

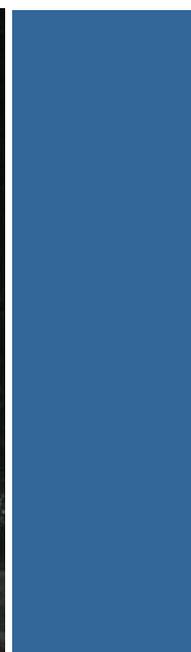
Leicestershire County Council

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# Ivanhoe Line Stage II

## Scheme Re-Appraisal

**Final**  
April 2009



## Revision Schedule

### Ivanhoe Line Stage II

Rev	Date	Details	Prepared by	Reviewed by	Approved by
1	July 2008	Draft	<b>Tony Magee</b> Senior Transport Planner	<i>MR Het</i> Principal Engineer	-
2	Sept 2008	Draft	<b>Tony Magee</b> Senior Transport Planner	<i>MR Het</i> Principal Engineer	-
3	Nov 08	Draft	<b>Richard Carr</b> Rail Operations Manager	<b>Phil Deaves</b> Consultant	<i>MR Het</i> Principal Engineer
4	21 Nov 08	Draft	<b>Richard Carr</b> Rail Operations Manager	<b>Phil Deaves</b> Consultant	<i>MR Het</i> Principal Engineer
5	9 Jan 09	Draft	<i>MR Het</i> Principal Engineer	<i>A. Mistry</i> Associate	<i>A. Mistry</i> Associate
6	23 Feb 09	Final	<i>MR Het</i> Principal Engineer	<i>A. Mistry</i> Associate	<i>A. Mistry</i> Associate
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## EXECUTIVE SUMMARY

Scott Wilson was appointed by Leicestershire County Council to carry out a passenger demand re-appraisal of the Ivanhoe Line Stage II and to review the capital and operating costs of the project. The purpose of this study was to look again at the viability of the line with a view to determining whether the line can be operated without significant subsidy to support a shortfall in revenue.

The original Ivanhoe concept envisaged a rail service linking Loughborough to Derby via Leicester and Burton on Trent. This involved bringing back into use the line which closed to passenger traffic in 1964 but remains in use for freight. The project was split into two stages and Ivanhoe Stage I was implemented in May 1994 running between Loughborough and Leicester. The Stage II section between Leicester and Burton on Trent was not progressed partially due to rail privatisation in the mid 1990's, and structural alterations in the make up of the UK rail industry. Following a scheme re-appraisal in October 1996, which concluded there would be an annual operating deficit of £0.8million, the project was not progressed any further.

The current housing growth agenda has prompted this new review in order to determine whether the planned growth may justify the re-opening of the railway line to passenger traffic. This growth is forecast to take place between 2013 and 2026 and this review has been completed sufficiently in advance of the planned growth to enable any identified infrastructure to be implemented.

Recent developments in regional planning have changed the projected number of houses likely to be built in the East Midlands Region over the planning period to 2026. Some of this housing may materialise within the catchments of the proposed stations, bringing potentially new rail patronage. As part of this study, a number of housing scenarios have been tested to estimate the likely impact of new dwellings on the potential viability of the proposed line.

The work in this project has looked into a combination of both the demand modelling and rail operations tasks. This high level review has used earlier studies as a basis for the analysis.

The analysis, in the form of a restricted cost-benefit analysis, suggests that the scheme would not be good value for money and that the project would be unlikely to cover its operating costs without some form of ongoing subsidy.

The capital cost is estimated to be around £53m (including optimism bias) and includes the construction of Knighton Chord and the re-signalling necessary to facilitate passenger traffic.

The annual operating cost is forecast to be £4.9m (also including optimism bias). By comparison, the estimated revenue to be generated from patronage is £895,000.

The level of housing development required for the line to be considered to "break even" was assessed using the TEE appraisal. This was based on the comparison of the existing housing levels within the station catchments of around 33,400 houses and the levels forecast with all the planned development complete. The level of passenger demand for the scheme to breakeven was estimated to be 495,000 single trips per year resulting in annual revenue of about £1.81m. In order to generate this quantity of trips, assuming the same level of operating costs but excluding capital costs, 232,000 houses would be required. This would result in a negligible positive NPV of £0.1m and a BCR of slightly over 1.0.

Based on a financial assessment there is a significant shortfall of revenue generated in comparison to the operating costs. This has been calculated as £2.865m<sup>1</sup> (exc optimism bias) which corresponds to a further 784,000 trips being necessary for the service to economically

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<sup>1</sup> £3.5m forecast Operating Costs (stated in section 12.5.1) less patronage generated revenue £635,001 (stated in section 10.6.4).

“break even”. The development required to generate this additional quantity of trips would be around 360,000 houses<sup>2</sup>. In the absence of this quantity of trips, the shortfall would require an ongoing subsidy to the same value until the service is included in the franchise arrangements.

Development on this scale is unlikely to be feasible as in order to influence the forecasts and realise the projected patronage levels, this housing increase would have to occur within the 0.8km and 2.8km catchments of the stations. It is not known whether this scale of housing level within the station catchments is physically feasible at this point in time.

The timescale for the potential implementation of Ivanhoe Stage II would seem to have to coincide with both the potential resignalling of Leicester Power Signal Box and the re-franchising of the adjacent services. The reinstatement of Knighton Chord will require changes to the existing signalling which could be accommodated within the resignalling at Leicester planned to take place around 2013-15. In turn, Knighton Chord is considered essential to the efficient operation of the re-opened line as without the Chord, it is not possible to maintain a meaningful service frequency.

The existing rail franchises of East Midlands Trains and Cross Country are due for renewal on the 1<sup>st</sup> of April 2015 the 1<sup>st</sup> of April 2016, respectively. The introduction of new service commitments to the Train Operating Companies would be best combined with the start of a new franchise term. The combination of the two would reduce the complexity and therefore make the cost more bearable.

Both the infrastructure work and the re-franchising are considerably outside the control of Leicestershire County Council. The uncertainty surrounding the future of the Leicester PSB resignalling and the construction of Knighton Chord would seem to indicate that there is little scope at this stage for the Council to influence the future of Ivanhoe Stage II.

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<sup>2</sup> This figure is additional to the existing housing levels and the planned development included in the TEE assessment. It includes the 232,000 houses referred to in terms of the TEE assessment breakeven calculation.

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## 1. INTRODUCTION

### 1.1 Overview

1.1.1 Following an upsurge in public opinion during the 1980's and 1990's some local authorities sought active proposals to have former passenger lines passing through their area re-opened for passenger traffic. Many of these were still open but for the carriage of freight, largely coal and have been shut for passenger use (except specials) since the 1960's Beeching era.

1.1.2 One such line in the East Midlands was the Ivanhoe Line, which covered more than one route. In essence its aim was to re-open some stations on the Midland Main Line (MML) between Loughborough and Leicester, re-open to passenger traffic the freight only line between Leicester and Burton on Trent and new stations between Burton on Trent and Derby on the Cross Country Main Line (XCML). In the event only part of the Ivanhoe project proceeded, the re-opening of stations on the MML and XCML.

1.1.3 A number of studies were commissioned into the Ivanhoe Scheme and these are the subject of review as part of this report.

### 1.2 Client Requirement

Scott Wilson was appointed by Leicestershire County Council to carry out the following:

- a review of the previous reports undertaken on the Ivanhoe Line Stage II project;
- a passenger demand re-appraisal for the Ivanhoe Line Stage II;
- a review of the Operational Costs of Ivanhoe Line Stage II such that the resultant report could be taken as a basis for further re-evaluation at 2008 prices;
- a review of the Capital Costs of Ivanhoe Line Stage II such that the resultant report could be taken as a basis for further re-evaluation at 2008 prices; and
- determine the level of housing growth needed in order that the line would be self supporting in terms of revenue derived from patronage compared to the ongoing operational costs.

### 1.3 Deliverables

The outputs comprise a single, combined report undertaken by Scott Wilson's rail and transport planning divisions and addressing the matters outlined above.

### 1.4 Report Structure

The report falls into four sections. The first will be a re-appraisal of the salient changes that have taken place in the rail industry since the production of the first generation of Ivanhoe Line Stage II reports between 1994 and 2004. This is followed by a passenger demand re-appraisal to assess potential demand. Finally the report takes a more in depth look at the operational and capital costs of implementing the scheme.

## 2. GEOGRAPHICAL CONTEXT

### 2.1 Background

- 2.1.1 The original Ivanhoe concept envisaged a rail service linking Loughborough to Derby via Leicester and Burton on Trent. This will involve bringing back into use the 31 mile rail line through Coalville, which closed to passenger traffic in 1964. Rail freight still uses the line, once an important route for conveying coal and latterly stone.
- 2.1.2 As originally devised in the early 1990's, the rail service frequency would have been hourly with the construction of 16 new stations many of which were replacing those shut in the 1960's. Three routes were involved in the plan; the Midland Main Line (MML) between Loughborough and Knighton Junction (North) south of Leicester, Knighton Junction (North) to Leicester Junction (Burton on Trent) via Coalville and from Leicester Junction (Burton on Trent) to Derby on the Birmingham to Derby Cross Country Main Line (XCML).
- 2.1.3 In the event the project, which spanned the three County Council areas of Leicestershire, Staffordshire and Derbyshire, was split into two and Ivanhoe Stage I – between Loughborough and Leicester – was implemented in May 1994. Part of Stage II between Burton on Trent and Derby also saw one new station, at Willington, opened in 1995 and this is served by local services between Derby, Burton on Trent and Birmingham.
- 2.1.4 The Stage II section between Leicester and Burton on Trent was delayed owing in part to rail privatisation in the mid 1990's, slower than anticipated project implementation by British Rail, over optimistic demand forecasting and structural alterations in the make up of the UK rail industry. Following a scheme re-appraisal in October 1996, which concluded there would be an annual operating deficit of £0.8million, the project was not progressed any further.

### 3. TRANSPORT AND ECONOMIC ANALYSIS

#### 3.1 Background

- 3.1.1 Phase II of the Ivanhoe Project received approval by Government for implementation but ran into difficulties. The privatisation of the railways delayed the project and changed the cost structure of railway operations making the operating costs for Phase II far higher than they had been. This was accompanied by a general high rate of cost inflation in the industry. These factors conspired to make implementation of Phase II much more expensive than had been originally estimated. Subsequent studies have determined that implementing Phase II is likely to bring considerable benefits; nevertheless the consistent conclusion was that it could only operate on a basis of considerable ongoing public subsidy.
- 3.1.2 Previous studies by AEA (2000) and MVA (1999) both forecast that, at that time, around 1100 passengers per day are expected to use Phase II services. These studies focused on revenue over operating costs and did not estimate passenger benefits from time savings or any environmental benefits. Two subsequent studies were carried out (2000, 2004, The Railway Consultancy Ltd) that reviewed and updated the previous work. They critically evaluated the operating and capital costs featured in previous reports, identified savings and included some estimates of additional passenger benefits and non-user benefits.
- 3.1.3 The purpose of the Transport and Economic analysis is to look at the viability of the line again with a view to determining whether the line can ever be operated without significant subsidy to support a shortfall in revenue. Earlier studies of the line have been used as the foundation for this work. Passenger benefits and non-user benefits are considered to the extent of a restricted cost-benefit analysis (RCBA).
- 3.1.4 The current housing growth agenda has prompted this review in order to determine whether the planned growth may justify the re-opening of the railway line to passenger traffic. This growth is forecast to take place between around 2013 and 2026 so the intention has been for this review to be completed sufficiently in advance of the planned growth to enable any identified infrastructure to be implemented.
- 3.1.5 Recent developments in regional planning have changed the projected number of houses likely to be built in the East Midlands Region over the planning period to 2026. Some of this housing may materialise within the catchments of the proposed stations, bringing new rail users. Hypothetical housing scenarios have been created to attempt to make an approximate estimate of the likely impact of new dwellings on the potential viability of the proposed line.

## 4. STUDIES REVIEW

### 4.1 Introduction

4.1.1 A review has been conducted of the following previous reports on the Ivanhoe Stage II project:

- Railway Consultancy Ltd Aug 2000 Ivanhoe Line Stage II review;
- Leicestershire County Council Feb 1997 Ivanhoe Stage II;
- Leicestershire County Council & Derbyshire County Council's Oct 1996 The Ivanhoe Line Financial & Economic re-appraisal; and
- Comments have been made on recommended course of action should any further consideration of the scheme take place.

4.1.2 The most recent of the reports contains the most immediately relevant material but is, in itself, a review of the past work conducted on the project. The earlier reports clearly require the greatest amounts of revision. The engineering inputs and design would need to be reviewed in more detail if the project was to be taken to the next stage. Given the changes in the railway industry in the last twenty years it would be prudent to conduct a completely new cost estimate of the capital works required.

4.1.3 As a result of the recent changes to the franchise landscape in the East Midlands it also seemed worthwhile to conduct a brief review of the context in which Ivanhoe Stage II might come into fruition. This includes the potential infrastructure schemes that might impact on the Ivanhoe Stage II. The most relevant of these are the potential capacity enhancement measures between Felixstowe and Nuneaton. These in turn are dependent upon the resignalling of Leicester itself.

4.1.4 While these schemes do not have a definite timescale or scope they are currently shown in the Freight Rail Utilisation Strategy (RUS) as occurring around 2015. If the Ivanhoe Stage II scheme could be timed to coincide with them it would have two benefits. Firstly, the capacity enhancements could be developed with the needs of Ivanhoe in mind. Secondly, and more importantly, the resignalling of Leicester would make it practical at the same time to make the changes to the signalling layout required as part of the reinstatement of the Knighton Chord.

4.1.5 The two franchises that directly impact on the Ivanhoe project, that of Arriva Cross Country and Stagecoach East Midland Trains (EMT) both began on the 11<sup>th</sup> November 2007. The Arriva franchise finishes on the 1<sup>st</sup> April 2015 while Stagecoach's continues to 1<sup>st</sup> April 2016. This means that the infrastructure schemes may also coincide with the re-franchising period of the train operators in the area. The service level commitments for Ivanhoe could therefore be included in the Franchise specifications for the renegotiated or new franchises either from 2015 or starting at some point in the lifetime of the franchise.

4.1.6 The infrastructure and franchise timescales coinciding in around 2015 might mean that Ivanhoe Stage II is more practical to implement. It would mean that both the capital expenditure (CAPEX) and train operations could be fitted around these events. The result would be that it would be easier to implement the engineering works and would allow the train services to be fully integrated within the franchise specifications.

## 4.2 Ivanhoe Line Stage II review - Railway Consultancy Ltd Aug 2000

- 4.2.1 The Wider Economic Benefits that are alluded to in the report need to be appraised following the DfT's WEBTAG (Wider Economic Benefits Transport Analysis Guidance).
- 4.2.2 The report examined the operational costs of the scheme and concluded that a total saving of 20% on operational costs might be possible. This was anticipated to partly comprise savings from a competitive tender process for the franchise operating the line and from cheaper rolling stock.
- 4.2.3 However, since 2000 no new players have entered the market and the anticipated reductions in the costs of rolling stock leasing have not been realised. The procurement of rolling stock, particularly if it were outside of the normal franchise timescale is difficult and would have cost implications. Much of the rolling stock market is now determined by the franchise award policy of the Department for Transport (DfT). This leaves little flexibility in the market and therefore removes much of the scope for possible savings. This makes the argument for coinciding the Ivanhoe Stage II opening with the start of the new franchise period in 2015 particularly strong as it would enable the rolling stock strategy for the whole of, say the East Midlands Franchise, to be inclusive of the needs of Ivanhoe Stage II. This would be likely to be the most practical and cheapest method of rolling stock provision.
- 4.2.4 It seems unlikely that competitive tendering amongst the Train Operating Companies (TOC's) would result in significant savings. In reality only EMT is well placed to integrate Ivanhoe Stage II within the rest of its services and therefore achieve lower operating costs as a result. During the lifecycle of their current franchise it would not be particularly attractive to setup a new operating commitment. It would be better to tender the services as part of the 2015 or 2016 refranchising of either East Midlands or Cross Country respectively. As part of their wider franchise bids, the bidders' could put forward proposals to operate the new services and this may result in more competitive responses to operate the line as part of a wider franchise commitment.
- 4.2.5 Potential savings of £4.3 million are identified by the report, based largely on the reduction of safety measures and infrastructure required for now redundant freight facilities. These appear to be reasonable with the possible exception of the comments at Bardon Hill. It is not known if the comment that the trains are being marshalled on the Up line at night is still applicable.
- 4.2.6 The suggestion that the platform length is reduced to 2 cars has some merit but could severely restrict the effects of peaking, which could occur early in the scheme. However, it should be ensured that this is the same specification as the Ivanhoe Stage I stations, the shortest of which is 56m at Syston. This needs to be done as these services are likely to be inter-worked and therefore they need to be interoperable.
- 4.2.7 The report comments on Burton on Trent station and junction requirements. This would need to be reviewed, depending on whether it was envisaged that the services terminated at Burton or continued on to Derby. Savings may be possible but would be dependent upon the train service that was actually proposed to operate the route. Some of the de-scoping of the original engineering proposal may be possible. However, it would be dependent on the train service specification. The extent of these savings would need to be calculated as part of the full revaluation of the engineering.

- 4.2.8 The report's conclusions relating to an extension of services to Nuneaton as not being practical, is still valid. The report recommends that the original plan of linking services with Ivanhoe Stage I be reverted to. This recommendation will have even greater weight once EMT introduced a new hourly Derby-Nottingham service in the December 2008 timetable. This may allow units to circulate from Nottingham returning via Leicester, Burton and Derby.
- 4.2.9 The main constraints on capacity exist at Derby and Leicester. The potential Felixstowe-Nuneaton capacity enhancement work may resolve the situation at Leicester. At Derby consideration would have to be given to the capacity for an additional reversing movement in the station arriving from the Burton direction and departing either towards Matlock or Nottingham. The increase in services from the December 2008 timetable may mean that there is little capacity available for an additional train to Derby from Leicester via Burton.
- 4.2.10 Since 2000 there has been a number of changes in the structure of the rail industry and therefore some of the sources of funding. The SRA (Strategic Rail Authority) is no longer in existence, with most of its functions now passed on to the DfT. Railtrack is also no longer in existence, having been replaced by Network Rail. The impact of this on the scheme is that Network Rail's attitude to the scheme may prove to be different to that of Railtrack. Secondly the DfT's role in moving the scheme forward will be far more significant. This is most applicable in terms of the DfT endorsement to include the service specification within the 2015 and 2016 renegotiation of the franchises.
- 4.2.11 The comments on the previous iterations of demand forecasting appear reasonable. However, given that the precise service levels appear to have varied between the forecasting iterations and that the services may yet be linked to Ivanhoe Stage I and other EMT services, it may well prove prudent to re-evaluate and revisit their conclusions in greater detail.
- 4.3 Ivanhoe Stage II – Leicestershire County Council Feb 2000**
- 4.3.1 The main areas of concern that this report highlighted are the inconsistent demand forecasts when compared against actual up take of the Stage I stations. The cost estimates and engineering work were conducted by Mott Macdonald in 1996. They detail all of the work necessary to complete the project.
- 4.3.2 There is a brief discussion of the passenger service specification which showed a Loughborough to Derby service pattern of 14 services in from Derby and 17 services in the opposite direction. The timetable is also assumed to be Monday to Saturday with no operations on Sunday.
- 4.3.3 Given the current capacity constraints in the area it is not practical to have trains terminating at Leicester station and all services would ideally be linked to Ivanhoe Stage I services. It is important that a clearer idea of the train service is developed in conjunction with stakeholders and potential operators. This will allow the infrastructure works to be specified more accurately in light of actual needs. It would also mean that the demand forecast updating could be closely matched to the actual service offering thereby increasing its relevance. It would be assumed therefore that the service quantum would closely match that of the existing Ivanhoe line and could therefore possibly operate on Sundays as well at a reduced frequency.

4.3.4 The main area of discussion is the stopping pattern and capacity between Derby and Burton as abstraction could occur from Cross Country's existing services by the new service between Derby and Burton. A further advantage of timing the introduction with a new franchise commitment is that the stopping pattern of Cross Country trains could be altered to reflect the new hourly service.

#### 4.4 **The Ivanhoe Line Financial & Economic re-appraisal – Leicestershire & Derbyshire County Councils Oct 1996**

4.4.1 This report is a financial and economic reappraisal of the 1989 work and comparison with the cost, benefits and revenue estimates revised to 1996 prices. It also takes into account the actual experience of operating the Stage I stations and the detailed design work and cost estimation conducted by Mott Macdonald. Given that the report is 12 years old, much of the information is now out of date. The main issue being that a lot of the analysis rests on comparisons with the original work conducted even earlier in 1989. Examples of assumptions that have subsequently proved to be otherwise are the year on year reduction of Operational Expenditure (OPEX) due to privatisation.

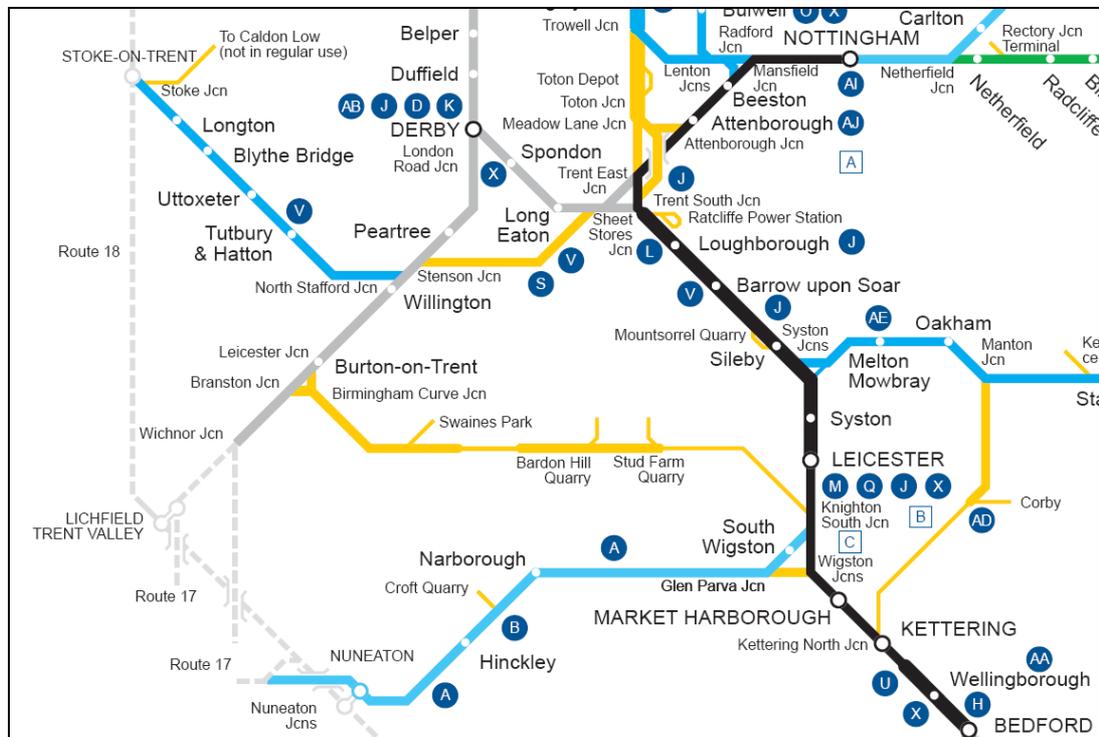
4.4.2 The report sets out the reasons behind the design changes to the signalling and track layout driven by safety standards in the wake of the Clapham Junction train disaster. It also outlines the changes that have occurred as a result of privatisation on the operational costs, rolling stock provision and capital costs.

4.4.3 The other main change in the scope of the scheme in the 1996 report is the inclusion of the reinstatement of Knighton Chord. In the first designs for the scheme a reversal move would have been required to access the branch, rather than allowing trains to run straight on to the branch from Leicester.

4.4.4 Given that the capital costs were produced from the detailed investigations by Mott Macdonald and the operation expenditure has also been recalculated to match the situation that existed in 1996 these can be assumed to be relatively accurate. The demand forecasts were also revised at this point to consider the actual up take of Ivanhoe Stage I. As to the further work required to now bring the report up to date, a similar exercise needs to be conducted as occurred in the mid 1990s in terms of reviewing the work from the late 80s. In the same way that this report compares the revised OPEX, CAPEX, and patronage data, this also needs to be carried out in light of the considerable changes that have occurred since 1996.

## 5. 2007 MIDLANDS RE-FRANCHISING IMPACTS

The figure below is an extract from the rail franchising map showing the area covered by the review.



**Figure 5.1 - 2007 East Midlands rail re-franchising map**

### 5.1 Arriva Cross Country

- 5.1.1 The New Cross Country Franchise combines the majority of the previous Cross Country franchise services currently operated by Virgin Cross Country and the Nottingham - Cardiff and Birmingham - Stansted Airport services previously operated by Central Trains. Covering around 1,500 route miles and calling at over 100 stations - stretching from Aberdeen to Penzance, and from Stansted to Cardiff - CrossCountry is the most extensive rail network in the UK. Its services combine routes that used to be part of Virgin CrossCountry along with the Cardiff-Birmingham-Nottingham, and Birmingham-Leicester-Stansted services previously operated by Central Trains.
- 5.1.2 The franchise began on 11th November 2007 and will end on 1st April 2016. DfT has the right to terminate the franchise after six years if the operator fails to meet agreed performance targets.
- 5.1.3 From the start of the New Cross Country Franchise the level of service the DfT required to be operated on the New Cross Country Franchise is specified in Service Level Commitment 1 (SLC1). SLC 1 commenced on 11<sup>th</sup> November 2007 and ends on 7<sup>th</sup> December 2008.

5.1.4 The SLC1 timetable largely reflected the then existing CrossCountry Trains Ltd services combined with the Central Trains Ltd services between Cardiff Central and Nottingham, the semi fast services between Birmingham New Street and Nottingham, Birmingham New Street and Stansted Airport including the local services between Birmingham New Street and Leicester.

5.1.5 Service Level Commitment 2 (SLC2) will commence with the implementation of the December 2008 timetable change. There will be a number of changes between the new Cross Country Franchise SLC1 and SLC2 timetables including the clear definition of six self contained routes, and the cessation of certain services. The SLC2 timetable is specifically designed to be operationally robust, by removing conflicting moves at Birmingham New Street from the train plan and introducing greater regularity to key New Cross Country Franchise passenger flows. The requirement to operate the Reading – Gatwick Airport/Brighton route will cease in the New Cross Country Franchise at the commencement of SLC2:

5.1.6 The six self-contained routes within the New Cross Country Franchise are defined as follows:

- Route 1: Plymouth – Bristol – Birmingham – Leeds – Newcastle – Edinburgh (certain services will be extended to Penzance, Dundee and Aberdeen and Glasgow);
- Route 2: Reading – Birmingham (routed via Solihull) – Doncaster – Newcastle (A minimum of one service in each direction each day will be extended to Guildford which may be part of Route 4);
- Route 3: Bristol – Birmingham – Stoke on Trent – Manchester (certain services will be extended to Cardiff and Taunton);
- Route 4: Bournemouth – Reading – Coventry – Birmingham – Stoke on Trent – Manchester;
- Route 5: Cardiff – Birmingham – Nottingham (including Birmingham - Nottingham semi-fast services); and
- Route 6: Birmingham – Leicester – Peterborough – Stansted Airport (including Birmingham - Leicester local services).

## 5.2 East Midlands Trains

5.2.1 Stagecoach Midland Rail Limited (a subsidiary of Stagecoach Group plc) was awarded the contract to run the East Midlands franchise. This brings together previous Midland Mainline services from London St Pancras and the eastern section of Central Trains.

5.2.2 The franchise began on 11th November 2007 and runs until 1st April 2015. However the DfT has the right to terminate the franchise after six years if the operator is failing to meet agreed performance targets. The franchise will receive a subsidy in the early years of the franchise and pay a premium in the later years. Over the life of the franchise a premium of £133m (NPV) will be paid to the DfT.

- 5.2.3 Ivanhoe Stage II was not included in the further information of the EMT ITT (Invitation to Tender). The schemes below were drawn to the bidder's attention in the ITT;
- The Thameslink Programme;
  - London 2012 Olympic and Paralympic games;
  - Midland Main Line speed enhancement;
  - New station proposals (e.g. Ilkeston);
  - Major station refurbishment work (e.g. Leicester Station Master Plan); and
  - Intercity Express Programme (ICEP). There is a duty for the franchisee to fully cooperate with ICEP and Derby station canopy renewal.
- 5.2.4 Under the Service Level Commitments 1 and 2, no change was proposed to the quantum or frequency of services on the Lincoln – Nottingham route. EMT were to assume the same timing for crossing the East Coast Main Line (ECML) at Newark as in the December 2006 timetable, but otherwise timings and calling patterns could be adjusted to fit with the Bidder's other timetable proposals. Bidders were requested to investigate the opportunities to make additional calls at Collingham.
- 5.2.5 No change was proposed to the existing quantum or frequency on the Nottingham – Leicester route either, although EMT was encouraged to timetable these trains in such a way that, taken together with Nottingham-St Pancras services, a sensible interval service is provided. All services must call at the 'Ivanhoe' stations and at Loughborough and East Midlands Parkway. EMT was requested to investigate the opportunities to make additional calls at Attenborough and Beeston. The Ivanhoe Stage I stations are therefore included as part of the franchise commitment directly.
- 5.2.6 On the Nottingham – Mansfield – Worksop service at most times a half-hourly frequency is provided between Nottingham and Mansfield, with an hourly extension to Worksop six days a week. EMT was asked to note the introduction of a late evening service on this route. The introduction of a Sunday service formed the basis of a Priced Option.
- 5.2.7 An hourly service was to be provided on the Derby – Stoke – Crewe line, which must operate on fixed pathways.
- 5.2.8 No change was mandated to the quantum or frequency of trains on the Derby - Matlock route, but EMT may wish to consider whether there is a way to improve the morning commuter opportunities. The off peak timetable is operated by one train unit, and is therefore 2-hourly with long layovers between services at Derby. The current demand does not justify the additional resources necessary to increase the service to hourly, but services could be operated at approximately 75-minute intervals without additional rolling stock. This possibility could be explored either for a period in the morning, or as an all-day proposal.
- 5.2.9 A new hourly, all stations (except Spondon - which need only be served four times a day in each direction) service between Derby and Nottingham is required, to operate in addition to the 2 trains per hour provided by the new Cross Country Franchise. This is due to be introduced in SLC2 from December 2008. EMT was asked to note that the Cardiff - Nottingham services provided by the new Cross Country will run non-stop between Nottingham and Derby.

## 6. FREIGHT OPERATIONS

### 6.1 Freight Timetable Leicester – Burton on Trent

- 6.1.1 One constraint to the re-opening of the Ivanhoe Line Stage II is that the current freight services must be maintained. As such, it was necessary to examine the current freight scheduling in order to determine the effects on the planned passenger service frequency.
- 6.1.2 The majority of freight paths in the December 2007 timetable between Knighton Junction and Birmingham Curve Junction are either Q, Y or light engine. That is to say they are irregular and run as and when demanded.
- 6.1.3 As with all freight routes the number of movements per day is far fewer than the number of paths. Only one Q path per weekday is shown on the northern section of the line between Mantle Lane TC and Burton Leicester Junction. There are no paths shown going south towards Birmingham at Branston Junction. A summary of movements is given below in Table 6.1.

Weekdays	Down (towards Burton)	Up (towards Leicester)
Light Engine	6	2
Freight Train	18	19
Saturdays	Down (towards Burton)	Up (towards Leicester)
Light Engine	0	2
Freight Train	6	8
Sundays	Down (towards Burton)	Up (towards Leicester)
Light Engine	3	0
Freight Train	0	0

**Table 6.1 - 2007 Light Locomotive and Freight Train Frequency Leicester – Burton line**

### 6.2 Freight Infrastructure

- 6.2.1 The railway line between Leicester and Burton was originally double track throughout but has been rationalised over the years. At the Leicester end were two double junctions effectively forming a triangle with the line to Burton. The southernmost of the two was known as Knighton South Junction and opened in 1850. The northernmost Junction was known as Knighton North Junction and opened a year earlier in 1849. Linking the two was the Midland Main Line. Both junctions ran westwards as double track to a junction called Saffron Lane. Knighton North Junction to Saffron Lane Junction closed in August 1967 abolishing the latter as a junction. The line from Knighton South Junction (latter re-named Knighton Junction) through Saffron Lane Junction to Desford Colliery Sidings was singled in December 1970 and from Desford Colliery Sidings to Bagworth Junction in June 1986. The section between Bagworth Junction and Mantle Lane Junction remains double track, but from Mantle Lane to Lounge Junction was singled in December 1986.

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- 6.2.2 The reinstatement of the Knighton Chord (from Knighton North Junction to Saffron Lane Junction), as well as enabling the desired service for Ivanhoe Stage II to be provided would also eliminate the need for freight trains to run round at Knighton Junction when approaching the Burton-Leicester Branch from the north.

## 7. OTHER INFRASTRUCTURE SCHEMES IN THE AREA

### 7.1 Introduction

7.1.1 The capacity enhancement plans currently being investigated by Network Rail would involve major work in the Leicester area. Possible plans include the reinstatement of four tracking between Syston and Wigston Junctions. It is anticipated that this would coincide with the resignalling of Leicester Power Signal Box (PSB), which could take place in 2013-15, however this is not certain at this stage. At the same time if the planned Knighton Chord and associated signalling work could be incorporated this would make the implementation of Ivanhoe Stage II far more practical.

7.1.2 The construction of Knighton Chord is considered as key to the viability of the re-opening of the line. While services could run using the existing trackwork, this would involve running along the goods track and reversing into Leicester Station. Operationally, this makes it difficult to maintain any meaningful service at with a reasonable service frequency. Without the construction of Knighton Chord, it is estimated that the service frequency would increase to around 90 minutes with a corresponding decrease in patronage compared to an hourly service. While this would result in a saving to the capital costs, the operating costs would remain comparable to those forecast for the hourly service but with a significant decrease in patronage-generated revenue.

7.1.3 In turn, Knighton Chord can not be constructed without signalling changes, so the Leicester PSB is also a prerequisite to the opening of the service. Although the resignalling scheme is expected to occur in 2013-15, this is not certain and would require the support of the rail industry to guarantee the work is progressed.

7.1.4 Although not coinciding the reinstatement of Knighton Chord with the resignalling would not preclude the works to Knighton Chord, it would result in a significant further cost being incurred by the project which would affect the economic viability of the scheme.

### 7.2 Ipswich To Nuneaton Capacity Enhancement

7.2.1 The principal outputs of the scheme are 16 additional paths, greater network availability, improvement in passenger/freight interactions (particularly where re-routing away from London) and shorter routing for freight trains between the port of Felixstowe and the West Coast Main Line. The estimated cost in the current Control Period (CP4) is £50m. The bulk of the expenditure on this scheme would take place in CP5, in order to exploit synergies with the Leicester resignalling scheme.

7.2.2 The following sub-projects will also be delivered in CP4:

- Doubling of East Suffolk Junction;
- An enhanced run-around at Barham;
- Extension of loops at Ely; and
- Provision of loops for recessing at Peterborough.

7.2.3 These are anticipated to deliver an additional 16 paths in each direction between Ipswich and both the East Coast Main Line and Midland Main Line. The majority of the benefits of the scheme would not be delivered until completion of both Phase 1 and Phase 2 in CP5 when enhancements are completed along the whole route. Upon completion of the Joint Line project in CP4, Phase 1 of the scheme would accommodate growth in inter-modal traffic from the Haven ports to the northeast. In addition, the works at Hinckley will give performance benefits to the additional traffic generated by gauge enhancement and the enhanced capacity of the route.

## **8. OPERATIONAL ISSUES**

### **8.1 Service Linking**

8.1.1 With the introduction of SLC 2 (in December 2008) for the EMT franchise there will be an hourly Nottingham-Derby-Matlock service. In the Invitation to Tender (ITT) for the franchise the commitment is only for an hourly Derby Nottingham service. This could be linked to a number of other destinations including Matlock as selected by EMT. However, if the Ivanhoe Stage II project went ahead it provides the possibility of linking the existing Nottingham Leicester services with the Ivanhoe Stage II services to Derby. This would allow the Ivanhoe Stage II services to be linked, either to the Nottingham Derby service or Matlock Derby service creating an efficient circulation of units.

### **8.2 Infrastructure Compatibility**

8.2.1 It is proposed in the Railway Consultancy Ltd Aug 2000 Ivanhoe Line Stage II Review that the station platform lengths be reduced to 2 cars in length. The Ivanhoe Stage I stations have platforms a minimum of 56 metres in length. Whilst there remains the option of matching the specifications of the two stages, since services that serve both are most likely to be linked by any service actually operated by a TOC, it is recommended that Stage II platforms remain at 4-car length. This is because commuting into Leicester only, rather than commuting across Leicester is likely to require additional capacity, which would be thwarted by limiting the platforms to 2-car lengths.

### **8.3 Competitive Tendering**

8.3.1 It is suggested in the Rail Consultancy Review that operational efficiencies could be achieved in the order of 20% from competitive tendering for the operation of the new route. It is felt that this is unlikely to be the case. The works suggested at Burton on Trent Station would not be necessary if the service is extended to Derby. However, as explored later in this report, this is not the preferred solution.

### **8.4 Sunday Services**

8.4.1 The original proposed timetable indicates no Sunday service and the cost of this may be exceeded by the gain in provision.

### **8.5 Operational Constraints**

8.5.1 There may also be an issue at certain times of the day in reversing Ivanhoe Stage II trains at Leicester given potential capacity constraints.

## 9. TRANSPORT OPTION EXAMINED

### 9.1 Single Option Selection

- 9.1.1 On the basis of careful examination of previous studies and of the work undertaken by Scott Wilson Railways in parallel with this study, a single option has been selected and examined in detail.
- 9.1.2 This is for an hourly service running between Leicester and Burton on Trent as part of an extended Lincoln to Leicester service which also covers the Ivanhoe Stage I stations between Loughborough and Leicester. This will require the least amount of resources to deliver an hourly train service.
- 9.1.3 All of the stations included in the finalised option have been selected with regard to likely patronage levels originating from them. Earlier studies have proposed more stations; however, in today's railway passenger market each individual station on a line must be viable. Further, an excessive number of station stops on a short line length may act to deter some rail patronage at others and reduce the potential for a Train Operating Company to agree to run services on a proposed line in the first place.
- 9.1.4 Based on the consideration of previous studies the number of stations for the project between Leicester and Burton has been evaluated but reduced from twelve to seven. These are:
- Bede Island;
  - Leicester Forest East;
  - Kirby Muxloe;
  - Coalville;
  - Ashby-de-la-Zouch;
  - Moira; and
  - Castle Gresley.
- 9.1.5 Two further stations at Bagworth and Desford were evaluated and considered for inclusion in this option but were rejected due to their very small catchments and likely very low level of rail patronage. These two stations were, therefore, considered very poor value for money.
- 9.1.6 The service would run for 16 hours per day, six days per week. A full service on Sunday may be considered necessary to capture latent tourist demand. The incremental variable costs of running a Sunday service are greater at the margin, largely due to higher staffing and crew costs. The initial, six day, analysis was carried out with a view to testing the impact of a full seven-day service only in the event of the six-day configuration coming close to being viable.

## 10. DEMAND AND REVENUE ESTIMATES

### 10.1 Demand and Revenue

10.1.1 To estimate the annual demand Scott Wilson used the multi-variable regression trip rate model from the Scottish Strategic Rail Study (SSRS) as the basis for estimation. This model has been derived from observed trip rates for a number of locations throughout Scotland using observed passenger data, which was applied to the local demographics and public transport service characteristics. The trip rate model developed is a generic method of assessing potential demand from a wide-ranging set of new services across Scotland. The model has been used by Scott Wilson on a number of occasions in the pre-feasibility stages of railway appraisals and gives a reliable initial indication of likely patronage levels. It is not specifically focused on any given spatial area, but provides a useful high-level demand forecast. The demand equation used is as follows:

$$\text{Demand} = a + (b \times S) + (c \times P1) + (d \times P2)$$

where;

- a, b, c and d are co-efficients estimated from observed data;
- S is the average service level, assumed to be the average generalised speed for the service as a proxy for the average service level;
- P1 is the population level within 0.8 km of the line or station; and
- P2 is the population level within 2.8 km of the line or station.

10.1.2 Table 10.1 below shows the variables used for semi-urban services derived from SSRS.

Variable	Parameter	T-stat
Constant	150.2	1.26
Average Generalised Speed	140.4	1.96
Population <1.0 km	3.2	4.71
Population 1.0 – 2.8km	1.1	1.88
Adjusted R-squared Value	0.82	

**Table 10.1: Model Parameters**

10.1.3 As can be seen from the t-stat values and the adjusted R-squared value, the model shows a good statistical goodness-of-fit to the base data used in SSRS to develop the model.

10.1.4 The 0.8- and 2.8 km catchments might be considered as relatively tight and larger catchments have been used in other recent railway patronage studies. They correspond with the catchments used in the previous studies on the Ivanhoe Line, so making this work more comparable with the earlier work.

10.1.5 No account was taken of the small proportion of rail trips that might be made by passengers living outside of the 2.8 km boundary. It is known from previous empirical observation of the usage on Stage I of the line that a small proportion of travel from the outer area would be likely to exist. An accurate incorporation of this element of demand would require additional work that is beyond the scope of this study. The decision to omit it also makes the demand forecasts for the new stations err on the conservative side.

10.1.6 Previous studies had based their population data on the 1991 census, which is now very out of date. Population data for this study was refreshed using data from the 2001 census. Ward boundaries had changed since the earlier studies so populations were re-collected/estimated at ward level using the new 2003 boundaries. Fractions of the populations within the wards were estimated where necessary.

## 10.2 Demographics Data

10.2.1 Figures for the economically active population (those in employment or “job seekers”) were used, making it possible to grow the figures up to 2008 on the basis of employment forecasts. The employment growth trend used was in line with the national average. The decisions here again tend to make the population forecast for the catchments conservative.

10.2.2 Table 10.2 below shows the 2001 ward populations used, either wholly or in part only, to estimate the station catchments.

Station	Wards	2001 Econ. Active Population	
		< 0.8 km	>0.8 and <2 .8km
Castle Gresley	Church Gresley	2391	
	Linton		2223
	Midway		3471
	Newhall & Stanton		3373
	Swadlincote	1665	
	Woodville		1500
Moira	Moira	2256	
Ashby de la Zouch	Hollywell	2466	
	Castle	1309	
	Ivanhoe	2060	
	Ravenstone		682
Coalville	Coalville	2146	
	Whitwick	3266	
	Snibston	2522	
	Greenhill		2900
	Hugglescote		2200
	Valley (Swannington)		1438
	Thringstone		1547
Kirby Muxloe	Muxloe	1514	378
	Ratby		2036
	Ellis		266
	Forest		2713

Station	Wards	2001 Econ. Active Population	
		< 0.8 km	>0.8 and <2 .8km
Leicester Forest East	Forest	904	
	Winstanley	810	1457
	New Parks	308	1463
	Braunstone Park	307	999
	Ravenhust & Fosse		357
Bede Island	Western Park	997	3990
	Fosse		2501
	Westcotes	4105	457
	Braunstone Park	769	999
	Castle		3206
	Aylestone		538
	Freemen		408
	Ravenhust & Fosse		1071

Source: NOMIS, 2001 Census

**Table 10.2: Wards and Estimated Economically Active Populations for Station Catchments**

10.2.3 Adding the wards for each zone gives the total population for each catchment area. To convert figures to 2008 levels we have assumed the employment growth rate is 1.5 per cent per annum. The station catchments in Leicester overlapped to varying extents and the population figures were adjusted to reflect this. This gave the resulting population data shown in Table 10.3 for each station.

Station	2008 Econ. Active Population	
	< 0.8 km	>0.8 and <2.8 km
Castle Gresley	4502	11728
Moira	2504	0
Ashby de la Zouch	6476	757
Coalville	8806	8973
Kirby Muxloe	1680	5985
Leicester Forest East	2585	4746
Bede Island	6516	10000

**Table 10.3: 2008 Station Catchment Population Estimates - Economically Active Residents**

10.2.4 The above data was used to produce the annual one-way demand flows at each station, to which the patronage forecast as resulting from the planned developments was added. For the purposes of the model, all journeys are converted into standardised single trips, which include return journeys etc.

### 10.3 New Land Use Developments

10.3.1 The demand model was also used to estimate the additional patronage levels due to the planned or committed new land-use developments in the area along the proposed line. Exact details of these new developments are at this time not known but indications of the rough areas were supplied by Leicestershire County Council and Leicester City Council, and are summarised as:

- Housing Allocation - Ashby-de-la-Zouch = 500 houses;
- Sustainable Urban Extension – Coalville area = 4850 houses; and
- Sustainable Urban Extension – Western periphery of Leicester = 4000 houses.

10.3.2 Population numbers for each planned housing development area were derived using an average number of people occupying dwellings sourced from existing data from the census. It was assumed that two thirds of each housing allocation would be realised within the station catchment. This was then allocated to the 0.8 km and 2.8 km distances by the ratio of the areas of the two circles to one another. The resultant population increases were input into the SSRS demand model to estimate the additional trips generated due to the new developments.

10.3.3 The above data produced the following annual one-way demand flows at each station produced by the new developments:

- Bede Island = 152 trips;
- Leicester Forest East = 4,576 trips;
- Kirby Muxloe = 4,576 trips;
- Coalville = 10,880 trips;
- Ashby-de-la-Zouch = 1,258 trips;
- Moira = 153 trips and
- Castle Gresley = 152 trips.

10.3.4 It will be noticed that some small amount of growth occurs at stations where there is no new housing. This is due to the background rail growth generated in the model. All of the housing is assumed to be realised by 2015, the opening year of the scheme. Although it is recognised that not all the planned development will be complete by this time (refer Section 3.1.4) especially in the current economic climate, this is when the re-franchising is due to occur. As such, it has been necessary to model the full patronage at this time.

### 10.4 Total Annual Demand

10.4.1 Adding the new development trips to the annual one-way demand flows gave a figure for total trips of 173,973 per year. This is broken down per each station as:

- Bede Island = 32,003 trips;
- Leicester Forest East = 18,068 trips;
- Kirby Muxloe = 16,537 trips;
- Coalville = 48,928 trips;
- Ashby-de-la-Zouch = 22,814 trips;
- Moira = 8,165 trips; and
- Castle Gresley = 27,458 trips.

10.4.2 The above analysis deals with that part of future housing growth that has some approximate allocated location within the county of Leicestershire. A further assumption was that it will all be built before the opening date for the line of 2015. The Draft East Midlands Regional Plan (July 2008) period extends from 2001 to 2026. Over the 25-year period a total of 94,500 new dwellings are planned in the County. Some of the impact of this housing growth on passenger demand for the proposed passenger line has been accounted for in the analysis described above. Construction of the rest of the housing allocation over time will also have an impact on demand for the line depending on the magnitude of it that is realised within the station catchments. It was decided that some estimates of this impact should be modelled separately from the main appraisal. This is due to the high degree of uncertainty with regard to its eventual location. This aspect of passenger demand was modelled by creating hypothetical scenarios, presuming greater and lesser proportions of the new dwellings eventually being located within, or without of, the proposed station catchments. The further work here is based upon the main appraisal and uses the same assumptions. The further work is described and presented in Sections 14.5 and 14.6.

## 10.5 Tourism Demand

10.5.1 The Ivanhoe line lies within an area that is rich in tourist attractions and it might be assumed that a high number of visitors to the attractions would generate significant demand for the proposed stations. Table 10.4 below shows some of the major visitor attractions along the line along with their visitor numbers.

Visitor Attractions	Annual Visitor Nos. (,000s)*
Conkers Visitor Centre – Moira	212.0
Snibston Discovery Park, Coalville	80.0
Donington Le Heath Manor House - Coalville	24.0
Ashby-de-la-Zouch Castle	11.4
Moira Furnace	7.6
<b>Total</b>	<b>335</b>

Most recently available figures reported for either 2006, 2007 or 2008 (Source: Leicestershire Promotions, courtesy of The National Forest)

**Table 10.4: Leicestershire Visitor Attractions within proposed station catchments**

10.5.2 Beyond these visitor numbers, little additional information about travel to the visitor attractions was obtained, keeping within the scope of the study requirements. However, some very rough idea of the potential demand may only be guessed at, using figures from other forest areas that have both railway stations and a high annual numbers of visitors.

10.5.3 Figures from the Forestry Commission were obtained that gave some idea of the proportions of people travelling by rail to visit events at Delamere Forest, in Northwich. Delamere railway station is served by an hourly service. Feedback from a snapshot visitor survey conducted at a particular event revealed that 87% of visitors travelled to the event by car or van and around 5% travelled by rail.

10.5.4 If we were to apply these figures to the total recorded tourist demand for Ivanhoe, around 43,500 visitors could be expected to travel to events by some mode other than car and 39 per cent of this figure would go by rail. It can be estimated that of a

possible 335,000 visitors a year a maximum of between 16,000-17,000 per year (about five per cent of the total) could potentially travel by rail based purely on the Delamere Forest example. However, it should be recognised that a proportion of these trips are likely to occur on Sundays and Bank Holidays (which this study has considered to be times when the service is not operating). As such, it may be necessary to extend the service in order to realise the full tourist demand (refer Section 9.1.6).

**10.5.5** Basing an analysis on a snapshot survey from one day is a very insufficient level of analysis and no conclusions as to the importance of tourism to the proposed line should be arrived at from it. To give a firmer basis for answering the question of the potential impact of tourism on demand for the line a more detailed investigation would be required. Topics for investigation would include:

- investigating in some detail the demand for travel that the visitor attractors generate;
- the trends in visitor numbers;
- the types of events on offer and market segments they attract;
- the extent of any marketing and promotion; and not least;
- the degree of accessibility between the potential station sites and the visitor attractions themselves; and
- a review of the latest quantitative research in the area of domestic tourist surface travel.

**10.5.6** Since an investigation on this scale was outside of the scope of the brief for this study no firm figures for the increase in demand for the line coming from tourist attractions have been estimated.

## 10.6 Revenues

**10.6.1** Having estimated the demand for each station, we estimated the revenues using average fares derived from existing published information. Fares were sources for existing services in the area and a regression analysis was carried out on the data. The information used is shown in Table 10.5.

Route	Fare (p)
Leicester – Syston	£2.00
Leicester – Sileby	£2.40
Leicester – Barrow	£2.50
Leicester – Loughborough	£3.90
Leicester – Long Eaton	£7.30
Leicester – Spondon	£7.50
Burton – Willington	£4.70

**Table 10.5: Fares Data**

10.6.2 The regression analysis gave the following fares equation in Table 10.6. As can be seen from the t-stat values and the adjusted R-squared value, the model shows a good statistical goodness-of-fit to the base data used.

Variable	Parameter	T-stat
Constant	140.06	1.55
Average Distance	14.52	3.82
Adjusted R-squared Value	0.74	

**Table 10.6: Fares Equation**

10.6.3 Using the average distances of travel and applying the resultant average fare of £3.65 per single trip to the total demand estimates gave the following annual revenues:

- Bede Island = £116,811
- Leicester Forest East = £65,947
- Kirby Muxloe = £60,360
- Coalville = £178,588
- Ashby-de-la-Zouch = £83,271
- Moira = £29,803; and
- Castle Gresley = £100,221.

10.6.4 This gives a total annual revenue stream of £635,001 per annum for the whole line.

## 10.7 Annual Passenger Growth

10.7.1 Having estimated the total demand and revenue for the line, we estimated the annual passenger growths using historic passenger flow data in the area. This was sourced from the MOIRA Rail Model. Information from Leicester station was used as a proxy for flows in the area. Table 10.7 shows the results.

Annual Passenger Growth	Trips
Leicester Station Pax 2003/4	4,756,362
Leicester Station Pax 2002/3	4,403,947
Leicester Station Pax 2001/2	4,048,122
Growth 2001/2 to 2003/4 =	18%

**Table 10.7: Observed Passenger Growth**

10.7.2 The above suggests the average growth per annum was 9%, however since Leicester station has a larger catchment area with higher-valued demographic characteristics we have erred on the side of caution and taken one-third of this figure (3% per annum).

## 10.8 Passenger Distribution

10.8.1 Passenger distribution was sourced from Census Journey-To-Work data. Information for key wards in each station catchment was used and the study area was split into 6 zones to take account of different origin-destination (OD) patterns as a proxy for flows in the area. Table 10.8 shows the zones used and the resultant distribution values obtained.

Zone No	Zone name	Stations in Zone	Percentage of observed trips
1	West External	Burton	4%
2	Line West	Castle Gresley, Moira	7%
3	Line Central	Ashby de la Zouch, Coalville, Kirby Muxloe	11%
4	Line East	Leicester Forest East	28%
5	East External	Bede Island, Leicester	38%
6	North External	Loughborough	12%

**Table 10.8: Zoning System for Trip Distribution**

10.8.2 The estimated demand flows from each station were assigned to the above distribution to give the pattern of movements through the study area. To convert them from passenger trips to vehicle movements, they were divided by an assumed average vehicle occupancy of 1.23.

10.8.3 The final step was to estimate the annual vehicle kilometres (veh-kms) of travel and vehicle hours (veh-hrs) of time saved. The distributed trips (in vehicles) were multiplied by the average distances between the zones to give the annual veh-kms of travel. The annual veh-hrs of time saved was obtained in a similar manner, except using the observed delays for each trip distribution end. Average delays were sourced from a study supplied by Leicestershire County Council entitled “6Cs Congestion Management Study”, (2008). These are likely to be higher now than when the original surveys were carried out, which could mean our estimates are somewhat conservative. In addition, we have not applied any growth rates to the time delays due to congestion, which could, again make them inclined towards the conservative side.

10.8.4 Vehicle operating costs (VOC) savings were estimated using the predicted kilometres-travelled. Using values from WebTAG and average default data, a monetised value of 8.2 pence per km was used to derive VOC benefits.

10.8.5 De-congestion benefits were also estimated, using values from WebTAG and average default data, a monetised value of 12.7 pence per km was used to derive de-congestion benefits.

## 11. SCHEME RAIL SERVICE OPTIONS

### 11.1 Background

11.1.1 As detailed in Section 2, the original Ivanhoe concept envisaged a rail service linking Loughborough to Derby via Leicester and Burton on Trent which closed to passenger traffic in 1964. The line is still used by rail freight generally conveying coal and stone.

11.1.2 Planned in the early 1990's, the rail service frequency was anticipated as being hourly.

### 11.2 Operating Cost Re-Appraisal

11.2.1 As part of the scheme brief, Scott Wilson was tasked with re-evaluating the operating costs for this project. The operating costs of a local passenger service will be dependent upon a number of factors and these include:

- Train leasing costs;
- Track access charges;
- Station/asset lease charges;
- Maintenance costs;
- Fuel costs;
- Train cleaning/victualling costs;
- Station cleaning costs;
- Train crew costs;
- Station staffing costs;
- Station security monitoring costs (cctv); and
- Route management, administration and overhead.

11.2.2 Whilst some of these costs will be fixed e.g. station asset/lease charges, others will vary according to the number of train sets required and thus mileage operated and will impact on the staffing requirement. Similarly the staffing levels of stations and their opening hours will have an impact on overall costs.

11.2.3 It is thus necessary to determine the service requirement in order to ascertain the level of costs.

### 11.3 Service Requirement Definition

11.3.1 The Ivanhoe Line Stage II study undertaken by LCC and published in February 1997 indicates approximate journey times. These are an important constituent of fleet requirements and consist of three elements:

- how long does it take a train to traverse the route in question?
- at each station what is the expected station dwell times?
- what are the minimum turnaround times at the terminal stations?

11.3.2 Train journey time information is now undertaken by a simulation package such as RailSys, which takes into account the design characteristics of the route and the rolling stock to indicate run times. The LCC 1997 study estimated journey time by use of a spreadsheet model. This report checks these times but uses them as the basis for evaluation.

- 11.3.3 Station dwell times are laid down in the Network Rail Publication Rules of the Plan (RotP) a document, which assists train planners and Network Rail by defining the parameters regarding train operations in certain areas. Amongst other information RotP covers information on route opening times, the type of signalling used, turnround times at stations used to terminate services (this can be quite detailed altering not only by platform but by stock type), margins at junctions between conflicting train moves, headway allowances between succeeding trains and platform lengths at stations.
- 11.3.4 Intermediate station dwell times vary typically 30 seconds or occasionally a minute. There is a tendency now to allow 45 second dwell times shown alternatively as 30 seconds and then one minute.
- 11.3.5 As stated in section 11.3.3 turnround times at stations are given in RotP. This data will be used to ascertain the total cycle time for a train set. Cycle time being the sum of:
- TTT (Train Travel Time) -the cumulative time a train spends moving from section to section;
  - PET (Performance & Engineering Time) – the time specified for engineering and performance allowances;
  - SDT (Station Dwell Time) – the time a train is scheduled to remain at intermediate stations; and
  - TRT (Turnround Time) – the time train sets spend between completing one service and commencing the next. Used when rolling stock is fully or partially dedicated to a route for all or part of a day.
- 11.3.6 It is common to consider an interim measure called Overall Journey Time (OJT) which would be the sum of TTT + PET + SDT. The OJT would be calculated for each direction and to this would be added the TRT at each end of the route to calculate the Overall Cycle Time (OCT). The calculation of the data is usually in minutes. This figure is divided by the service interval in minutes to ascertain the base train requirement. The actual number of train sets required will depend upon whether trains need to be strengthened during peak times of operation.

11.3.7 An example of the above would be as follows:

	A – B	B – A	Total
Train Travel Time	27 mins	28 mins	55 mins
Performance & Engineering Time	2 mins	2 mins	4 mins
Station Dwell Time	1½ mins	1½ mins	3 mins
Overall Journey Time*	30½ mins	31½ mins	63 mins
Turnround Time B	6 mins		6 mins
Turnround Time A		10 mins	10 mins
Overall Cycle Time			78 mins
Service frequency (trains per hour)			60 mins
Train requirement			2 trains

Note: \* Trains are not permitted to arrive at terminal stations on half minutes, thus OJT is rounded up to the next whole minute.

**Table 11.1: Train Set Requirement Calculation 1 Train Per Hour**

11.3.8 If the train service interval is hourly the train requirement is  $78/60 = 1.3$  trains or 2 trains. If the service interval is 30 minutes the train requirement is  $78/30 = 2.6$  trains or 3 trains as shown in Table 11.2 below.

	A – B	B – A	Total
Train Travel Time	27 mins	28 mins	55 mins
Performance & Engineering Time	2 mins	2 mins	4 mins
Station Dwell Time	1½ mins	1½ mins	3 mins
Overall Journey Time*	30½ mins	31½ mins	63 mins
Turnround Time B	6 mins		6 mins
Turnround Time A		10 mins	10 mins
Overall Cycle Time			78 mins
Service frequency (trains per hour)			30 mins
Train requirement			3 trains

Note: \* Trains are not permitted to arrive at terminal stations on half minutes, thus OJT is rounded up to the next whole minute.

**Table 11.2: Train Set Requirement Calculation 2 Trains Per Hour**

11.3.9 In the example above two other factors are demonstrated. The first is where the OCT gives a lengthy un-productive down time. In this case 42 minutes (120 minutes minus 78 minutes), 120 minutes being derived from the maximum the OCT could be and still require 2 trains with a 60 minute service frequency. An option in this case would be to explore whether the service could be extended so greater benefits might be yielded from operating the same resources over a longer route. The second factor is to increase service frequency. In the example doubling the frequency does not give rise to a doubling of the operational cost since an hourly service will require two trains but a half hourly service will only require three trains not four.

#### 11.4 Original Service Requirement

11.4.1 The LCC 1997 study envisaged the provision of an hourly service between Loughborough and Derby. Data given in Appendix 1 of the study showed that the journey time was 99½ minutes to cover the 55.4 mile journey. This was based on there being 19 intermediate stations all with a dwell time of 1 minute except Leicester, which was given 3 minutes. However, no allowance was made for any engineering or performance time, which on a journey of this length would be at least two minutes. Equally dwell times are somewhat over lengthy at 1 minute and a more modern application is to make these 45 secs, displayed alternately as 30 second and 1 minute dwells.

11.4.2 Based on the original data this would yield the following:

	Loughborough – Derby	Derby - Loughborough	Total
Train Travel Time	78½ mins	78½ mins	157 mins
Performance & Engineering Time	0 mins	0 mins	0 mins
Station Dwell Time	21 mins	21 mins	42 mins
Overall Journey Time*	99½ mins	99½ mins	200 mins
Turnround Time Derby	20 mins		20 mins
Turnround Time Loughborough		6 mins	6 mins
Overall Cycle Time			226 mins
Service frequency (trains per hour)			60 mins
Train requirement			4 trains

Note: \* Trains are not permitted to arrive at terminal stations on half minutes, thus OJT is rounded up to the next whole minute.

**Table 11.3: Train Set Requirement Loughborough – Derby LCC 1997 Study**

11.4.3 With slightly modified data of reduced dwell times and a PET of 2 minutes this produces the following (an error in the addition of the TTT has been corrected):

	Loughborough – Derby	Derby – Loughborough	Total
Train Travel Time	77½ mins	77½ mins	155 mins
Performance & Engineering Time	2 mins	2 mins	4 mins
Station Dwell Time	16½ mins	16½ mins	33 mins
Overall Journey Time*	96 mins	96 mins	192 mins
Turnround Time Derby	20 mins		20 mins
Turnround Time Loughborough		6 mins	6 mins
Overall Cycle Time			218 mins
Service frequency (trains per hour)			60 mins
Train requirement			4 trains

Note: \* Trains are not permitted to arrive at terminal stations on half minutes, thus OJT is rounded up to the next whole minute.

**Table 11.4: Train Set Requirement Loughborough – Derby Modified Dwell Times**

## 11.5 Modified Service Requirement

11.5.1 Scott Wilson has suggested that the number of stations between Leicester and Burton on Trent be reduced from 12 to 7. Table 11.5 shows this effect.

	Loughborough – Derby	Derby – Loughborough	Total
Train Travel Time	77½ mins	77½ mins	155 mins
Performance & Engineering Time	2 mins	2 mins	4 mins
Station Dwell Time	13 mins	13 mins	26 mins
Overall Journey Time*	92½ mins	92½ mins	186 mins
Turnround Time Derby	20 mins		20 mins
Turnround Time Loughborough		6 mins	6 mins
Overall Cycle Time			212 mins
Service frequency (trains per hour)			60 mins
Train requirement			4 trains

Note: \* Trains are not permitted to arrive at terminal stations on half minutes, thus OJT is rounded up to the next whole minute.

**Table 11.5 Train Set Requirement Loughborough – Derby Reduction In Stations**

11.5.2 Thus, in this instance a reduction in the number of stations and dwell times does not reduce the overall train set requirement.

11.5.3 A comparison has also been undertaken of the train set requirement for two other routes:

- Loughborough to Burton on Trent; and
- Leicester to Burton on Trent.

11.5.4 Table 11.6 evaluates the requirement for both an hourly and half hourly service between Loughborough and Burton on Trent where it can be seen that on a dedicated service the train requirement is 3 for an hourly service and 6 for a half hourly service. Thus there is no corresponding saving in operating costs by increasing the service frequency.

15.1.1 Table 11.7 evaluates the requirement for both an hourly and half hourly service between Leicester and Burton on Trent where it can be seen that on a dedicated service the train requirement is 3 for an hourly service and 6 for a half hourly service. Thus there is no corresponding saving in operating costs by increasing the service frequency.

11.5.5 The minimum number of train sets that are required to deliver the service is thus 3, both for a Loughborough and Leicester to Burton service. The cost of starting at Loughborough as opposed to Leicester could be evaluated and then traded off against future demand. Previous studies have indicated that cross-city demand in Leicester is unlikely to be significant.

	Loughborough – Burton on Trent	Burton on Trent – Loughborough	Total
Train Travel Time	64½ mins	64½ mins	129 mins
Performance & Engineering Time	2 mins	2 mins	4 mins
Station Dwell Time	10½ mins	10½ mins	21 mins
Overall Journey Time	77 mins	77 mins	154 mins
Turnround Time Burton on Trent	15 mins		15 mins
Turnround Time Loughborough		6 mins	6 mins
Overall Cycle Time			175 mins
Service frequency (trains per hour)			60 mins
Train requirement			3 trains
Service frequency (trains per hour)			30 mins
Train requirement			6 trains

**Table 11.6: Train set requirement Loughborough – Burton on Trent**

	Leicester – Burton on Trent	Burton on Trent – Leicester	Total
Train Travel Time	48 mins	48 mins	96 mins
Performance & Engineering Time	2 mins	2 mins	4 mins
Station Dwell Time	5 mins	5 mins	10 mins
Overall Journey Time	55 mins	55 mins	110 mins
Turnround Time Burton on Trent	15 mins		15 mins
Turnround Time Leicester		10 mins	10 mins
Overall Cycle Time			135 mins
Service frequency (trains per hour)			60 mins
Train requirement			3 trains
Service frequency (trains per hour)			30 mins
Train requirement			6 trains

**Table 11.7: Train set requirement Leicester – Burton on Trent**

- 11.5.6** There is also an additional option. Current local train services on Ivanhoe I are provided by an hourly Lincoln to Leicester service. These trains arrive in Leicester at approximately 23 minutes past the hour (xx:23) and turnround to leave at 32 minutes past the hour (xx:32) as shown in Table 11.8 overleaf. Given an overall journey time to Burton Trent of 55 minutes this would put a train into Burton at x1:19 allowing for a three minute SDT at Leicester. With a 15 minute turn round the train could leave at x1:34 arriving back in Leicester at x2:29 in time to meet the xx:32 departure to Lincoln. Trains can leave Leicester at xx:24 towards Burton because the 2 minute PET would become part of the SDT at Leicester.
- 11.5.7** Currently to serve the 09:32, 10:32 and 11:32 departures to Lincoln requires three trains as shown in columns 3 to 5 in Table 11.8 overleaf. Column 6 shows that an extension to Burton on Trent will incur two extra trains since the train arriving in Leicester at 09:23 will leave for Lincoln at 11:32 necessitating additional trains to cover the 09:32 and 10:32 departures.
- 11.5.8** Thus the most cost effective way of providing the original service would be by extending the Lincoln to Leicester service on to Burton on Trent.

		Train 1	Train 2	Train 3	Train A
Leicester	Arr	09:23	10:23	11:23	09:21
	Dep	... ..	... ..	... ..	09:24
Burton on Trent	Arr	... ..	... ..	... ..	10:19
Burton on Trent	Dep	... ..	... ..	... ..	10:34
Leicester	Arr	... ..	... ..	... ..	11:29
	Dep	09:32	10:32	11:32	11:32

**Table 11.8: Train Set Requirement Lincoln - Leicester – Burton On Trent**

## 12. SCHEME RAILWAY OPERATIONAL COSTS

### 12.1 Train Set Overview

12.1.1 The proposed operational costs for Ivanhoe Line have proved elusive to acquire as East Midlands Trains, the incumbent train operator, has been unable to furnish costs on a par with those supplied to Leicestershire County Council in 1997 for earlier studies.

12.1.2 One of the first tasks was to ascertain the most efficient method of operation, i.e. to determine the minimum number of train sets that would deliver the most productive level of service. In determining this, notice was taken of Network Rail's 2008 Rules of the Plan, which stipulates planning timings at terminal stations. This is fundamental in determining layover times between successive services.

12.1.3 In terms of route options the following were evaluated:

- Loughborough to Derby;
- Loughborough to Burton on Trent; and
- Leicester to Burton on Trent.

12.1.4 Analysis showed that the most cost effective of these in train set utilisation was either Loughborough or Leicester to Burton on Trent. Depending upon service frequency this would require 3 train sets for an hourly service and 6 train sets for a half hourly service. However a further option presented itself, which was consideration to extend the existing Lincoln – Nottingham – Leicester service.

12.1.5 Analysis of this latter option proved that it saved a train set and was thus the best option to pursue. The saving was achieved in turnaround time at Leicester, which was avoided and was sufficient to permit the operation of one less train set, i.e. a total of 2 train sets.

### 12.2 Train Set Costs

12.2.1 Train set costs consist of the following elements:

- Train set leasing charges;
- Train set staffing costs (these do not include any additional staffing at stations or inspectors or management); and
- Train set running costs.

12.2.2 These costs are shown in the following tables.

Cost	cost per item	No. required	Total Annual Cost
Train set Lease	£500,000	2	£1,000,000
Driver	£70,000	7	£490,000
Conductor	£60,000	7	£420,000
TOTAL			£1,910,000

**Table 12.1: Train Set Leasing And Staffing Costs**

Mileage	No. of miles per day	No. of miles per week	No. of miles per year
Off-service	128	768	39,680
In service	1,018	6,108	315,580
TOTAL	1,146	6,876	355,260

**Table 12.2: Train Set Mileages**

Item	Cost per train mile	No. of miles per year	Annual cost
Fuel	£0.41	355,260	£145,694
Maintenance*	£1.74	355,260	£618,152
TOTAL	£2.15	355,260	£763,846

Note \*Maintenance is for two train sets £1.74 per mile per set. Each set covers 177630 miles

**Table 12.3: Train Set Running Costs**

### 12.3 Track Access Charges

12.3.1 Track Access charges fall into two areas: fixed and variable. They are levied upon the train or freight operating company both to give access to the line and reimburse a contribution to Network Rail for keeping the line open for the available traffic. This may vary of course by time of day or day of the week.

12.3.2 The fixed costs for this line will largely be determined upon the signalling requirements. Discussions with Network Rail suggest that two signal boxes will need to be kept open for two shifts and that this will incur staffing costs amounting to 5 signallers.

Staff Cost	Cost	No. required	Annual Cost
Signaller	£60,000	5	£300,000

**Table 12.4: Track Access Fixed Charges**

12.3.3 The variable costs will be dependent on the original Capital Costs and the level of upgrade that is committed to at the outset. A figure of £0.08 per train set per mile has been suggested.

Variable Cost	No. of trains	Mileage per train	Annual Cost
£0.08 per train mile	2	177,630	£28,421

**Table 12.5: Track Access Variable Charges**

## 12.4 Station Leasing Charges

12.4.1 Unless otherwise agreed, virtually all railway assets in the form of stations are owned by Network Rail. There is therefore a station lease charge payable to Network Rail by the lead train operating company for services calling at these stations.

Cost	No. of stations	Cost per station	Annual Cost
Station	7	£5,000	£35,000

**Table 12.6: Station Leasing Charges**

## 12.5 Total Direct Operating Costs

12.5.1 Table 12.7 shows the total direct operating costs for this scheme at 2008 prices. Other costs for train and station cleaning will need to be ascertained as well as marketing and general overhead. It is our belief that a **total annualised figure of £3.5M** be estimated for the total operational costs of the scheme.

Cost	Cost per day (6)	Cost per week (52)	Annual Cost
Drivers	£1,571	£9,423	£490,000
Conductors	£1,346	£8,076	£420,000
Fuel	£467	£2,802	£145,694
Maintenance	£1,981	£11,888	£618,152
Train Leasing	£3,205	£19,231	£1,000,000
Station Leasing	£112	£673	£35,000
Track Access Fixed	£962	£5,769	£300,000
Track Access Variable	£91	£547	£28,421
<b>TOTAL</b>	<b>£9,735</b>	<b>£58,409</b>	<b>£3,037,267</b>

**Table 12.7: Total Direct Operating Costs**

## 13. SCHEME RAILWAY CAPITAL COSTS

### 13.1 Approach and Methodology

- 13.1.1 As a further part of the brief, Scott Wilson was asked to consider an update of the capital costs for the Ivanhoe Line Stage II Scheme. The basis for the appraisal was reference to the 1997 Leicestershire County Council report into the scheme as this was the most comprehensive piece of work undertaken.
- 13.1.2 The line from Leicester to Burton on Trent has been systematically changed since the 1960's, first to meet the needs of the coal transportation sector and more recently the rail aggregates market.
- 13.1.3 The original basis for re-examination of the capital costs came from the operational re-appraisal, which has concluded that the most economical solution is a two train set operation working to an hourly frequency extending the Lincoln – Nottingham – Leicester service on to Burton on Trent. It is on this basis that the following costs have been calculated.
- 13.1.4 As part of the economic re-appraisal it was viewed that the number of the stations on the scheme should be reduced from 12 to 7. The stations considered are:
- Bede Island;
  - Leicester Forest East;
  - Kirby Muxloe;
  - Coalville;
  - Ashby-de-la-Zouch;
  - Moira; and
  - Castle Gresley.
- 13.1.5 In order to keep construction costs to a minimum it is our opinion that the project should be staged and to this end we recommend that all stations should initially consist of just a single platform, thus obviating the need for cross track access be that footbridges or subways.
- 13.1.6 In order for this to be operationally robust, it is suggested that where a station is located on double track the line adjacent to the platform be restricted to passenger trains and be bi-directionally signalled as indeed should the far track, which would be bi-directionally signalled for freight trains.
- 13.1.7 Where double track does not exist at a site with a proposed station there may be a need to create a passing loop so that passenger trains and freight trains may operate independently of each other.
- 13.1.8 Whilst undertaking the capital cost appraisal, it became apparent that an alternative pre-scheme option could present itself for examination. That is for a single train set to be used to provide a service between Leicester and Bede Island/Leicester Forest East and Coalville only to establish a base traffic level from which a more extensive service could be developed. It may even be possible to do this without re-installing the Knighton Chord; however it is not anticipated that the service frequency would match the planned 1 hour service without the Chord and hence patronage would be expected to be lower.
- 13.1.9 This has been examined using a programme called SWIFT (Scott Wilson Integrated Future Train Timetabling) which showed that no benefit would accrue from this

approach. The journey times can be reduced with such an approach, but saving the cost of the Knighton Chord only becomes possible if line speed is enhanced to 60mph and then a service interval of a train once every 75 minutes would be the best that could be achieved. No costing of this option has been undertaken.

## 13.2 Costing Assumptions

13.2.1 The following assumptions have been assumed:

- all structures are fit for use by dmu traffic at a line speed of 45mph based on current use by RA8/RA10 traffic at 20mph;
- all existing structures are able to accommodate a two-track railway;
- platform lengths based on Cass 15X dmus (23m vehicle length);
- basic station facilities to be provided i.e. minimum platform width, shelter, station unstaffed;
- disabled access provided at all new stations;
- use of standard design at all new stations; and
- track solum is wide enough to accept a two track railway without earthworks being required.

## 13.3 Review Of Physical Work Costs

13.3.1 A summary of the revised capital cost estimates is shown in Table 13.1.

Item	Costs (2008)	Comments
Preliminary Works	£5,500,000	See 13.3.2
Land	£1,000,000	See 13.3.3
Permanent Way (new)	£6,688,800 <sup>1</sup>	See 13.3.4
Permanent Way (improvements)	£1,237,500	See 13.3.5
Other route improvements	n/a	See 13.3.6
Stations	£3,618,000	See 13.3.7
Signalling	£5,141,857	Indexed up
Telecommunications	£750,000	Estimate
Bridges & Structures	£1,000,000	Estimate
Contractor Costs	£1,200,000	Estimate
Construction Services	£2,250,000	Estimate
Miscellaneous Costs	£300,000	Estimate
Contingency	£2,000,000	Estimate
Maintenance Work Forward	£2,000,000	Estimate
Third Party Representative	£375,000	See 13.3.7
<b>TOTAL</b>	<b>£33,061,157<sup>2</sup></b>	

<sup>1</sup> Works assumed to take place following the resignalling of Leicester PSB. Refer to sections 7.1.2 – 7.1.4 for details of coinciding Knighton Chord with Leicester PSB.

<sup>2</sup> Figures exclude optimism bias. Refer to section 14.3.6.

**Table 13.1: Review of Physical Works Costs**

- 13.3.2 Preliminary Works are assumed to be the demolition and relocation of affected businesses at Knighton on the proposed Knighton Chord. This figure has been increased from the previous studies due to the development of part of that area. The costs include the purchase and demolition of the existing industrial units and the relocation of part of the existing police station car park. Since the earlier studies were completed, the area around the planned location of the Chord has been developed and much of the land is now occupied. Alternatives have been considered in place of Knighton Chord; however, development around the area is similar on all sides of the Knighton junction area such that the Chord remains the preferred option at this stage.
- 13.3.3 The figure for land is an estimate as it has not been possible to make a more detailed valuation at this stage.
- 13.3.4 The new Permanent Way would include the Knighton Chord (which may have to be double track), passing loops and re-doubling of track from the former Saffron Lane Junction to Bede Island station and from Coalville to Lounge Junction. This cost has been wholly attributed to the scheme at this stage. As the Chord will be utilised by the freight traffic it is possible that a contribution could be made towards the cost of the upgrade. However, at this stage this can not be quantified and is outside the control of Leicestershire County Council, so no allowance has been made in the costs.
- 13.3.5 Improvements to the existing Permanent Way include the upgrade of 8.25km of track and ensuring this is suitable for 45mph operation.
- 13.3.6 An allowance of £3.6m was included in the 1997 study for route improvements,. However, the study does not explain what works this covered. As such, given the bounds of this study, it has not been possible to assess whether any future allowance should be included in the capital costs.
- 13.3.7 Station costs are based upon 7 stations and 4 car single platforms 102m in length. If 2 car platforms are specified costs are reduced to £3,068,000. The cost breakdowns are given in Appendix II.
- 13.3.8 Third Party representation would be over a three-year timescale with a one-year design and two years construction.

## 14. ECONOMIC ANALYSIS

### 14.1 Background

14.1.1 This chapter summarises the economic appraisals of the options. Before presenting the results the development of a spreadsheet model to perform the many calculations of the individual streams of capital costs, on-going outlays due to operation and maintenance is described, as are the many different benefits that accrue as a result of the different options and the extra train services they provide. A comparison of the resulting benefit/cost ratios of the proposals is then summarised.

### 14.2 Development of a Restricted Cost/Benefit Analysis (RCBA) Model

14.2.1 In order to appraise the benefits and costs of the new stations, a Restricted Cost/Benefit Analysis (RCBA) spreadsheet model was developed. The emphasis on this appraisal was not to provide an exact, detailed, estimate but to allow for a high-level indication of whether the project is worth pursuing at a more detailed level of assessment. The model contains the following features:

#### *Costs*

- capital costs – broken down into phases; and
- operating/running costs – per annum.

#### *Benefits*

- revenues – obtained from the estimated trips; and
- societal benefits (i.e. the estimated value of road de-congestion time- and vehicle operating-cost savings).

#### *Other Data*

- annual discount rates; and
- an assumed opening year of 2015.

#### *Period of Analysis*

- the period of analysis is 60 years, with an annual discount rate of 3.5% for the first 30 years and 3.0% per annum for the remainder of the period. This is in line with the Transport Appraisal Guidance by the DfT.

14.2.2 The revenues used were those estimated from the calculations described in the earlier chapters of this report, grown for each year to take account of estimated fares increases. The value of benefits to society was estimated using the DfT's monetised benefit factors. This allows for the benefits of road de-congestion, accident savings, etc.

### 14.3 Costs and Revenue Forecasts

14.3.1 Estimates of capital costs, operating costs and revenue generated by patronage are as set out in Table 14.1 and are derived from Chapters 10, 12 and 13 of this report.

Capital Cost	Annual Operating Cost	Patronage Revenue
£33,061,157	£3,500,000	£635,001

**Table 14.1: Summary of Estimated of Capital Costs, Operating Costs and Patronage Revenue**

- 14.3.2 It is worth comparing the above cost estimates with those from the previous studies. Capital costs received from previous studies are now too old to be able to be de-scoped or refreshed with a fair degree of accuracy. Factoring up previous cost estimates by an annual inflation of 6% (the average rate of rail cost inflation since) brings about a figure of around £14m. This figure is far too low to be realistic.
- 14.3.3 Consequently, for this revised Economic Appraisal we have used the values shown in Table 14.1, namely £33.1m for capital costs and £3.5m for annual operating costs (both values are in 2008 prices).
- 14.3.4 The reinstatement of trackwork including the Knighton Chord and double track as far as Bede Island and between Coalville and Lounge Junction are substantial capital costs and included within the capital cost figure. Re-laying the Knighton Chord would also eliminate the need for freight trains to run round at Knighton Junction when approaching the Leicester-Burton line from the north.
- 14.3.5 The reinstatement of Knighton Chord will in effect be impossible without the resignalling of Leicester PSB. The introduction of new service commitments to TOCs would be best combined with the start of a new franchise term. The combination of the two would reduce the complexity and therefore make the cost more bearable.
- 14.3.6 The DfT “Guidance on Rail Appraisal” requires a correction to allow for the risk of under-estimating capital and operating costs of rail schemes. This is known as an allowance for “Optimism Bias”. Both capital and operating cost estimates are in 2008 prices and do not include allowances for “Optimism Bias”, and hence the values in Table 14.1 were adjusted accordingly. For a scheme at the pre-feasibility stage of development the recommended adjustments are +66% and +41% for capital and operating costs respectively. After applying these adjustments to the figures in Table 14.1 the Optimism Bias adjusted estimates of capital and operating costs are as set out in Table 14.2.

Capital Cost + 66%	Annual Operating Cost + 41%	Patronage Revenue + 41%
£52.882m	£4.935m	£895,351

**Table 14.2: Optimisation Bias Adjusted Estimates of Capital Costs, Operating Costs and Patronage Revenue**

- 14.3.7 Earlier studies had assumed some developer contributions towards capital costs of approximately £200,000 per year for a ten-year period around the construction phase. A total developer contribution of £2m has been assumed over the life of the TEE Appraisal, and this figure was removed from the above adjusted capital cost estimate to give the total value used in the TEE Appraisal (**£50.882m in 2008 prices**). The annual operating cost of **£4.935m in 2008 prices** remains unchanged.
- 14.4 Results of the Base Case Appraisal**
- 14.4.1 The calculations have been carried out for a Restricted Cost/Benefit Analysis (Restricted CBA). Tables 14.3 and 14.4 show the results excluding and allowing for the optimism bias allowance respectively.

Restricted CBA Indicator	Results
Net Present Benefits (NPB)	£47.856m
Net Present Costs (NPC)	£80.079m
Net Present Value (NPV)	-£32.222m
Benefit/Cost Ratio (BCR)	0.60

**Table 14.3: Economic Analysis Estimates of Capital and Operating Costs**

Restricted CBA Indicator	Results
Net Present Benefits (NPB)	£47.856m
Net Present Costs (NPC)	£119.007m
Net Present Value (NPV)	-£71.151m
Benefit/Cost Ratio (BCR)	0.40

**Table 14.4: Optimism Bias Adjusted Economic Analysis Results**

14.4.2 The above suggest that, with or without optimism bias, the proposals generate a high negative return. Clearly, this is based on a restricted CBA and a full CBA could yield more positive benefits such as modal shift, road safety benefits and wider economic benefits. By the same token, a more detailed and wide ranging analysis of costs, particularly capital costs may mitigate the very low BCR to some extent. To have more certainty a multi-modal modelling exercise and full Transport Economic Efficiency (TEE) Appraisal would need to be carried out.

## 14.5 Future Housing Growth in Leicestershire and Likely Impact on Passenger Demand

14.5.1 Part of the brief for this study asked for analysis of the impact of planned housing growth in Leicestershire on the likely demand for the proposed Ivanhoe Stage II scheme. A number of hypothetical scenarios were created, bound by assumptions, to give some idea of the magnitude of this effect. A description of how this exercise was carried out is described below. This concludes with the findings from the exercise, linking it to the appraisal above (hereon called the “base case appraisal”).

14.5.2 The period for the Draft East Midlands Regional Plan (July 2008) runs from 2001 to 2026. Over a period of 25 years 94,500 new dwellings are planned in the County. Leicestershire County Council provided information on how this housing allocation might possibly be distributed over the Leicestershire districts over the 25-year period in Table 14.5 below. The figures expected to be of relevance to the proposed passenger line are shown in bold within the table.

14.5.3 The “dwellings per year” figures for Blaby, North West Leicestershire District Council and Leicester City were used to make some estimates of the amount of passenger demand that would result from assuming more or less of the housing allocation being built in the catchments for the proposed new stations on the line.

14.5.4 There is significant housing growth planned for Leicestershire as set out in the Regional Spatial Strategy. A substantial amount of this development will be built in Sustainable Urban Extensions (SUEs). There are two SUEs planned along the route of the line.

14.5.5 Within the initial passenger forecasts some part of the housing allocations were already assumed. For example, the SUEs were assumed to have been fully built by 2013 within the appraisal period and prior to the expected 2015 date of opening for the line (refer Section 10.3.4). This is in order to assess the scheme viability rather than this being the expected date for the completion of the developments. Some part of the impact on passenger demand of some of the housing growth had, therefore, already been taken into consideration. The further estimates in the scenarios described here are designed to examine the parts of the housing allocation that will be supplemental to the expected demand originating from the SUEs.

14.5.6 It is also important to emphasise that only the growth planned to occur within the catchment areas of the stations has been included within the forecasts.

District	Dwellings per year	25 year total
<b>Blaby</b>	<b>340</b>	<b>8500</b>
Charnwood	760	19000
Harborough	345	8625
Hinckley & Bosworth	460	11500
Melton	160	4000
<b>NWLDC</b>	<b>480</b>	<b>12000</b>
Oadby & Wigston	55	1375
<b>Leicester City</b>	<b>1180</b>	<b>29500</b>
TOTAL	3780	94500

Source: Leicestershire County Council

**Table 14.5: Leicestershire County Housing Allocations 2001-26**

14.5.7 Scenarios were created making assumptions about the different proportions of the supplemental housing allocation that might be realised within the station catchments of Kirby Muxloe, Coalville, Ashby-de-la-Zouch, Leicester Forest East and Bede Island. The proportions used in the scenarios ranged from one to 75 per cent. The three proportions of 10, 33 and 66 per cent were chosen on the basis of being distinct increments that would give a clear illustration of relative impacts. Expecting more than 66 per cent (two-thirds) of the whole district allocation being realised within the station catchment is considered infeasible due to the presumption of likely physical land constraints. Based on the same reasoning, expecting as much as two-thirds of the allocation to be realised in the catchments is optimistic but it is useful to include it for illustrative purposes.

14.5.8 It was assumed throughout that the impact of the extra passenger demand on railway operations would be constant, in that the rolling stock capacity in the base case would be sufficient and not need to be expanded. It was also assumed that there would be no crowding effects on demand.

- 14.5.9 Once the proportions of dwellings assumed to be built in the station catchments had been estimated, those already accounted for within SUEs were deducted. This revealed the proportion of the housing allocation that was already accounted for through the SUEs, modelled previously in the base case appraisal.
- 14.5.10 The remainder were in effect residences assumed to be built between 2013-26. They were transformed into estimated populations using a household occupancy figure, taken from local census figures. These figures were in turn reduced to economically active populations (those most likely to use the rail services on a frequent basis) and the total then cast in equal amounts over the years 2014-26 to arrive at the new totals of supplemental populations per station catchment at the forecast year of 2026. This year is chosen purely for the purpose of demonstrating the temporal impact on passenger demand of housing growth at the end of the housing plan period.
- 14.5.11 The totals for the forecast year were then divided between the 0.8 km and 2.8 km station catchments on the basis of the relative ratios of the two circle areas. The resulting populations are shown in Table 14.6 below.
- 14.5.12 The earlier passenger demand estimates (as in the base case appraisal) were then supplemented with the populations in Table 14.6 below, to produce new demand estimates. In each case the restricted cost-benefit model was set up as previously in all other respects, featuring exactly the same parameters as in the earlier, base case appraisal. Six outputs were then obtained. These outputs corresponded to the 66, 33 and 10 per cent levels of assumed proportion of housing allocation within the station catchments the forecast year 2026.

District in the County of Leicestershire	Station catchment(s) within District	Assumed % percentage of housing realised in catchment(s)	Estimated Additional Populations 2026	
			< 0.8 km	>0.8 and <2.8 km
Blaby	Kirby Muxloe	+66	1010	6312
		+33	350	2185
		+10	*	*
NWLDC	Coalville & Ashby de la Zouch	+66	1033	6457
		+33	101	631
		+10	*	*
Leicester City	Leicester Forest East & Bede Is	+66	4273	26705
		+33	1981	12381
		+10	377	2355

Source: Leicestershire County Council. \*10 per cent level is already attained within SUE allocations.

**Table 14.6 Additional populations in station catchments due to new housing 2014-25**

- 14.5.13 Table 14.7 below illustrates the impact on passenger demand over the base case of a fully implemented housing plan, assuming all allocations are in fact built. The low figures for the 10 per cent level are due to much of the trips/revenue being accounted for within SUE allocations. At the end of the housing plan period revenue is positively related to the assumed increase in the proportion realised in the catchment by approximately 2%, 14% and 37% respectively.

14.5.14 This supplemental demand from the new housing stock is extended to the full length of the appraisal period to gain full appraisal term estimates (60 years) for Net Present Value and Benefit-to-Cost Ratios for each of the three scenarios. Given the assumption made in paragraph 14.5.8 above the present value of costs remaining constant over all scenarios, the results from the exercise are presented in Table 14.8 below.

Scenarios Assumed proportion of possible new housing realised within proposed station catchment(s)	Estimated Additional Trips/Revenue 2026	
	Single trips (,000)	Revenue (£,000)
Base case demand	549	2006
+10%	+12	+44
+33%	+77	+283
+66%	+201	+733

**Table 14.7 Estimated impact of additional passenger trips and revenue over base case due to housing growth assuming three different demand scenarios**

Assumed % proportion of possible new housing realised within proposed station catchment(s)	Results over full appraisal period			
	Benefits Present Value	Costs Present Value	Net Present Value (NPV)	Benefit Cost Ratio (BCR)
Base case demand	£47.86m	£80.08m	-£32.22m	0.60
+10%	£52.67m	£80.08m	-£27.41m	0.66
+33%	£63.73m	£80.08m	-£16.35m	0.80
+66%	£83.86m	£80.08m	£3.78m	1.05

**Table 14.8 Impact on the level of housing stock increases over whole appraisal period assuming three different demand scenarios**

Assumed % proportion of possible new housing realised within proposed station catchment(s)	Results over full appraisal period (including adjustment for Optimism Bias)			
	Benefits Present Value	Costs Present Value	Net Present Value (NPV)	Benefit Cost Ratio (BCR)
Base case demand	£47.86m	£119.01m	-£71.151m	0.40
+10%	£52.67m	£119.01m	-£66.34m	0.44
+33%	£63.73m	£119.01m	-£55.28m	0.54
+66%	£83.86m	£119.01m	-£35.15m	0.70

**Table 14.9 Impact on the level of housing stock increases over whole appraisal period assuming three different demand scenarios including Optimism Bias adjustment**

14.5.15 Table 14.9 above includes the effect of including the DfT recommended adjustments for optimism bias for a rail project at pre-feasibility stage. The impact on total costs is 40 per cent, having the effect of further increasing the already negative NPV and corresponding poor BCRs.

#### 14.6 How much housing is required for the scheme to “break even”?

14.6.1 A further scenario asked how much new housing would be required to be built in the station catchments in order for the line to balance its costs with revenue or “break-even”. This is an important consideration pertaining to whether the passenger service would be able to operate free of an annual operating cost subsidy. It was recognised early on that even if the full allocation of housing units for the districts of Blaby, North West Leicestershire and Leicester City, totalling 50,000 houses over the plan period, could somehow be accommodated close to the new station catchments, this figure would prove insufficient to allow the scheme to breakeven.

14.6.2 The level of passenger demand for the scheme to breakeven was therefore estimated. The figure is 495,238 single trips per year resulting in annual revenue of about £1.81m. Assuming the same level of operating costs (but excluding capital costs), an assumed level of 232,000 houses delivers a negligible positive NPV of £0.1m and a BCR of slightly over 1.0.

14.6.3 The study has been conducted using a TEE appraisal which, compared to a simple financial assessment, includes the consideration of the wider benefits of a scheme, such as highway decongestion. It is on this basis that a bid for scheme funding would be based. In terms of a financial assessment, the shortfall which would require an ongoing subsidy is the difference between the revenue (£635,001) and operating costs (£3.5m). This financial difference of £2.865m, using the average fare given in paragraph 10.6.3, equates to a further 784,000 trips. By comparison with the figures in 14.6.2, it is clear that, in addition to the housing forecast and included in the TEE appraisal, a further 360,000 houses<sup>3</sup> would be required for the scheme financially breakeven. It is anticipated that these figures represent the subsidy required to fund the scheme until such time as it could be included in the franchise agreements. In terms of not requiring a subsidy, a level of patronage over 4 times that forecast would be required.

14.6.4 For comparison, the level of existing housing within the catchments of the planned stations is 33,400 houses. The level of housing currently forecast within the model is 66,650 houses. From these figures it can be seen that the scale of the increase in housing levels is great. It is important to understand that, in order to influence the forecasts and realise the projected patronage levels, this housing increase would have to occur within the 0.8km and 2.8km catchments of the stations. It is not known whether this scale of housing level within the station catchments is physically feasible at this point in time.

14.6.5 The analysis is carried out on a very simple cost-effectiveness basis. Capital costs have been excluded, based on an assumption that these costs could be covered by external agencies, e.g. central government or private developers. Operating costs have assumed to be unaffected by the additional patronage and the negative impacts on passenger demand from crowding effects have been excluded.

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<sup>3</sup> This figure is additional to the existing housing levels and the planned development included in the TEE assessment. It includes the 232,000 houses referred to in terms of the TEE assessment breakeven calculation.

- 14.6.6 The analysis suggests that if around a third of the applicable housing allocation for the three districts under consideration were to be built in the catchments of five of the seven new stations proposed, then the negative net present value of the proposed line would be reduced by almost 10 per cent. Assuming costs stayed constant then the corresponding BCR would increase from 0.67 to 0.75. This scenario also includes housing being built in the catchments from the SUEs and a large housing allocation in Ashby-de-la-Zouch.
- 14.6.7 Assuming that two thirds of the District allocations fall within the catchments of the five stations produces an improved BCR, but the ratio is still less than one. Expecting this proportion of the housing allocation to be realised within the station catchments may be unrealistic but the figure serves to give some idea of how much housing growth would be needed to increase the BCR to any significant extent.
- 14.6.8 This analysis is a strategic, high level estimate only and as such takes no account of numerous potential land-use/transport interactions that might arise within the given scenarios. To get a better estimate here a transport and land-use interaction model would need to be employed. The analysis was undertaken using a restricted cost/benefit analysis (RCBA) thus taking a limited account of the external costs and benefits of the scheme. The net wider economic impacts and/or regenerative benefits of the scheme are also excluded from the analysis. Any of these factors could serve to influence the final NPV/BCR and the economic business case for the scheme.
- 14.6.9 It is important to highlight that as described in Chapters 4 and 5, implementing the Ivanhoe Line Stage II in conjunction with the re-franchising of the existing rail operations would enable the operating costs to be included in the planned franchise specifications and hence avoid the need for an ongoing annual subsidy.

## 15. CONCLUSIONS

- 15.1 The purpose of the study was to carry out a passenger demand re-appraisal of the Ivanhoe Line Stage II and to review the capital and operating costs of the project. The study was to consider the viability of the scheme with a view to determining whether the line can be operated without significant subsidy to support a shortfall in revenue. Earlier studies have been used as the foundation for this work.
- 15.2 Passenger and non-user benefits have been considered to the extent of a restricted cost-benefit analysis. The outcome of this assessment suggests that the proposal generates a negative return. The Net Present Value is negative and the BCR figure of 0.40 is substantially below the expected minimum target of 1.0. This result suggests that the scheme would not be good value for money and that the project would be unlikely to cover its operating costs without some form of ongoing subsidy.
- 15.3 The capital cost is estimated to be around £53m and includes the construction of Knighton Chord and the re-signalling necessary to facilitate passenger traffic. The annual operating cost is forecast to be £4.9m. By comparison, the revenue estimated to be generated from patronage is £895,000.
- 15.4 The housing levels calculated by the TEE appraisal as being required for the scheme to “breakeven” was estimated to 232,000 properties within the 0.8km and 2.8km station catchments, generating around 495,000 single trips per year. This is estimated to result in an annual revenue of £1.81m. Assuming the operating costs remain unchanged this would deliver negligible positive NPV of £0.1m and a BCR of slightly over 1.0.
- 15.5 The required housing represents a significant increase over the existing 33,400 houses located within the station catchments. As such, it is not expected that this scale of development could be accommodated within the land areas available.
- 15.6 Based on a simple financial assessment, there is a shortfall of £2.865m (exc optimism bias) in the revenue generated by patronage compared to the annual operating costs. This shortfall would require ongoing subsidy until such time as the service was included in the franchise agreements.
- 15.7 Without either the development needed to generate the additional trips detailed above or the inclusion of the operating costs within the rail re-franchising, there will be the need for an ongoing subsidy to fund the shortfall in revenue.
- 15.8 The impact of tourism on the demand forecasts was estimated based on a limited snapshot assessment. This was not considered robust in terms of demand forecasting and consequently the figures were not included in the overall patronage. Comparing the trips generated by tourism with the total patronage forecast on the line demonstrates that the relatively small tourist demand would not have any noticeable influence on the outcome of the study.
- 15.9 For the scheme to have any potential economic viability, it would seem essential for the implementation of Ivanhoe Stage II to coincide with both the resignalling of Leicester Power Signal Box and the re-franchising of the adjacent services. Both of these events are outside the control of Leicestershire County Council and, combined with the difficulties associated with the reinstatement of Knighton Chord due to the development of the site, there appears to be little opportunity for the Authority to influence the future of the scheme.
- 15.10 In the event that the re-franchising could not deliver the benefits anticipated in terms of undertaking some of the costs of the new service commitment, this would leave a substantial annual subsidy being required to support the operation of the line.

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## REFERENCES

Freight Route Utilisation Strategy, Network Rail, March 2007.

Greater Anglia Utilisation Strategy, Network Rail, December 2007.

East Midlands Franchise Invitation to Tender, DfT, October 31<sup>st</sup> 2006.

New Cross Country Franchise Invitation to Tender, DfT, October 31<sup>st</sup> 2006.

Route Plans 2007, Route 19, Midland Main Line & East Midlands, Network Rail, March 2007.

## APPENDIX I

### Study Brief

**Project Title:**

Ivanhoe Line Phase 2 – Patronage, Revenue and Operating Cost Refresh

**Project Brief**

*“To supply an initial study of the projected operating costs and revenue for the proposed Ivanhoe Railway Line Stage 2.”*

**Project Aim**

To establish whether, in the light of changes in circumstances since the last review of the Ivanhoe Phase II proposal and in particular the housing growth agenda, would there now be any realistic possibility that the line could be reopened to passenger traffic on the basis of a service that could run, for the most part, on a commercial basis, i.e. does not require significant ongoing revenue support. In the event of a shortfall, the level of new development along the line necessary to avoid revenue support shall be identified.

**General**

The study will be initial in nature, consisting mainly of considering, then updating, now out of date information from previous studies of the line that were commissioned in the late 1990s. The quantitative elements of the previous work will be updated in the light of changes in conditions since. This shall consider the background growth that has occurred since the last study by using the RIFF (Rail Industry Forecasting Framework) model when forecasting passenger demand. The impact of potential development, including housing growth (and the implications of the Housing Growth Agenda), in areas along the line will be considered as the main socio-economic driver and order of magnitude estimates of the impact of this on patronage will be made. The study shall be based on the requirement that the existing freight services are retained.

**Main elements of the project:**

- Meeting with client to define scope of study (03.03.08.)
- Prepare brief and seek agreement with client
- Literature review and data collection
- Stakeholder consultation
- Quantitative work
  - Uplift patronage estimates and convert to revenue
  - Uplift operating costs
  - Produce forecasts of revenue and operating costs
  - Use RIFF model to create methodology estimating housing growth impact
  - Create scenarios (agreed beforehand with client) of large scale housing impact on forecasts of revenue and operating costs
- Produce draft report including initial conclusions on the prospects now for possible reopening of the line to passenger traffic on the basis of a service that could run on a largely commercial basis
- Technical Review and edits/revisions
- Meeting with client to discuss draft report
- Produce final report
- Project management/progress updates (ongoing throughout project)
- Produce drawings/figures for report (ongoing throughout project)

A refresh of the capital cost elements of line is not currently included in the study but may be undertaken as a supplemental piece of work. Whether the capital costs are to be

updated will be determined, with Client agreement, once an initial comparison of the revenue and operating cost forecasts has been made. In the event that the operating costs exceed the forecast revenue, the Client may not wish to undertake the refresh of the capital cost estimate. If undertaken, the refresh is likely to comprise examination of the current estimate plus application of an uplift to reflect inflation; investigation of the likely cost increases due to new technology, standards etc; consultation with Network Rail and consideration of the current standard of the line.

It is expected that the review would take two weeks and could be carried out at the same time as the latter stages of the main study. A cost estimate for the capital cost review can be provided once the level of existing information is understood.

The main elements of the study are outlined below:

#### **Meeting with client to define scope of study**

At the time of writing this meeting with the client has already taken place and this project brief is informed and hopefully a reflection of the issues agreed at the meeting.

#### **Prepare brief and seek agreement with client**

This document is the project brief and agreement is sought, subsequent to its issue.

#### **Literature review and data collection**

As Leicestershire County Council does not have all the information from the previous studies, it is not available to support the further development of this study. The work will include a literature review of all available information from the previous studies noting all information relevant to an updated patronage forecasts and operating costs. Other socio-economic, transportation and rail industry information will also be gathered to inform the study. Information on the historic, planned, or feasible changes in housing stock on the line will be required. LCC have agreed to supply the best data they have available to SW on this. All information will be used strictly for modeling purposes only and kept within client confidence.

Although the main figures are given in the information available from the previous studies, the supporting build up to these values is not available. As such, the RIFF model has been selected as the output will be commensurate with the input data and will provide a general indication of whether further study into the viability of the Ivanhoe line is appropriate. The availability of the detailed background information would have led to the same approach but would make it (a) more continuous with previous studies and (b) would have enabled the initial assumptions and parameters to be updated. Without this information it will be necessary to research comparators in order to validate the study outputs.

This research will require liaison with 3<sup>rd</sup> parties in order to obtain the information necessary. This will affect the overall timescale, of which the Client will be kept apprised at all times.

All efforts will be made to obtain the information required from Leicestershire County Council and other parties at the earliest stage. If this information is delayed or not made available the project may be delayed and additional costs incurred.

#### **Stakeholder consultation**

Stakeholder consultation is required with Network Rail; East Midlands train operators and the freight operating companies. There is a possibility that ROSCOs may also need to

be consulted. The purpose is to obtain the data and background information to inform an updated operating cost projection. Feasible and realistic levels of service will be discussed, as well as strategic plans, in order to ascertain changes and potential aspirations of each party that would impact on the proposals.

Contact with the National Forest Authorities will be required for the study to help estimate new rail patronage demand from this source. This will include obtaining information on anticipated patronage generated by tourism.

Contact will also be made with the adjoining local authorities (Staffordshire & Derbyshire County Councils) and NW Leicestershire District Council.

All efforts will be made to obtain the co-operation and consult with third parties at the earliest stage. It has been assumed that we will have one meeting with each named stakeholder. If additional meetings are required to obtain the necessary information or further stakeholder have to be consulted; the project may be delayed and additional cost incurred.

It has also been assumed that Leicestershire County Council can provide contact details for the most appropriate representatives within the adjacent local authorities with whom Scott Wilson should liaise.

**Quantitative work; consisting of:**

- Uplift patronage estimates and convert to revenue
- Uplift operating costs
- Produce forecasts of revenue and operating costs
- Use RIFF model & associated TRL report to create methodology estimating housing growth impact
- Create scenarios (agreed beforehand with client) of large scale housing impact on forecasts of revenue and operating costs

These estimates will be order of magnitude in nature only. The study will also to take account of any background growth in rail passengers in the East Midlands region in the intervening period since the earlier patronage forecast estimates were made. Since it lies outside of the scope of the brief, no attempt will be made to estimate additional user benefits. No transportation modelling beyond simple spreadsheet methods will be required or necessary for the work. All assumptions made in the quantitative work will be outlined throughout. Where applicable WEBTAG and rail industry parameters will be used and referenced. The study will be based on the existing background data available.

**Produce draft report including initial conclusions**

A **deliverable** in the form of draft report will be issued to the client and comments invited. A meeting with the client will be scheduled at a mutually convenient time within two weeks of the issue date of the draft report. The format of the report will be discussed and agreed with Leicestershire County Council in advance of substantial writing of the document.

**Meeting with client to discuss draft report**

The draft report's initial conclusions will be discussed with the client at **meeting** with the Scott Wilson project manager. From the date of this meeting, time will be allowed to the

consultant to incorporate any agreed revisions of the draft report into the final report for delivery to the client by the said delivery date. It is understood that if the client's revisions to the draft report result in extensive additional work then an appropriate extension to the project will be requested and charged for accordingly.

**Produce final report**

The final report will incorporate the outcomes from the meeting detailed above. The deliverables will be provided in hard copy (3no) and electronic (PDF), as requested.

**Project management (ongoing throughout project)**

Project management, both technical and administrative will be ongoing throughout. In addition to the technical management of the project, the project manager will liaise with the client with the objective of keeping the client up-to date with progress towards delivery. A written update or progress report will also be provided (typically 2 weekly).

**Programme**

- As agreed, initial work commenced on 28<sup>th</sup> April 2008.
- The delivery date of the draft report will be agreed, but is expected to be July 2008 (due to the delays in agreeing the exact brief and the extra timescale required to research comparators as detailed above).
- The meeting to discuss the draft report with the Client is expected to be arranged within 2 weeks of issue of the report (assuming Client availability).
- Delivery of the final report shall be agreed once the extents of the Client's revisions are known (nominally one week at this stage).
- A separate proposal, as an extension to this brief, can be provided at the Client's request for updating the capital costs.

## APPENDIX II

### Comparison Of Journey Times With Different Infrastructure Options

		Line Speed				
		Proposal	As is	Knighton	45 mph	60 mph
Leicester	dep	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Coalville	arr	00:29:00	00:35:15	00:43:15	00:27:45	00:24:45
	dep	00:29:45	00:36:00	00:44:00	00:28:30	00:25:30
<i>Perf allowance</i>		<b>[2]</b>	<b>[2]</b>	<b>[2]</b>	<b>[2]</b>	<b>[2]</b>
Burton on Trent	arr	00:55:00	01:09:45	00:17:45	00:53:45	00:49:15
Burton on Trent	dep	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Coalville	arr	00:23:15	00:30:15	00:30:15	00:24:45	00:21:15
	dep	00:24:00	00:31:00	00:31:00	00:25:30	00:22:00
<i>Perf allowance</i>		<b>[2]</b>	<b>[2]</b>	<b>[2]</b>	<b>[2]</b>	<b>[2]</b>
Leicester	arr	00:55:00	01:04:15	01:11:45	00:55:45	00:48:45

## APPENDIX III

### Capital Costs - Stations

Bede Island	1 platform (£,000)	
	2 car (51m)	4 car (97m)
Site Clearance	10	10
Platforms	175	250
Shelter	20	20
Footbridge	--	--
Ramps	--	--
Lighting	75	75
Platform Access	100	100
Car Park <sup>1</sup>	--	--
<b>Total</b>	<b>380</b>	<b>455</b>

Note

1 No road access

Leicester Forest East	1 platform (£,000)	
	2 car (51m)	4 car (97m)
Site Clearance	8	8
Platforms	175	250
Shelter	20	20
Footbridge	--	--
Ramps <sup>1</sup>	--	--
Lighting	75	75
Platform Access	10	10
Car Park <sup>2</sup>	200	200
<b>Total</b>	<b>488</b>	<b>463</b>

Notes:

- 1 No ramps required, station to be constructed adjacent to existing
- 2 Assume a new car park. Existing car park adjacent to site. May need approval from Bus company to use existing facility

Kirby Muxloe	1 platform (£,000)	
	2 car (51m)	4 car (97m)
Site Clearance	20	20
Platforms <sup>1</sup>	200	300
Shelter	20	20
Footbridge	--	--
Ramps	--	--
Lighting	75	75
Platform Access	50	50
Car Park <sup>2</sup>	200	200
Total	565	665

## Notes:

- 1 Station may require to bridge Station Drive to keep it in its historical location
- 2 Car Park to east of Station Drive on south side of railway

Coalville	1 platform (£,000)	
	2 car (51m)	4 car (97m)
Site Clearance	10	10
Platforms	175	250
Shelter	20	20
Footbridge	--	--
Ramps	--	--
Lighting	75	75
Platform Access <sup>1</sup>	200	200
Car Park <sup>2</sup>	250	250
Total	730	805

## Notes:

- 1 Ramp from adjacent bridge
- 2 Alterations to existing car park on west side of station site.

Ashby de la Zouch	1 platform (£,000)	
	2 car (51m)	4 car (97m)
Site Clearance	10	10
Platforms	175	250
Shelter	20	20
Footbridge	--	--
Ramps	--	--
Lighting	75	75
Platform Access	20	20
Car Park	--	--
Total	300	375

Moira	1 platform (£,000)	
	2 car (51m)	4 car (97m)
Site Clearance	10	10
Platforms	175	250
Shelter	20	20
Footbridge	--	--
Ramps	--	--
Lighting	75	75
Platform Access	20	20
Car Park	--	--
Total	300	375

Castle Gresley	1 platform (£,000)	
	2 car (51m)	4 car (97m)
Site Clearance	5	5
Platforms	175	250
Shelter	20	20
Footbridge	--	--
Ramps	--	--
Lighting <sup>1</sup>	75	75
Platform Access	30	30
Car Park	--	--
Total	305	380

Note:

1 Platform only, increase if car park required