Lewes-Uckfield Railway Line Reinstatement Study 2008

FINAL

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South East England Development Agency
East Sussex County Council
Lewes District Council
Wealden District Council
Uckfield Town Council
Lewes Town Council
Crowborough Town Council
Southern Railway

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Lewes - Uckfield Railway Line Reinstatement Study

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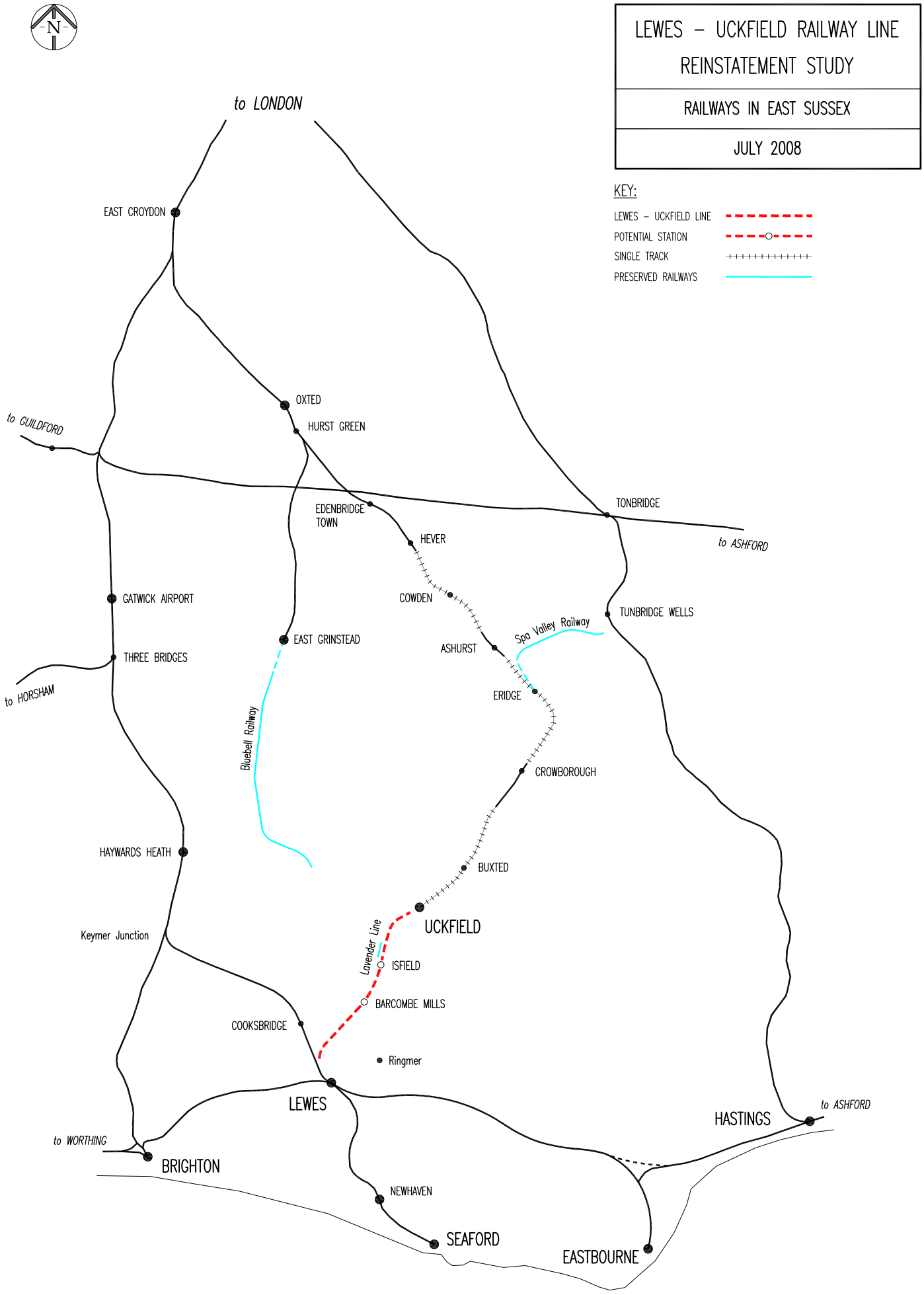

LEWES – UCKFIELD RAILWAY LINE
REINSTATEMENT STUDY
RAILWAYS IN EAST SUSSEX
JULY 2008
KEY:
LEWES – UCKFIELD LINE
POTENTIAL STATION
SINGLE TRACK
PRESERVED RAILWAYS
N
to LONDON
EAST CROYDON
OXTED
HURST GREEN
to GUILDFORD
TONBRIDGE
EDENBRIDGE TOWN
HEVER
to ASHFORD
GATWICK AIRPORT
COWDEN
TUNBRIDGE WELLS
EAST GRINSTEAD
Spa Valley Railway
ASHURST
THREE BRIDGES
to HORSHAM
ERIDGE
Bluebell Railway
CROWBOROUGH
HAYWARDS HEATH
BUXTED
UCKFIELD
Keymer Junction
Lavender Line
ISFIELD
BARCOMBE MILLS
COOKSBRIDGE
Ringmer
LEWES
HASTINGS
to ASHFORD
to WORTHING
BRIGHTON
NEWHAVEN
SEAFORD
EASTBOURNE

Executive summary

Network Rail has been commissioned by the Central Rail Corridor Board, whose Members comprise local MPs and representatives from regional, county and district levels (and Observers who are representatives of County, District, Town and Parish Councils) to undertake a study to investigate the technical feasibility, costs and benefits of reinstating the Lewes to Uckfield railway line, and so identify whether or not there is a business case for the proposal.

There are no physical obstructions which would preclude the rebuilding of the railway between Lewes and Uckfield, although significant infrastructure works would be required at some locations. New bridges will be required in place of all the former highway level crossings, with particularly significant work required in Uckfield Town Centre and also along the A22 Uckfield bypass.

The base option consists of a single track railway with passing loops provided at Uckfield and also the junction with the main line near Lewes. This would be sufficient to operate a half hourly service along the route. The total estimated capital cost for this option is £141.0 million, including a 30% contingency allowance as required at this stage of project development.

Priced options were studied for the construction of intermediate stations at Isfield and Barcombe Mills, and separately for the provision of double track throughout the reinstated route. Depending upon the final specification adopted, these would add between £7.4 million and £38.8 million to the base capital cost, again including a 30% contingency allowance.

The benefits of the reopened link are relatively low based on current assumptions for growth in population and employment in the area (contained in the draft South East Plan's Regional Spatial Strategy. This leads to a negative Net Present Value (NPV) and a Benefit to Cost Ratio (BCR) ranging between 0.64 and 0.79 dependent on the service options modelled. The projected annual operating ratios (annual revenue to cost ratio) range from 0.69 to 1.63.

In order to make the case for the reopening of the line, the benefits realised need to be at least double that forecast in order to meet the absolute minimum BCR required of 1.5, and treble to meet the usual minimum BCR of 2.0. This in turn will require a significant increase in population along the corridor as a whole and/or a fundamental shift in the travel behaviour of the existing population.

1 Background

1.1 History

1.1.1 The line between Lewes and Uckfield first opened in 1858, and was further developed in 1868 when a new approach route was constructed which entered Lewes station from the east. This enabled through services from Uckfield and beyond to operate via Lewes to Brighton. The route operated and was practically unchanged until it was proposed for closure in the late 1960s, ultimately closing in February 1969.

1.1.2 In the forty years since the closure of the line there have been repeated calls for the line to be reopened. A number of studies have been undertaken over the years by a variety of interested parties, including Railtrack on behalf of Connex South Central, the then Train Operator for the area, and most recently by the Wealdenlink partnership, a consultancy formed of three companies with potential property interests. Some of these studies have also included the reopening of the Eridge to Tunbridge Wells line which closed more recently in July 1985; the route from Lewes through to Tunbridge Wells gaining the title 'The Central Rail Corridor'.

1.1.3 The route between Lewes and Uckfield was protected during the mid-1970s from development in various local and structure plans, aiming to ensure that nothing further would be built which could prevent the line from re-opening in the future. This planning policy protection still remains.

1.1.4 In 2004, the local authorities and partners formed the Central Rail Corridor Board, comprising local MPs and representatives from regional, county and district levels to provide a planning and policy perspective for reinstatement. A step-change in the way the Board pursued its objective was made on 24th March 2006, when Members decided to move the Board from being an observer to commissioning status and being publicly accountable.

1.1.5 Although the Central Rail Corridor Board has the ultimate objective of reinstating both the Lewes– Uckfield and Eridge – Tunbridge Wells sections of line, the Board took the decision to focus resources on the former.

1.2 Changes to the train service since the line closed

1.2.1 Following closure of the line little changed for many years. An hourly service was established between Uckfield and Oxted where the trains were attached to / detached from East Grinstead – London services.

1.2.2 The line between Sanderstead and East Grinstead was electrified in 1987, and apart from a limited number of through trains to London during peak commuter times, the Uckfield service was reduced to a connecting diesel shuttle to / from Oxted.

1.2.3 The opportunity was then taken to improve the long term viability of the line by reducing operating costs. The intermediate signal boxes were closed in January 1990 and a new signalling system was installed to control almost the whole of the line from one signal box located at Oxted. The line south of Hever to Uckfield was singled with two double track sections retained at Ashurst and Crowborough to permit a half hourly service.

1.2.4 In May 1991 the old station at Uckfield was closed and a new single platform was constructed east of the High Street. This removed the need for the level crossing which had been causing considerable disruption on this busy main road.

1.2.5 In 2004 the 'slam door' diesel trains which dated from the late 1950s were replaced by modern Class 171 'Turbostars'. These air-conditioned coaches offered a much improved internal environment and improved acceleration. The single platform at Uckfield was lengthened in 2004 to allow the running of 8 coach Turbostar trains. At the time of introduction of the new trains the service was improved considerably, with the off-peak hourly Oxted shuttle extended though to London Bridge and so providing a through link direct to Croydon as well as the capital. A later last through service from London was also introduced.

1.2.6 The net result of these changes has been a significant increase in the number of passengers using the line in the past 4 years. There is some evidence to suggest that this is due in part to the lower price of season tickets from Uckfield Line stations to London compared to similar distance trips on the adjacent routes via Haywards Heath and Tunbridge Wells. This is causing passengers from villages in the area to drive to Uckfield line stations in preference to the adjacent lines.

1.3 Developments on the closed route

1.3.1 There has been some encroachment on to the original rail alignment in the Uckfield area, along with the construction of the Uckfield by-pass, which is approximately 1 mile west of the town centre, in 1986. This crosses the route of the former line at grade.

1.3.2 The closed station at Isfield was bought by an enthusiast who then restored the station, which then developed into the 'Lavender Line' heritage railway. Track was laid and this now extends for about one mile north of the station. The station at Barcombe Mills has also been restored by its owner.

1.3.3 In Lewes much of the route through the town (constructed in 1868) is no longer available as much of the land has been redeveloped (see aerial view in Appendix 2.) Reinstatement along this alignment is therefore impractical. However, much of the original route (constructed in 1858) that connects with the main route from Lewes to Cooksbridge remains and can clearly be seen from the aerial photographs.

2 Technical Feasibility

2.1 Introduction

2.1.1 This section of the report summarises Network Rail's proposed scope of work to enable the route to be reopened and connected to the current national railway network at Lewes and Uckfield. Options are summarised as follows:

Base Option	This is the *minimum* specification that is considered appropriate to reinstating the link to provide a beneficial train service. The Base Option specification recognises that further development of the train service may be desired in the future. Passive provision is made for the options described below, along with passive provision for future electrification.
Intermediate stations	Option studies the feasibility, incremental costs and benefits available through the provision of stations at Isfield and Barcombe Mills
Double Track	Option studies the feasibility, incremental costs and benefits available through the provision of double track throughout the reinstated line.

2.2 Guide to Railway Investment Projects (GRIP) Deliverables

GRIP principles

2.2.1 The Guide to Railway Investment Projects (GRIP) describes how Network Rail manages and controls projects that enhance or renew the national rail network. It covers the project process from inception through to the post-implementation realisation of benefits. Network Rail has developed this approach to managing investment projects in order to minimise and mitigate the risks associated with delivering such projects on an operational railway. The approach defines the investment project lifecycle, key products and controls that are mandatory when undertaking network investment schemes.

2.2.2 The approach is based on best practice within Network Rail, other industries that undertake major infrastructure projects, and practice recommended by the major professional bodies. These include the Office of Government Commerce (OGC), the Association of Project Management (APM), and the Chartered Institute of Building (CIOB).

2.2.3 In today's rail industry, investments can be funded, procured and delivered in a number of ways. These range from schemes funded, managed and delivered wholly by Network Rail to those schemes where such activities are wholly or partly undertaken by third parties. Network Rail has an important role to play, regardless of approach. As the operator and maintainer of the national rail network, Network Rail has an obligation to ensure that all schemes are compatible and integrated with existing railway operations. Network Rail's licence obligations require it to be confident that when schemes are completed, they can be operated and maintained safely, reliably, efficiently and cost effectively.

GRIP in relation to this study

2.2.4 This study takes the project forward to the completion of GRIP stage 2.

2.2.5 **GRIP 1 - Output definition** establishes the scope of the investment in terms of the incremental network capability required by the "client", in this case ESCC on behalf of the Project Board. This is described in terms such as journey time, capacity, loading gauge etc. It may also require the scoping of asset renewal.

2.2.6 **GRIP 2 - Pre-feasibility** ensures that asset condition, safety or standards requirements are identified and included in the scope of the investment. It further identifies any existing constraints on the network that may hinder the delivery of the client's required outputs, and thus defines the incremental capability that must be delivered by the investment.

2.2.7 Finally, the study provides confirmation that the outputs can be delivered economically by addressing the identified constraints, and develops each option to the point of output definition.

Future GRIP stages

2.2.8 In the event that the project is taken forward for further development, the following GRIP stages would be followed in sequence:

2.2.9 **GRIP 3 - Option selection** Develops and assesses chosen options such that the selection of a single option can be made. At this point scope in terms of outputs is frozen.

2.2.10 **GRIP 4 - Single option development -** Develops the selected single option to the point of freezing the technical scope required in sufficient detail to allow finalisation of the business case, progressing necessary consents and scheduling of implementation resources.

2.2.11 **GRIP 5 - Detailed design** Produces a complete and robust engineering design that allows risks, costs, timescales, resources and benefits to be fully understood prior to commitment to implement.

2.2.12 **GRIP 6 - Constructing, testing and commissioning** Delivers the asset change/renewal to the appropriate specification and provides confirmation that the asset and system work in accordance with their design and that they deliver the incremental network capability. It also introduces the asset into operational use.

2.2.13 **GRIP 7 - Scheme hand-back** is the final hand over of the asset to its owner, along with a full maintenance schedule.

2.2.14 **GRIP 8 - Project closeout** is settling of accounts and warranties

2.3 Base Option

Operational Characteristics

2.3.1 The Base Option assumes that the maximum service required to operate on the reinstated line is a 30 minute frequency in each direction. This is consistent with the existing service provided, which is in itself constrained by stretches of single line along the route from Uckfield to Hurst Green.

2.3.2 Intermediate stations are not proposed as part of the base option: these are considered as an option in section 2.4.

2.3.3 The line would be required to accommodate trains of a maximum length of 240 metres (12 x 20m carriages), although services would normally be operated by trains of a shorter length. Trains would be capable of acceleration and braking performance at least as good as the existing Class 171 Diesel Multiple Units (DMUs) that operate the existing service north of Uckfield. The route would also be capable of operating freight traffic up to the maximum axle load permitted on the UK network (25.5 tonnes per axle). This is standard for new railway construction in the UK. However it should be noted there is a weight restriction on the existing route north of Uckfield that prohibits all but the lightest freight trains from travelling over that part of the route; see section 10.1 below.

2.3.4 The ruling line speed for the route is assumed at 90mph with some localised reductions for track curvature; for example, the junction with the main Cooksbridge line will be 30mph. The 90mph ruling line speed provides a good balance between track maintenance costs (which generally increase with speed) and a suitable journey time. Given the frequency of service proposed and the type of trains operating them, the track maintenance cost will be little changed up to 90mph. The journey time between Lewes and Uckfield would be about 10 minutes (stop to stop) with no intermediate station calls.

2.3.5 Graphs detailing the proposed line speeds and the performance curves for the trains operating along them are provided as Appendix 6.

Infrastructure requirements

Route from Lewes to Uckfield

2.3.6 The proposed route follows the track of the original route from Lewes to Uckfield, most of which has been protected from development since the 1970s. An exception to the use of this route is a short section of approximately 1,500 metres at the southern extremity of the line where a number of options have been investigated. New / reinstated railway construction is required along 12,000 metres of route.

2.3.7 Traversing from north to south, the new route would commence at Uckfield, which is at the end of the existing line from Hurst Green. It then follows the original 1858 route via Isfield and Barcombe Mills to a point approximately 500 metres due east of the village of Hamsey. From here to Lewes four options have been considered:

2.3.8 *Option 1*

This route would follow the original track of 1858. This alignment crosses the path of two minor roads at grade, each of which will require a bridge with substantial civil engineering required for approach ramps. It may be possible to seek closure of one of the roads and thus provide only one bridge. In addition, at least three residential properties would require modification to remove extensions or additions which were made after the line was closed, thus providing sufficient land for a reinstated line.

2.3.9 The difficulties involved in addressing the minor road crossings and impact on residential property led to rejection of this option.

2.3.10 *Option 1A*

This route is aligned slightly to the north of the Option 1 and differs as follows:

- The track can be constructed at a higher level which reduces the amount of civil engineering required for the road bridges;
- This route avoids the need to modify the residential properties;
- Curvature of the track will be less severe than option 1 which may permit marginally higher line speeds.

2.3.11 Two bridges would still be required to accommodate the public highways; again there is the potential to seek closure of one of the roads and thus provide only one bridge.

2.3.12 This option is the preferred solution being lowest in cost and easiest in terms of achieving the necessary consents. This option has been used for estimating purposes.

2.3.13 *Option 2*

Re-instating the 1868 route from Hamsey, along the east bank of the River Ouse and then through Lewes town centre would require major civil engineering works as well as changes to the road network and buildings in the town itself where the former route has been lost. A significant portion of route in this built up area is contained within a Conservation Area. The engineering challenges are considerable and the cost is likely to be significant. For this reason this route has not been investigated in detail and is not proposed for further consideration.

2.3.14 *Option 2A*

This route would initially follow the 1868 route from Hamsey, as in Option 2 above. At a point approximately 300 metres east of Old Malling Farm, near Monks Way, the route would diverge from the 1868 route, and proceed on a short embankment before crossing the River Ouse to rejoin the current Cooksbridge line just north of Lewes Tunnel.

2.3.15 This option requires the construction of three major bridges over the river Ouse and a fourth over a private lane to Old Malling Farm. The filled in cutting near Hamsey Church would also have to be re-excavated. The cutting appears to have been used as a landfill site and would therefore require assessment for possible contamination.

2.3.16 This route would bring the railway close to South Malling church and the residential properties on Monks Way. There would also be changes to the riverside environment close to Lewes town centre.

2.3.17 From a railway perspective, as well as being a slightly longer route than option 1A and more costly to construct, this option also increases the ongoing maintenance burden because of the number of significant structures that will have to be inspected and maintained. For this reason this route has not been investigated in detail and is not proposed for further consideration.

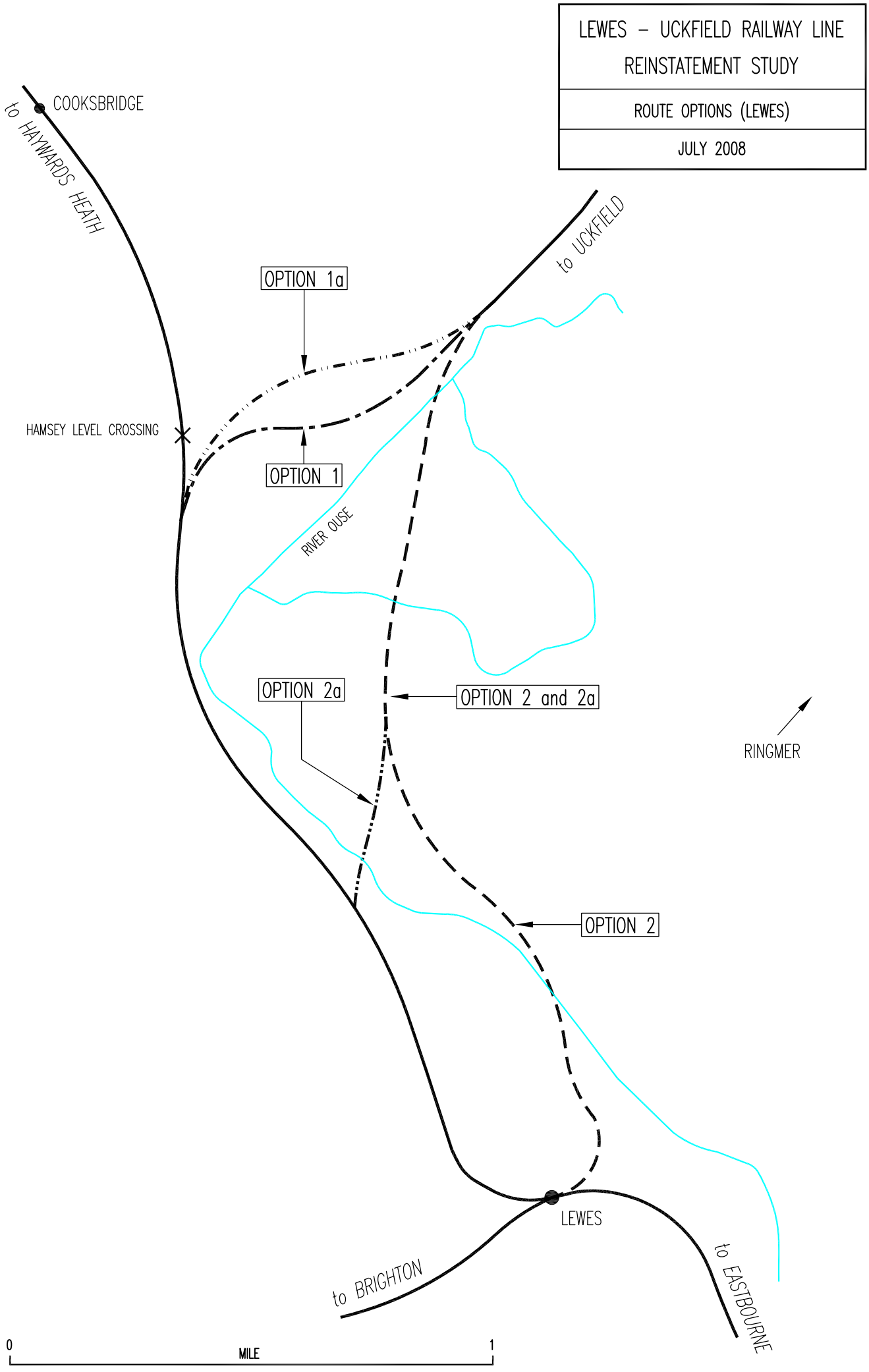
2.3.18 *Option 3*

The original Lewes - Uckfield line passed through largely open country and did not directly serve the settlement of Ringmer, now with a population of approximately 5,000. Some of the previous studies undertaken into reintroducing a rail link between Lewes and Uckfield looked at re-routing the line to serve Ringmer directly.

2.3.19 In terms of engineering, this presents considerable difficulty. A route serving Ringmer would involve constructing a new railway along a new corridor from the Isfield area to Lewes. Gaining access to Lewes itself would require expensive tunnelling through Cliffe Hill outside Lewes. Alternatively a longer route could be constructed using the current line towards Eastbourne with the new route diverging near Glynde, and projecting towards Ringmer. Further alternatives include following either option 1A or 2A and then projecting due east to Ringmer. Any of these variations would be longer than the previous route and therefore extend journey times for other passengers.

2.3.20 Serving Ringmer is outside the scope of re-opening the Lewes to Uckfield railway line, but is shown for illustrative purposes. Such a route could only be justified if there was potential for a large number of additional passengers generated by the new station, most likely through considerable housing development at Ringmer itself. The additional cost and likely additional issues arising from the consents process required for a completely new corridor compared to reopening a former line, lead us to conclude that this option should not be pursued.

2.3.21 The diagram overleaf shows some of the options. Route 1A is the preferred option at this stage.


LEWES – UCKFIELD RAILWAY LINE
REINSTATEMENT STUDY
ROUTE OPTIONS (LEWES)
JULY 2008
COOKSBRIDGE
to HAYWARDS HEATH
to UCKFIELD
OPTION 1a
HAMSEY LEVEL CROSSING
OPTION 1
RIVER OUSE
OPTION 2a
OPTION 2 and 2a
RINGMER
OPTION 2
LEWES
to BRIGHTON
to EASTBOURNE
0
MILE
1

Track and Formation

2.3.22 Sufficient land would need to be acquired and track formation constructed to permit two tracks to be reinstated throughout the route. It has been assumed that the width of the corridor that would need to be acquired would be 15 metres throughout to allow for construction activities and potential future developments; for example, electrification. There are a few locations where it will not be possible to acquire the full 15 metre strip; for, example where buildings would encroach onto the strip, but not the location of the tracks. There is the potential to sell the additional land to adjacent landowners on completion of construction, albeit the benefit is likely to be small when the costs of sale are taken into account.

2.3.23 Earthworks, specifically cuttings and embankments along the line of the route, will need inspection and assessment to ensure suitability for reuse. It is likely that remedial work will be necessary along much of the route, with major work to ensure the stability of embankments expected at some locations. It has been assumed that 1,500 metres of embankments require such attention.

2.3.24 Diagrams illustrating typical lateral clearances required for a reinstated railway corridor are included in Appendix 4. The dimensions shown represent the minimum lateral clearances required and are valid for straight and level track. Allowances would need to be added to these dimensions to take into account track curvature. Similarly, the width of the railway corridor would need to be increased along sections of the route to cater for any other structures, such as footbridges, signals and the former platforms at Isfield and Barcombe Mills.

2.3.25 The proposed lateral clearance between tracks would allow for the subsequent provision of conductor rails in the event that the route was to be electrified. An assessment of possible land requirements for the installation of electrification equipment and buildings would be undertaken during the next stage of development of the project so that these land purchases could be incorporated within the main proposal.

2.3.26 Within the 15 metre strip of land acquired, all vegetation and scrub would be cleared, and the two track formation excavated to at least 500mm below final sleeper level. The formation will then be built up to base level with 200mm of sand and 300mm of granite ballast.

2.3.27 Whilst the formation is to be installed to double track standards, it is proposed to install only one track at this stage. The process required to acquire and prepare land for two tracks is identical to that required for a single track, whilst the incremental cost is marginal. Furthermore in the event that a second track was required, a second round of consents and civil engineering work would be avoided, along with the considerable additional expense and a lengthy timescale.

2.3.28 Track would have to be installed to current Network Rail standards, with new concrete sleepers compatible with future installation of an electrified third rail, and continuously welded running rails. Switches and crossing at junctions will be similarly constructed.

2.3.29 Passing loops are proposed at each end of the reinstated route. The first is an extension of the double junction with the Lewes – Cooksbridge line for approximately 1000 metres; this enables a northbound train from Lewes to Uckfield to stand clear of the Cooksbridge line whilst awaiting a southbound train to clear the single line. The second loop is proposed at Uckfield station itself, and again is in the order of 1000 metres in length.

2.3.30 At Isfield, it is assumed that the Lavender Line retains one track for continued operation of the heritage line. This will require complete separation and careful segregation between the two systems, particularly with respect to staff safety. A connection between the two lines is not proposed here as part of the option, although this is feasible and could be added to the scope if funding was made available. Shared and/or through running operation from the Lavender line on to the main line network would only be possible if the heritage company operated rolling stock that was certified to main line standards and held a train operators safety case.

Bridges and Other Structures

2.3.31 The reinstated line will require a number of structures, including underbridges (rail over road or river), overbridges (road over rail), footbridges, cattle creeps, retaining walls and culverts. In many cases the structures from the former line are still in place. However it should be borne in mind that the route has been out of use for approaching 40 years, and as a result there has been no maintenance on any of the structures or track bed for that time. In many places, parts of the structure have been removed and will need replacement. Finally, on the proposed new section of route near Hamsey completely new structures will be provided where none existed before.

2.3.32 *Underbridges*

A total of thirteen existing bridges that need to be considered have been identified. It has been assumed that all would require to be replaced in part. The existing abutments for the bridges would be reused where possible, with heavy repair expected at most locations. It is known, for example, that the abutments for the bridge over the River Uck north of Isfield have been subject to significant subsidence. All abutments would be constructed to permit installation of two tracks, but initially would be provided only with a single track deck. This deck would be positioned on the abutment such that a second deck could be installed at a later date. It is possible that following further detailed development of the project the difference in costs may be sufficiently marginal such that a decision is made to construct a double-track bridge deck at the outset.

2.3.33 Detailed inspection and assessment of the existing structures to establish their condition and suitability for re-use would be undertaken during the next stage of the project. New underbridge structures, including any existing structures repaired for reuse, would be designed to comply with current standards. This is necessary to ensure that they are suitable for the appropriate traffic loadings, the gauging requirements for all rolling stock and to be of sufficient width to include safe access walkways for track maintenance staff across the structure.

2.3.34 The proposed route of the reinstated railway closely follows the course of the Rivers Uck and Ouse at certain points. In order to reduce the number of structures it has been suggested that it may be possible to divert some short sections of the river where bridges are relatively close together. On initial investigation it is clear that the substantial volume of earthmoving required would render this option more expensive than bridging the river. Furthermore, there are considerable additional environmental issues, flood assessment for example, which would require detailed assessment. Therefore this option has not been pursued at this stage, but may be considered in more detail at the next stage of project development.

2.3.35 *Overbridges*

The former route contains only a couple of existing overbridge, the principal one being adjacent to Culver Farm near Barcombe, providing access across the line to nearby agricultural land. This bridge would similarly be subject to detailed inspection and assessment during development of the project. Surveys would be required to establish the exact width and height of the structure in order to determine any modifications with regard to gauge clearance works for the proposed rolling stock that would operate along the route. For the purposes of the estimate it is assumed that the bridge will not require reconstruction.

2.3.36 Further overbridges will be required where public highways cross the route, particularly where level crossings were formerly in use across the alignment. It is assumed that new bridges will be built to current railway standards for gauge, and highway standards for the roadway. Level Crossings are dealt with in more detail later in this section.

2.3.37 *Former station platforms*

At the former stations of Isfield and Barcombe Mills the reinstated track will have to be positioned such that it is well clear of the extant platforms at the 90mph ruling line speed. It is likely that some trimming of the platform faces may be necessary; alternatively the line could be positioned in the middle of the former two track formation.

2.3.38 *Other structures*

Records indicate that there are at least forty culverts, which are mostly brick arch structures, under the railway along the route. These culverts mainly

accommodate farm tracks (cattle creeps) and watercourses (streams or floodwater.) A previous study indicated that some of the culverts observed at the time appeared to be in a reasonable condition. Detailed inspection and assessment of all of these culverts would be required during the next stage of the project, and it has been assumed for estimating purposes that repairs or strengthening works would be required to twenty-five percent of these culvert structures. This percentage is based on our experience of similar schemes elsewhere.

Public Highways and Footpaths

2.3.39 In line with ORR (see Appendix 11) and Network Rail policy, it is proposed to provide grade separation for public highway and public footpaths. Level crossings will not be constructed and alternative methods for enabling the public to cross the railway will be provided. It is a matter of fact that level crossings represent the single greatest risk of injury and fatality to rail passengers, representing 42% of the total such risk. The ongoing operational and maintenance costs for level crossings can be considerable, and they also provide a source of delay to trains following incidents and failure. As a result Network Rail has a policy of not constructing new level crossings, and is actively pursuing the closure of many existing crossings. ORR (HMRI) were consulted with respect to the prospective instatement of Level Crossings; the view was given that some of the specific locations may have the potential for use of level crossings on an exceptional basis, however others would have to be bridged. Locations where level crossings may be permitted (subject to detailed risk assessment and ORR approval) are indicated with an asterisk (*) in the list below. For the purposes of the business case bridges have been assumed in all cases (see section 8.2)

2.3.40 The local road traffic congestion effects of level crossings must also be taken into account. As an example, if a level crossing was to be installed at Uckfield High Street, the barriers would be closed to road traffic for approximately 15 minutes in every hour for a half hourly train service, causing particular congestion on this already busy thoroughfare.

2.3.41 Locations identified where new highway bridges and / or modifications to road layouts are required to comply with this policy for this base case are:

- Uckfield High Street (site of former level crossing);
- Uckfield Bypass (A22)
- Isfield (Station Road)*
- Anchor Lane*
- Barcombe Mills Road*
- Hamsey (Whitfeld Lane)*
- Hamsey (Ivors Lane)*

2.3.42 *Uckfield High Street*

There are a number of proposals currently being considered by the local Highway Authority for a new road to cross the proposed rail alignment to the west of the High Street. If a new station were to be located on the site of the original station, to the west of the High Street, provision of road access to the station would need to be incorporated into these proposals, along with access to the bus station on the north side of the railway. The provision of a suitable site for car parking associated with this transport interchange would also be required. These proposals would facilitate the permanent closure of the High Street at the location of the former level crossing, with a footbridge on the line of the High Street provided to maintain a pedestrian route. Appendix 2 contains brief details of the three proposals currently under investigation**.**

2.3.43 Alternatives to these proposals also considered were:

i) a road overbridge on the current alignment of the High Street
ii) a road underpass on any alignment
iii) a rail over road solution

2.3.44 (i) and (ii) are precluded by the considerable expense involved acquiring property to facilitate the civil engineering work required, and in (ii) by the impracticality of tunnelling under the river. Whilst (iii) is relatively straightforward in engineering terms, railway gradients are somewhat shallower than highways, leading to approach ramp structures in excess of 500 metres on either side. Furthermore the relocated Uckfield station would have to be located in an elevated position with the tracks at least 5 metres above the level of the former track. The cost, practicality and environmental effects of the alternatives are such that they were not considered in further detail.

2.3.45 Detailed consultation with the local authorities would be required during the next stage of development of the project in order to co-ordinate plans for the town centre with the reinstatement of the railway.

2.3.46 *Uckfield Bypass*

The Uckfield By-Pass (A22) has been constructed across the route of the former railway to the south-west of Uckfield. It is proposed to raise the A22 to pass over the reinstated railway, which would involve the construction of a new overbridge structure and modifying the vertical alignment of the existing road. The Copwood Roundabout area, to the north of the railway, appears to be at a higher level than the A22 at its intersection with the railway. This may assist the modification of the vertical alignment of the road.

2.3.47 An alternative is to construct a rail over road crossing. This would require lowering the road to pass under the reinstated railway thus causing vertical alignment issues with the A22 crossing of the River Uck. The reinstated

railway cannot be raised over the road due to the gradient profile required for the line.

2.3.48 *Isfield*

A new road alignment would be provided either to the north or south of the former level crossing. The northerly route is probably easier from an engineering viewpoint, although both routes are approximately the same length and thus costs will be similar. A preferred route would be developed in the next stage of development of the project.

2.3.49 *Anchor Lane*

This narrow lane leads to a dead end at the Anchor Inn Public House and the river. A simple bridge to replace the old crossing is possible. An alternative is to construct a new road access eastwards to the Isfield Road or the A26. This necessitates a crossing of the Iron River, and is likely to be more costly than a bridge across the railway. The bridge across the railway is thus assumed for estimating purposes.

2.3.50 *Barcombe Mills*

Two options exist: either a bridge on the line of the existing Barcombe Mills Road or a new road alignment, approximately 100 metres south of the former level crossing. This latter option would also require a new road bridge across the River Ouse and a total of approximately 300 metres of new highway. It is assumed that the on-line option is that chosen, although this would be subject to consultation through the project development process.

2.3.51 *Hamsey*

Bridges would be required for both Whitfield Lane and Ivors Lane. As described above, it may be possible to close one of these two roads through the consents process for the reopened line, therefore saving the cost of providing one bridge. However for the purposes of the estimate it has been assumed that two bridges are required.

2.3.52 *Footpaths*

There are six public rights of way across the former alignment, along with some private rights of way open to the public along the former alignment itself. In discussion with ESCC it has been identified that some of these routes are part of recognised longer distance paths or advertised as circular leisure walks. There is the potential to close and / or divert some of the footpaths that cross the line on to adjacent paths or public highways though the consents process required for the project. The best case is that three of the six footpaths could be so treated, reducing the number of footbridges required to three. In this event there would be a capital cost saving of approximately £2.1 million compared to the base estimate.

2.3.53 A map (Appendix 10) supplied by East Sussex County Council has been included showing footpaths and bridleways across the route.

Signalling and Telecommunications

2.3.54 Signalling the new route is relatively straightforward. It is proposed that the route is controlled from the existing signalboxes at Oxted and Lewes, the former of which already controls the line from Hurst Green to Uckfield. Control of the signalling system would be through an extension of the existing NX (entrance / exit) panels to a simple relay interlocking at Lewes, and a Computer Based Interlocking (CBI) at Oxted. Amendments to the existing signalling would be required at Uckfield to allow for the new loop, whilst new signalling on the reopened line would be limited to entrance and exit signals at the Uckfield end and an intermediate section in the Barcombe area to reduce headway for following in the same direction. Train detection would be by axle counters, and signals would be single LED type capable of displaying red, yellow and green aspects.

2.3.55 The Lewes end of the line, including the junction with the Cooksbridge line and the short two track section would be controlled from the existing signalbox at Lewes. This would require amendment to the existing relay interlocking and NX panel.

2.3.56 Voice telecommunications would be provided by extending the coverage of the soon to be installed GSM-R (Global System Mobile – Railway) secure digital radio network. This would require the provision of additional base stations and a fixed bearer, fibre optic network alongside the alignment.

Uckfield Station

2.3.57 The original station at Uckfield was sited on the west side of the High Street, consisting of two single-face platforms with the station building located on the down (southbound) platform and a footbridge linking the platforms.

2.3.58 Closure of the Lewes to Uckfield section of the railway resulted in the original station being the only part of the railway infrastructure to remain operational on the west side of the High Street. This required continued use of the level crossing for trains arriving and departing which frequently resulted in road traffic congestion. In May 1991 the old station at Uckfield was closed and a new single platform was constructed east of the High Street. This removed the need for the level crossing which had been causing considerable disruption on this busy main road. The original station buildings on the west side were abandoned and subsequently demolished due to fire damage and vandalism, although sections of the platform structures including lighting columns are still visible today. The former signal box was closed with the relocation of the station and the building remains in-situ as a commercial property, currently occupied by a taxi company.

2.3.59 The current station consists of one single face platform constructed on the track of the former down line, with the truncated up line remaining in

operational use. The access point to the station is at the western end of the platform and is directly from the High Street. Station facilities consist of a ticket office located at the rear of the platform along with a short platform canopy. Network Rail is in the process of developing proposals for improving the station facilities, most likely through the provision of a new building of modular construction.

2.3.60 A new station could be provided on either the east or west of the High Street. It has been assumed that a new station would be constructed on the west side of the High Street, as this limits disruption to existing train services during construction and is in an area less susceptible to flooding. The station would incorporate two platforms to service both tracks of the proposed passing loop. Platforms would be 194 metres long to accommodate 8 x 23m carriage trains plus a 10 metres stopping tolerance, with passive provision for future extension to 250 metres. The new up (northbound) platform would need to be constructed in advance of reinstatement of the down line through the station so that the station could remain operational throughout the works. A new station building would be provided. Potentially this could be the proposed new modular building relocated from the current station site. Access will be provided to the highway network, along with provision for car parking. The exact size of the car park is yet to be determined, and would be influenced by Network Rail's current work with Uckfield Town Council on providing additional car parking in the short to medium term.

2.3.61 Development of a new station in the area of the original station is likely to require piled supports to the western end of the new up platform due to the position in relation to the River Uck. Note that the Environment Agency, in response to a land use and transport study at Uckfield station prepared by consultants on behalf of East Sussex County Council in 2000, indicated that they had concerns about a development proposed on the site of the current station due to the location within the floodplain of the river and "would object to any such proposal". Consultation with the Environment Agency would need to be progressed in detail during development of the project to ensure they were content with the proposed new location for the station. A consortium including the BRB residuary body have been preparing a largely residential development for the old station site during the preparation of this report, this development would require the station to remain to the north of the High Street.

2.3.62 Records show that Tree Preservation Orders (TPO) are present on the south side of the former railway in the vicinity of the area of the original station and facilities. Some of these may encroach on the alignment of the reinstated tracks to the west of the former station. The majority of the area containing Tree Preservation Orders appears to be clear of any new station provided on the west side of the High Street, however this would need to be confirmed during the environmental appraisal process and taken into account through the consents process.

2.3.63 On completion of the new station and the road bridge, enabling closure of the High Street, the existing single-face platform would then be removed and the second track constructed. The current bridge over the Uck would not then be required to accommodate road traffic and consideration could be given to its removal, although this would not be required as part of the road / railway development it would remove one of the restrictions to the flow of water following heavy rainfall.

Other rail infrastructure

2.3.64 The train service proposed in section 2.3.1 does not require any additional rail infrastructure aside from that required to reinstate the line. In particular, it has been assumed that Uckfield line trains would be timetabled to run beyond Lewes to Eastbourne or Newhaven, and thus a new turnback facility at Lewes would not be required. A detailed timetabling exercise together with rolling stock requirements would be required at the next stage of development to determine likely service provision and thus whether additional turnback facilities are required at, or near Lewes.

2.3.65 Were a turnback facility required at Lewes it would present particular challenges due to the tight curvature of the railway immediately to the east of the station. This would almost certainly require the purchase of additional land and wholesale realignment of the existing tracks. The cost of this work is likely to be disproportionate to the additional ongoing cost of operating trains further east, hence the assumption that no turnback is required.

Costs

2.3.66 The total cost for this base option as described is estimated at **£141.0m** at Q1 2008 prices, including a 30% contingency as applicable at GRIP stage 2. It should be noted that this does not allow for the 60% 'optimism bias' uplift as is required for Government funded projects at this stage of development. A breakdown of the main constituents of this cost is included in section 6.

2.4 Option - Intermediate Stations

Background

2.4.1 One of the regular conflicts in improving the railway network is the contradictory desire for faster journey times against opening more stations. Whilst providing new stations, and allowing trains to call at them, improves the accessibility to the rail network, the time taken by trains to decelerate, dwell, and re-accelerate lengthens journey times for longer distance travellers.

2.4.2 The former line between Uckfield and Lewes had two intermediate stations:

Isfield, located in the village of the same name. The village is relatively small with a population of fewer than 600.

Barcombe Mills, located adjacent to the hamlet of the same name and approximately 1km south east of the village of Barcombe Cross. Taken together with the village of Barcombe itself, these settlements have a combined population of approximately 1,500.

2.4.3 Both stations closed on closure of the line in 1969. This option assumes that both stations are reopened, and that no other intermediate stations are provided.

Operational Characteristics

2.4.4 The Intermediate Stations Option assumes a maximum 30 minute frequency in each direction, with all trains calling at both Isfield and Barcombe Mills. Ultimately station calls would be at the discretion of the Train Operator and service specifier, in this case the Department for Transport. The additional time required to call at each station compared to a non-stop service is in the order of 2 minutes per station. This leads to an Uckfield to Lewes running time (stop to stop) of about 14 minutes with intermediate station calls. Occupation of the single line section is likely to be 12 minutes per train, just sufficient to permit the 30 minute frequency. Therefore no additional stretches of double track are required, however this will need confirmation through detailed performance modelling of a proposed timetable in the next stage of project development.

2.4.5 The stations would be configured to allow 184 metre (8x23 m carriage) trains, with passive provision provided for future extension to 240 metres (12x20m carriage) trains.

Infrastructure requirements

Stations

2.4.6 At both Isfield and Barcombe Mills there has been development of the station buildings in the time since the route was closed. It is not proposed to reinstate the former station buildings, but rather to provide a minimum level of facilities at each, for example a small modular type station building with facilities to sell tickets and a small waiting area. The new stations would be configured to be compatible with all applicable legislation, and would be fully accessible to mobility impaired persons. Areas for drop off / pick up would be provided, along with a level of car parking appropriate to the expected patronage.

2.4.7 Platforms of 194 metres in length would be constructed and would be 3.5 metres wide minimum, and provided with lighting, customer information systems and basic shelters.

2.4.8 *Isfield*

The original station at Isfield, located to the north side of Station Road, is currently in the ownership of the Lavender Line preservation group who operate a short section of the line as a heritage railway. As a result the station is in a relatively serviceable condition, albeit with many heritage features. The station consists of two single-face platforms of solid-fill construction with brickwork front walls, and a station building on the up platform of brick construction with a timber waiting shelter situated on the former down platform. It is assumed that the Lavender Line would retain the up platform for continued use as a heritage facility, whilst the reopened route would use the down platform.

2.4.9 In order to bring the station up to mainline network standards, the existing down platform would require refurbishment and extension to the proposed length of 194 metres. As explained in para 2.3.37 above, the platform face may require trimming at the track edge to allow for clearances at the proposed line speed for the route. Existing heritage facilities on the down side of the station, including the signal box, platform waiting shelter and water tank, may require relocation elsewhere within Lavender Line premises. A new pedestrian access to the station would be necessary, possibly adjacent to the existing bus stop.

2.4.10 There is the potential for some of the station facilities to be shared with the Lavender Line. This could include, for example, toilets and car parking. Generally heritage railways limit their operation to weekends and school holidays, therefore it is unlikely that full shared use of, for example, ticket facilities would be achieved.

2.4.11 An aerial view of the Isfield area is shown as Appendix 2

2.4.12 *Barcombe Mills*

The original station at Barcombe Mills, located on the south side of Barcombe Mills Road, consisted of two single-face platforms with the station building being located on the up platform. The original platforms are still in situ and are of solid-fill construction with brickwork front walls. It appears that the level of the track between the platforms has been raised and will therefore require removal of this fill. The former station building, also of brick construction, is now occupied as a residential property. The waiting shelter located on the former down platform was demolished and replaced with chalet style holiday accommodation.

2.4.13 Reinstatement of the railway would divide the current property, and it is assumed that purchase of the whole site would be required with the former up platform reinstated. It is also possible that the station building could be

reinstated to its original use. However, it is likely to be less costly to re-sell the station building as a small business unit, and provide a more modern and compact station facility elsewhere at the station.

2.4.14 In order to bring the platform up to mainline network standards, it would require extensive refurbishment and extension to the proposed length of 194 metres. As explained in para 2.3.37 above, the platform may require trimming at the track edge to allow for clearances for the proposed line speed on the route. It appears that the platform canopy still remains in-situ and attached to the former station building. However, a brick structure, possibly an extension to the original building, has now been constructed under the canopy and would require demolition.

2.4.15 Car parking facilities would be required given the larger catchment population of Barcombe Mills compared to Isfield and thus parking for up to 30 cars has been assumed. There is potential to advertise the station as a 'park and ride' facility for the larger village of Ringmer, two miles to the south east of Uckfield, in which case a greater number of spaces would be required.

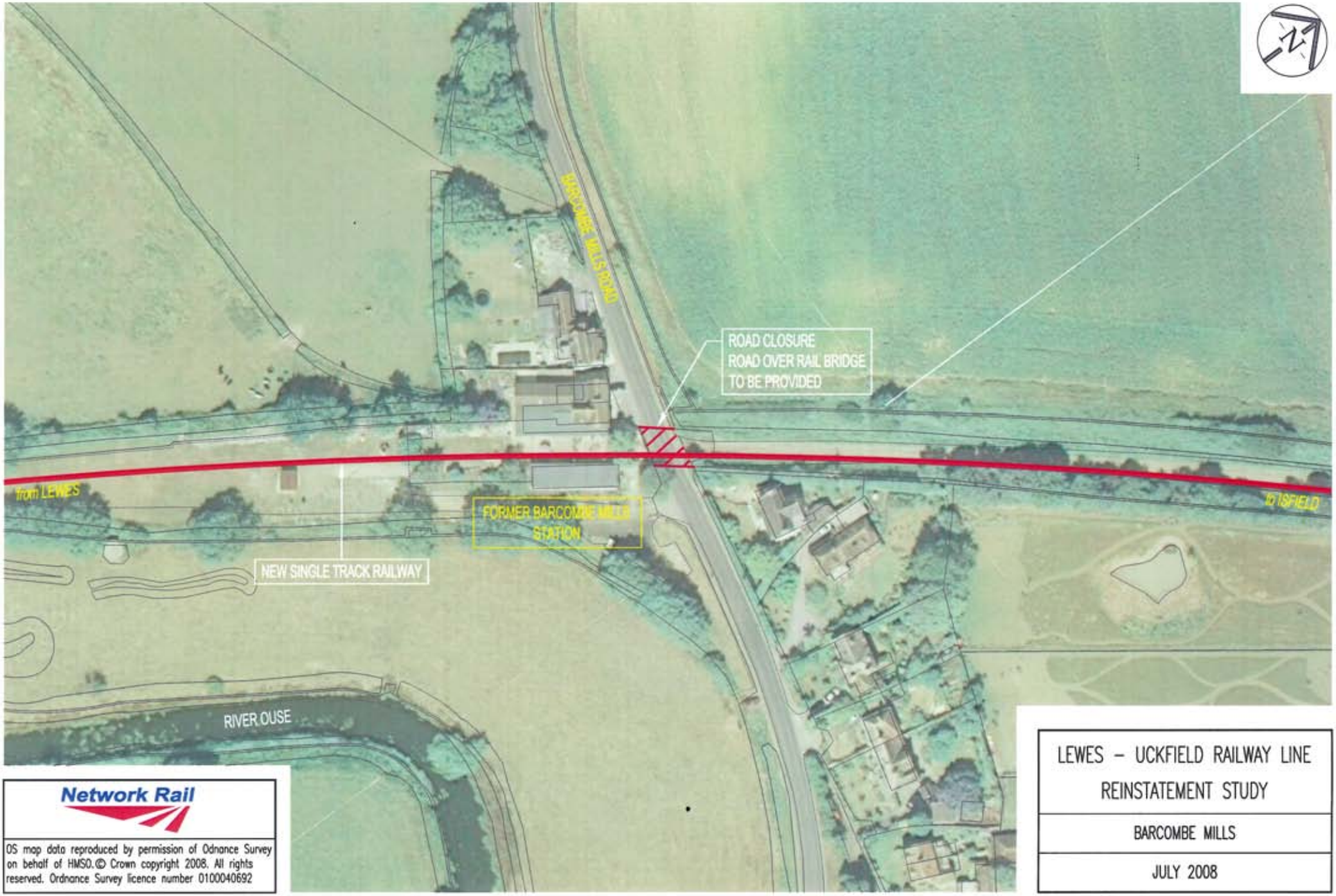
Other railway infrastructure

2.4.16 The intermediate station option requires some minor alterations to the scope compared to the base option. The largest item is that making future provision for 240 metres (12 x 20m carriage) trains at Isfield would require earthworks to cut back the slope beyond the Uckfield end of the station. The positioning of signals would also have to be confirmed in relation to the location of the intermediate station platforms.

Costs

2.4.17 The total incremental cost for this option compared to the base option as described is estimated at **£7.4m** at Q1 2008 prices, including a 30% contingency as applicable at GRIP stage 2. It should be noted that this does not allow for the 60% 'optimism bias' uplift as is required for Government funded projects at this stage of development. A breakdown of the main constituents of this cost is included in section 6.

2.4.18 Costs for the new station works have been derived from actual cost data retrieved from the construction of new stations elsewhere on the network. As a comparator, a new station has recently been constructed at Mitcham Eastfields in south London, costing in excess of £6million for a simple two platform station with platforms of 170 metres in length.



Network Rail

LEWES – UCKFIELD RAILWAY LINE REINSTATEMENT STUDY

BARCOMBE MILLS

JULY 2008

2.5 Option – Double Track

Background

2.5.1 The base option has assumed that a single track would be provided on the reopened route, save for passing loops at either end. This limits the service to a maximum frequency of two trains per hour at 30 minute intervals in each direction. In order to increase the frequency of the train service the length of double track line needs to be increased or additional passing loops provided. The route was double track throughout prior to closure and the incremental costs for double track provision are limited to track, structures and stations. The costs for all pre construction activities and the majority of civil engineering work remain the same.

Operational Characteristics

2.5.2 This option assumes that with two tracks throughout, a maximum frequency of 8 trains per hour could be provided in each direction. In theory, the service could be increased to three trains per hour by provision of two tracks from Isfield to Hamsey. However much greater capacity can be provided by providing double track for the whole route, hence this has been taken as the basis of the double track option.

2.5.3 It should be borne in mind that whilst this option would enable the frequency between Lewes and Uckfield to be increased substantially compared to the base option, the constraint on capacity north of Uckfield would remain. Network Rail has no current plans to improve capacity between Uckfield and Hurst Green in terms of train frequency, although this does remain a longer term possibility. There are further constraints on capacity, notably at Croydon, that would require expensive resolution before more peak services could operate from Uckfield to the capital.

Infrastructure requirements

Track

2.5.4 Two tracks would be provided throughout the route from Uckfield to the junction with the Cooksbridge Line north of Lewes. Track specification is the same as for the base option, and the tracks are spaced at the standard interval. Provision of two tracks throughout would require the acquisition of the Lavender Line operation.

Bridges and other structures

2.5.5 All underbridges would be constructed with a two track deck in place from the outset. This deck would also include sufficient space for a safe access walkway for maintenance staff. All other structures would be constructed as for the base option.

Signalling

2.5.6 Overall, the quantity of signalling equipment required is little changed compared to the base option. Although there will be some reduction in complexity compared to that necessary for bi-directional signalling on a single line compared to the base option. In operational risk terms, a two track railway is also marginally safer than a single track.

Intermediate Stations

2.5.7 The intermediate stations at Isfield and Barcombe Mills as proposed in section 2.4 would require additional work in relation to a two track railway. Platforms would be required for each track and these would be the same length as those for the single track option. It is likely that one platform at each station would have to be completely reconstructed to provide adequate track separation and clearance to the platform edge.

2.5.8 Refurbishment work and provision of standard facilities (lighting, seating, customer information etc) would be required on both platforms. Full compliance with the Disability Discrimination Act regulations would require a step free route from the main station access to each platform. This would involve the provision of a footbridge, either with lifts or ramps. There may be the opportunity to combine the step free route with the alternative highway crossings to be provided in the base option at both Isfield and Barcombe Mills.

2.5.9 At Isfield the heritage facilities located at the station would have to be permanently relocated.

Costs

2.5.10 The total incremental cost for this double track option compared to the base option without intermediate stations is estimated at **£25.5m** at Q1 2008 prices, including a 30% contingency as applicable at GRIP stage 2.

2.5.11 The total incremental cost for this double track option compared to the base option including two intermediate stations is estimated at **£38.8m** at Q1 2008 prices, including a 30% contingency as applicable at GRIP stage 2.

2.5.12 For both the above it should be noted that this does not allow for the 60% ‘optimism bias’ uplift as is required for Government funded projects at this stage of development. A breakdown of the main constituents of this cost is included in section 6.

3 Benefits

3.1 Introduction

3.1.1 This section provides an overview of the benefits of reinstating the Lewes - Uckfield line, providing an initial demand forecast and summarising other potential benefits. Network Rail engaged Mott MacDonald to produce this element of the study. In order to undertake this part of the study, an indicative train service that would utilise the new line including an option for calls at new stations at Isfield and Barcombe Mills was developed, along with demand and revenue forecasting models to predict potential use of the new line.

3.2 Data used and Constraints

3.2.1 Key sources of data are as follows:

Data	Date of data	Source
London Area Travel Survey (LATS)	2001	DfT
MOIRA Data	December 2007	Southern
Mapping	Spring 2008	ESCC
Development Plans	Spring 2008	ESCC/SEERA
National Rail Passenger Survey	Autumn 2007	Passenger Focus

3.2.2 Assumptions made within the benefits and business case sections are stated at the appropriate point.

3.3 Service Provision

Overview

3.3.1 Options for the services modelled in the demand forecasting models are:

Option	Description
Option 1:	Low cost alternative - a dedicated express bus link between Uckfield and Lewes, similar in concept to the previously operated Connex service
Option 2a:	London Bridge-Uckfield-Lewes-Eastbourne train service without calls at Isfield or Barcombe Mills stations
Option 2b:	London Bridge-Uckfield-Lewes-Eastbourne train service with calls at Isfield and Barcombe Mills stations
Option 3a:	London Bridge-Uckfield-Lewes-Newhaven train service without calls at Isfield or Barcombe Mills stations
Option 3b	London Bridge-Uckfield-Lewes-Newhaven train service with calls at Isfield and Barcombe Mills stations
Option 4a	London Bridge-Uckfield-Lewes train service without calls at Isfield or Barcombe Mills stations
Option 4b	London Bridge-Uckfield-Lewes train service with calls at Isfield and Barcombe Mills stations

3.3.2 It should be noted that Option 1 (Low cost alternative) would only be assessed were the rail based options proven to be viable, providing a comparator.

Timetables

3.3.3 All the timetable options have been developed from the December 2007 timetable as coded in MOIRA, with the new services based upon the current timings at Uckfield to maintain paths on the existing network. Due to the single line sections north and south of Uckfield, the extended services require up to 10 minutes of passing time at Uckfield to avoid conflict.

Option 1: Express Bus

3.3.4 The Express Bus service has not been assessed as each of the rail options do not meet the minimum criteria required for reinstating the line.

Option 2a: London-Uckfield-Eastbourne (fast)

3.3.5 An example timetable has been developed for through services from London to Eastbourne via Uckfield.

3.3.6 *Issues*
Due to the fixed timings north of Uckfield this would mean that such a new service would largely duplicate existing services between Lewes and Eastbourne in both the Up and Down directions, including the diesel operated Brighton – Ashford service. If the new Lewes – Uckfield – London Bridge service replaced the current Brighton – Ashford service between Lewes and Eastbourne, there would be a 1tph service reduction between Brighton and Lewes unless an additional shuttle service operated between Brighton and Lewes using current paths west of Lewes. This would lead to the loss of direct connections from Brighton to stations east of Eastbourne.

3.3.7 *Rolling Stock Requirement*
The extension to Eastbourne would require a minimum of three additional units, assumed to be 4-car Class 171 DMUs, with an approximate 15-20 minutes turnaround in Eastbourne. Due to the duplication of services it would in theory be possible to cut back the Brighton – Ashford service to an Eastbourne – Ashford service, retaining the same timings and paths between Eastbourne and Ashford. This would release a 2-car Class 171 for strengthening existing services while providing additional seating capacity (4-car 171 replacing 2-car 171) between Lewes – Eastbourne.

Option 2b: London-Uckfield-Eastbourne (with intermediate stations)

3.3.8 Building upon Option 2a, the timings would be extended by 2 minutes per stop, giving an Uckfield to Lewes journey time of 14 minutes in total. The resulting timings are shown in Tables 3 and 4, based upon trains passing at the short section of double track at the new double junction west of Lewes – parallel movements at this junction have been assumed to be possible.

3.3.9 *Issues*
The same pathing issues as mentioned in Option 2a would also apply.

3.3.10 *Rolling Stock Requirement*
The same number of units as for Option 2a would apply, achieved through shorter turnaround times at Eastbourne.

Option 3a: London-Uckfield-Seaford (fast)

3.3.11 This service would utilise the same timings as for Option 2a as far as Lewes, then continue to Seaford calling at Newhaven Town and Newhaven Harbour.

3.3.12 *Issues*
Seaford receives a (roughly) 3tph service to Brighton in the morning peak, as well as two direct services to London Victoria via the Brighton Main Line. Rules of the Plan (ROTP) specified minimum headways on the Seaford branch are 7½ minutes for slow services and absolute block (AB) signalling and single sections between Newhaven and Seaford effectively means that the Seaford branch beyond Newhaven is operating close to capacity in the morning peak. It would be planned to reverse the majority of the peak service at Newhaven Harbour potentially using the spur to the Newhaven Marine station.

3.3.13 *Rolling Stock Requirement*
Extension of the morning peak London Bridge – Uckfield service to Newhaven Harbour would require a minimum of two additional 4-car Class 171 to maintain the existing service provision, with an approximate 13 minutes turnaround at Newhaven Harbour.

Option 3b: London-Uckfield-Seaford (with intermediate stations)

3.3.14 As for option 2b, option 3b includes an additional 2 minutes per stop between Lewes and Uckfield. As such it has adopted the same timings as far south as Lewes as for option 2b, then running on towards Newhaven. Timings for this service option are shown in Tables 7 and 8.

3.3.15 *Issues*

This service permutation provides a turnaround at Newhaven Harbour of only 5 minutes, which is too short to permit reliable operation. This would imply the need for an additional train to provide the service. An alternative option would be to reverse the service at Newhaven Town, giving a turnaround time of approximately 9 minutes.

3.3.16 *Rolling Stock Requirement*

Extension of the morning peak London Bridge – Uckfield service to Newhaven Harbour would require a minimum of three additional 4-car Class 171 to maintain the existing service provision. Reversal at Newhaven Town would require only two additional 4-car Class 171 units.

Option 4a: London-Uckfield-Lewes (fast)

3.3.17 This service would utilise the same timings as for Option 2a as far as Lewes where the train would then terminate. The train would run empty to a new turnback siding to the east of the station before forming the next service back towards Uckfield.

3.3.18 *Issues*

The new turnback siding required has not been investigated on a technical basis for this study. It is assumed to be feasible, however the curvature of the track immediately east of Lewes may present some challenges, potentially including a short reduction in the linespeed for main line services. For .the purposes of the business case the turnback is assumed to cost £6million (including 30% contingency) based on the cost of similar schemes elsewhere.

3.3.19 *Rolling Stock Requirement*

Extension of the London Bridge – Uckfield service to Lewes would require one additional 4-car Class 171 to maintain the existing service provision.

Option 4b: London-Uckfield-Seaford (with intermediate stations)

3.3.20 As for option 2b, option 4b includes an additional 2 minutes per stop between Lewes and Uckfield, and again using the new turnback siding proposed in Option 4a.

3.3.21 *Issues*

The same issues regarding the turnback siding are present as with Option 4a above, and the £6m cost estimate is also used.

3.3.22 *Rolling Stock Requirement*

The effect of the additional stops extends the round trip from Uckfield to Lewes by 8 minutes; unfortunately this is just sufficient to require the provision of two additional 4-car Class 171 units.

3.4 Demand and Revenue Forecasting

Overview

3.4.1 Trips on the new link between Uckfield and Lewes can be split in to three distinct categories:

- **Diverted Trips:** points from south of Lewes to north of East Croydon and vice versa;
- **New Route Trips:** new demand between points south of Lewes to between Uckfield and East Croydon inclusive; and
- **New Station Trips:** new demand from the proposed new stations of Isfield and Barcombe Mills for that option

3.4.2 The opening of the new line would enable an enhancement of services between Lewes, and points southwards to Eastbourne and northwards to London. Such movements would allow for diversions from using the Brighton main line and would also lead to an induced growth in trips from additional services offered to East Croydon and London from Lewes and points south. As such the changes would be incremental in nature, driven by frequency enhancements and small time reductions.

3.4.3 Two possible sources of estimating such demand exist – either use of the MOIRA model or the PLANET South model. The former provides for accurate time of day allocation to services but no future year modelling; whilst the latter allows for average loadings across the AM peak only but does look into the future and allow crowding benefits to be appraised.

3.4.4 Whilst MOIRA or PLANET can be used to model diverted and induced trips for longer distance journeys with significant established rail markets (e.g. East Croydon to Eastbourne), new journey opportunities from stations along the Uckfield branch to the South Coast and vice versa would be beyond the bounds of an elasticity based model (such as PLANET).

3.4.5 These movements have therefore been forecast using a direct demand model, predicting the demand between an origin (e.g. Uckfield) and a destination (e.g. Eastbourne) as a function of origin population, distance to station, rail times/costs and destination details (or an attractiveness factor).

3.4.6 One of the key requirements of this direct demand model is accurate ticket sales data from LENNON in order to calibrate the models and predict future year passenger and revenue forecasts. Unfortunately this data has not been available for this study, so therefore passenger flow data has instead been taken from the December 2007 MOIRA model for the South Central franchise. While passenger flows in MOIRA are derived from LENNON

ticket sales data, reported flows between station pairs are two-way, with no breakdown of the split between originating flows.

3.4.7 This has posed a significant problem for the calibration of the direct-demand model, and recourse has been made to using information on directionality of trips between origin-destination pairs as may be derived form London Area Travel Survey (LATS) data and the National Passenger Survey (NPS).

Methodology and Assumptions

3.4.8 *Diverted Trips*
The MOIRA model has been used to assess the impact the scheme would have upon trips which already have an established rail market, for example London - Lewes or Eastbourne to East Croydon.

3.4.9 The new services have been coded into MOIRA using the same timings as the current Uckfield services between London Bridge and East Croydon, and then running express between East Croydon and Lewes with a coded arrival/departure time as if the service had run via Uckfield as proposed in the scheme timetables.

3.4.10 To avoid incorrectly increasing service levels between London Bridge and East Croydon, calls at East Croydon were coded as 'Set-Down only' in the 'Up' London bound direction and 'Pick-up only' in the 'Down' away from London direction.

3.4.11 *New Route Trips*
Given the limitations on elasticity models, a bespoke direct demand model has been developed for the movements permitted by the line reporting which currently are impossible or very unlikely to be made by rail (for example Lewes-Uckfield, Crowborough to Seaford). The formulation of this has been derived based upon the following inputs:

- Population around station (in 2.5, 5, 7.5, 10 minutes walk time ‘zones’);
- Economic activity levels in above zones;
- Level if car availability by household in zones;
- Average access time of zones to associated stations;
- Rail generalised journey time between origin and destination stations (derived from MOIRA); and
- Destination station gross floor area office and/or retail within 1km of station.

3.4.12 The above inputs have been regressed against the number of rail trips between origin & destination stations split into combined season and full, and reduced markets. LATS data has provided information on distribution of rail trip origins into the 4 different time zones for additional model accuracy.

3.4.13 Given the domination of London trips in the study area, for the purpose of accurately modelling the southbound trip making patterns only non-London (i.e. outwith the M25 ring) have been induced in the direct demand model.

3.4.14 Each variable in the model was allowed to assume either a constant or logarithmic functional form, and analysis also showed that certain key stations (e.g. Haywards Heath) had significantly larger levels of rail trip generation than may be expected. As such different generation factors were allowed for, with the study focus being upon smaller scale stations such as encountered on the Uckfield line.

3.4.15 Given that the majority of data in the regression model was derived for the Brighton main line, this would dictate that the forecast derived are based upon a Brighton Main Line fares regime. It has been noted that the Uckfield line currently enjoys low fares per passenger mile due to historically poor service provision. However, as for the MOIRA modelling, it has been assumed that by the time of opening of the new line fares levels will have equalised to that of the parallel Brighton main line.

3.4.16 *New Station Trips*

For the two new stations at Isfield and Barcombe Mills, two different methods have been adopted to forecast demand and revenue for southbound trips and those heading towards London. For the former, the "New Route Trips" direct demand model has been used. For the latter market, a standalone trip rate model has been developed for trips to London and East Croydon, based upon MOIRA data for rail demands to these stations, the rail generalised journey time, and the population within time bands of the origin station of 2.5, 5, 7.5 and 10 minutes. For this model stations along the Uckfield, East Grinstead Lines and Plumpton and Cooksbridge have been used for the model calibration. In order to correctly model the known disparity between fares levels on the Uckfield Line, a simple application of a Passenger Demand Forecasting Handbook (PDFH) fares elasticity has been made to the Uckfield Line stations to uplift the fares to a "Brighton Main Line fare level", thus suppressing the demand prior to developing the model.

3.4.17 *Future Year Demand*

Future year demand has been derived based upon PDFH v4.1 growth factors, with changes in extraneous factors derived as follows:

- Population changes from TEMPRO supplemented by analysis of the South East Plan, with assumptions made that additional housing targets at the district level would follow the pattern of allocation as observed with recent growth;
- GDP changes based upon WebTag advice
- Car ownership changes not included due to very minor changes in future as observed from TEMPRO; and
- Car congestion effects currently not included due to weak linkage to rail.

3.4.18 In addition, a future year's fare policy of RPI+1% has been assumed to apply. Forecasts have been derived for 2019 based upon the above process.

3.4.19 A demand and revenue build-up has been assumed to apply, this being taken as 60% of forecast demand in the 1st year of opening, 90% in the second and 100% in the 3rd year. Opening year has been taken as 2017.

3.4.20 Forecasts have been derived for 2019 based upon the above process.

Assumptions

3.4.21 The results of the forecasting method for new route trips are based upon the assumption that by the time the new line opens the considerable fares differential between the Uckfield branch and the Brighton Main Line has been addressed, with Uckfield line fares raised to a similar level per kilometre as those on the Brighton Main Line.

3.4.22 All demand forecasts reported are two-way single flows (a return journey is classed as two trips) with revenue derived using half the relevant return fare for peak and off-peak journeys. Where daily flows are reported these have been factored from annual flows using an annual to daily factor of 312.

Results – Diverted Trips

3.4.23 As discussed above, existing passengers making trips between Lewes (and points east thereof) and Croydon (and points north thereof) may choose to use the reopened line, thereby releasing seating capacity on existing services via Haywards Heath, as well as leading to additional induced demand due to the enhanced service frequency to points towards London.

3.4.24 The current standard southbound off-peak journey time between London and Lewes is 65 minutes, including an allowance for an extended stop at Haywards Heath to allow for the splitting and joining of trains. Certain peak services complete the journey in a shorter time due to the avoidance of the splitting / joining operation, with the quickest journey taking 58 minutes.

3.4.25 On the Uckfield line, the current journey time for southbound off-peak services from London Bridge is 73 minutes, with one limited stop peak service completing the journey in 70 minutes. The quickest journey time from London to Lewes via Uckfield is thus 80 minutes (non stop on the reopened line) rising to 87 minutes for a standard off peak service calling at new intermediate stations on the reopened line.

3.4.26 The increase in average journey times via Uckfield is 23 minutes, representing an increase of 40% of the best peak time and 26% of the standard off peak time for a stopping train. With this level of increase it is

unlikely that the route via Uckfield would be an attractive option for customers from Lewes, and points east, where passengers can generally be sure of obtaining a seat today.

3.4.27 It is recognised that the journey times assumed in this study are longer than those assumed in the study conducted on behalf of Connex South Central. However that study assumed a significant upgrade to the existing route north of Uckfield, including double track and electrification throughout along with selective linespeed increases. This, combined with a timetable that omitted station calls at the smaller stations north of Uckfield, enabled a London to Lewes via Uckfield journey time in the region of 70 minutes. Investigating the cost of such infrastructure improvements north of Uckfield is outside the remit of this study; see chapter 10.

3.4.28 A MOIRA model run was undertaken for each of the modelled options, with the following results provided, expressed as annual 2019 demand.

Service Option	**Description**	**Change in Annual Demand**	**Change in Daily Demand**	**Change in Annual Revenue**
Option 2a:	London-Uckfield-Eastbourne fast	70,000	225	£137,000
Option 2b:	London-Uckfield-Eastbourne new stations	68,000	220	£130,000
Option 3a:	London-Uckfield-Newhaven fast	31,000	100	£67,000
Option 3b:	London-Uckfield-Newhaven new stations	33,000	105	£61,000
Option 4a:	London-Uckfield-Lewes fast	<1,000	<5	£7,000
Option 4b:	London-Uckfield-Lewes new stations	<1,000	<5	£4,000

3.4.29 As may be noted, the greatest gain in demand and revenue to the national rail network is available from Option 2a, however the vast majority of this additional demand is due to the increase in service frequency between Eastbourne and Lewes. As anticipated, the overall increase in demand between the South Coast and points north of East Croydon is minimal due to the uncompetitive journey times via Uckfield. This trend in overall growth is consistent across all options as the table below shows.

Flow (two-way)	Option	% of market switching to new link	% demand growth due to new services
Eastbourne - London	2a: Without intermediate stations	5%	<1%
	2b: With intermediate stations	4%	<1%
Newhaven Town - London	3a: Without intermediate stations	33%	2%
	3b: With intermediate stations	29%	1%
Lewes – London	4a: Without intermediate stations	2%	<1%
	4b: With intermediate stations	2%	<1%

3.4.30 Although no option would see overall growth greater than 2%, there is still some switching from the Brighton Main Line to the route via Uckfield. This is particularly true for the Newhaven options where roughly a third of the market would switch to using the Uckfield line. This is considerably higher than the level of switching under the other timetable options because there is no through Newhaven to London service throughout the day at present.

3.4.31 The minimal growth in demand in existing markets can be explained by the total generalised journey times upon which the demand forecasts in MOIRA are based. For example, although the frequencies from Lewes to London are increased with the introduction of the new link, the new average generalised journey time is only marginally lower. This is because the benefits gained from the increased frequency (reduced service interval penalty) are balanced by an overall increase in average journey times.

3.4.32 The longer journey times via Uckfield limit the potential benefits which can be obtained from these longer distance trips, which attract higher fares. This helps to explain why the revenue gain is apparently so low, with an average fare per trip of the order of £1.20 to £1.73 for each one-way leg of trip.

Results – New Route trips

3.4.33 The results of the direct demand model assessment has provided two sets of forecasts:

- A peak time model (based on full and season ticket types); and
- An off-peak model (based on reduced ticket types).

3.4.34 The table below shows the results of the direct demand in terms of 2019 demand and revenue, with both time periods summed.

Service Option	Description	Change in Annual Demand	Change in Daily Demand	Change in Annual Revenue
Option 2a:	London-Uckfield-Eastbourne fast	509,000	1,630	£3,900,000
Option 2b:	London-Uckfield-Eastbourne new stations	470,000	1,500	£3,700,000
Option 3a:	London-Uckfield-Newhaven fast	503,000	1,610	£3,800,000
Option 3b:	London-Uckfield-Newhaven new stations	465,000	1,490	£3,600,000
Option 4a:	London-Uckfield-Lewes fast	485,000	1,550	£3,700,000
Option 4b:	London-Uckfield-Lewes new stations	456,000	1,460	£3,600,000

3.4.35 The model covers a host of different origin-destination movements, including Lewes-Uckfield, with average fares per one-way trip of the order of £7.50.

3.4.36 The table below highlights the predicted daily demand between key station pairs for each of the four options assessed. By far the greatest demand across the new link is predicted to be for flows to and from Lewes, particularly Uckfield – Lewes where journey times by rail are competitive. Note that the balance of new trips made are a variety of small flows to various stations across the network.

Flow	**2019 Daily Demand (Two-way single flows)**					
	Option					
	2a	**2b**	**3a**	**3b**	**4a**	**4b**
Uckfield – Lewes	383	333	383	333	383	333
Uckfield – Brighton	98	90	98	90	98	90
Uckfield – Eastbourne	95	86	53	49	53	49
Uckfield – Newhaven Town	33	31	61	55	33	31
Uckfield – Seaford	29	27	33	31	29	27
Crowborough – Lewes	84	77	84	77	84	77
Crowborough – Brighton	53	50	53	50	53	50
Crowborough – Eastbourne	49	45	31	30	31	30
Crowborough – Newhaven Tn	19	18	29	27	19	18
Crowborough – Seaford	17	16	19	18	17	16
Buxted – Lewes	37	33	37	33	37	33
Buxted – Brighton	19	18	19	18	19	18
Buxted – Eastbourne	17	16	11	10	11	10
Buxted – Newhaven Town	6	6	10	10	6	6
Buxted – Seaford	6	5	8	6	6	5

Results – New station trips

3.4.37 Two sets of new station results are shown for the forecast year of 2019:

- Demand and revenue to/from non-London destinations; and
- Demand and revenue to/from London (includes East Croydon)

3.4.38 There is a clear issue of overlap in demand between the existing stations at Lewes, Cooksbridge, Plumpton and Uckfield with Isfield and Barcombe Mills. The degree of abstraction from these stations has been estimated using a GIS based assessment of the location of trips origins of the existing demand towards London from LATS, and this has led to the table below showing both gross and net demand at the two new stations. Gross demand represents the forecast demand at the new stations while the Net demand is how many of those trips are expected to be new and not abstracted from other nearby stations. For local demand (non-London), only a small catchment area has been allowed (up to 5 minutes drive time) and this has avoided any major station overlaps and hence abstraction.

Service Option	Description	Daily Demand: Non-London	Annual Revenue: Non - London	Gross Daily Demand: London	Net daily Demand: London	Net Annual Revenue: London
2a:	London-Uckfield-Eastbourne fast	n/a	n/a	n/a	n/a	n/a
2b:	London-Uckfield-Eastbourne new stations	182	£325,750	154	109	£550,000
3a:	London-Uckfield-Newhaven fast	n/a	n/a	n/a	n/a	n/a
3b	London-Uckfield-Newhaven new stations	179	£310,000	154	109	£550,000
4a:	London-Uckfield-Lewes fast	n/a	n/a	n/a	n/a	n/a
4b	London-Uckfield-Lewes new stations	173	£307,000	154	109	£550,000

3.4.39 The table below provides a breakdown of the predicted 2019 daily demand for key flows at each of the new stations.

Flow	2019 Daily Demand (Two-way single flows)		
	Option 2b	Option 3b	Option 4b
Isfield – Lewes	9	9	9
Isfield – Brighton	10	10	10
Isfield – Eastbourne	9	5	5
Isfield – Newhaven Town	3	6	3
Isfield – Seaford	3	3	3
Isfield – Uckfield	9	9	9
Isfield – East Croydon (gross/net)	4/3	4/3	4/3
Isfield – London (gross/net)	37/29	37/29	37/29
Barcombe Mills – Lewes	17	17	17
Barcombe Mills – Brighton	17	17	17
Barcombe Mills – Eastbourne	16	9	9
Barcombe Mills – Newhaven Town	5	10	5
Barcombe Mills – Seaford	5	5	5
Barcombe Mills – Uckfield	17	17	17
Barcombe Mills – East Croydon (gross/net)	11/8	11/8	11/8
Barcombe Mills – London (gross/net)	102/69	102/69	102/69

3.4.40 These results show there would be very little demand from either of the proposed new stations due to their rural nature and small catchment populations. The overall level of demand at Barcombe Mills would be broadly equivalent to that at Plumpton while footfall at Isfield would be comparable to nearby Cooksbridge.

Results Summary

3.4.41 The total number of new passenger trips generated by the reopening of the line varies dependent on the option chosen; ranging between approximately 1,500 and 2,000 trips per day; 450,000 to 620,000 trips per annum. This is in line with expectations, with the majority of trips being generated between existing stations on the Uckfield to Croydon line and the south coast. Annual revenue is in the range £3.5m to £6m per annum.

3.5 Socio-economic Benefits

3.5.1 Socio economic benefits for the reopening scheme have been appraised following guidance presented in WebTAG units 3.13.1 and 3.13.2.This has covered the following calculations:

- Journey time savings of existing rail travellers;
- Journey time savings of new and transferring rail travellers;
- Car decongestion savings;
- Car accident savings;
- Road infrastructure savings (reduced highway maintenance);
- Air quality benefits; and
- Greenhouse gas benefits.

3.5.2 In estimating the components costs and benefits the assumed diversion from car and bus to rail has been based upon Table 2 of WebTAG unit 3.13.2 which provides the following transfer rates based upon the National Transport Model, and expressed as changes in numbers of trips as a percentage of a change in rail trips.

Mode	**Change in trips**
Walk	-13%
Cycle	-4%
Car driver	-44%
Car passenger	-24%
Bus	-16%

3.5.3 With the assumption that 10% of the rail demand is newly generated, and that given the rural location of the station the transfer from walk or cycle is low, the table below shows the assumed split of sources of new rail demand for the appraisal.

Mode	**Proportion of rail trips from mode**
Car	73%
Bus	17%
Generated/induced	10%
Total	100%

Environmental

3.5.4 The Business Case has included the following environmental impacts:

- Effect on local air quality
- Effect on noise pollution

- Greenhouse gas emissions

3.5.5 Using WebTAG guidance for rail projects it is possible to place a monetary value on the impact of each option on the three socio-economic impacts. The level of benefit is driven by the reduction in car kilometres generated by each option. The values adopted in the appraisal have been taken from WebTAG 3.13.2 which provides guidance on rail projects.

3.5.6 The Table below shows the number of car kilometres removed from the network in the 2019 and the present value (PV) of benefit for each of the above impacts.

Option	Car Kilometres Removed (million pa)	Air Quality Benefit (£ million PV)	Noise Pollution Benefit (£ million PV)	Greenhouse Gas Benefit (£ million PV)
2A	9.70	0.30	0.20	0.63
2B	10.94	0.34	0.23	0.71
3A	8.84	0.27	0.18	0.58
3B	10.07	0.31	0.21	0.65
4A	8.65	0.27	0.18	0.56
4B	9.98	0.21	0.31	0.65

3.5.7 In addition to the above quantifiable benefits there will be other marginal environmental impacts:

- Landscape - the options will lead to a visual intrusion in a rural area in addition to a small increase in noise
- Biodiversity - the development of the options may require the removal of some vegetation and trees
- Journey ambience - users of the new option will receive slight improved ambience as the route travels through a rural area

Accessibility

3.5.8 Severance – some current crossing points on the railway may be blocked by the opening of the scheme and thus could lead to increased severance for members of the public.

3.5.9 The development of new stations in options 2B, 3B and 4B will provide easier access to the transport network for residents of the catchment areas.

Safety

3.5.10 The schemes will provide a safety benefit to wider society. The removal of car kilometres from the highway network will also lead to a reduction in accidents and thus a monetary benefit to the economy. The factors used to

apportion benefit per kilometre removed have again been derived from WebTAG. The Table below shows the benefits in 2019.

Option	Car Kilometres Removed (million pa)	Accident Benefit (£ million PV)
2A	9.70	1.24
2B	10.94	1.39
3A	8.84	1.12
3B	10.07	1.27
4A	8.65	1.10
4B	9.98	1.26

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Regeneration

3.5.9 Regeneration benefits of new transport links are usually gained where former industrial areas are connected to high quality transport networks for the first time, enabling access to jobs and services for economically deprived areas. The best recent rail-based example is the reopening of the Ebbw Vale line in Wales, connecting a large population to the jobs and attractions of Cardiff via rail for the first time in a generation and also leading to significant development on the corridor itself.

3.5.10 In the case of Lewes – Uckfield, the rural location and relatively prosperous population along the proposed line of route result in there being little quantifiable regeneration benefit. However it is possible that the provision of an all day service linking Newhaven Town to London as per service options 3A and 3B may provide a small stimulus to redevelopment in the area.

3.6 Diversionary capability

Current arrangements

3.6.1 At present when the Brighton Main Line is closed for engineering works anywhere between East Croydon and the coast trains have to be diverted away from their usual route. Brighton and the coast west thereof are served by trains diverted via Horsham; the diversion operating via Three Bridges and Crawley or Epsom depending on the section of route closed. Services to the east coast are generally replaced by buses for the part of the journey subject to closure. The exception is when the closure is between Wivelsfield and Brighton; in this case Brighton is served via Lewes.

3.6.2 Such closures occur on up to 8 occasions per year, usually on winter Sundays when demand is lowest. Due to the nature of the track layout between Three Bridges and East Croydon, complete closures are required only rarely and generally are programmed for the Christmas holiday period.

Using the reopened line for diversions

3.6.3 Were the Lewes – Uckfield line to be re-instated then an alternative route from London to Lewes would be available for traffic to the East Coast and Brighton. This would see use on those occasions when the main line is closed between East Croydon and Wivelsfield.

3.6.4 Discussions have taken place with Southern, the current Train Operating Company, to identify the service that would be provided via the alternative route. Assuming the railway infrastructure north of Uckfield remains as now, then a maximum of two services per hour could operate in each direction. In order to provide the greatest seating capacity, these trains would be run to the longest extent possible, generally 8 or 10 car class 171 DMUs. In order to minimise journey time impacts, at least one train each hour would stop only at Oxted, Crowborough and Uckfield between East Croydon and Lewes. To maximise use of the limited amount of diesel rolling stock, these services would be likely to turnback at Lewes for London. Passengers would then be required to change on to regular services to Brighton and stations to Eastbourne and beyond.

3.6.5 Due to the maximum 70mph line speed north of Uckfield, and the line via Uckfield to Lewes being some 6 miles longer than via Gatwick, journey times to Lewes would be extended by approximately 15 minutes compared to the current route. Allowing for connection time at Lewes, journey times to Brighton would be approximately 40 minutes longer, and Eastbourne 30 minutes longer than the normal route. Substitute bus services would still be required to serve the main line stations without a service, thereby limiting the available cost saving.

3.6.6 The total benefit to the industry would be from the ability to offer a rail service throughout to destinations east of Lewes, along with marginally shorter journey times to Brighton compared to the usual diversion via Horsham. This would improve the attractiveness of the service to optional travellers on these routes, thereby enabling a small increase in revenue.

3.6.7 Reopening of the route would also enable the diversion of passengers for the south coast east of Brighton on to Uckfield Line services in the event of an emergency total closure of the Brighton line between Croydon and Wivelsfield. Such closures are thankfully rare, and Network Rail is working to further improve performance in order for such closures to be eliminated as far as is practicable.

3.6.8 The benefit to the industry of providing an alternative route in the event of an emergency total closure is the avoidance of compensation to passengers for cancelled trains and delayed journeys. The trains themselves could not be diverted as the Uckfield line is not electrified, and thus compensation payments from Network Rail to the train operator would not be reduced. Given the rare occurrence of total closures, and the relatively low level of cost avoided, this has not been included within the business case.

Closures for engineering work in the longer term

3.6.9 Network Rail is currently working to reduce significantly the level of train service interruptions caused by weekend engineering work through a programme known as the 'Seven Day Railway'. The principle of this programme is to change the methods for delivering engineering work such that the majority is able to be completed in overnight closures of 8 hours. Trains would operate on tracks adjacent to the work where possible through the use of bi-directional signalling as is provided on the Brighton Main Line south of Three Bridges. The only closures in excess of this amount would then be for major bridge reconstructions and the commissioning of new signalling equipment, both of which occur rarely on any given route. Network Rail plans to be moving towards the seven day railway principle in stages, with an initial target of being fully implemented in the middle of the next decade.

3.6.10 Assuming the Seven Day Railway principle is implemented, planned closures of the Brighton main line south of Croydon in excess of 8 hours are likely to reduce to an average of around 2 occasions per year from the current average of 8 occasions. It follows that the benefit of having the Uckfield line available for diversions would thus be reduced, to the point of the incremental benefit being negligible. Therefore no such benefit has been accrued to the business case for diversions resulting from planned engineering work.

3.7 Train capacity

3.7.1 In forming the scheme operating costs it has been assumed that existing train lengths are preserved for services north of Uckfield. To assess train capacity we have examined MOIRA train loading forecasts for the Winter 2007/8 timetable between Edenbridge Town and Hurst Green. These have then been growthed to 2019 demand, and then the additional demand created by the reopening of Lewes-Uckfield applied. The results have been compared to present day train capacities using the currently rostered class 171 units.

Time period	2007 demand	2019 demand	2007/8 seated capacity
07:30-09:30 arrival in London	1289	1830	1304
16:30-18:30 departures from London	906	1287	1186

3.7.2 As this shows, London-bound services from the Uckfield line are already operating with loads approaching seated capacity. By 2019 the predicted

level of background growth alone would result in demand exceeding both the morning and evening peak 2007/08 capacity. Re-opening of the Uckfield - Lewes railway would increase peak flows across the Edenbridge Town - Hurst Green screenline in 2019 by up to 7% under timetable Option 2a with a lower overall impact in other timetable options.

4 Operating Costs

4.1 Overview

4.1.1 The incremental operating costs presented have been derived from Network Rail data provided as part of the business case project, and also from industry benchmarks sourced by Mott MacDonald. These have been used on a pence per vehicle mile basis.[1]

4.1.2 The costs have been prepared for the operating cases defined by the service patterns described in the previous section. It has been assumed in calculating the additional vehicle miles that each current Uckfield service is extended in its current formation and that each up service is formed by a train from the coast in the current formation. The weekday totals have been scaled for an operating week and then for a year.

4.1.3 The benchmark figures for maintenance were material only, and hence an allowance for extra fitting staff has been made. Network Rail provided non-capital lease rentals for the additional sets and thus no further heavy maintenance costs have been added.

4.2 Assumptions

Assumption	Comment
Lease Costs	
Based on Network Rail provided benchmark data, sourced from Rolling Stock Leasing companies	For a new build or follow-on build then there is the potential for these to rise as they are based on the first purchase cost of the vehicles Southern will have specific figures for their vehicles; this is commercially sensitive, hence use of benchmark data
Because a non-capital lease cost has been quoted no heavy maintenance provision has been separately made	These figures will be based on a mileage assumption and can move up or down when the actual fleet mileage in known. This will affect the payment for all the fleet not just the additional vehicles
Maintenance Cost	
Based on a pence per mile basis. Figure used is a benchmark from 2002 uplifted by 4% per annum Pence per mile figure does not include staff costs	Southern will have specific figures for their vehicles; this is commercially sensitive, hence use of benchmark data It is possible that increasing fleet size may bring economies of scale in material procurement that could lower the overall pence per mile figure
Assumption of 0.5 staff per additional vehicle at £35,000 pa	In practice it may not be necessary to add additional labour but the initial fleet is relatively small so the additional vehicles are significant

[1] Vehicle Mile is best defined by example – when one 4-car unit travels one mile then, overall, the unit does four vehicle miles.

Fuel Usage	
Fuel consumption - A benchmark figure	Based on relatively fast running and easy infrastructure
Fuel cost (63.5p per litre)	This figure is subject to significant variability, and relies on the prices at which a Train Operator can hedge fuel costs The actual cost of fuel paid by each Train Operating company is confidential, thus an assumed benchmark figure is used
Traincrew Costs	
2 extra sets of crew per additional unit	Costs per individual based on industry benchmarks Allows for working hours limitations
Mileage	
Based on a development of the timetabling work - all services currently terminating/starting at Uckfield assumed to continue to new destination	
6.3 multiplier used to scale from a single weekday to a full week allowing for an assumed reduced Saturday service and further reduced Sunday service 1.06 uplift used to allow for empty coaching stock working	
Formation assumed to be the same as now	
Station Charges	
2 new category F stations – approximate cost of £23,000 pa at 2001 prices	
Uckfield lease increases £30,000 pa	Network Rail assumption
Uplifted for 6 years of RPI at 4% because originally figures are 2001/02	
New stations are assumed not to be staffed	No additional station staffing required

4.3 Results

4.3.1 Total annual operating costs are as detailed in the table below; all costs are in £k pa

Timetable Option / Cost Category	2A	2B	3A	3B	4A	4B
Rolling Stock Lease	2,479	2,479	1,239	1,859	620	1,239
Rolling Stock Maintenance	695	695	429	464	261	261
Fuel	988	988	623	623	356	356
Traincrew	628	628	314	471	157	157
Track Access (Maintenance)	1,031	1,031	928	928	853	853
Station Charges (Maintenance)	30	89	30	89	30	89
Total	**5,851**	**5,909**	**3,564**	**4,434**	**2,276**	**3,112**

4.4 Operating Ratio

4.4.1 A useful measure of scheme performance is that of the ability of a new train service to cover it's incurred operating costs from revenue generated. This would show whether the service would be able to cover its day to day costs, expressed in terms of an operating ratio, being that of the revenue divided by the operating costs. The table below shows this analysis for the year 2019 with the assumption made of no real increases in operating costs from the 2007/8 prices.

Timetable Option / Category	2A	2B	3A	3B	4A	4B
Revenue generated	4,037	4,706	3,867	4,521	3,707	4,461
Operating costs	5,851	5,909	3,564	4,434	2,276	3,112
Operating ratio	**0.69**	**0.80**	**1.09**	**1.02**	**1.63**	**1.43**

4.4.2 The majority of the forecast additional revenue is accrued from flows between Uckfield and Lewes and to destinations which would require a change of train at Lewes, for example Brighton. For this reason, the additional revenue accrued from operating the service to points beyond Lewes on the South Coast is minimal when compared to the incremental operating costs, specifically the additional rolling stock required. This results in Options 4a and 4b (extension to Lewes) having the best operating ratio, with Options 3a and 3b (extension to Newhaven) also covering forecast operating costs in 2019.

4.4.3 The operating ratio will increase over time as revenue increases at a faster rate than operating costs.

5 Business Case

5.1 Overview

5.1.1 The process adopted for the development of a business case for this reopening scheme, follows current WebTAG (Unit 3.13.1, Guidance on Rail Appraisal) and GRIP advice. The appraisal has been undertaken to provide an outline appraisal / business case alone, which may be summarised as:

- Quantifying where easily possible from demand models revenue, time savings, accident savings; and
- Providing qualitative assessments of unpriced benefits such as air quality, noise, environment, ecology, integration.

5.1.2 An Outline Business Case will not require detailed design of the scheme, nor of undertaking consultation at this stage. The key outputs of an Outline Business Case are:

- An Appraisal Summary Table [AST]; and
- A Transport Economic Efficiency [TEE] table.

5.2 Assumptions

5.2.1 The Business Case comprises a 60 year discounted appraisal. Costs and benefits are discounted at 3.5% for 30 years and 3% thereafter, in line with the Treasury Green Book, to the base year of 2008. All costs and benefits are shown in 2002 prices, in line with DfT advice, net of inflation.

5.2.2 It is assumed that:

- Half the construction cost occurs in 2015 and half in 2016;
- The line reopens 2017; and
- The first full year of operation is in 2019.

5.2.3 For the economic appraisal, new rail demand has been assumed to be diverted or generated in the proportions already shown in Chapter 3 of this report. For all new rail users the standard rule of half has been applied to the calculation of time savings. For car users transferring to rail, decongestion, road infrastructure benefit, air quality improvement, noise and greenhouse gas reductions are converted into a monetary benefit calculated using DfT guidance. In undertaking this calculation it has been required to convert the passenger km figure to that of a car km value, this based upon an assumption of a car occupancy factor of 1.63 taken from WebTAG.

5.2.4 Time savings for diverted rail travellers have been derived from MOIRA. For other users, at the outline appraisal stage of assessment it has assumed that all non-rail users receive a time saving of 10 minutes per trip. The value

of time utilised is a mixture of working and non working time, which is increased in real value over time, in line with DfT advice.

5.2.5 The 10 minute time saving per trip has been calculated based on the difference between forecast rail in-vehicle journey times between Lewes and Uckfield and current bus in-vehicle journey times. The bus times have been obtained from the South East online journey planner and range from 21 minutes to 27 minutes.

5.2.6 Given that the rail journey time is estimated to be 10 minutes in the without station case and 14 minutes in the with stations case, it was concluded that a 10 minute saving would represent a conservative estimate of time saving.

5.2.7 The impact of reliability, crowding and time saving benefits to parallel and diversionary rail services is not quantified in the outline business case. Costs include Optimism Bias of 15% for operations cost (industry standard).

5.2.8 Loss of tax revenue has been included in the calculation as specified by WebTAG, with the following assumptions made:

- Transfers from car provide a reduction on VAT and fuel duty proportionate to vehicle kms removed;
- Transfers from bus provide no taxation changes (bus users pay no VAT on fares); and
- Generated demand gives rise to a loss in VAT from spending diverted to travel from other expenditure.

5.3 Results

5.3.1 Six options have been tested:

- Option 2A (Eastbourne Service without new stations);
- Option 2B (Eastbourne Service with new stations);
- Option 3A (Newhaven Service without new stations);
- Option 3B (Newhaven Service with new stations);
- Option 4A (Lewes Service without new stations); and
- Option 4B (Lewes Service with new stations).

5.3.2 *Table 1 presents the appraisal results for all options.*

Table 1 Economic results for all options (Present Values in £000s)

Public Accounts Table			**2A**	**2B**	**3A**	**3B**	**4A**	**4B**
Local Government Funding	A							
Revenue	B		85,867	99,189	81,308	96,229	80,433	94,023
Operating costs	C		-103,746	-104,750	-63,262	-78,199	-40,272	-54,608
Investment costs	D		-92,589	-97,693	-92,589	-97,693	-96,465	-101,570
Developer and Other Contributions	E		0	0	0	0	0	0
NET IMPACT	**F**	**SUM (A:E)**	**-110,468**	**-103,255**	**-74,543**	**-79,663**	**-56,304**	**-62,155**
Central Government Funding	G							
Indirect Tax Revenues	H		-5,916	-6,461	-5,202	-5,900	-5,177	-5,847
NET IMPACT	**I**	**G+H**	**-5,916**	**-6,461**	**-5,202**	**-5,900**	**-5,177**	**-5,847**
TOTAL Present Value of Costs (PVC)	**J**	**F+I**	**-116,384**	**-109,716**	**-79,746**	**-85,563**	**-61,481**	**-68,002**

Analysis of Monetised Costs and Benefits			**2A**	**2B**	**3A**	**3B**	**4A**	**4B**
User Benefits: Time Savings	K		32,371	32,939	22,040	28,543	21,644	24,043
Non User Benefits: Noise	L		209	228	183	208	181	206
Local Air Quality	M		309	338	272	309	272	306
Greenhouse Gases	N		655	715	576	653	572	647
Accidents	O		1,279	1,396	1,123	1,274	1,113	1,263
Infrastructure	P		139	157	126	143	123	142
Congestion	Q		7,898	8,605	6,926	7,854	6,835	7,784
Present Value of Benefits (PVB)	**R**	**SUM (K:Q)**	**43,032**	**44,560**	**31,246**	**38,984**	**30,891**	**34,555**
Net Present Value (NPV)	**S**	**J+R**	**-73,518**	**-65,338**	**-48,498**	**-46,579**	**-30,737**	**-33,612**
Benefit to Cost Ratio (BCR)	T	(B+R)/ (C+D+I)	0.64	0.69	0.70	0.74	0.78	0.79

5.3.3 The Table shows that all options provide a negative economic Net Present Value (NPV). The benefits to users (time savings) and non users are less than the Present Value of Costs to public accounts. There is also a negative cost to the Train Operating Company in options 2A and 2B (as operating costs are greater than fares revenue) which, may also impact on public accounts, for example through a need for increased subsidy. It has been assumed that all investment costs would be paid for out of the public account.

5.3.4 The best performing scheme in terms of Benefit Cost Ratio is 4B which generates a BCR of 0.79.

5.3.5 The DfT requires an AST to be produced for Major Scheme Funding bids. On the next pages we reproduce the ASTs for each option. The ASTs show that the scheme overall contributes towards a number of Government objectives, with minimal adverse impacts. Crowding, reliability impacts and wider economic impacts are unquantified in the outline business case.

5.3.6 The environmental assessment contained in the ASTs has been undertaken by Mott MacDonald based upon a desk top study with no reference to detailed plans or drawings.

5.3.7 In a Major Scheme funding bid, the Appraisal Summary Table (AST) is completed to cover the Government's transport objectives. This brings information together to give a fair and unbiased overall description, without giving prominence to any one type of effect or benefits expressed in monetary terms. The ASTs for all six options are provided below.

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Appraisal Summary Table Option 2A (2002 prices)

Option	Description		Problems		Present Value of Costs to Public Accounts £'000	
London Bridge - Eastbourne without new stations	Lewes - Uckfield Railway Line Reinstatement		No existing railway connection at present. No possibility to divert traffic from Brighton to East Croydon.		-£116,384	
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT ('000)**		**ASSESSMENT £'000**	
ENVIRONMENT	**Noise**	Overall reduction from car transfer to train	-9,700	Car km reduction (Opening Year)	£202	
	Local Air Quality	Overall improvement from car transfer to train	-9,700	Car km reduction (Opening Year)	£300	
	Greenhouse Gases	Overall reduction from car transfer to train	-9,700	Car km reduction (Opening Year)	£635	
	Landscape	Increased noise and visual intrusion on rural countryside	N/A		Slight adverse	
	Townscape	N/A	N/A		Neutral	
	Heritage of Historic Resources	Three scheduled monuments in vicinity not affected	N/A		Indeterminate/neutral	
	Biodiversity	Removal of individual trees	N/A		Insignificant/neutral	
	Water Environment	Scheme will not signficantly increase risk of flooding	N/A		Insignificant/neutral	
	Journey Ambience	Reinstatement of a rail route through countryside	N/A		Better	
SAFETY	**Accidents**	Road accidents reduce, some traffic transfers to train	-9,700	Car km reduction (Opening Year)	£1,240	
	Security	N/A	N/A		Neutral	
ECONOMY	**Public Accounts**	N/A	Construction cost. Loss of indirect tax revenue.		Central Govt	-£116,384
	Transport Economic Efficiency: Business Users & Transport Providers	Damage to road infrastructure reduces, some traffic transfers to train	-9,700	Car km reduction (Opening Year)	Trspt provdrs (road)	£144
		N/A	-£3,525	Net operating costs Opening Year	Trspt provdrs (rail)	-£17,990
	Transport Economic Efficiency: Consumers	Decongestion, transfer to train	-9,700	Car km reduction (Opening Year)	Non users	£7,898
		Time savings	489	Number of trips to benefit (Opening Year)	Users	£20,932
		Crowding reduced on alternative routes	TBA	TBA	Users	TBA
	Reliability	Offers diversionary route with time savings compared to present diversionary route	TBA		-	
	Wider Economic Impacts	Greater connectivity	TBA		-	
ACCESSIBILITY	**Option values**	Option of rail mode for trips	489	Number of trips (Opening Year)	-	
	Severance	Separation effect for current crossings of the railway not formalised by the scheme	N/A		Slight negative	
	Access to the Transport System	New stations reduce access times. Additional car parking.	N/A		Beneficial	
INTEGRATION	**Transport Interchange**	Better interchange possibilities due to connecting to other railway lines.	N/A		Moderate Beneficial	
	Land-Use Policy	Consistency with local, regional and national land use policies.	N/A		Beneficial	
	Other Government Policies	Transport Ten Year Plan, 2002, The Future of Transport - White Paper, July 2004, Making the Connections: The Final Report on Transport and Social Exclusion, February 2003	N/A		Beneficial	

Appraisal Summary Table Option 2B (2002 prices)

Option	Description		Problems		Present Value of Costs to Public Accounts £'000
London Bridge - Eastbourne with new stations	Lewes - Uckfield Railway Line Reinstatement		No existing railway connection at present. No possibility to divert traffic from Brighton to East Croydon.		-£109,716
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT ('000)**		**ASSESSMENT £'000**
ENVIRONMENT	**Noise**	Overall reduction from car transfer to train	-10,941	Car km reduction (Opening Year)	£228
	Local Air Quality	Overall improvement from car transfer to train	-10,941	Car km reduction (Opening Year)	£338
	Greenhouse Gases	Overall reduction from car transfer to train	-10,941	Car km reduction (Opening Year)	£715
	Landscape	Increased noise and visual intrusion on rural countryside	N/A		Slight adverse
	Townscape	N/A	N/A		Neutral
	Heritage of Historic Resources	Three scheduled monuments in vicinity not affected	N/A		Indeterminate/neutral
	Biodiversity	Removal of individual trees	N/A		Insignificant/neutral
	Water Environment	Scheme will not signficantly increase risk of flooding	N/A		Insignificant/neutral
	Journey Ambience	Reinstatement of a rail route through countryside	N/A		Better
SAFETY	**Accidents**	Road accidents reduce, some traffic transfers to train	-10,941	Car km reduction (Opening Year)	£1,396
	Security	N/A	N/A		Neutral
ECONOMY	**Public Accounts**	N/A	Construction cost. Loss of indirect tax revenue.		Central Govt -£109,716
	Transport Economic Efficiency: Business Users & Transport Providers	Damage to road infrastructure reduces, some traffic transfers to train	-10,941	Car km reduction (Opening Year)	Trspt provdrs (road) £157
		N/A	-£2,450	Net operating costs Opening Year	Trspt provdrs (rail) -£8,100
	Transport Economic Efficiency: Consumers	Decongestion, transfer to train	-10,941	Car km reduction (Opening Year)	Non users £8,605
		Time savings	538	Number of trips to benefit (Opening Year)	Users £32,939
		Crowding reduced on alternative routes	TBA	TBA	Users TBA
	Reliability	Offers diversionary route with time savings compared to present diversionary route	TBA		-
	Wider Economic Impacts	Greater connectivity	TBA		-
ACCESSIBILITY	**Option values**	Option of rail mode for trips	538	Number of trips (Opening Year)	-
	Severance	Separation effect for current crossings of the railway not formalised by the scheme	N/A		Slight negative
	Access to the Transport System	New stations reduce access times. Additional car parking.	N/A		Beneficial
INTEGRATION	**Transport Interchange**	Better interchange possibilities due to connecting to other railway lines.	N/A		Moderate Beneficial
	Land-Use Policy	Consistency with local, regional and national land use policies.	N/A		Beneficial
	Other Government Policies	Transport Ten Year Plan, 2002, The Future of Transport - White Paper, July 2004, Making the Connections: The Final Report on Transport and Social Exclusion, February 2003	N/A		Beneficial

Appraisal Summary Table Option 3A (2002 prices)

Option	Description		Problems	Present Value of Costs to Public Accounts £'000
London Bridge - Newhaven without new stations	Lewes - Uckfield Railway Line Reinstatement		No existing railway connection at present. No possibility to divert traffic from Brighton to East Croydon.	-£79,746
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT ('000)**	**ASSESSMENT £'000**
ENVIRONMENT	**Noise**	Overall reduction from car transfer to train	-8,843 Car km reduction (Opening Year)	£183
	Local Air Quality	Overall improvement from car transfer to train	-8,843 Car km reduction (Opening Year)	£272
	Greenhouse Gases	Overall reduction from car transfer to train	-8,843 Car km reduction (Opening Year)	£576
	Landscape	Increased noise and visual intrusion on rural countryside	N/A	Slight adverse
	Townscape	N/A	N/A	Neutral
	Heritage of Historic Resources	Three scheduled monuments in vicinity not affected	N/A	Indeterminate/neutral
	Biodiversity	Removal of individual trees	N/A	Insignificant/neutral
	Water Environment	Scheme will not signficantly increase risk of flooding	N/A	Insignificant/neutral
	Journey Ambience	Reinstatement of a rail route through countryside	N/A	Better
SAFETY	**Accidents**	Road accidents reduce, some traffic transfers to train	-8,843 Car km reduction (Opening Year)	£1,123
	Security	N/A	N/A	Neutral
ECONOMY	**Public Accounts**	N/A	Construction cost. Loss of indirect tax revenue.	Central Govt -£79,746
	Transport Economic Efficiency: Business Users & Transport Providers	Damage to road infrastructure reduces, some traffic transfers to train	-8,843 Car km reduction (Opening Year)	Trspt provdrs (road) £126
		N/A	-£1,376 Net operating costs Opening Year	Trspt provdrs (rail) £18,046
	Transport Economic Efficiency: Consumers	Decongestion, transfer to train	-8,843 Car km reduction (Opening Year)	Non users £6,926
		Time savings	484 Number of trips to benefit (Opening Year)	Users £22,040
		Crowding reduced on alternative routes	TBA TBA	Users TBA
	Reliability	Offers diversionary route with time savings compared to present diversionary route	TBA	-
	Wider Economic Impacts	Greater connectivity	TBA	-
ACCESSIBILITY	**Option values**	Option of rail mode for trips	484 Number of trips (Opening Year)	-
	Severance	Separation effect for current crossings of the railway not formalised by the scheme	N/A	Slight negative
	Access to the Transport System	New stations reduce access times. Additional car parking.	N/A	Beneficial
INTEGRATION	**Transport Interchange**	Better interchange possibilities due to connecting to other railway lines.	N/A	Moderate Beneficial
	Land-Use Policy	Consistency with local, regional and national land use policies.	N/A	Beneficial
	Other Government Policies	Transport Ten Year Plan, 2002, The Future of Transport - White Paper, July 2004, Making the Connections: The Final Report on Transport and Social Exclusion, February 2003	N/A	Beneficial

Appraisal Summary Table Option 3B (2002 prices)

Option	Description		Problems	Present Value of Costs to Public Accounts £'000
London Bridge - Newhaven with new stations	Lewes - Uckfield Railway Line Reinstatement		No existing railway connection at present. No possibility to divert traffic from Brighton to East Croydon.	-£85,563
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT ('000)**	**ASSESSMENT £'000**
ENVIRONMENT	**Noise**	Overall reduction from car transfer to train	-10,075 Car km reduction (Opening Year)	£208
	Local Air Quality	Overall improvement from car transfer to train	-10,075 Car km reduction (Opening Year)	£309
	Greenhouse Gases	Overall reduction from car transfer to train	-10,075 Car km reduction (Opening Year)	£653
	Landscape	Increased noise and visual intrusion on rural countryside	N/A	Slight adverse
	Townscape	N/A	N/A	Neutral
	Heritage of Historic Resources	Three scheduled monuments in vicinity not affected	N/A	Indeterminate/neutral
	Biodiversity	Removal of individual trees	N/A	Insignificant/neutral
	Water Environment	Scheme will not signficantly increase risk of flooding	N/A	Insignificant/neutral
	Journey Ambience	Reinstatement of a rail route through countryside	N/A	Better
SAFETY	**Accidents**	Road accidents reduce, some traffic transfers to train	-10,075 Car km reduction (Opening Year)	£1,274
	Security	N/A	N/A	Neutral
ECONOMY	**Public Accounts**	N/A	Construction cost. Loss of indirect tax revenue.	Central Govt -£85,563
	Transport Economic Efficiency: Business Users & Transport Providers	Damage to road infrastructure reduces, some traffic transfers to train	-10,075 Car km reduction (Opening Year)	Trspt provdrs (road) £143
		N/A	-£1,808 Net operating costs Opening Year	Trspt provdrs (rail) £18,029
	Transport Economic Efficiency: Consumers	Decongestion, transfer to train	-10,075 Car km reduction (Opening Year)	Non users £7,854
		Time savings	532 Number of trips to benefit (Opening Year)	Users £28,543
		Crowding reduced on alternative routes	TBA TBA	Users TBA
	Reliability	Offers diversionary route with time savings compared to present diversionary route	TBA	-
	Wider Economic Impacts	Greater connectivity	TBA	-
ACCESSIBILITY	**Option values**	Option of rail mode for trips	532 Number of trips (Opening Year)	-
	Severance	Separation effect for current crossings of the railway not formalised by the scheme	N/A	Slight negative
	Access to the Transport System	New stations reduce access times. Additional car parking.	N/A	Beneficial
INTEGRATION	**Transport Interchange**	Better interchange possibilities due to connecting to other railway lines.	N/A	Moderate Beneficial
	Land-Use Policy	Consistency with local, regional and national land use policies.	N/A	Beneficial
	Other Government Policies	Transport Ten Year Plan, 2002, The Future of Transport - White Paper, July 2004, Making the Connections: The Final Report on Transport and Social Exclusion, February 2003	N/A	Beneficial

Appraisal Summary Table Option 4A (2002 prices)

Option	Description		Problems	Present Value of Costs to Public Accounts £'000
London Bridge - Newhaven without new stations	Lewes - Uckfield Railway Line Reinstatement		No existing railway connection at present. No possibility to divert traffic from Brighton to East Croydon.	£61,481
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT ('000)**	**ASSESSMENT £'000**
ENVIRONMENT	**Noise**	Overall reduction from car transfer to train	-8,659 Car km reduction (Opening Year)	£180
	Local Air Quality	Overall improvement from car transfer to train	-8,659 Car km reduction (Opening Year)	£267
	Greenhouse Gases	Overall reduction from car transfer to train	-8,659 Car km reduction (Opening Year)	£564
	Landscape	Increased noise and visual intrusion on rural countryside	N/A	Slight adverse
	Townscape	N/A	N/A	Neutral
	Heritage of Historic Resources	Three scheduled monuments in vicinity not affected	N/A	Indeterminate/neutral
	Biodiversity	Removal of individual trees	N/A	Insignificant/neutral
	Water Environment	Scheme will not signficantly increase risk of flooding	N/A	Insignificant/neutral
	Journey Ambience	Reinstatement of a rail route through countryside	N/A	Better
SAFETY	**Accidents**	Road accidents reduce, some traffic transfers to train	-8,659 Car km reduction (Opening Year)	£1,100
	Security	N/A	N/A	Neutral
ECONOMY	**Public Accounts**	N/A	Construction cost. Loss of indirect tax revenue.	Central Govt £61,481
	Transport Economic Efficiency: Business Users & Transport Providers	Damage to road infrastructure reduces, some traffic transfers to train	-8,659 Car km reduction (Opening Year)	Trspt provdrs (road) £124
		N/A	-£141 Net operating costs Opening Year	Trspt provdrs (rail) £39,026
	Transport Economic Efficiency: Consumers	Decongestion, transfer to train	-8,659 Car km reduction (Opening Year)	Non users £6,781
		Time savings	467 Number of trips to benefit (Opening Year)	Users £21,707
		Crowding reduced on alternative routes	TBA TBA	Users TBA
	Reliability	Offers diversionary route with time savings compared to present diversionary route	TBA	-
	Wider Economic Impacts	Greater connectivity	TBA	-
ACCESSIBILITY	**Option values**	Option of rail mode for trips	467 Number of trips (Opening Year)	-
	Severance	Separation effect for current crossings of the railway not formalised by the scheme	N/A	Slight negative
	Access to the Transport System	New stations reduce access times. Additional car parking.	N/A	Beneficial
INTEGRATION	**Transport Interchange**	Better interchange possibilities due to connecting to other railway lines.	N/A	Moderate Beneficial
	Land-Use Policy	Consistency with local, regional and national land use policies.	N/A	Beneficial
	Other Government Policies	Transport Ten Year Plan, 2002, The Future of Transport - White Paper, July 2004, Making the Connections: The Final Report on Transport and Social Exclusion, February 2003	N/A	Beneficial

Appraisal Summary Table Option 4B (2002 prices)

Option	Description		Problems	Present Value of Costs to Public Accounts £'000
London Bridge - Newhaven with new stations	Lewes - Uckfield Railway Line Reinstatement		No existing railway connection at present. No possibility to divert traffic from Brighton to East Croydon.	-£68,002
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT ('000)**	**ASSESSMENT £'000**
ENVIRONMENT	**Noise**	Overall reduction from car transfer to train	-9,982 Car km reduction (Opening Year)	£206
	Local Air Quality	Overall improvement from car transfer to train	-9,982 Car km reduction (Opening Year)	£306
	Greenhouse Gases	Overall reduction from car transfer to train	-9,982 Car km reduction (Opening Year)	£647
	Landscape	Increased noise and visual intrusion on rural countryside	N/A	Slight adverse
	Townscape	N/A	N/A	Neutral
	Heritage of Historic Resources	Three scheduled monuments in vicinity not affected	N/A	Indeterminate/neutral
	Biodiversity	Removal of individual trees	N/A	Insignificant/neutral
	Water Environment	Scheme will not signficantly increase risk of flooding	N/A	Insignificant/neutral
	Journey Ambience	Reinstatement of a rail route through countryside	N/A	Better
SAFETY	**Accidents**	Road accidents reduce, some traffic transfers to train	-9,982 Car km reduction (Opening Year)	£1,263
	Security	N/A	N/A	Neutral
ECONOMY	**Public Accounts**	N/A	Construction cost. Loss of indirect tax revenue.	Central Govt -£68,002
	Transport Economic Efficiency: Business Users & Transport Providers	Damage to road infrastructure reduces, some traffic transfers to train	-9,982 Car km reduction (Opening Year)	Trspt provdrs (road) £142
		N/A	-£544 Net operating costs Opening Year	Trspt provdrs (rail) £39,414
	Transport Economic Efficiency: Consumers	Decongestion, transfer to train	-9,982 Car km reduction (Opening Year)	Non users £7,784
		Time savings	522 Number of trips to benefit (Opening Year)	Users £24,043
		Crowding reduced on alternative routes	TBA TBA	Users TBA
	Reliability	Offers diversionary route with time savings compared to present diversionary route	TBA	-
	Wider Economic Impacts	Greater connectivity	TBA	-
ACCESSIBILITY	**Option values**	Option of rail mode for trips	522 Number of trips (Opening Year)	-
	Severance	Separation effect for current crossings of the railway not formalised by the scheme	N/A	Slight negative
	Access to the Transport System	New stations reduce access times. Additional car parking.	N/A	Beneficial
INTEGRATION	**Transport Interchange**	Better interchange possibilities due to connecting to other railway lines.	N/A	Moderate Beneficial
	Land-Use Policy	Consistency with local, regional and national land use policies.	N/A	Beneficial
	Other Government Policies	Transport Ten Year Plan, 2002, The Future of Transport - White Paper, July 2004, Making the Connections: The Final Report on Transport and Social Exclusion, February 2003	N/A	Beneficial

5.4 Sensitivity Tests

5.4.1 The following sensitivity tests have been undertaken. The tables below present the Net Present Value and Benefit Cost Ratio of the tests.

Benefit Cost Ratio of Sensitivity Tests

Timetable Option / Sensitivity Test	2A	2B	3A	3B	4A	4B
Base	0.64	0.69	0.70	0.74	0.78	0.79
Demand *1.5	0.92	1.00	1.04	1.09	1.14	1.17
Demand *2	1.20	1.31	1.36	1.43	1.50	1.53
Demand *3	1.74	1.90	1.99	2.07	2.17	2.22
Construction Cost Optimism Bias 60%	-	-	0.52	0.56	-	-
No Contingency on Construction Costs / No Optimism Bias on Operating Costs	0.77	0.83	0.86	0.91	0.96	0.98
Developer Contribution £50m	-	-	0.55	0.64	-	-
Developer Contribution £100m	-	-	0.12	0.39	-	-
Demand *1.5 / No Contingency on Construction Costs / No Optimism Bias on Operating Costs	1.11	1.21	1.27	1.33	1.41	1.43
Demand *2 / No Contingency on Construction Costs / No Optimism Bias on Operating Costs	1.45	1.58	1.66	1.73	1.84	1.87
Demand *3 / No Contingency on Construction Costs / No Optimism Bias on Operating Costs	2.08	2.27	2.40	2.49	2.65	2.69

Net Present Value of Sensitivity Tests

Timetable Option / Sensitivity Test	2A	2B	3A	3B	4A	4B
Base	-73,518	-65,338	-48,498	-46,579	-30,737	-33,612
Demand *1.5	-15,556	997	6,098	16,951	20,696	27,577
Demand *2	42,406	67,332	60,547	80,315	73,066	88,766
Demand *3	158,329	200,001	169,446	207,044	177,805	211,143
Construction Cost Optimism Bias 60%	-	-	-103,905	-105,195	-	-
No Contingency on Construction Costs / No Optimism Bias on Operating Costs	-38,664	-29,190	-18,778	-13,728	-4,194	-3,100
Developer Contribution £50m	-	-	-48,498	-46,579	-	-
Developer Contribution £100m	-	-	-48,498	-46,579	-	-
Demand *1.5 / No Contingency on Construction Costs / No Optimism Bias on Operating Costs	19,298	37,145	35,671	49,636	48,175	58,089
Demand *2 / No Contingency on Construction Costs / No Optimism Bias on Operating Costs	77,259	103,480	90,121	113,000	100,545	119,278
Demand *3 / No Contingency on Construction Costs / No Optimism Bias on Operating Costs	193,183	236,149	199,020	239,728	205,284	241,656

Effect of Developer Contributions on Scheme Benefit Costs Ratio

5.4.2 As the above appraisal table shows the inclusion of a developer contribution reduces the Benefit Cost Ratio but leaves the Net Present Value unchanged.

5.4.3 The treatment of developer contributions according to WebTAG guidance is clear, albeit in some cases giving rise to what may seem illogical results. WebTAG unit 3.13.1 "Guidance on Rail Appraisal" August 2007 clearly states that any developer contributions should be entered as a negative value in the Private Sector Provider Impact, which generates the present value of transport economic efficiency benefits, or the PVB. The developer contribution also has an effect on the present value of costs (PVC), reducing these costs by the level of developer contributions. Therefore the developer contribution will reduce in equal absolute value the present value of costs and the present value of benefits. This together has no net affect upon the Net Present Value (NPV) of the scheme but does affect the benefit cost ratio (BCR).

5.4.4 Where the BCR is greater than one the effect of the developer contribution is to increase the scheme BCR. When the BCR is less than one it reduces the BCR. Key to this perhaps illogical behaviour is that the developer contribution reduces the benefit at the top of the BCR ratio as well as the costs at the bottom.

5.4.5 The logic of this may be expressed as follows. Were a scheme to be made cheaper by virtue of a lower bid for construction or operation then this would reduce the costs by this amount with no effect upon the benefits. This would then lead to an increase in the BCR. In an alternative case if an offer to reduce (or subsidise) the costs were made this would also reduce the costs but to UK plc which would also take money out of the system to this value, hence also reducing the benefits to the country and hence the scheme. This difference is what explains the effect upon the BCR.

5.5 Business Case Conclusions

5.5.1 The evaluation identifies that options 4A and 4B have the best performing BCRs at 0.78 and 0.79 respectively. This represents poor value for money as per DfT appraisal guidance.

5.5.2 Sensitivity tests have been completed on demand, benefit and cost assumptions used in the appraisal. The tests show that a BCR of greater than 2.0 is only generated by all options when demand is increased by a factor of 3 over that forecast. This represents demand in the region of 4,500 to 6,000 trips per day or 1.5million to 2million trips per annum.

6 Capital Cost Estimates

6.1 Estimates

6.1.1 All estimates provided below are to Network Rail GRIP Stage 2, and include contingency at 30%. It should be noted that this does not allow for the 60% 'optimism bias' uplift as is required for Government funded projects at this stage of development.

6.1.2 **Base Option (section 2.3)**

Cost Category	Estimated Cost (£m)
Land Purchase and Consents	**16.8**
GRIP3 Project Management (including Network Rail) Design (consultant)	**0.9**
GRIP4-8 Project Management (including Network Rail) Design (consultant) TWA Costs	**12.6**
Material Costs for Rebuilding the Railway	
Structures Bridges/Embankments/Culverts/Fencing etc.	**43.1**
Track including preparation of the formation	**21.4**
Signalling and telecoms works	**11.8**
Contractor's costs and allowances	**1.9**
Total	**108.5**
Contingency (30%)	**32.5**
Total Estimated Cost	**141.0**

6.1.3 Intermediate stations option (section 2.4) Incremental cost compared to Base Option

Cost Category	Estimated Cost (£m)
Land Purchase and Consents	**-**
GRIP3 Project Management (including Network Rail) Design (consultant)	**-**
GRIP4-8 Project Management (including Network Rail) Design (consultant) TWA Costs	**0.7**
Material Costs for Rebuilding the Railway	
Structures (Station works)	**4.9**
Track including preparation of the formation	**-**
Signalling and telecoms works	**-**
Contractor's costs and allowances	**0.1**
Total	**5.7**
Contingency (30%)	**1.7**
Total Estimated Incremental Cost	**7.4**

6.1.4 Double track option (section 2.5) Incremental cost compared to Base Option (no intermediate stations)

Cost Category	Estimated Cost (£m)
Land Purchase and Consents	**-**
GRIP3 Project Management (including Network Rail) Design (consultant)	**-**
GRIP4-8 Project Management (including Network Rail) Design (consultant) TWA Costs	**1.6**
Material Costs for Rebuilding the Railway	
Structures (additional bridge works)	**7.8**
Track including preparation of the formation	**9.6**
Signalling and telecoms works	**-**
Contractor's costs and allowances	**0.5**
Total	**19.6**
Contingency (30%)	**5.9**
Total Estimated Incremental Cost	**25.5**

6.1.5 Double track option (section 2.5)
Incremental cost compared to Base Option (with intermediate stations)

Cost Category	Estimated Cost (£m)
Land Purchase and Consents	**-**
GRIP3 Project Management (including Network Rail) Design (consultant)	**-**
GRIP4-8 Project Management (including Network Rail) Design (consultant) TWA Costs	**2.9**
Material Costs for Rebuilding the Railway	
Structures (additional bridge and Station works)	**16.5**
Track including preparation of the formation	**9.6**
Signalling and telecoms works	**-**
Contractor's costs and allowances	**0.8**
Total	**29.8**
Contingency (30%)	**9.0**
Total Estimated Incremental Cost	**38.8**

6.2 Estimate assumptions

- The estimate is based on a price level of 2008 Q1
- Estimates for incremental options assume that the work is completed concurrent with the base option
- Information from the Project Development team was use to establish quantities and specification of estimated items as at GRIP stage 2.
- The project management is based on a percentage of working week hours against the assumed length of each GRIP Stage.
- Percentages used in this estimate are those found in the Network Rail Principle of Estimating guidelines PM04.
- No allowances have been made for TOC or FOC Compensation.
- No allowance has been made for the Industry Risk Fund (IRF) or Network Rail Fee Fund (NRFF) applicable to projects funded by third parties.
- No allowance has been made for inflation or other cost escalation.

- GRIP stage durations are based on assumptions and a provisional programme held by the project team.

6.3 Cost Comparisons

6.3.1 The capital costs of railway schemes are often called into question, and, quite properly, are challenged to ensure that scheme promoters get value for money. Below is a list of significant rail and highway projects either completed or under construction detailing the average per kilometre in order that a comparison can be made.

Project	Estimate year	Cost £m per route km
CTRL Phase 1 (Channel Tunnel – Ebbsfleet)	2004	25.8
M1 Widening J6A - J10	2007	18.1
A27 Beddingham – Southeram improvement	2006	13.9
A21 Lamberhurst bypass	2005	7.9
Airdrie-Bathgate railway reopening (new section only, excluding stations and electrification)	2006	9.1
Uckfield – Lewes (base option, *excl* contingency)	**2008**	**9.0**
Uckfield – Lewes (base option, *incl* contingency)	**2008**	**11.8**

6.3.2 As can be seen, the cost per kilometre for this project is almost identical to the estimated cost of a similar reopening project taking place in Scotland, and is towards the lower end of the range for similar highways schemes in the south east..

7 Programme

7.1 The estimated overall programme to complete the works described is seven years and six months. This includes an allowance for public consultation and the TWA process that will be necessary to enable land and property to be acquired and other consents to be granted. At a number of points, decisions will be required by the client on the option to take forward, and to finalise continued funding. The programme is indicative at this stage and bears risks of change, particularly with respect to the aforementioned decision and consents processes.

7.2 The stages identified below are set out accordance with GRIP procedures. Prior to each stage allowance is made for the necessary decision and contractual processes required before progressing. There then follows a period to allow for the procurement process ending with awarding a contract to the successful tenderer. A contract start up period would then be necessary. It is possible that some of the stages could be combined to reduce the number of cycles needed; this could however increase risk and add to the overall cost.

7.3 The full programme is included as Appendix 9.

GRIP Stage 3 – Option Selection

7.4 Using this GRIP 2 study as a base, complete a more detailed investigation to produce a single option to take forward. This would include:

- Further development of the demand forecast
- Detailed engineering investigation, including intrusive surveys, geotechnical reports and land reports
- Time Table study to confirm that the infrastructure being provided will enable the desired train service to operate
- Initial Parliamentary report
- Initial Environmental Appraisal

Duration - 13 months

GRIP Stage 4 – Single Option Development and Outline Design

7.5 Following a decision on the single option, this phase would be used to produce an outline design which is then endorsed and approved by the relevant reviewing bodies. In parallel with this, the preparation of all necessary documentation for the consents process would take place, including an Environmental Impact Assessment, Traffic Impact Assessment and various other statutory reports. The Programme assumes that consents would be granted through an Order made under the Transport and Works

Act (TWA). Assuming approval is granted, the recommendations in the report are binding, potentially including items that will alter the proposed design.

7.6 An alternative to the TWA process is to promote a Private of Hybrid Bill through the Houses of Parliament. This route is used typically for mega-projects of national significance such as the Channel Tunnel Rail Link (CTRL) and Crossrail. It is not felt appropriate for this project, and thus it is assumed that the TWA process is followed.
Duration - 35 months (Outline design and planning approvals)

GRIP Stage 5 - Detail Design

7.7 This stage produces a complete and robust engineering design that allows risks, costs, timescales, resources and benefits to be fully understood prior to commitment to implement. This is a full complement of Construction drawings for every component of the new or amended infrastructure. Once complete this can be used to procure implementation contracts to a high level of certainty.

7.8 It is possible to overlap GRIP stages 4 and 5 in order to reduce the programme time. However in this case it is not recommended due to the risk of changes required through the consents process.
Duration - 18 months

GRIP Stages 6 and 7 Construction, Testing and Commissioning

7.9 This stage delivers the project to the designed specification. All major construction activities are included, such as taking possession of land, clearance and preparation of the alignment, civil engineering activity installation of rail infrastructure. The testing and commissioning phase includes an allowance for trial running and driver training to ensure the line is taken into use in a risk free manner. The new line would then be brought into full use.
Duration - 27 months

Project handback and closeout

7.10 Finally the project will be closed, with all the ‘as built’ drawings documented, all necessary safety and maintenance documentation briefed, and the final accounts settled with both funder and contractor.

8 Risks and opportunities

8.1 Principal Risks

8.1.1 The principal risks which could impact on the capital cost and / or timescale of the proposed scope of works are:

- the consents process may take longer than assumed and may result in conditions being imposed, for example compensation arrangements, that may be may be more onerous than assumed;

- the cost of acquiring land and property (e.g. station buildings at Barcombe Mills or the Lavender Line) may be higher than estimated;

- the scope of works to provide access across the railway for road vehicles and pedestrians at the sites of existing or former level crossings may be more extensive than assumed. Specifically, we have allowed for the construction of a bridge over the railway in Uckfield town centre based on the proposal shown in the Appendix 2. Further work is required to verify the eventual design of the scheme, and to assess the impact on properties affected. . The preferred planning strategy for this area will need to be resolved through the Wealden Local Development Framework;

- more detailed timetable planning at a later stage of the project may determine that partial or full double track may need to be provided at the outset, or that alterations are required to the track and signalling arrangements at Lewes to enable the frequency of train service proposed;

- the scope of remedial works required to existing structures may be more extensive than allowed for in the cost estimate;

- ensuring the reinstated rail line does not exacerbate the risk or consequences of flooding of the rivers Uck and Ouse will be a challenge. Additional infrastructure, and flood risk management measures, may be required to mitigate this.

8.2 Opportunities

8.2.1 Some of the assumptions identified also represent opportunities to reduce the time and cost required to reinstate the line. The main opportunities identified to date are:

- integration of the design and construction of some, or all, of the route with flood defence measures;

- the condition of existing structures may be better than assumed, reducing the scope of remedial works required;

- the highway alterations required to provide bridges at the site of former level crossings could be incorporated with other changes to assist in property development in the area. The land value gained from such development could contribute, at least in part, to the capital cost of the scheme;

- certain public highways and/or rights of way could be diverted or combined to reduce the number of bridges required across the reinstated route. This would be particularly beneficial if also combined with the level access footbridges required at the optional intermediate stations;

- the provision of level crossings in place of bridges at Isfield, Anchor Inn and Barcombe Mills may be permitted if the industry can demonstrate 'exceptional circumstances' to the ORR. A comprehensive risk assessment would have to demonstrate that installing a level crossing would not present undue risk to road or rail users. Were level crossings at these locations permitted, the capital cost would reduce by £3.0m, however the operating cost to Network Rail would rise by around £0.4m per annum. Whilst the initial capital cost would reduce, the net effect would be to worsen the business case.

9 Funding

Overview

9.1 Securing the provision of the substantial capital sums required for the delivery of major infrastructure projects is absolutely critical to its success. Central Government funding for such projects is subject to strict criteria and annual budgetary limits, with schemes such as this having to compete for finance against others up and down the country .Therefore it is appropriate to consider all potential methods of raising the funds necessary for a project such as the reinstatement of the Lewes to Uckfield line. Discussions have been held with a private sector company that has studied the reopening of the route previously, in order to generate funding proposals. Their full input to the study is attached as Appendix 8.

9.2 However the scheme is to be funded, it will require the presentation of a sound business case with a positive Net Present Value (NPV) and a Benefit to Cost Ratio (BCR) of an absolute minimum of 1.5, and more usually 2.0 to secure public funding. Schemes with lower NPV or BCR are unlikely to attract funding in competition with other, more financially robust, proposals elsewhere.

Possible Sources

9.3 There are numerous potential sources of funding. This paper assumes that conventional sources such as Local Transport Plan (LTP) and Major Scheme Business Cases are well understood already and focuses on alternatives. Broadly speaking these can be considered under a series of headings:

- Local
- National
- International
- Private

Local sources

9.4 ESCC and/or Network Rail have the potential to raise modest funds through mechanisms such as land sale associated with the scheme, if appropriate. The opening of an improved rail route will result in an increase in land value and any residual portfolio will increase in value as a result of investment. Where existing facilities exist, revenue from parking and other services will increase.

9.5 As from 2009, it is likely that local planning authorities will be able to raise funds from planning permissions granted to new developments through a new mechanism called the Community Infrastructure Levy (CIL). The CIL will support the provision of a range of new infrastructure necessary to support planned development and will be established through the Local Development Framework system. This mechanism is sometimes known as a "Roof Tax" as it involves a levy on all new houses and commercial developments.

9.6 The CIL will embrace not just physical infrastructure such as transport, drainage and flood defence, but also social infrastructure, such as affordable housing, education and health facilities, and green infrastructure such as parks, open spaces and nature corridors. Therefore new rail infrastructure will be only one possible call on CIL-based investment and may not be seen as higher priority than other items.

9.7 Whilst it is possible that £15,000 per dwelling could be raised for infrastructure generally, this will be dependent on the rival claims of other infrastructure needs, such as education, affordable housing and healthcare. As an example, the provision of a reopened railway line between Oxford / Aylesbury and Milton Keynes is expected to be funded through the provision of approximately 200,000 dwellings along the route. The cost of the rail scheme is approximately £200m, therefore it can be seen that the value attributed to the rail scheme is somewhat less. Unless the rail scheme is central to the needs of new housing development, it is likely that a lower cost per property will generally be available for rail investment and a higher proportion allocated to other purposes.

National sources

9.8 DfT, DCLG and other government departments periodically make funds available. Like most local authorities, ESCC has experience in bidding for these funds, and these remain a supplementary funding source.

9.9 In addition there is the periodic opportunity to bid for funds such as the Transport Innovation Fund (TIF) for schemes which boost national productivity, or for funding for a Major Scheme. However, competition for such funds is strong, and bid costs can be substantial. This scheme is not of national significance and is unlikely to quality for Productivity TIF status.

9.10 A further recent example was the CIF, for which Round 2 bids have been recently submitted. To maximise success, in any future rounds or other similar calls for bids, ESCC needs to ensure that it has a strong economic

case at the basis of the scheme. On present assumptions this scheme is unlikely to qualify for Community Infrastructure Funds.

International sources

9.11 The main international funding source is the European Union (EU) which provides a range of funding sources, notably for Transport and for Regional Development. These only offer partial funding, and can require considerable administration as well as incurring bid costs, but the availability of EU funds can help to generate local match funding. In this instance it is unlikely that significant levels of funding would be readily available given that Structural Funds are focused largely on less affluent areas, the general decline in EU funding for capital programmes in Western Europe, and the non-strategic nature of the scheme.

Private sources

9.12 Private funding is typically obtained in the form of loans which are approved as Prudential Borrowing for specific schemes, or as private investment in infrastructure which either is privately owned, and leased-back, or subject to some form of payback process such as tolling. An example is Private finance initiative (PFI) funding which is used for a variety of major investments.

9.13 In either case, these arrangements incur onward repayment costs and some mechanism for repayment needs to be in place at the outset. Therefore they are most appropriate for schemes like a bridge or tunnel river crossing which can potentially generate income once it is completed. Care must be taken, however, to ensure that there is a valid repayment funding stream, and that the risks associated with this are identified and managed.

9.14 There is a significant start-up cost associated with any PFI, although this particular scheme is of a level of capital expenditure for which this would be acceptable. Either PFI or Prudential Borrowing, however, can only provide up-front investment to be recouped through downstream revenue and only provide a realistic solution where clear revenue can be identified in the future through mechanisms such as track access charges and levies on future housing sites unlocked by investment

10 Long-term future development of Rail Corridor

10.0 This study has been in response to a specific remit to investigate the reopening of the route between Lewes and Uckfield. In addition, the Project Board requested a brief outline of a possible longer term strategy for the route from East Croydon to Lewes.

10.1 North of Uckfield

Capacity – train lengths

10.1.1 The simplest way to provide additional capacity on any train service is to operate longer trains. The basic hourly off-peak service is currently provided by four coach trains with peak hour services augmented to half hourly trains, some of which are lengthened to six or eight coaches.

10.1.2 Most of the platforms at the intermediate stations on the line are approximately 120m in length which although sufficient to operate the 'slam-door' rolling stock operated until 2003, is now insufficient for the longer trains operated in the peak today. To enable this, a method of selective door operation is in use that allows the train conductor to release the doors only on the part of the train adjacent to the platform.

10.1.3 The provision of longer trains on the existing route from Uckfield would have to be in response to additional demand on this route. Additional demand north of Oxted can be provided by longer trains from the East Grinstead branch, already capable of operating 8 coach trains, and proposed to be operating 12 coach trains by 2011. It therefore follows that providing longer trains on a regular basis to serve demand on the Uckfield line would require the provision of longer platforms throughout the route to avoid the need for selective door operation.

Capacity – More frequent trains

10.1.4 The current track configuration limits the train service frequency between Hever and Uckfield to half-hourly. In order to operate a more frequent service, double track would need to be provided at all of the three sections of single line. This would require some civil engineering work to reinstate the formation for two tracks, and extensive alterations to the signalling system. The proposed extension of the Spa Valley Railway (a heritage railway) into Eridge station would have to be re-acquired; there are termination provisions in the lease with the Spa Valley Railway for precisely this scenario.

10.1.5 Re-doubling the three sections of single line would permit a more frequent service to run, however there would still be a limit to the number of trains

that could be accommodated north of Hever. Although the line through Oxted to Croydon is not running to capacity at the moment, the current infrastructure cannot accommodate any additional trains through the East Croydon area or into the London terminals. Even in the event that these capacity constraints are solved in the long term, there would be competing demands for the new capacity created which ultimately must be allocated to the route(s) which provide the greatest return on the investment.

10.1.6 Detailed timetable modelling would be required to confirm the precise requirements as any additional trains would also have to be accommodated within the service patterns of other trains on the network.

Line Speed

10.1.7 For historic reasons, the maximum line speed between Hurst Green and Uckfield is currently 70mph, as this was the maximum speed permitted by the old slam door trains.

10.1.8 A study into the potential for increasing line speed was undertaken in th year 2000 when it was known that new, faster trains were to be introduced to the line. Unlike the proposed route south of Uckfield this section contains many steep gradients and also some sharper curves. With almost all services calling at all stations, trains can not accelerate to a speed much above 70mph before braking for the next station. As a result the study found that it would be uneconomic to increase line speed and it remains at 70mph.

10.1.9 It would be possible to review this study, and investigate potential improvements in the light of any proposed service changes, particularly if limited stop services were introduced.

Stations / station stops

10.1.10 The line passes through a mostly rural landscape, so no consideration has been given to opening any new stations. All the original stations are open although a minor halt at Monks Lane (between Hurst Green and Edenbridge) closed in 1939.

10.1.11 A faster service could be provided by omitting some of the lesser used stations, similar to the service in place between Ashford and Hastings. Alternatively if traffic continues to grow then it may be possible to consider operating an all day half-hourly service alternative services calling at principal stations only.

Electrification

10.1.12 Electrification of the route has been proposed a number of times, and indeed was suggested prior to the closure of the route south of Uckfield. Electrification offers several benefits, particularly the ability to remove the small fleet of diesel trains which are used solely for this route, and that from Ashford to Hastings. Electric trains are somewhat easier to maintain, cheaper to power, and the benefit of a standard fleet is notable. In operational terms it would enable Uckfield and East Grinstead services to join / split at Oxted, improving the utilisation of capacity and the train fleet on the network as a whole.

10.1.13 The most significant challenge in electrification is obtaining a connection to an adequate supply from the National Grid or regional distribution network. It is assumed that this can be achieved without significant cost.

10.1.14 In general terms, third rail direct current (DC) electrification costs in the order of £500 per track metre. Using this assumption electrifying the line north of Uckfield would cost in the order of £30m for the current mixed single double track route and £50m if the whole route was to be returned to double track. These costs are at GRIP stage 1 and do not include contingency.

Capability – Freight trains

10.1.15 The reinstated line would be constructed to be capable of operating freight trains up to the maximum axle load permitted in the UK, 25.5 tonnes per axle. However, the existing line north of Uckfield has restrictions in place that prohibit all but the lightest freight services. This is due principally to the type of construction of certain structures, notably underbridges and viaducts, on the route.

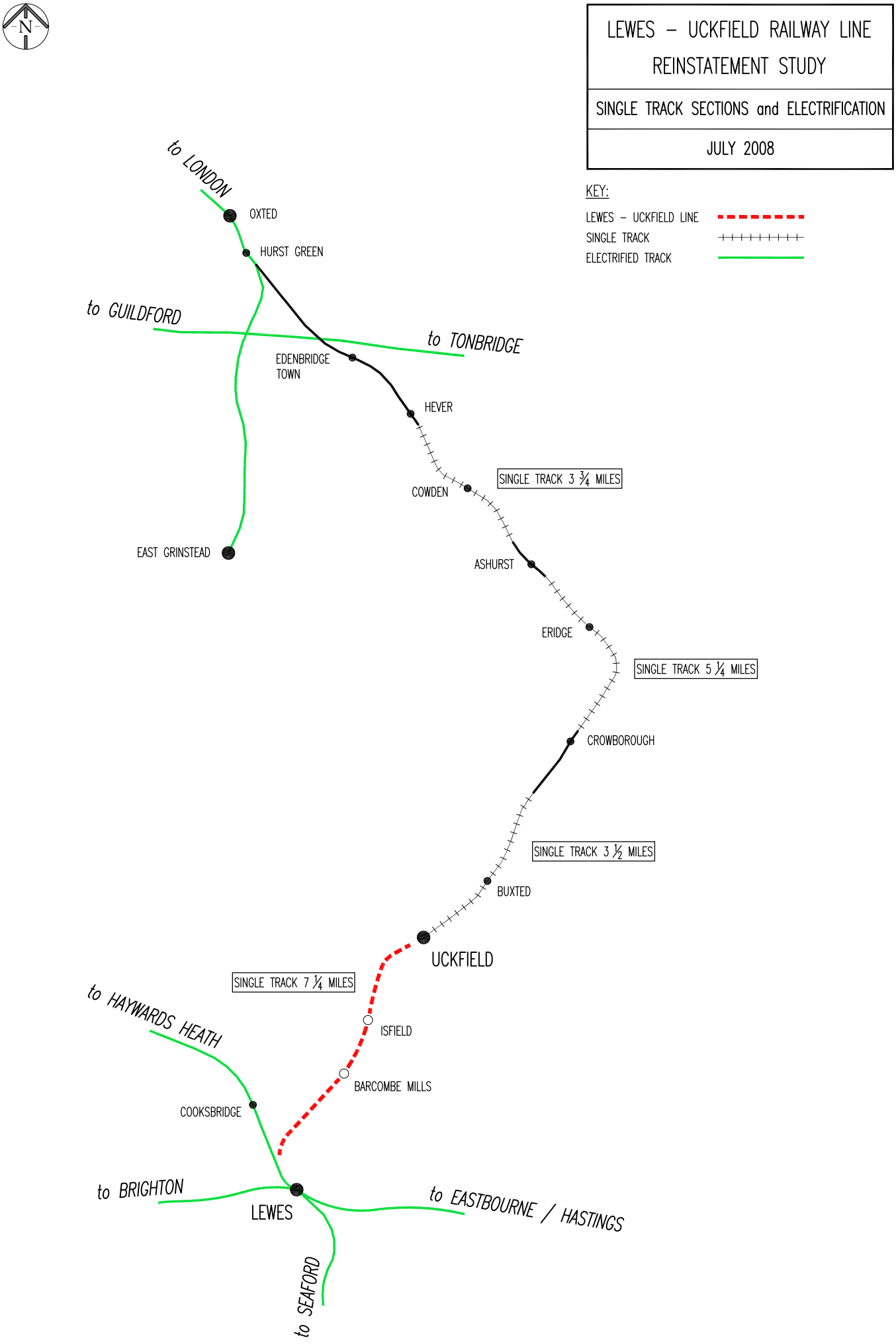
10.1.16 As and when the restrictive structures concerned are due for complete renewal, it is Network Rail policy to provide the capability for the heaviest freight trains. However the structures concerned are not expected to require renewal for the foreseeable future, even allowing for an increase in passenger traffic. The capital cost of upgrading the structures to permit freight services would thus have to be borne by those services. No assessment has been made of the work required, however costs would be likely to run into the tens of millions of pounds.

10.1.17 Rail borne freight traffic in East Sussex is low in comparison to the rest of the UK. This is principally due to the absence of heavy industry or major ports in the county. The majority of traffic that is carried is aggregates for the construction industry, with one train a day on average. Such trains are

accommodated comfortably within the capacity of the existing network, usually being timetabled to operate in the middle of the day or at night.

10.1.18 It is likely that the port of Newhaven will be developed both for passenger and freight services; if rail borne freight traffic does result from this development it is likely to be in the order of one or two trains per day. As with today's freight traffic, this could be accommodated comfortably within the capacity of the existing network. It is likely that a proportion of such traffic may be destined for the Midlands or north of England, and would require to be routed via Redhill and Reading specifically to avoid London.

10.1.19 Therefore, on the basis of current forecasts there is no requirement to consider the upgrade of the existing Uckfield to London route for freight services.


LEWES – UCKFIELD RAILWAY LINE
REINSTATEMENT STUDY
SINGLE TRACK SECTIONS and ELECTRIFICATION
JULY 2008
KEY:
LEWES – UCKFIELD LINE
SINGLE TRACK
ELECTRIFIED TRACK
N
to LONDON
OXTED
HURST GREEN
to GUILDFORD
to TONBRIDGE
EDENBRIDGE TOWN
HEVER
COWDEN
SINGLE TRACK 3 ¾ MILES
EAST GRINSTEAD
ASHURST
ERIDGE
SINGLE TRACK 5 ¼ MILES
CROWBOROUGH
SINGLE TRACK 3 ½ MILES
BUXTED
UCKFIELD
SINGLE TRACK 7 ¼ MILES
to HAYWARDS HEATH
ISFIELD
BARCOMBE MILLS
COOKSBRIDGE
to BRIGHTON
LEWES
to EASTBOURNE / HASTINGS
to SEAFORD

10.2 South of Uckfield

Capacity

10.2.1 Additional capacity between Lewes and Uckfield over the base option would be best provided by the installation of two tracks throughout as per the option described in section 2.5. Further capacity above and beyond this level would require additional signalling to permit a closer headway between trains. This is readily achievable, however as stated earlier the ability to use this capacity depends to a great extent on similar capacity being provided further north.

Electrification

10.2.2 Electrification of the reinstated route would only drive benefit if the existing route to Hurst Green was also electrified. There would be some economy of scale in completing both sections at the same time. However, for the purposes of this study the same unit rate of £500 per track metre is used.

10.2.3 The incremental cost of electrification is estimated to be £7m for single line and £12m for full double line options. These costs are at GRIP stage 1 and do not include contingency.

Cycle path (Hamsey – Uckfield)

10.2.4 It is understood that consideration is being given to providing a cycle path alongside the route of the rail link.

10.2.5 With the single track options it may be possible to upgrade the formation of the second track to provide a separate cycle way; an additional fence would be required to separate the railway from the path. At those locations where new single deck bridges are proposed for the railway, it would require an additional structure to carry a pathway. At Isfield, the cycle path would have to use the local road network around the station area and Lavender Line. A similar solution may be required around Barcombe Mills station area. In all cases the cycle path would have to be removed should a double track line be needed in the future

10.2.6 With a double track route option a cycle path could not easily be incorporated within the width of the original track formation. Should confirmed funding be available at the outset, then it may be possible to expand the design submitted to the public enquiry to acquire the additional land needed for both a double track railway line and a parallel cycle path.

10.2.7 No costs for a cycle path have been included as part of this study.

11 Consents and Environmental Issues

11.1 Consents

11.1.1 An Order under the Transport and Works Act (TWA) would need to be prepared and submitted to the Secretary of State for approval with regard to the reinstatement of the railway between Lewes and Uckfield. The strategy for seeking powers should be progressed in parallel to the development of the project as reinstatement of the railway would require land acquisition along the whole route. Investigation of the legal status of the land along the former route would need to be undertaken to determine whether any conditions were attached to the sale with regard to any future reinstatement of the railway. The first phase, commissioned towards the end of pre-feasibility, is to commission a Parliamentary Report.

11.1.2 The TWA process is well established, enabling proper consultation with the communities and organisations affected. A public inquiry, chaired by a Planning Inspector appointed by the Secretary of State for Transport, is usually necessary to deal with objections, and this process can take between 6 to 24 months depending on the number and severity of the objections. On completion of the public inquiry the Inspector submits a report to the Secretary of State for Transport for approval. Approval is usually granted, and the Order made, within 6 months of submission of the report.

11.1.3 In addition to land acquisition there are several individual items that are likely to be studied in detail at any public inquiry:

- Diversions and / or closures of footpaths and bridleways that currently intersect / occupy the proposed route of the railway.
- The proposed over bridge (road over rail) where the A22 (Uckfield By-Pass) intersects the proposed route of the railway.
- Provision of new bridges at the previous location of the level crossings.
- Provision of a new two-platform station at Uckfield, including sufficient car parking spaces.
- Provision of intermediate stations, including sufficient car parking spaces.

11.2 Environmental Issues

11.2.1 The reinstatement of the line between Lewes and Uckfield would in the main follow the original alignment which is still evident in many places.

11.2.2 The environmental impact assessment process, mandatory for TWA Order Applications, would commence at GRIP stage 3. The assessment would need to consider issues for both construction and operation of the new railway including but not limited to:

- permanent loss of some land and temporary land requirements for construction access and works compounds;
- railway land is generally regarded as contaminated and so development of the former track alignment and associated structures would require assessment;
- close proximity to a number of water courses along the route of the railway would need to be addressed, including flood risks as much of the route alignment is in the floodplain of the rivers Uck and Ouse. It may be necessary to change the way that the railway is built to address concerns raised by the Environmental Agency; they have previously raised concerns about a previous proposal to develop the current station site at Uckfield;
- the former railway alignment may currently be providing habitats for both flora and fauna and some compensatory measures may be necessary, such as providing an equivalent habitat in the adjacent area. The presence of any rare or protected species along the proposed route has not been investigated as part of this study;
- damage to soils and drainage;
- reinstatement is likely to create landscape and visual impacts, due to clearance of vegetation along the route and the creation of a new transport corridor;
- changes to the local roads in connection with new overbridges;
- general nuisance associated with the construction activities;
- impacts of construction traffic;

- air quality impacts, which are most likely to occur during construction and typically relate to dust and emissions from plant;

- impact of noise and vibration are most likely to affect nearby properties and can occur both during construction and subsequent railway operations. The main objections to the proposals are likely to be from local residents and landowners, which may lead to mitigation measures such as acoustic barriers, double glazing;

- selection of suitable sites, subject to operational requirements, for equipment installations along the route will help minimise environmental impacts;

- records indicate that a Site of Special Scientific Interest (SSSI) extends from north of Lewes to the location of the former junction near Hamsey. The SSSI is located on the opposite side of the Lewes - Cooksbridge mainline to the former junction and should not be affected by the proposed railway works although this would need to be assessed during the development of the project.

11.2.3 The results of this study have been shared with the Environment Agency and at this stage no objections were raised in principle to the reopening the line as described. Any further development of the proposal would involve close liaison with the agency including the preparation of the Environmental Impact Statement.

11.2.4 Apart from some works underway near Somerfields in Uckfield no other flood mitigation measures are currently planned. Any new structures (such as station buildings, bridges) could be considered as new development and so require a sequential test to ensure other options have been investigated which could be less of a risk during flooding. This could be used when comparing the option of developing the current station to accommodate two tracks and two platforms as opposed to using the original station site for such a development. The areas of particular concern following the previous flooding event would be Somerfields car park and the adjacent nature reserve together with the site of the current station car park.

11.2.5 Most of the remainder of the route is on extremity of the areas which flooded and the amount and depth of water was much reduced compared to elsewhere. Any changes made as a result of re-opening the line would have be evaluated to ensure they did not cause the situation to be exacerbated in other adjacent locations

12 Conclusions

12.1 The study has demonstrated that it is feasible, on a technical basis, to reopen the former route from Lewes to Uckfield. The quantity of engineering work required is significant, but there is nothing out of the ordinary that requires novel technology or any particularly demanding engineering solutions.

12.2 The level of demand, and resultant revenue for the reopened route, would be relatively low. This is the result of the rural location of the route, the small size of the settlements it could serve directly, and the short distances involved. Demand generated would be principally from Uckfield and Crowborough to Lewes and Brighton, and if the intermediate stations option is taken up, demand from these new stations to London.

12.3 The business case has demonstrated that on currently understood levels of employment and population growth in the area between and around Lewes to Uckfield, there is not a case for reopening the line on either a straightforward monetary or a socio-economic basis. The revenue generated covers the ongoing costs of operation for some service options, but in all cases fails to cover the substantial capital cost over a 60 year appraisal period, even when allowing for non-monetary benefits.

12.4 The main reason for the poor business case is the low level of demand for the reopened route. In the forty years since the route closed, car ownership in the country as a whole has increased from 49% of households in 1968 to 75% in 2005. In 1968, many of the users of the line had no option but to use the train if they wished to travel; however that is not the case today. The challenge for any new railway proposal is thus the extent to which new services can tempt passengers out of their cars and on to trains.

12.5 Were the assumptions on employment and population in the area to change significantly, then the business case for the line could become more attractive. Additional residential development above that already planned along the route of the former line, or at established settlements such as Uckfield or Crowborough, would undoubtedly increase demand for a reinstated train service. If such development was within 15 minutes walk of a station (existing or new) and came with constraints on car ownership within the development, then the likelihood of increased demand strengthens further.

12.6 The sensitivity tests demonstrate that demand needs to be two to three times that forecast to generate a business case that may be able to attract public funding. To generate such a level of demand above that forecast implies a significant increase in the size of the population along the line of the route and/or a fundamental shift in the travelling behaviour of the

existing population. In light of current planning policy it is unlikely that population growth of this order is likely, and notwithstanding recent increases in the cost of motoring, a change in travel behaviour of the order required is similarly unlikely.

12.7 Funding the reinstatement of the line remains a challenge. The low benefit to cost ratio precludes public funding of the scheme as it stands, The Community Infrastructure Levy or some similar method of capturing the increased land value of new property currently planned in the area is likely to be the only route to securing the substantial capital sum required for construction.

Appendices

Appendix- 1 General Arrangement Drawings (7 sheets)

Appendix- 2 Aerial Diagrams
- Lewes (x2)
- Isfield
- Uckfield

Appendix 3 Signalling Diagrams
- Single Track Option
- Double Track Option

Appendix- 4 Railway Corridor Sections

Appendix- 5 Gradient Diagram

Appendix- 6 Speed Profiles
- Lewes to Uckfield
- Uckfield to Lewes

Appendix-7 Scope of Works
- Single Track - No intermediate stations (Base Case)
- Double Track - No intermediate stations
- Partial Double Track - No intermediate stations
- Single Track - With intermediate stations
- Double Track - With intermediate stations
- Single Track - No intermediate stations (Option 2a)

Appendix- 8 Benefits, Operating Costs and Business Case Assumptions

Appendix-9 Programme

Appendix-10 Public Footpaths

Appendix-11 ORR Policy on Level Crossings

Appendix-12 References

APPENDIX 1

General Arrangement Drawings

(7 sheets)

APPENDIX 2

Aerial Diagrams

- Lewes
- North of Lewes
- Isfield
- Uckfield

- Barcombe Mills aerial is in the main report

APPENDIX 3

Signalling Diagrams

- Single Track Option
- Double Track Option

APPENDIX 4

Railway Corridor Sections

APPENDIX 5

Gradient Diagram

APPENDIX 6

Speed Profiles

- Lewes to Uckfield
- Uckfield to Lewes

APPENDIX 7

Scope of Works

- Single Track - No intermediate stations (Base Case)
- Double Track - No intermediate stations
- Partial Double Track - No intermediate stations
- Single Track - With intermediate stations
- Double Track - With intermediate stations
- Single Track - No intermediate stations (Option 2a)

APPENDIX 8

Benefits, Operating Costs and Business Case Assumptions

APPENDIX 9

Programme

APPENDIX 10

Public Footpaths

APPENDIX 11

ORR Policy on Level Crossings

APPENDIX 12

References