while queues from the south extended beyond the modelled area by around 200 vehicles.

The average journey times in the 2016 'Do Minimum' for the Saturday Peak Hour are shown in Table 3.6 with the change from the 2007 'Base' shown in brackets.

Table 3.6: 2016 'Do Minimum' average journey times (Saturday 11:00-12:00) (mm:ss)

		TO				
		A23 north	A23 south	A25 west	A25 east	Belfry CP
FROM	A23 north	-	15:36 (+10:26)	15:23 (+10:28)	14:12 (+10:09)	15:02 (+10:31)
	A23 south	18:15 (+12:09)	-	15:15 (+11:16)	15:47 (+11:10)	14:43 (+11:04)
	A25 west	03:36 (+00:32)	05:11 (-00:30)	-	03:50 (-00:32)	04:34 (-00:24)
	A25 east	06:05 (+02:03)	04:01 (+00:39)	03:35 (+00:32)	-	03:22 (+00:39)
	Belfry CP	03:59 (+00:36)	05:33 (+01:52)	01:11 (+00:03)	04:16 (-00:24)	-

3.26 Table 3.6 demonstrates the substantial increase in average times from A23 north and A23 south, ranging between 10 and 12 minutes. This represents a trebling of journey times when compared to 2007.

3.27 In summary, the baseline assessment has identified that growth in vehicle trips due to the development and regeneration of Redhill will lead to greater traffic congestion within the town centre. The increased level of delay to traffic will be most acutely felt during Saturday, while the impact on the Weekday PM Peak period can be lessened through encouraging use of both lanes on the southern approach to the Lombard Roundabout.

3.28 It is apparent that the predicted levels of congestion would need to be tackled as a matter of priority, and as a fundamental component for achieving the range of access objectives set for the Town Centre Area Action Plan.

Baseline Model Audit

3.29 Surrey County Council undertook an Audit of the Baseline/Do Minimum modelling in accordance with its own standardised approach. The findings of the Audit are included in Appendix F. All observations and amendments identified by the County have been incorporated within the modelling described within this Section.

4. NETWORK OPTIONS

Outline strategy

4.1 The Baseline Assessment identifies that severe congestion could arise on the highway network, resulting from the growth in traffic associated with the development and regeneration of Redhill town centre. The level of congestion predicted is high enough to conclude that the traffic management arrangements will be insufficient in their current form. If town centre action plan objectives to change travel habits to and from the town centre are to be realised, the predicted traffic congestion has to be addressed at the outset.

4.2 The outline traffic management strategy can be summarised as follows:

- Tackle the Baseline predicted level of traffic congestion through alternative network management arrangements
- Address town centre access issues for all modes of travel, as influenced by the emerging Town Centre Area Action Plan
- Consider how networks for walking, cycling and public transport influence the approach for town centre traffic management
- Devise measures that require no or minimal additional non-highway land, so as to be deliverable and cost effective.

4.3 Two overreaching options have been developed to meet the outline strategy. In developing these options, due regard was given to previous investigations carried out by Surrey County Council, and as commented on by Reigate & Banstead Borough Council Members and officers. The two options are:

- Option 1 (Highway Network) – providing operational benefit to the highway network to overcome the predicted levels of congestion
- Option 2 (Balanced Network) – balancing the impacts of the various measures to bring wider benefits to all modes of travel

Overall network layout plans for Option 1 and Option 2 are shown in Figures 4.1 and 4.2 of Appendix B respectively, with a further detailed breakdown of each option described in paragraphs 4.4–4.20 and shown in Figures 4.4-4.14 of Appendix B.

Option 1 – Highway network

4.4 This option concentrates on improvements to the highway network that bring about journey time benefits for traffic in general, and so ease movement to, through and around the town centre. With this approach, benefits are accrued principally for general traffic and bus services, with congestion reduced through the rationalisation of the network and an increase in route choices, thus reducing overall vehicle kilometres for journeys.

4.5 This option proposes carriageway modifications to five locations around Redhill town centre. Measures included in the modelling are described below and shown in the figures contained in Appendix B.

4.6 H1 - Lombard Roundabout (see Figure 4.4):

- Northern arm (A23 London Road) – Modification of island shape, road width (minor widening) and conversion to two lane approach
- Eastern arm (A23 Princess Way) – Minor realignment to footway and island kerbs to suit new layout on A23
- Southern arm (London Road) – Conversion to two-way working from exit only, easing of entry radius, construction of island and removal of existing kerb build out
- Western arm (Gloucester Road) – Removal of existing island and replacement with smaller in new location

4.7 H2 - A23 Princess Way dual pedestrian crossing, east of Lombard Roundabout (see Figure 4.5):

- Amend crossing layout to suit new carriageway arrangement, which is changed from 2 lanes eastbound / 1 lane westbound to 1 lane eastbound / 2 lanes westbound

4.8 H3 - Sainsbury's access (see Figure 4.6):

- An elongated roundabout is proposed, instead of the planned traffic signalled junction
- Car park access via western arm and two lanes in each direction along A23 Princess Way
- Modification of existing island at Ladbroke Road to suit, giving exiting vehicles option to travel north or southbound on A23 Princess Way (currently southbound only)

4.9 H4 - Conversion to two-way traffic movement on the A25 town centre section (see Figures 4.7-4.9):

- Change of current one-way system between the Cromwell Road / High Street junction and the Lombard Roundabout to two-way
- Modification of the layout, traffic signal phasing and pedestrian facilities at the junction of Cromwell Road and the High Street
- Replacement of current priority arrangement with signals and change existing Pelican crossing to integrate with a Toucan crossing at the junction of Cromwell Road and the Huntingdon Road, with minor road widening where necessary

- Changes to access arrangements at Belfry Shopping Centre car park to allow for new road layout (subject to agreement with the Belfry Centre)
- Modification of the layout, traffic signal phasing and pedestrian facilities at the junction of Station Road and St. Matthew's Road, with minor road widening where necessary
- Minor road widening to the three corners located between the Station Road / St. Matthew's Road junction and the Lombard Roundabout
- Modification of pedestrian crossing signals at northern end of the High Street, adjacent to London Road

4.10 N1 - Redstone Hill / rail car park (see Figure 4.14):

- Installation of mini-roundabout in place of existing arrangement to allow safer access to/from the proposed multi-storey car park
- Extension of kerb to western footway
- Cavendish Road priority to remain unchanged

Option 2 - Balanced network

4.11 This option identifies a series of measures that spread the benefits of network changes to a wider range of travel modes, and to town centre users. Whereas general traffic and bus services could primarily gain most from the measures highlighted in Option 1, the extent of the journey time savings and eased congestion can be further enhanced under Option 2 to provide additional improvements for walking, cycling and the public realm.

4.12 This option proposes carriageway modifications to six locations around Redhill town centre. Measures included in the modelling are described in paragraphs 4.14-4.20 and shown in the figures contained in Appendix B.

4.13 The measures support development of walking and cycling networks for Redhill, which are shown in Figure 4.3 of Appendix B. Additionally, some non-traffic opportunities in, or close to, the town centre are described in paragraph 4.21 and also shown in Figure 4.2 of Appendix B.

4.14 B1 - Lombard Roundabout (as Option 1, H1; see Figure 4.4):

- Northern arm (A23 London Road) – Modification of island shape, road width (minor widening) and conversion to two lane approach
- Eastern arm (A23 Princess Way) – Minor realignment to footway and island kerbs to suit new layout on A23
- Southern arm (London Road) – Conversion to two-way working from exit only, easing of entry radius, construction of island and removal of existing kerb build out

- Western arm (Gloucester Road) – Removal of existing island and replacement with smaller in new location

4.15 A23 Princess Way dual pedestrian crossing, east of Lombard Roundabout:

- Crossing to be removed to provide two lane operation on both carriageways of A23 Princess Way

4.16 B2 - Sainsbury's access (see Figure 4.10):

- Installation of traffic signal-controlled junction (revised design of original proposals)
- Provision of additional dual pedestrian crossing facilities to northern arm of A23 Princess Way, to replace removed crossing described in paragraph 2.9
- Access to/from Ladbroke Road to remain unchanged

4.17 B3 - Station Roundabout, Station Road and junction with Noke Drive (see Figures 4.11-4.12):

- Installation of reduced size roundabout (approximately half the size of the current arrangement), providing large gains in areas of public space
- Relocation of pedestrian/cycle crossing facilities closer to desire lines
- For Station Road approach, widening of footway to both sides and carriageway reduced from three lanes to two, with improved lighting under bridge
- Modification of the layout and signal phasing to give controlled pedestrian facilities on all arms at the junction of Station Road and Noke Drive

4.18 B4 - Conversion to two-way traffic movement on the A25 town centre section (as Option 1, H4; see Figures 4.7-4.9):

- Change of current one-way system between the Cromwell Road / High Street junction and the Lombard Roundabout to two-way
- Modification of the layout, traffic signal phasing and pedestrian facilities at the junction of Cromwell Road and the High Street
- Replacement of current priority arrangement with signals and change existing Pelican crossing to integrate with a Toucan crossing at the junction of Cromwell Road and the Huntingdon Road, with minor road widening where necessary
- Changes to access arrangements at Belfry Shopping Centre car park to allow for new road layout (subject to agreement with the Belfry Centre)

- Modification of the layout, traffic signal phasing and pedestrian facilities at the junction of Station Road and St. Matthew's Road, with minor road widening where necessary
- Minor road widening to the three corners located between the Station Road / St. Matthew's Road junction and the Lombard Roundabout
- Modification of pedestrian crossing signals at northern end of the High Street, adjacent to London Road
- Signposting for A25 through traffic to be via northern route through Lombard Roundabout (rather than via Belfry Roundabout)

4.19 B5 - Toucan crossing at A23 Marketfield Way (see Figure 4.13):

- Installation of Toucan crossing on A23 Marketfield Way, adjacent to Market Field Road and rail car park access footway

4.20 N1 - Redstone Hill / rail car park (see Figure 4.14):

- Installation of mini-roundabout in place of existing arrangement to allow safer access to/from the proposed multi-storey car park
- Extension of kerb to western footway
- Cavendish Road priority to remain unchanged

4.21 Non-carriageway opportunities:

- Public realm enhancements to Station Road (between Station Roundabout and the High Street)
- Footway upgrade to Market Field Road

Sustainable Transport Opportunities

4.22 While both network options will benefit traffic and bus services in terms of journey time savings and town centre accessibility, Option 2 (Balanced Network) supports better access to the town centre through pedestrian and cycle networks. The various measures identified under Option 2 can be designed to provide a safe crossing of the roads by both pedestrians and cyclists. However, this option goes further by actively promoting specific measures that enhance the walking and cycling experience. A network strategy plan for walking and cycling is shown in figure 4.3 of Appendix B, with the measures summarised below.

4.23 **Walking** - Improvements to the pedestrian access network include:

- Upgraded/additional facilities at junctions and new crossing on A23 Marketfield Way
- Relocation of facilities closer to desire lines
- Increase in large areas of public space adjacent to Station Roundabout

- Footway widening on Station Road with improved lighting
- Upgrade access footpath between A23 Marketfield Way and rail car park area
- Better access to bus station, rail station and car park
- Network of footways and footpaths enhanced for walk quality, safety, security and way finding, using a combination quiet and busy roads

4.24 **Cycling** - Improvements to the cycle access network include:

- Expansion of National and Redhill cycle network routes
- Toucan facilities on A23 Marketfield Way and at junction of A23 Cromwell Road / Huntingdon Road
- Proposed shared cycle/footway on Princess Way
- Possible shared use footway on Station Road
- Proposed on-street cycle parking to Station Road (west of Station Roundabout)

4.25 Both Option 1 and Option 2 provide benefits for the bus network through journey time savings, and also provide a platform for alternative routes around the town centre to provide better accessibility. Specific improvements and benefits for bus services include:

- Two-way working on A25 to allow more convenient route options and stop locations
- Better access to/from bus station for pedestrians and improved links to rail station and central shopping area (High Street)

Estimated Costs

4.26 Notional costs for Options 1 and 2 are shown in Tables 4.1 and 4.2 below.

Table 4.1: Option 1 (Highway Network) estimated costs

Measure Ref. & Location	Estimate (£)
H1 – Lombard Roundabout	150,000
H2 – Princess Way crossing	100,000
H3 – Sainsbury's access	300,000[1]
H4 – A25 Two-way working	750,000
N1 – Redstone Hill	75,000
TOTAL	1,375,000

[1] *Assumes additional costs to developer proposals for design alternative, land acquisition and wider impact on statutory undertaker plant and mains*

Table 4.2: Option 2 (Balanced Network) estimated costs

Measure Ref. & Location	Estimate (£)
B1 – Lombard Roundabout	200,000[1]
B2 – Sainsbury's access	50,000[2]
B3 – Station Roundabout / Noke Drive	750,000
B4 – A25 Two-way working	750,000
B5 – Marketfield Way Toucan crossing	60,000
PR – Station Road public realm	400,000
N1 – Redstone Hill	75,000
TOTAL	2,285,000

[1] *Includes additional removal of staggered pelican crossing on Princess Way*

[2] *Assumes construction costs of original scheme remain with developer and cost allowance is to incorporate additional pedestrian facilities*

4.27 It should be noted that:–

a) As far as practicable, the costs include feasibility, detailed design, construction and contingencies (such as an element of statutory undertakers plant and mains).

b) Costs are broad estimates and will depend on factors such as timescale, choice of materials/equipment, impact on statutory undertakers' plant and mains, and scope of works. Therefore, a deviation of +/- 50% should be allowed.

5. OPTIONS MODELLING

5.1 In order to understand the effects of the component parts of Option 1 (Highway) and Option 2 (Balanced), the key elements were individually examined by creating additional S-Paramics models derived from the 'Do Minimum' model. In each model, only a specific part of the overall network plan was included, so that its viability in terms of traffic conditions could be assessed and compared with the 'Do Minimum'. Option Components that were tested are summarised below.

5.2 Highway Network:

- H1 (also for Option 2, B1) - Lombard Roundabout changes associated with H4/B4 (testing included in H4/B4), including a two-lane approach on Princess Way
- H2 – Princess Way dual pedestrian crossing not tested as a standalone facility
- H3 – Change in the design of the approved Sainsbury's junction to an elongated roundabout which enables full access to and from Ladbroke Road
- H4 (also for Option 2, B4) – Conversion of the A25 through the town to two-way working, involving changes to Cromwell Road, St. Matthew's Road, Station Road, Queensway and London Road, with the northern route being the signposted route for through traffic on the A25. The design includes a four-stage signalised junction between St. Matthew's Road and Station Road with one of the stages being all-red to enable pedestrian crossing facilities
- N1 – Redstone Hill proposed mini-roundabout not tested as a standalone feature

5.3 Balanced Network:

- B2 – The design of the approved Sainsbury's signalised junction expanded to include full pedestrian facilities, replacing the current facilities provided between Sainsbury's and Lombard Roundabout, thus enabling two lanes in each direction on Princess Way between Sainsbury's and Lombard Roundabout
- B3 – Reduction of Station Roundabout from 33 metres internal diameter to 15 metres with associated repositioning of pedestrian crossing facilities. The westbound carriageway of Station Road beneath the railway is reduced from two lanes to a single lane, and the signalised junction with Noke Drive includes an additional pedestrian stage.
- B5 – Marketfield Way Toucan Crossing not tested as a standalone feature
- N1 – Redstone Hill proposed mini-roundabout not tested as a standalone feature

5.4 Analysis of each model was undertaken ten times for each of the three time periods, with the overall statistics compared against the 'Do Minimum' model. The results for total overall journey distance and journey time for every simulated vehicle in the model are shown in tables 5.1 and 5.2 respectively. This is presented as an index where the measured statistic, averaged over the ten analysis runs, is referenced to the 'Do Minimum' with a base index of 1.00.

Table 5.1: Individual option model **journey distance** indices

Model	AM peak (07:30-09:30)	PM peak (16:15-18:15)	Saturday (10:30-12:30)
Do-Minimum	1.00	1.00	1.00
B2	1.00	1.00	0.99
B3	1.00	0.99	0.98
B4/H4	0.97	0.96	0.94
H3	0.99	0.99	0.98

Table 5.2: Individual option model **journey time** indices

Model	AM peak (07:30-09:30)	PM peak (16:15-18:15)	Saturday (10:30-12:30)
Do-Minimum	1.00	1.00	1.00
B2	1.04	0.96	0.86
B3	1.15	1.42	0.97
B4/H4	0.72	0.75	0.50
H3	0.95	0.90	0.89

5.5 The results show that the two-way working component (B4/H4) reduces the total distance travelled by all vehicles in the model by between 3% and 6%, which effects a very significant reduction in the total journey time of between 25% and 50%. Observation of the operation of the model reveals a significant reduction in congestion on the A23 approaches from both north and south directions. This is due to reduced flows through the Lombard, Station and Belfry roundabouts, as a result of the greater flexibility provided for individual journeys, e.g. a trip from the A25 west to the Belfry car park is able to route directly via St. Matthew's Road, rather than circumnavigating the town through all three roundabouts on the A23.

5.6 Component H3 also exhibits some significant time savings, mainly due to traffic accessing Ladbroke Road or the station car park development site having a more direct route, thus causing a small reduction in flows through the Lombard and Station roundabouts.

5.7 Component B2 shows only a significant change in the Saturday time period, where there is a 14% reduction in overall journey time.

5.8 Journey times for component B3 are increased in the Weekday peak periods, which can be expected in view of the reduced capacity for vehicular traffic attributed to the proposals, such as the accommodation of an additional access for the Liquid & Envy site development, and through the opportunity afforded by the smaller roundabout to relocate pedestrian/cycle crossings on the approaches to positions nearer the natural desire lines and therefore, closer to each other.

5.9 The objective of the Option 2 (Balanced Network) modelling is to demonstrate that the substantial benefits accrued for traffic through the two-way working component (B4/H4) enable a significant opportunity to upgrade the walking and cycling connections between the station and the town centre (component B3 in particular). This option also provides the opportunity to substantially improve the public realm, while bringing about an overall improvement in the efficiency of the highway network, including traffic growth from town centre development.

5.10 Tables 5.3 and 5.4 show the effect of Option 1 (Highway Network) and Option 2 (Balanced Network), when compared with the 'Do Minimum' in terms of average journey distance and time.

Table 5.3: Full option model journey distance indices

Model	AM peak (07:30-09:30)	PM peak (16:15-18:15)	Saturday (10:30-12:30)
Do-Minimum	1.00	1.00	1.00
Option 1 (Highway)	0.95	0.95	0.93
Option 2 (Balanced)	0.96	0.97	0.93

Table 5.4: Full option model journey time indices

Model	AM peak (07:30-09:30)	PM peak (16:15-18:15)	Saturday (10:30-12:30)
Do-Minimum	1.00	1.00	1.00
Option 1 (Highway)	0.64	0.70	0.48
Option 2 (Balanced)	0.85	0.83	0.51

5.11 Option 1 combines the advantages accrued through components H3 and H4, which result in substantial improvements to average journey time and distance travelled.

5.12 Option 2 effectively uses some of the gains from the two-way working in component B4 (same as H4) to accommodate the impact of the reduced size roundabout and two lane eastern approach from B3, yet still maintains the improvements to average journey time and distance travelled when compared to the 'Do Minimum' situation. Option 2 can therefore be seen to meet its stated objective of using the journey time savings and distance benefits arising from the highway network changes to improve Redhill for walking, cycling and the public realm.

Do Something Models Auditing

5.13 All S-Paramics models have been audited by Surrey County Council using its standard spreadsheet audit procedure. Each audit involves a comparison of each model with its derivative to confirm that all differences between models are appropriate. The outputs from the audits are shown in Appendix F and confirm that each model has been coded correctly.

6. EVALUATION FRAMEWORK

Introduction

6.1 An evaluation framework is a tool to identify the various impacts and outcomes resulting from a range of interventions, which is used to help inform the decision making process. For the purpose of the Redhill traffic modelling study, an evaluation framework was developed to assist in the appraisal of the scheme options and for the generation of preferred strategies for the Core Strategy and Redhill Town Centre Area Action Plan.

Development of Evaluation Framework

6.2 The starting point for the development of the evaluation framework was the strategic objectives for Redhill that were defined in the study brief prepared by RBBC entitled 'Redhill Town Centre Traffic Modelling: Specification for Consultancy Advice'. These were defined as follows:

- To improve the integration between transport modes and in turn strengthen Redhill's position as a strategic and local hub
- To prioritise public transport movements to/from the town centre and encourage modal shift
- To put in place measures to address peak period congestion, whilst balancing the needs of other modes of transport
- To provide access to, facilities for, and information about alternative modes of transport
- To improve town centre walking and cycling environments
- To provide information and access to a choice of car parks for town centre users

6.3 It was recognised that the key objective for the study was the need to deliver transport improvements that would contribute to the regeneration of the town centre. Any proposed measures would therefore need to both facilitate and meet the challenges of a significant economic expansion of the town centre.

6.4 An evaluation framework was developed in consultation with officers from RBBC with reference to the strategic objectives and the over-arching priority in terms of promoting regeneration. Account was also taken of the forecast 2016 conditions that highlighted the key transport problems and issues that needed to be addressed.

6.5 A total of five objectives were identified that focused on supporting planned growth, deliverability, affordability, improving the environment and supporting transport choices.

6.6 The evaluation framework is presented in Table 6.1.

Table 6.1: Redhill town centre evaluation framework

Strategic Objective	Secondary Objectives	Measurable Evaluation Criteria
1. Support planned growth to mitigate impacts of future developments	Improve access to town centre by all modes Improve access between station and town centre Minimise delays and congestion on the road network	Reductions in congestion at key junctions Reductions in journey times for car drivers/passengers Reductions in journey times for bus passengers Enhance permeability of town centre for pedestrians/cyclists
2. Ensure measures are deliverable	Ensure public acceptance and minimisation of risk	Engineering constraints Land ownership / availability Necessary permissions / procedures / authorities Timescale of delivery
3. Ensure measures are affordable	Able to meet criteria for available funding mechanisms	Cost Value for money
4. Improve the quality of the environment within town Centre	Reduce carbon emissions and improve air quality Improve quality of urban landscape	Index of airborne pollutants Resident / town centre visitor satisfaction
5. Provide and support a choice of transport alternatives	Promote and improve facilities for walking and cycling Promote and improve facilities for buses Promote Car Clubs Travel planning	Increase in use of non-car modes Higher passenger numbers / user satisfaction Increase in membership and use Proportion/number of trips by mode within town centre area

6.7 Table 6.1 shows a number of secondary objectives that were also defined to set out in more practical terms how each of the strategic objectives could be delivered. The third column sets out the criteria by which each objective could be measured. This contains both qualitative and quantitative measures, with the latter including the operational performance of the network obtained from the model forecasts.

The evaluation process

6.8 The generation of the initial scheme options was informed by reference to the five strategic objectives. This effectively provided the criteria for the preliminary sorting process, whereby the options that broadly satisfied each of the objectives were taken forward for more detailed testing and evaluation.

6.9 The evaluation process was carried out as a two stage process. The first stage involved an evaluation of the individual scheme/network options that are described in Chapter 3 of this report. The second stage involved evaluating the two strategies i.e. the Highway Network and Balanced Network options process

that were developed from a combination of the individual schemes, as described in Chapter 4.

6.10 As noted in paragraphs 6.2-6.7 above, one of the key inputs to the evaluation framework was the output from the modelling, which provided the basis for the network and operational performance. The operational performance of the individual scheme options and the two strategies are described in Chapter 5.

Evaluation of scheme options

6.11 Table 6.2 summarises the assessment of the various measures against the evaluation criteria. Some of the key findings include:

- The two-way working component H4/B4 creates the primary benefits for journey time savings and scores well in comparison to the other measures. Some benefits are also accrued for pedestrians and cyclists through the three signalled junctions, including specific measures for those travel modes. As journey times are improved, it is anticipated that two-way working will help in meeting carbon reduction targets
- The reduced roundabout component B3 substantially improves the pedestrian, cycling and public realm environment, although journey times for general traffic and buses will be negatively impacted upon. The scheme is anticipated to be more expensive than other measures. However, this potentially represents good value for money, considering the pedestrian, cycling and public realm benefits accrued
- The changes to Lombard Roundabout (component H1/B1) benefit general traffic, although there is little improvement for walking and cycling. Should this measure be taken forward, then the location should be further investigated to bring about better improvements for sustainable transport modes
- The various measures have few constraints to delivery, such as the need for third party land. The main constraints are anticipated to be funding availability and highway approval processes

Evaluation of strategies

6.12 The following summarises consideration of the combined effects of the two network options in respect of the evaluation criteria:

<u>Option 1 – Highway Network</u>

- This option provides clear and measurable journey time and distance savings for general traffic
- These benefits can also be accrued for bus services. Town centre access is enhanced with the opportunity to re-route or provide additional services as a result of the wider route choices and stopping options

- This option is cheaper overall than Option 2. Value for money is limited in the main to the journey time and distance savings for traffic, with the scheme only partially addressing the overall access strategy for the town centre
- Similarly, the option would have only a minor discernible benefit for the town's public realm
- Through the signal controlled junctions in the proposed two-way working, some improvement for pedestrians and cyclists from the west of the town centre is provided. There is no change to arrangements from the eastern side however

Option 2 – Balanced Network

- Access for all travel modes is substantially enhanced for the town centre. Journey time savings are gained for general traffic and buses, although to a lesser degree than for Option 1. However, when compared to the 'Do Minimum' situation, these remain substantial
- As with Option 1, bus services benefit with a wider route choice. Further benefits are also achievable with the additional and enhanced pedestrian crossing points affording easier access to the bus station and other stops
- This option is more expensive. However, value for money is gained through journey time savings. Better support of modal shift to walking and cycling is also provided, particularly for local trips which may then add to the achievement of carbon reduction targets
- Significant benefits are achievable for the town's public realm. Considerable additional space is gained around the rail station (a key arrival point for the town centre) and the east side of the town centre for environmental enhancements and public amenity, which would add to the viability of regeneration for Redhill
- Pedestrian and cycle facilities are improved from virtually all compass points around the town centre. The adoption of a sustainable transport network similar to that shown in Figure 4.3 (see Appendix B) would reinforce these benefits

6.13 In conclusion, while Option 1 (Highway Network) provides good benefits to general traffic and buses, the full set of town centre strategy objectives are much more clearly met through Option 2 (Balanced Network). Although more costly to implement, Option 2 (Balanced Network) is therefore the clearly preferred option.

Table 6.2: Evaluation framework for scheme options

Strategic Objective	Secondary Objectives	Measurable Evaluation Criteria	Option 1 – Highway Network					Option 2 – Balanced Network					
			H1	H2	H3	H4	N1	B1	B2	B3	B4	B5	N1
1. Support planned growth to mitigate impacts of future developments	Improve access to town centre by all modes	Reductions in congestion at key junctions	++	+	++	+++	0	++	+	−−	+++	+	0
	Improve access between station and town centre	Reductions in journey times for car drivers/passengers	0	+	++	+++	+	0	−	++++	+++	+	+
	Minimise delays and congestion on the road network	Reductions in journey times for bus passengers	+	+	++	+++	0	+	−	−−	+++	−	0
		Enhance permeability of town centre for pedestrians/cyclists	0	0	0	++	0	0	+	+++	++	+++	0
2. Ensure measures are deliverable	Ensure public acceptance and minimisation of risk	Engineering constraints	−	−	−−	−−	−−	−	−−	−−	−−	−	−−
		Land ownership / availability	0	0	−−−	−−	−	0	0	0	−−	0	−
		Necessary permissions / procedures / authorities	0	0	−−	−−	−	0	−−	−−−	−−	−	−
		Timescale of delivery	−	−	−−	−−	−	−	−	−−	−−	−	−
3. Ensure measures are affordable	Able to meet criteria for available funding mechanisms	Cost	−	−−−	−−−	−−−	−	−	−	−−−	−−−	−	−
		Value for money	+	+	+	+++	0	+	+	+++	+++	++	0
4. Improve the quality of the environment within town Centre	Reduce carbon emissions and improve air quality	Index of airborne pollutants	+	+	+	++	0	+	0	0	++	0	0
	Improve quality of urban landscape	Resident / town centre visitor satisfaction	0	0	−	+	+	0	+	+++	+	+	+
5. Provide and support a choice of transport alternatives	Promote and improve facilities for walking and cycling	Increase in use of non-car modes	0	0	−−	+	+	0	+	++++	+	+++	+
	Promote and improve facilities for buses	Higher passenger numbers / user satisfaction	+	+	+	++	0	+	+	+	++	+	0
	Promote Car Clubs	Increase in membership and use	0	0	0	0	0	0	0	0	0	0	0
	Travel planning	Proportion/number of trips by mode within town centre area	+	+	+	++	0	+	+	++	++	+	0

+ – Positive impact on objective **0** - No discernible impact against objective **−** - Negative impact on objective
Note: The greater the number of symbols, the greater the potential impact

7. CONSULTATIONS

7.1 The project team met with councillors and lead officers from Reigate & Banstead Borough Council and Surrey County Council to discuss the issues relating to Redhill Town Centre on 8th November 2011, 23rd January 2012 and 9th February 2012.

7.2 The first meeting was held to identify and talk through the various transport and accessibility issues. Key points raised related to:

- Ensuring smooth flow of traffic on the main roads
- Difficulties and safety when using various footpaths, road crossings and facilities for cycling
- Access between the rail station and the wider area
- The implications of various developments for the town centre

7.3 The subsequent two meetings considered the findings of the preliminary modelling, and the suite of measures being promoted through the study.

7.4 The potential consequences of the growth in traffic arising from proposed developments contained in the Redhill Town Centre Area Action Plan were reflected upon. The S-Paramics 'Do minimum' model for 2016 showed that, without significant intervention, traffic congestion could reach unacceptable levels on most of the arterial routes.

7.5 The effects of various measures were presented for both the Highway Network and Balanced Network options. It was demonstrated that converting the one-way section of the town centre highways network to two-way (component H4/B4 – see figures 4.7 – 4.9) provided substantial alleviation of the predicted congestion and to such an extent that it opened up the significant opportunity to improve the Station Roundabout (component B3 – see figures 4.11 – 4.12) for pedestrians, cycles and the public realm, which could become the principal platform to address the wider accessibility aims of the AAP.

7.6 At both meetings in 2012 it was unanimously agreed that the Balanced Network (Option 2) offered a credible solution for the emerging traffic problems and would reinforce the AAP aims to make Redhill a more attractive and environmentally friendly place. It was recognised that this option should be taken forward as the preferred strategy for enhancing the transport network in and around Redhill town centre.

8. CONCLUSIONS AND RECOMMENDATIONS

Summary

8.1 This report has described the development, testing and evaluation of transport options designed to address the strategic challenges facing Redhill, and to facilitate the regeneration of the town centre.

8.2 The study was underpinned by an S-Paramics micro-simulation traffic model covering Redhill. This provided future year forecasts of traffic conditions within the town centre and surrounding road network.

8.3 The forecasts prepared for 2016 took into account the growth resulting from developments and infrastructure changes that have taken place within Redhill town centre since 2007, and those anticipated to occur by 2016. The additional traffic from the proposed developments resulted in a 22% increase in trips to and from Redhill in the AM peak, a 35% increase in the PM peak and a 38% increase in the Saturday peak.

8.4 The initial 'Do Minimum' forecasts demonstrated a significant increase in congestion with conditions being particularly acute during the PM peak, with traffic being brought to a standstill within the town centre. However, following a more detailed examination of the operational performance of the network, it was demonstrated that by permitting right turning traffic on the southern approach of Lombard Roundabout to use both lanes instead of the right-hand lane only, a significant improvement in junction throughput could be achieved. This modification was therefore included in the revised 'Do Minimum' model in order to prevent excessive congestion on the southern approach to Lombard Roundabout blocking back through the one-way system.

8.5 The revised 'Do Minimum' forecasts showed that traffic congestion did increase during all modelled periods, particularly for traffic approaching from the A23 (N), where journey times to all destinations increased. Averaged across the network, and compared to the 2007 'Base' model, journey times increased by 40% for the AM peak, over 70% for the AM peak and over 150% for the Saturday peak.

8.6 A number of schemes were developed to support the planned regeneration of the town centre and to mitigate the traffic impacts of the future developments. These included both improvements to the operation of the network, a reduction in congestion, and measures to improve conditions for cyclists and pedestrians, particularly with respect to access to the town centre.

8.7 The individual schemes were combined to form two main options:

- **Option 1 (Highway Network)** – focusing on improvements to the highway network that bring about journey time benefits for traffic in general, and so ease movements to, through and around the town centre
- **Option 2 (Balanced Network)** - measures that spread benefits of network changes to a wider range of travel modes to provide substantial improvements for walking, cycling and the public realm

8.8 Included in both options was the conversion of the current one-way system on the A25 between Cromwell Road/High Street junction and Lombard Roundabout to two-way working.

8.9 Tests of the individual schemes demonstrated that the most significant benefits were from this conversion of the current one-way system to two-way. There were very significant reductions in journey time, with a significant reduction in congestion on the A23 approaches from both the northern and southern directions, due to reduced flows through the Lombard, Station and Belfry roundabouts. This was in turn due to the greater flexibility provided for individual journeys.

8.10 The model tests showed that a reduced Station Roundabout, with associated re-positioned pedestrian crossing facilities and a reduction of the westbound carriageway of Station Road to a single lane (forming part of the Balanced Network option), could increase journey times in the weekday peak periods as a result of the reduced capacity. However, the impact is more than offset by the benefits accrued for general traffic from the two-way working proposal for the A25 on the western side of the town centre.

Conclusions

8.11 Option 2 (Balanced Network) generates significant additional benefits when compared with Option 1 (Highway Network), as it achieves the overall town centre strategic objectives more comprehensively.

8.12 The operational benefits are largely due to the conversion of the one-way system on the A25 (between the Cromwell Road/High Street junction and Lombard Roundabout) to two-way working, and the rationalisation of traffic movements in and around the town centre achieved from this.

8.13 Option 2, designed to provide benefits to cyclists and pedestrians, includes a re-modelled Station Roundabout and provides more modest improvements to the highway network. Predicted savings in journey times range between 15% for the AM and PM peak to just under 50% for the Saturday peak.

8.14 The performance of Option 2 demonstrates that the conversion of the current one-way system on the A25 to the west of the town to two-way allows for the

introduction of improvements at the Station Roundabout that benefits pedestrians and cyclists, as well as opening up opportunities to improve the public realm.

8.15 In relation to the evaluation framework, Option 2 scores much more positively when compared against Option 1.

8.16 Both Option 1 and Option 2 are deliverable with engineering constraints being limited to highway network processes. The initial assessment suggests there are limited land ownership constraints to affect their delivery.

Recommendations

8.17 The following recommendations are made:

- Option 2 (Balanced Network) should form the basis of a future transport plan for Redhill to meet the challenges arising from the proposed redevelopment of the town centre
- The work undertaken for this study be used as evidence to support the Core Strategy and forthcoming Redhill Town Centre Area Action Plan (AAP)

9. NEXT STEPS

9.1 On the basis that the recommendations of this report are agreed, the next stage will be to progress the various concepts through Feasibility Assessments. This would include:

- Preparing layout designs on accurate topographical survey bases
- Upgrade designs to reflect upon highways design criteria
- Assess the operational effectiveness of the layouts using industry standard software
- Perform accident investigation and analysis to identify any other road safety issues, and incorporate measures within the designs as appropriate
- Liaise with statutory undertakers to confirm the potential impacts and costs on their plant and mains
- Carry out Stage 1 Safety Audits on the preferred layouts

9.2 This report also identifies the development of walking and cycle networks, which would raise the standard of provision for both pedestrians and cyclists. To establish these networks, the following should be taken forward:

- Wider consultation including pedestrian and cycling interests to confirm the the routes and their extents
- Perform walking and cycling audits to identify the opportunities and constraints for the preferred routes
- Develop and estimate the preferred/prioritised range of measures and routes

9.3 The public realm improvement opportunities will require concept development. Particular schemes which may have an integrated public realm and road design approach include:

- Station Roundabout
- The Station Road link between the High Street and Station Roundabout
- Proposed mini-roundabout on Redstone Hill
- Consideration should also be given to the public realm treatments for the northern and southern approaches to the pedestrianised High Street. These could be progressed in conjunction with development of the walking and cycle networks.

9.4 The outcome of the Feasibility Assessments will be viable, costed measures to meet the Redhill Town Centre Area Action Plan objectives which are prioritised and programmed to enable the council to secure funding through the various avenues available.

Quality

It is the policy of Project Centre to supply Services that meet or exceed our clients' expectations of Quality and Service. To this end, the Company's Quality Management System (QMS) has been structured to encompass all aspects of the Company's activities including such areas as Sales, Design and Client Service.

By adopting our QMS on all aspects of the Company, Project Centre aims to achieve the following objectives:

- Ensure a clear understanding of customer requirements;
- Ensure projects are completed to programme and within budget;
- Improve productivity by having consistent procedures;
- Increase flexibility of staff and systems through the adoption of a common approach to staff appraisal and training;
- Continually improve the standard of service we provide internally and externally;
- Achieve continuous and appropriate improvement in all aspects of the company;

Our Quality Management Manual is supported by detailed operational documentation. These relate to codes of practice, technical specifications, work instructions, Key Performance Indicators, and other relevant documentation to form a working set of documents governing the required work practices throughout the Company.

All employees are trained to understand and discharge their individual responsibilities to ensure the effective operation of the Quality Management System.

APPENDIX A - S-PARAMICS 'BASE' AND 'DO MINIMUM' MODELS

APPENDIX B - NETWORK PLANS AND SCHEME OPTION LAYOUTS

APPENDIX C - S-PARAMICS 'HIGHWAY NETWORK' AND 'BALANCED NETWORK' MODELS

APPENDIX D – BRIEFING NOTE 1

APPENDIX E – CONSULTANCY BRIEF

APPENDIX F – MODELLING AUDIT

Accreditations

Memberships