

# **Transport for South Hampshire**

## **Eastleigh Area Supplementary Rail Study**

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**Hampshire County Council Scheme: JO 13 G**

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# Transport for South Hampshire

## Eastleigh Area Supplementary Rail Study

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## **EXECUTIVE SUMMARY**

Transport for South Hampshire requested a supplementary rail study to build upon the outcomes from the study produced by Network Rail “Eastleigh - A Strategic Overview of Railway Operational Needs (Summary)” published in July 2008.

The study is required to indicate what land in the Eastleigh area should be safeguarded for future rail use. This is set against the background of the creation of the South Hampshire Strategic Employment Zone (SHSEZ). This, together with the planned expansion of Southampton International Airport as part of its master plan, requires a number of assumptions to be made about the future rail network.

### **Rail sidings to the south of Eastleigh**

It is not possible to determine whether there is scope to reduce or rationalise the number of sidings south of Eastleigh because Network Rail and English, Welsh and Scottish Railways (EWS) were unable to give a clear indication of their future needs in the area.

It was clear however that retention of the loop line was appropriate, as both parties operate trains on a daily basis. As it is already electrified, albeit de-energised, then the retention of electrification would appear at this stage to be sensible.

Currently HM Railway Inspectorate (HMRI) is unwilling, other than in exceptional circumstances, to sanction new level crossings on Network Rail infrastructure. It is unlikely, given the potential use of the Chickenhall Lane Link Road and the regular daily use of the sidings and any new chord that this scenario could be considered to be exceptional and it is considered unlikely that approval for new level crossings would be given.

There are a number of potential alignments for the chord. Operationally the optimal alignment appears to be a grade separated junction with the Southampton mainline that passes under the Runway End Safety Area, alongside the existing sidings and joins the Portsmouth line beyond the existing River Itchen crossing. This alignment would require adjustments to the planned alignment of the Chickenhall Lane Link Road. Other potential alignments severely reduce the sidings capacity of the area.

### **Southampton Airport Parkway station**

The major constraints on the rail development are the spans of the Wide Lane and M27 bridges that will constrain the junction and four tracking to end north of these structures on the mainline.

It is clear that the optimal transport solution is where the station can be part of the airport terminal building although many UK airports successfully have short intermediate transport links – buses, people movers – between their station and the airport terminal. Additionally a frequent rail service is also helpful.

There are a number of issues when considering potential park and ride schemes. Often they can lead to a reduction in parking spaces because different users use them at different times. In this case we consider this to be unlikely because the rail and airport uses are likely to be at similar times to any urban use. Careful management of any facility would also be required to prevent unintended use. A combined facility is likely to have to be multi-storey and of significant size.

### **Eastleigh station**

Eastleigh station had until recently a larger footfall than Southampton Airport Parkway station. Lately

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however the relative positions have reversed as growth at Southampton Airport Parkway has outstripped Eastleigh station growth due almost certainly to the much increased growth of passenger traffic at the Airport.

Eastleigh does however remain the ninth biggest station by footfall in Hampshire.

The station itself makes a poor substitute for the Chord. Reversing at Eastleigh is likely to have up to a ten minute time penalty. It cannot currently cope with the volume of reversing moves that would be required, and even following a suitable upgrade, because of the implication on operations and timetabling it is probably not a practical proposition.

Current interchange provision at Eastleigh for the Airport is restricted to a regular bus service which stops close to the airport entrance. If passenger numbers were to grow further or an additional northern terminal at the airport was developed then improved interchange arrangements may be viable.

The sidings currently in use east of Eastleigh appear to have a significant future as they are used for aggregate re-cycling which is set to continue and potentially increase.

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## 1 INTRODUCTION

### 1.1 Background

Transport for South Hampshire has requested a supplementary rail study that builds upon the outcomes from the study produced by Network Rail “Eastleigh - A Strategic Overview of Railway Operational Needs (Summary)”<sup>1</sup> published in July 2008.

The study is required to indicate what land in the Eastleigh area should be safeguarded for future rail use. This is set against the background of the creation of the South Hampshire Strategic Employment Zone (SHSEZ), which has been identified as a major employment creating scheme. This, together with the planned expansion of Southampton International Airport as part of its master plan, requires a number of assumptions to be made about the future rail network.

The Network Rail study provided “... a strategic overview of likely railway operational needs at Eastleigh over the coming 15-20 years” and described known plans and aspirations of the passenger and freight train operators and local, regional and national government. However, the study did not address matters of detailed track alignment or station facilities.

It was considered that waiting for changes to rail facilities to be clarified by ‘due process’ would hamper the development planning work that is necessary to allow questions of access and land allocation to be progressed by SHSEZ at this critical stage in its master planning.

Against this backdrop, there is a need to ascertain a degree of certainty on a number of issues that are of importance to the local authorities in planning for property developments in and around Eastleigh. These are required to be made with a reasonable level of certainty and commitment by Network Rail and the train operating companies (passenger and freight) to assist all parties as they move forward.

The issues to be addressed and resolved, taking account of the assumptions listed above were identified by Transport for South Hampshire as being those set out below.

### 1.2 Rail sidings to the south of Eastleigh:

- How many sidings are essential to remain?
- How many could perform their function in a different location, subject to negotiation and which could be surrendered as redundant?
- Whether the Loop Line is and should remain electrified and what options exist to re-align the Loop Line to enable its principal purpose to be maintained?
- What is the potential for the Chickenhall Lane Link Road (CLLR) to cross the Loop Line by means of a level crossing?
- What is the optimum alignment for the Eastleigh Chord<sup>2</sup> in operational terms? With reference to previous engineering studies, what is the feasibility of such an optimum alignment and alternatives?

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<sup>1</sup> Network Rail confirmed that the report was labelled summary only because it was distilled down from various other bits of information, gathered as part of a wider look at Hampshire in preparation for a later refresh of the South West Main Line RUS. Network Rail confirmed that there is no fuller or more comprehensive version of the report.

- Is there scope for the reconfigured Loop Line to be signalled and used as the Eastleigh Chord? What would be the implications of making the connection between the Botley Line and the Loop Line on a new alignment diverging from either side the River Itchen viaduct? Is there any scope for an “outer loop” to replace this one and facilitate the Eastleigh Chord, perhaps by putting extra links in the network over a wider area than might otherwise be considered?
- What is the optimum location for commercial premises, served by a long siding within the overall Masterplan for redevelopment of the former Alstom site, bearing in mind other track requirements?

### **1.3 Southampton Airport Parkway station**

- Given the assumption that Southampton Airport Parkway station would be provided with four platform faces with the junction with the Eastleigh Chord line being located to the south of the station, where the four tracks revert to two. What are the constraints in this area, in particular the existing location of Wide Lane overbridge?
- What design lessons are to be learned from other important rail/airport stations in the UK and abroad?
- What constraints and opportunities exist in providing a notional footprint of a combined airport terminal and four platform station served by the A335 expanded as part of the Chickenhall Lane Link Road extension to M27 Jn5, car parking and other facilities?
- Is there scope for the projected Southampton and Eastleigh Park & Ride facility, featuring convenient interception facilities from the M27 motorway and a bus priority route to the south, to be co-located in the vicinity of the station to encourage the use of rail as a P&R mode?

### **1.4 Eastleigh station**

- Provide commentary on the role of Eastleigh station, in terms of train service and strategic importance in comparison with Southampton Airport Parkway station.
- Comment on the option for Eastleigh station to provide an alternative to the Chord for through trains from Fareham to the Airport, taking account of additional facilities that would need to be provided and impact on through journey times although no further work is required on this point.
- How could linkage with the Airport be provided from Eastleigh station?
- Comment on the status of the use of sidings to the east of Eastleigh station, adjoining Barton Park, those serving the rail aggregates recycling depot and the Foster Yeoman’s aggregate site, noting the scope for relocation by negotiation, or surrender. Again, the usage of sidings deemed to be ‘essential’ should be quantified by reference to existing and projected use by operators.

The main references used in the report are detailed in Appendix 5.

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<sup>2</sup> The Eastleigh Chord proposal is to link the Hedge End line with the Waterloo–Bournemouth main line. This would enable trains from Portsmouth and the east to serve Southampton Airport in addition to Southampton Central, freeing up capacity on the coastal line to Portsmouth via Swanwick and Fareham.



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## 2 Rail Sidings to the south of Eastleigh

### 2.1 Corridor width assumptions

The following corridor widths were assumed for the determination of safeguarding areas based on current Network Rail standards for new or altered infrastructure:

For the junction with the Eastleigh Chord:

- Fence to fence on main line 36m assumes a four track railway, corridor width considers grade separated junction and retaining walls widths;
- Fence to Fence on Chord line 16m assumes a two track railway.

### 2.2 Ownership and leasehold arrangements

Network Rail has supplied details of ownership and leasehold arrangements of land and sidings at Eastleigh which are shown in **Appendix 1**.

### 2.3 Essential sidings

Meetings were held with Network Rail and EWS to confirm how many sidings are essential to remain. Unfortunately, neither Network Rail nor EWS could quantify definitively the projected utilisation of the 'essential' sidings except in very general terms, however, the existing utilisation was identified.

The **Eastleigh East Yard** comprising the **Marshalling Sidings**, **Engineers Sidings** and the **Rail Welding Plant** is the home depot for the Network Rail infrastructure fleet and renewal activities such as rail welding. Network Rail expects to continue these activities in a similar form for the foreseeable future.

The **Reception Roads** are currently used for marshalling long welded rail trains in addition to other engineering trains. They are also used by both EWS and Freightliner for staging container trains on route to the Port of Southampton as a result of either reduced capacity on the main line or at the Port.

Freightliner also uses the Reception Roads to stage trains due to the need to timetable matching paths between Oxford and Reading. The Reception Roads are the only facilities at Eastleigh that will accommodate 775m freight trains.

The **Marshalling Sidings** are used by EWS for wagon repair and storage of strategic rolling stock spares. Mendip Rail employs the sidings to the northwest of Eastleigh Station leading to Yeomans Stone Terminal to transport construction materials. Additionally GB Rail Freight run stone trains through this area. A few of the former Down Carriage Sidings are used for setting off ballast trains nevertheless the sidings in this area are mostly redundant.

The majority of the sidings adjacent to the Traction and Rolling Stock Maintenance Depot are essential to EWS, the exception being the Steam Sidings, 8 - 16.

The **Loop Line**, currently sidings 2 - 3, is used to turn around infrastructure trains, car carrying wagons and some other commercial freight trains.

Other sidings in the depot area are used by both Axiom and EWS. Axiom uses the sidings for overnight stabling and maintenance of Cross Country rolling stock; as well as maintenance of Freightliner locomotives.

Land has to be retained because of the Loop and beyond that there appears to be limited flexibility for activities in the sidings to be rationalised, even if they were subject to negotiation. To establish what flexibility might be available within the depot area would require additional investigation, design work and consultation with third parties.

There are a limited number of redundant sidings throughout Eastleigh. Some redundancy is known to exist within the **Airport Sidings**, i.e. sidings 8 - 16 however these lie within the Public Safety Zone (PSZ) and Runway End Safety Area (RESA) of Southampton Airport and hence offer very limited development potential.

Further redundant sidings can be found in the former **Down Carriage Sidings**, some of the sidings are however used for setting off ballast trains. Also, given the aspiration to meet the future demand for 775m freight trains the reinstatement of these sidings could be necessary, in conjunction with some remodelling of the existing track layout.

Given the redundancy identified in Airport Sidings, i.e. numbers 8 - 16, it may be possible to relocate the functionality of the former Down Carriage Sidings to this area. However reduced operational flexibility would result, as currently the layout provides no direct access to the Portsmouth Lines. This flexibility could be reinstated by connection to the proposed Eastleigh Chord.

The Airport Sidings which lie south of Eastleigh Station in the airport PSZ, contain an array of lights, most likely to be runway approach lights. It is assumed that these lights will need to remain in their existing position.

The current usage of Eastleigh Sidings is also shown in **Drawing 0001** in **Appendix 2**.

## **2.4 Electrification of the Loop Line**

The Loop Line is currently electrified although it is not energised. The stakeholders have expressly stated that the functionality of the Line, in terms of the facility for turning trains needs to be preserved. To provide operational flexibility, the electrification of the loop should also be retained.

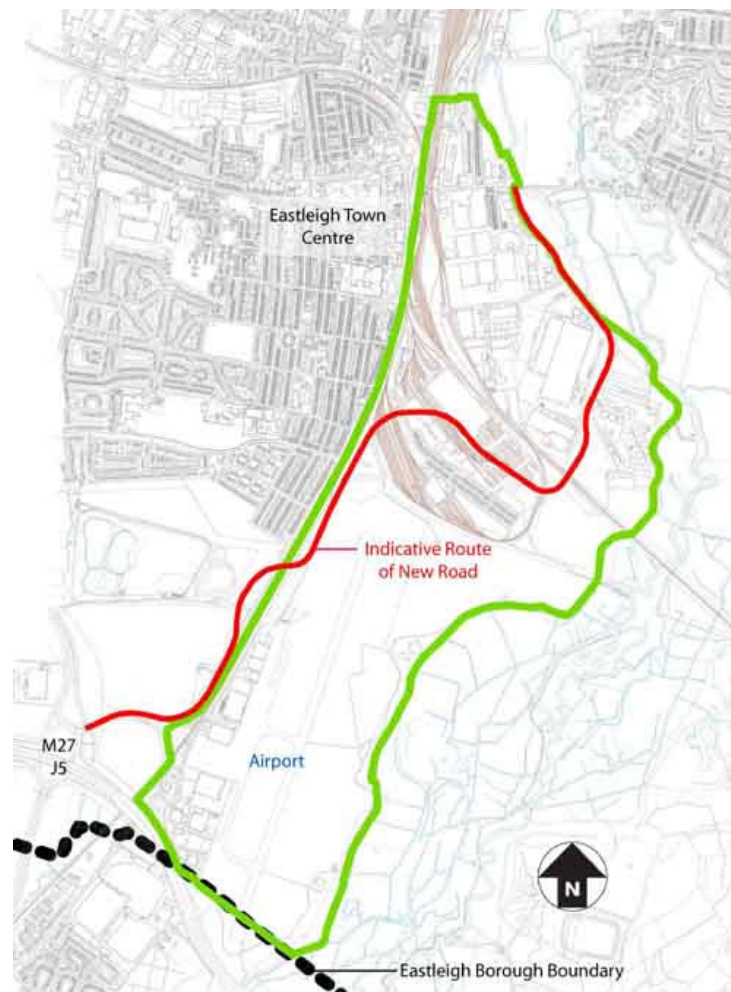
## **2.5 Re-alignment of the Loop Line**

It may be feasible to alter the actual alignment of the Loop Line, if the enclosed sidings are reduced in number, currently sidings 2 or 3 are used as the Loop Line instead of the “**Through Road**”. Should the switch and crossing on the “Through Road” be brought back into use then it can be used as the Loop Line which would subsequently free up an additional one or two sidings.

A further option would be to reroute the Loop Line traffic onto the existing outermost Airport Sidings.

## **2.6 Chickenhall Lane Link Road**

The Link Road connects M27 junction 5 with the B3037 Bishopstoke Road, east of Eastleigh town centre. The scheme is approximately four kilometres in length. North of the M27 junction 5, the scheme heads northwards via the A335 Wide Lane, continuing past Southampton Airport Parkway Station. It crosses the main Southampton to Waterloo railway line running west of and parallel to the Southampton Airport runway, then turns and heads east through the EWS and Alstom railway sites, before turning north to cross the Fareham railway line and join the existing Chickenhall Lane by Pirelli, terminating at the junction with the B3037 Bishopstoke Road. However this option for the road alignment assumes that the existing site is cleared for redevelopment.



Source: Eastleigh Borough Council – The South Hampshire Strategic Employment Zone Issues and Options dated 27.06.07

### **Figure 3.4 Proposed Alignment of the Chickenhall Lane Link Road**

Potential exists for the Chickenhall Lane Link Road to cross the Loop Line and the Fareham line by use of level crossings.

Her Majesty’s Railway Inspectorate (HMRI), have stated in their Policy on Level Crossings, that their aim is; “Except in exceptional circumstances, there should be no new level crossings on any railway.” Consultation would be required with them and at this stage we do not consider either requirement to provide a level crossing would be deemed “exceptional circumstances”.

Additionally, it should be noted that the Loop Line is not currently signalled and hence does not currently support the necessary interface for a level crossing. Provision of the required signalling control would require extensive resignalling works - in the order of several millions of pounds. Also, EWS has advised that manoeuvres in yard occur throughout the day and Network Rail has also advised there are up to three turning movements made via the Loop Line each day, increasing with the onset of the weekend due to the requirement for engineering train movements.

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## 2.7 Optimum alignment for the Eastleigh Chord

The optimum alignment for the Eastleigh Chord is a double track grade separated junction as put forward by Atkins in May 2004 and by MVA Consultancy in March 2008. This option allows maximum timetabling flexibility and minimum performance risk. The alignment would allow for operation of three trains per hour via the Eastleigh Chord.

The impact of the airports' PSZ and RESA would need to be considered in all options.

Following meetings with EWS and Network Rail a preferred option and five sub options have been developed by Mott Gifford; these are discussed in detail below and shown on **Drawings 002 and 002a in Appendix 2**. All options avoid the total removal of sidings and the removal of the maintenance facilities in the sidings and works area.

**Option MG1** consists of four-tracking the main lines from Southampton Airport to a grade separated junction with the Eastleigh Chord. The line will then descend to a lower level to allow for a cut and cover tunnel below the RESA, before climbing to ground level and continuing on a straight alignment to a double junction with the Portsmouth Line. Option MG1 presents the preferred option from a railway operational perspective. This option maintains the flexibility of the Main Lines and does not conflict with the functionality of the sidings and the depot. However, as shown, the chord alignment conflicts with the Southern CLLR alignment.

**Option MG2** consists of a double junction with the main Lines before following a curve around the RESA. This curve reverses and joins the straight alignment of MG1 following it to the Portsmouth Line. This option severs all sidings between the Through Road and Airport sidings, thereby losing the functionality of these sidings. It also conflicts with the Southern CLLR alignment.

**Option MG3** is similar to MG1 but instead of following a straight alignment towards the Portsmouth line, it follows a reverse curve to join the Portsmouth line to the Eastleigh side of the River Itchen Viaduct. This option would conflict with the proposed Chickenhall Lane Line Road (CLLR) alignment and land safeguarded for development. However, as shown, the chord alignment conflicts with two arms of the CLLR.

**Option MG4** is similar to MG2 but instead of following a straight alignment towards the Portsmouth line, it follows a reverse curve to join the Portsmouth line to the Eastleigh side of the River Itchen Viaduct. This option severs all sidings between the Through Road and Airport sidings, thereby losing the functionality of the sidings; it would additionally conflict with the proposed CLLR alignment and land safeguarded for development.

**Option MG5** consists of a 200m radius curve through the existing Eastleigh Works (St Modwen) site. This option would sever access to the Traction and Rolling Stock Maintenance Depot making the existing workshops, yard, Steam Shed Sidings and the Loop Line non operable and would result in the complete loss of railway functionality of the yard. Although this option would sever the access lines and Loop Line, it may be possible to overcome this by means of a flat crossing between the two routes, suitably protected by signalling.

**Option MG6** consists of a bored tunnel connecting the Portsmouth Lines to Main Lines. The proposed tunnel would lie under the depot access lines, the Portsmouth Single and two sidings. This option maintains the functionality of the Traction and Rolling Stock Maintenance Depot, Steam Shed Sidings and the Loop Line. This option, however, involves a bored tunnel under the operational Portsmouth Line which is unlikely to produce a cost benefit. It would also require the relocation of the "virtual quarry"

adjacent to the line.

The proposed alignment for the CLLR, consisting of an underpass beneath the flight path immediately north of the runway, and a roundabout on a climbing gradient to provide access into the BAA long-stay car park conflicts with the preferred option MG1. In order to avoid conflicting alignments and allow the Chord and CLLR to proceed in parallel it is suggested that the alignment of the proposed CLLR runs parallel to the alignment of option MG1 / MG3, such that a combined cut and cover tunnel to accommodate both the Eastleigh Chord and CLLR is excavated.

Additionally it is suggested that the roundabout providing access to the BAA long-stay car park is moved South towards Southampton Airport Parkway Station in order to avoid conflict with MG1. These two adjustments will assist in providing a solution to any conflicts.

Clearances between the proposed CLLR and the current platforms at Southampton Airport Parkway Station needs to be maintained such that, two island platforms, approximately 8m wide to allow for a Disability Discrimination Act (DDA) compliant footbridge, can be built to accommodate four platform faces at Parkway.

The advantages and disadvantages of each Option are detailed in the table below:

Option	Advantages	Disadvantages
MG1	Flexibility on the Main Lines High speed junction available with the Portsmouth Line Existing earthworks can be used	Excavation for cut and cover New bridge, culverts and a viaduct will be required Conflicts with CLLR Crosses the River Itchen flood plain
MG2	High speed junction available with the Portsmouth Line Existing earthworks can be used Avoids RESA	New bridge, culverts and a viaduct will be required Crosses the River Itchen flood plain Severs all sidings between the Through Road and airport sidings No16 Conflicts with CLLR Impact on Airport long stay car park
MG3	Flexibility on the Main Lines No new major bridges	Excavation for cut and cover New embankment to be constructed over agricultural land; land has been allocated for future development Reverse curves result in low speed Double conflicts with CLLR Low speed junction with Portsmouth Line Crosses area of Public Amenity Designated for the environmental protection of the River Itchen navigation
MG4	Avoids RESA	Excavation for cut and cover Severs all sidings between the Through Road and airport sidings No16

		<p>New embankment to be constructed over agricultural land</p> <p>Reverse curves result in low speed</p> <p>Double conflicts with CLLR</p> <p>Low speed junction with Portsmouth Line</p> <p>Crosses area of Public Amenity</p> <p>Designated for the environmental protection of the River Itchen navigation</p>
MG5	Avoids any conflict with the CLLR alignment	<p>Severs all connections to existing sidings and workshops at Eastleigh works</p> <p>Low speed connection to the Main and Portsmouth Lines</p>
MG6	Avoids any conflict with the CLLR alignment	<p>Severs all connections to the existing sidings and workshops at Eastleigh works</p> <p>Low speed connection to the Main and Portsmouth Lines</p> <p>Tunnel will need to be bored below the existing works connections</p>

**Table 3.1: Advantages and Disadvantages of Mott Gifford Options**

Appendix 1 details all the alignment options considered for the Eastleigh Chord in previous engineering studies.

## **2.8 Reconfigured Loop Line to be used as the Eastleigh Chord**

There is some scope for the reconfigured Loop Line to be signalled and used as the Eastleigh Chord following detailed engineering design. There would be insignificant impact on passenger services as up to three engineering trains only use the Loop each day, the turning movements could fit around passenger services.

## **2.9 Provision of an Outside Loop**

There is scope for an “outside loop” on the condition the exiting Loop Line would be moved inwards or the **Through Road** reinstated. Otherwise an “outside loop” could be provided however, it would infringe the Airports’ PSZ and RESA.

## **2.10 Provision of the Eastleigh Loop by using the Wider Area**

Consideration has been given to replicating the Eastleigh Chord facilities over a wider area based on the current rail network.

Six potential alternative routes have been identified:

- 1) Eastleigh / Fareham / St.Denys / Millbrook / Eastleigh.
- 2) Eastleigh / Southampton / Redbridge / Romsey / Eastleigh.
- 3) Eastleigh / Southampton / Redbridge / Romsey / Laverstock Chord / Basingstoke / Eastleigh.
- 4) Eastleigh / Havant / Guildford / Woking / Eastleigh

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- 5) Eastleigh / Havant / Ford / Horsham / Redhill / Guildford / Havant / Eastleigh
- 6) Eastleigh / Basingstoke / ReadingWest / Didcot / Swindon / Westbury / Salisbury / Romsey / Eastleigh
- 1) Would require three run round movements to be made in the platform at Fareham, in the up goods loop at Redbridge and a third run round at Eastleigh (if the train is to travel southwards) resulting in a journey time of three hours and a distance of  $34\frac{3}{4}$  miles.
  - 2) Would require a run round movement to be performed in the platform at Romsey, resulting in a journey time of a little under two hours for a distance of just over 20 miles. This is an estimate of the time required to complete the movement based on an assumed average train speed of 25mph and 1 run round at Romsey taking 30 minutes.
  - 3) Would require a run round movement to be made in the platform at Basingstoke, and given the extended route, would result in a journey time of four and a quarter hours to travel about  $88\frac{1}{4}$  miles.
  - 4) Would require locomotive run rounds in the platform at Woking and the journey time would be in the region of 5 hours for just under 112 miles.
  - 5) Would require loco run rounds at Redhill and Guildford. The journey time will be in the region of  $6\frac{3}{4}$  hours. There is a speed restriction on the timber built viaducts on the route between Arundel and Pulborough on the Mid Sussex line, the route is approximately  $153\frac{3}{4}$  miles in length.
  - 6) This route does not require any locomotive run rounds. However, the journey time will be in the region of  $10\frac{1}{2}$  hours for a distance of approximately  $257\frac{1}{2}$  miles. The route also requires paths on the Great Western Main line from Reading to Thingley Junction. This will also require relief drivers with the requisite route knowledge.

Many factors will influence the efficiency and actual timing of any of the above journeys. These factors include, but are not limited to the following:

- Availability of train paths.
- Availability of run round loops.
- Availability of Shunter/Guard to accompany the train.
- Availability of train drivers with the requisite route knowledge.
- Availability of ground frame attendant.
- Priority given to passenger services at points of conflict on the route, in particular at junctions and when running round in station platforms.

In addition, confirmation would be required that the existing signalling infrastructure was in place to support any proposed movements.

Given the journey times required, none of the above is considered as acceptable alternatives to the existing loop proposals.

However, in order to improve the efficiency of 1) above, a new chord line could be installed to connect the routes from Southampton/St.Denys and Eastleigh/Botley at Fareham. The route of this chord could partially follow the trackbed of a disused rail route and would then diverge across rural land. The chord would avoid the requirement to perform a locomotive run round in

the platforms at Fareham. This would entail resignalling of the Fareham area and changes to the controlling signal box.

The efficiency of 3) above could be improved by the installation of a new chord line to connect the Exeter and Southampton lines in the area of East Oakley to the west of Basingstoke. The new chord would be formed in existing rural land. The new chord would avoid the requirement to perform a locomotive run round in the platforms at Basingstoke. This would entail resignalling of the Basingstoke area and changes to the controlling signal box.

It is not considered cost effective to introduce any other additional links into the current rail network in order to provide an alternative to the proposed Eastleigh Chord.

## **2.11 Commercial premises**

The provision of commercial premises and an associated long siding is dependent on the redevelopment of the former Alstom site. A siding could be provided adjacent to the Portsmouth lines with the commercial premises alongside. An indicative location for commercial premises and rail siding is shown on **Drawing 0003** in **Appendix 2**.

## **2.12 Use of sidings to the east of Eastleigh Station**

The sidings to the east of Eastleigh station, adjoining Barton Park, those serving the rail aggregates recycling depot and the Foster Yeoman's aggregate site, are served once a day by trains to Botley/Chichester/ Fareham.

The rail aggregates recycling depot is served increasingly by post engineering works trains due to the need to recycle ballast. With the forecast increases in landfill tax, the facility is likely to be increasingly used in future. The current location of this facility is of logistically advantageous in that it is almost adjacent to the infrastructure trains home depot, East Yard.

The usage of sidings deemed to be 'essential' is currently unknown since the operators were unable to provide any information beyond a general description of their activities. It would appear unlikely that the sidings could be relocated within the Eastleigh area, however, there may be some scope to transfer some functions to exiting facilities elsewhere.



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### **3 Southampton Airport (Parkway) Station**

#### **3.1 Four tracks**

Southampton Airport Parkway station is adjacent to the airport terminal and offers a straightforward rail to air and vice versa interchange. According to the current master plan passenger numbers at Southampton Airport are forecast to increase from circa 2 million annual passengers in 2007 to 6 million annual passengers by 2030. It is anticipated that much of this growth could be met through public transport improvements.

The increased rail capacity associated with the Eastleigh Chord, Botley line improvements and Parkway expansion would meet the demands of a busier airport. It is proposed that the existing Parkway station is reconstructed with two island platforms served by four tracks, straddled by the station building, associated facilities and DDA compliant footbridge.

This scheme is linked with the Eastleigh Chord proposal in that additional capacity on the main line would be required to avoid conflicting movements associated with the chord. Through rerouting interregional trains via the Botley line, more trains will be serving Parkway station and hence additional capacity on the main line is required.

Appendix 4 refers to the requirements for increasing the capacity on the Botley to Fareham line to accommodate new or rerouted services.

In providing additional tracks in both directions, main line capacity between Eastleigh and Parkway will be enhanced which also benefits passenger and freight trains on the main line.

#### **3.2 Wide Lane Overbridge**

An assumption is made that Southampton Airport Parkway station would be provided with four platform faces with the junction with the Eastleigh Chord line being located to the south of the station, where the four tracks revert to two.

The constraints in this area, relate in particular to the existing location of Wide Lane overbridge which appears to only have sufficient span to accommodate three tracks. In addition, the M27 overbridge only appears to have sufficient span to accommodate two tracks, requiring the two to four tracks junction to be located north of this bridge.

The constraint imposed by the existing Wide Lane overbridge is considered to prevent the delivery of the four platform station at Southampton Parkway Station, assuming the station remains in its current location. The proximity of the bridge to the platform ends would not allow the required track configuration to be achieved on one side at least, as it is understood that the existing bridge span is sufficient for only three tracks. A new Wide Lane overbridge would, therefore be required, and the opportunity could be taken to provide any replacement bridge on a new alignment.

An alternative would be to move the station Up platform towards Eastleigh to allow sufficient space for the required track configuration. Given that there has been some discussion with regard to rebuilding the station as a combined rail/terminal building this may present the opportunity to achieve this.

Furthermore, the existing railway underpass access through Airport Lands would require to be extended. The underpass is shown on the drawing, Flight Path Underpass Alignment Cycleway/ Footway Proposals, drawing no. 227150-HWY-022.

### 3.3 Rail/Airport Stations

Within the UK there are nine main airports, including Southampton, where rail is directly accessible from the passenger terminal. Each of the nine airports feature in the Top 20 airports ranked according to annual passenger traffic throughput in 2007:

Rank	Airport	Annual Passengers in 2007	Rail Connection
1	HEATHROW	68,066,028	Yes
2	GATWICK	35,216,113	Yes
3	STANSTED	23,779,697	Yes
4	MANCHESTER	22,112,625	Yes
5	LUTON	9,927,321	
6	BIRMINGHAM	9,226,340	Yes
7	EDINBURGH	9,047,558	
8	GLASGOW	8,795,727	
9	BRISTOL	5,926,774	
10	NEWCASTLE	5,650,716	Yes
11	LIVERPOOL	5,468,510	
12	NOTTINGHAM EAST MIDLANDS INT'L	5,413,360	
13	BELFAST INTERNATIONAL	5,272,664	
14	ABERDEEN	3,412,257	
15	LONDON CITY	2,912,123	Yes
16	LEEDS BRADFORD	2,881,539	
17	PRESTWICK	2,422,332	Yes
18	BELFAST CITY (GEORGE BEST)	2,186,993	
19	CARDIFF WALES	2,111,148	
20	<b>SOUTHAMPTON</b>	<b>1,965,686</b>	<b>Yes</b>

**Table 4.1: UK Airports with Direct Rail Access**

Information about each of the nine UK rail/airport stations is as follows:

**Southampton Airport (Parkway)** station is adjacent to Southampton Airport. The airport has one of the fastest train-to-plane connections in Europe, with just 99 steps to the terminal<sup>3</sup>.

<sup>3</sup> Source: BAA website



**Figure 4.1 Southampton Airport (Parkway) Station**

South West Trains operate up to 3 trains per hour between London Waterloo, Winchester and Southampton Airport with up to 3 direct services to Bournemouth, 2 to Poole and Wareham and hourly to Weymouth and most intermediate stations.

CrossCountry services link Southampton Airport (Parkway) with the Midlands, North West and North East England and Scotland.

**Birmingham Airport** – an Air-Rail Link transfers passengers between Birmingham International Railway Station and the two airport passenger terminals. The Air-Rail Link is free, operates every 2 minutes between Birmingham International Interchange and the Airport Passenger Terminals, with a journey time of less than two minutes.

A frequent bus link also operates between Birmingham International Airport and Coleshill Parkway station for direct rail connections to the East Midlands including Nuneaton, Leicester and Peterborough.

**Glasgow Prestwick Airport** is the only airport in Scotland to have its own railway station. The station is connected to the single passenger terminal by a covered walkway over the A79 road, and platforms are easily accessed by stairs, escalators and lifts.

The station is owned by the Airport, not by Network Rail or First ScotRail. There are regular train services (approx. every half an hour) from Glasgow central station to the Airport. All services from the station are operated by First ScotRail. Most services are to Glasgow Central and Ayr on the Ayrshire Coast Line. There are also less frequent services to Stranraer, Newcastle and Kilmarnock.

**London Gatwick Airport** has its own railway station attached to the South Terminal. Access to the North Terminal is via free transit from the North Terminal. Southern and Gatwick Express operate train services to London Victoria. Direct train services serve many parts of the country with CrossCountry. Southern Railway also operates trains to a variety of other towns including many south coast destinations.

**London Heathrow Airport:** The Heathrow Express rail service operates from all terminals to Paddington Station. Heathrow Connect trains operate local services from Terminal 1 to Paddington. The London Underground also links all terminals with central London and other main line rail stations.

**London Stansted Airport** has its own railway station in the heart of the airport terminal building. The Stansted Express is a dedicated rail service operating between London Liverpool Street and Stansted Airport station. Fastest journey time is 41 minutes, with an intermediate stop at Tottenham Hale to enable transfer onto the Victoria Line (London Underground) for the West End.

Central Trains operates an hourly express service seven days a week between Birmingham and Stansted Airport calling at Leicester, Peterborough and Cambridge offering connections with services to Yorkshire and the North East.

**London City Airport** has a Docklands Light Railway (DLR) station connected to the airport terminal. The Docklands Light Railway is a driverless overground system connecting East London to the London Underground network.

The DLR departs London City Airport every 7 to 15 minutes, with journey times of 7 minutes to Canning Town and 22 minutes to Bank.

**Manchester Airport** railway station is located in the heart of the airport complex. From there Skylinks, a series of moving walkways, connect the three terminals to the upper level of the railway station. .



**Figure 4.2 Manchester Airport**

Manchester Airport rail station has frequent services to Manchester and all nearby towns. There are regular connections to the Airport from Manchester Piccadilly, Preston, West Yorkshire and the Northeast. From Monday to Saturday six trains an hour run between the Airport and Manchester Piccadilly during the day with four per hour on Sundays. Night services are less frequent.

**Newcastle Airport** has a Metro station located immediately adjacent to the passenger terminal. The station is linked by a covered walkway directly into the terminal building. The Tyne & Wear Metro provides a fast and frequent rail link from Newcastle Airport to the City Centre, Central Station and throughout Tyneside. Trains run approximately every 10-12 minutes with a journey time of 20 minutes from Newcastle centre to the airport.

From Newcastle there are services to other major UK cities (including London King's Cross, Leeds, and Edinburgh), and to various local destinations.

### **i. Design lessons**

From the above information it can be seen that airport rail stations fall into three main categories as follows:

Those where the railway station is integral to the passenger terminal, i.e.

- Gatwick Airport (South Terminal)
- Heathrow Airport
- Stansted Airport
- London City Airport

Those where the railway station is detached from the passenger terminal but within easy walking distance, i.e.

- Southampton Airport (Parkway)
- Glasgow Prestwick Airport
- Newcastle Airport

Those where a further journey is required from the railway station by a dedicated transit vehicle to access the passenger terminal, i.e.:

- Birmingham Airport
- Gatwick Airport (North Terminal)
- Manchester Airport

The first category is the preferred one since rail passengers are immediately absorbed into the airport processing system since access to and from the station platform is by escalators, lifts or walkways.

The second category requires passenger to physically transfer from the station to the airport environment, usually over or across a road.

The third category will usually add time to the overall transit time between the railway platform and the passenger terminal, compared with the other two categories.

All of these airports have a frequent train service to their associated station. For the London airports this is predominantly direct to London for onward travel. For the regional airports, a good service to local destinations and other national ones is preferable.

There are numerous examples of airport rail stations outside of the UK, but most will probably fall into the three categories described.

Special mention should be made of Amsterdam Schiphol Airport that has an integrated station and frequent services all over Holland. Paris Charles de Gaulle Airport has a short bus ride to an interchange station with high speed links to regional France and RER links to central Paris.

### **3.4 Footprint for a combined airport terminal and four platform station**

Within this study we have concentrated on providing the rail input in terms of the required footprint/safeguarding requirements for an expanded station.

We are not currently in a position to address the remaining requirements under the remit of this study as we do not have sufficient information to undertake feasibility design of the airport terminal nor car parking and other facilities.

We would be happy to consider this requirement as a separate study once the study options and findings have been digested.

### **3.5 Park & Ride facility**

Southampton City Council does not currently provide any Park & Ride (P&R) facilities, except for special events.<sup>4</sup> The city centre is well provided with public car parking spaces, currently estimated to be around 11,500 spaces, which are reportedly under utilised, and also has some 13,500 private non-residential spaces (PNR) spaces within the city centre.

According to the Southampton City Council website Southampton has 42 car parks, from surface car parks around the city centre to covered car parks within the city's main shopping area, including West Quay's 4,000 parking spaces.

In the short term this situation is unlikely to change to make P&R a feasible option for Southampton. The July 2007 report "Southampton Parking Review" by Halcrow identified conditions whereby P&R would become a feasible transport option for Southampton in the longer term. These conditions included:

- Future growth in city centre parking demand, particularly from the development of employment opportunities, which the city centre currently lacks;
- Management of the parking supply; and
- The pricing structures for the city centre in relation to P&R fare structures.

There is an existing off-airport P&R facility located just off junction 5 on the M27, around 1.5 miles from Southampton Airport on the west side of Stoneham Lane, between Chestnut Avenue and the point where Stoneham Lane splits into two. This P&R facility is operated by Meteor Parking Ltd<sup>5</sup> and targeted towards customers travelling from any direction.

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<sup>4</sup> During the period of the Boat Show there is a Park and Ride scheme operating from Junction 1 of the M271 motorway with frequent buses to the show entrance. There is also a Park and Ride for ticket holders to Southampton Football Club matches. This is located close to Junction 8 of the M 27, with a 25 minute bus ride to the stadium.

<sup>5</sup> Meteor also operates at Gatwick, Heathrow, Birmingham and Manchester airports.

The car park is 'self park' secure and monitored by CCTV. There is a free transfer bus to Southampton Airport, which runs on demand 24 hours a day and is wheelchair accessible. Satellite imagery indicates that there are approximately 345 spaces available. No public information is available on the usage of the parking spaces but recent observations indicate the facility is well used, being at least 2/3 full. The cost of parking is approximately £47.00 for 7 days parking, although the pricing tariff is variable, depending on length of stay and time of year.

There is an alternative Airport long-stay car park at the north end of Mitchell Way, which the Eastleigh Chord would pass through.

The MVA report “Delivering Strategies” produced in March 2008 mentioned in section 3.2.2 that “Park and ride provision could be provided by a site at Stoneham, a short distance from Parkway, linked to improvements at M27 Junction 5.”

We understand that there is greenfield land on the west side of the railway, north or south of the M27 but this is largely or wholly associated with recreational facilities, mainly the University of Southampton.

Southampton Airport Parkway currently has a car park with capacity for 594 cars; the expansion of the station to four tracks would result in the loss of approximately 266 spaces. We understand that South West Trains has planning permission to build a multi-storey car park with capacity to offer some 400 additional spaces, on four levels, at Southampton Airport Parkway Station.

A site adjacent to Wide Lane could be incorporated with present car parking facilities to form the Eastleigh and Southampton Park and Ride facility. This lies to the north of the M27 adjacent to Junction 5 and to the south and east of Wide Lane and is currently used as playing fields by the University of Southampton. A link would be needed with Parkway station and the highway access may need to be revised. The site is however located in the Eastleigh-Southampton strategic gap and is subject to the requirements of the adopted Local Plan.

A detailed study of the future demand for P&R for Southampton would be necessary to ascertain the impact on M27 junction 5. It would also need to be considered in the context of the parking review and town centre access study for Eastleigh.

In terms of rationalising parking in the Eastleigh area the key questions are:

1. Whether it could be combined on one site and
2. Whether fewer spaces would be required when combined than the sum of those needed when separate.

Under item 1, for a single P&R facility we assume that this to mean combining the expanded Parkway parking with urban P&R. Combining airport parking as well would be a much larger issue. Parkway parking should be reasonably close to the station and both need to be reasonably close to M27 Junction 5 because that will be the main access point (and urban P&R traffic will not be willing to divert much from its preferred route). This limits the area of search for a possible site.

In terms of the number of parking spaces required, for the station we can assume the size planned by South West trains, i.e. around 600 spaces. For urban P&R we do not believe that any number has been proposed. 500 spaces are probably the minimum needed but a larger site would be beneficial. Reduction of the overall total of P&R spaces can be achieved, when the demands occur at different times. This includes where the main demand is during working hours on weekdays, and with, for example, supermarket car parking, where the main demand is evenings and weekends. It is unlikely that something like that would work here because rail P&R and urban P&R are both weekday work related.

It is instructive to look at other existing sites:

- In Winchester there are two park and ride facilities located at Bar End, near junction 10 of the M3, which together offer almost 800 spaces. A new facility is due to open in 2010 with 864 spaces.
- Portsmouth City is planning a site at Tipner on land to the west of the M275. This could take the form of a multi-storey facility, which could then release surface car parking on the other side of the junction. It is understood that the P&R facility would initially be 500 spaces but would be expandable to 1,800 spaces.
- Norfolk County Council operates six purpose built Park and Ride sites providing 4,912 spaces, located on the main routes into Norwich city centre. Last year, more than 3.4 million passengers used the Park and Ride. This is equivalent to almost 700 passengers for each space provided. One of the six sites is located at Norwich Airport and has 620 spaces.

In searching for a potential location near to junction 5 of the M27 a rule of thumb measure of 25 sq m per space, which includes internal roads and landscaping but excludes screening landscaping around the site can be used to estimate a suitable footprint.

Therefore, for a P&R facility with 500 spaces the area required would be around 15,625 sq m, including a 25% contingency for screening landscaping around the site. A site for 1,000 spaces would require around 3.1 hectares (31,250 sq m). Based on the Norwich experience above, 1,000 spaces would generate around 700,000 annual users.

Another option would be to consider what site would be required for a multi-storey to accommodate the same number of spaces. A reasonable starting point is to assume that the number of floors would be the same as the one proposed for the station because that was approved. This could then be divided into the number of spaces to obtain a starting point for a footprint and hence location.

There are other issues to consider. The management arrangements required should not be underestimated. Rail P&R for journeys in the London direction will occur earlier in the day than urban P&R and those customers pay more than could be charged for urban P&R. So without foolproof controls the P&R spaces available to the urban market would partially be used by rail patrons. And if airport passengers see it as a way of getting cheaper parking as well then urban P&R spaces could be much reduced. There would need to be confidence that there is a management solution before heading in this direction.



## 4 Eastleigh Station

### 4.1 The role of Eastleigh Station

Eastleigh Station is the 9th busiest station in Hampshire and acts as a major interchange on the network.



**Figure 5.1 Eastleigh Station**

### 4.2 Current passenger train services

The table below details current passenger train departures from Eastleigh Station between 0800 and 0900 on Monday 11 August 2008:

Destination	Dep	Arr	
London Waterloo	0812	0938	
	0821	0953	via Southampton Parkway
	0842	1008	
	0853	1019	via Basingstoke
Southampton Central	0802	0817	
	0821	0838	
	0847	0858	
Romsey	0802	0834	via Southampton Central
	0821	0853	
	0848	0901	
Portsmouth Harbour	0830	0918	
	0847	0954	via Southampton Central

Source: [www.thetrainline.com](http://www.thetrainline.com)

**Table 5.1: Departures from Eastleigh Station between 0800 and 0900 on 11 August 2008**

In addition, Network Rail report that a further six passenger trains each hour pass through the station without stopping. There are also numerous movements of empty coaching stock to/from Northam depot.

According to the MVA report, the number of station entries and exits at Eastleigh station in 2002/03 was 1,006,508. The number of station entries and exits in 2005/06 was 1,169,080. The same numbers for Southampton Airport Parkway station were 987,402 and 1,421,310 respectively. The growth in station entries and exits at Eastleigh between 2002/03 and 2005/06 was 16.2%, while at Southampton Airport Parkway it was 43.9%.

Passenger traffic at Southampton Airport grew from 789,325 passengers in 2002 to 1,912,979 passengers in 2006, an average annual growth of 24.8% which suggest that the reason for higher growth at Southampton Airport Parkway station compared to Eastleigh was passenger traffic growth at the Airport.

According to Network Rail in 2007/08 Eastleigh generated a total of 1,310,600 passenger journeys, making it the 9th busiest station in Hampshire.

### 4.3 Freight services

The largest freight flow through Eastleigh is intermodal traffic moving from the Port of Southampton to destinations in the Midlands and North of England. There are also flows of traffic which support Network Rail’s infrastructure maintenance and renewal activities, movement of light locomotives etc.

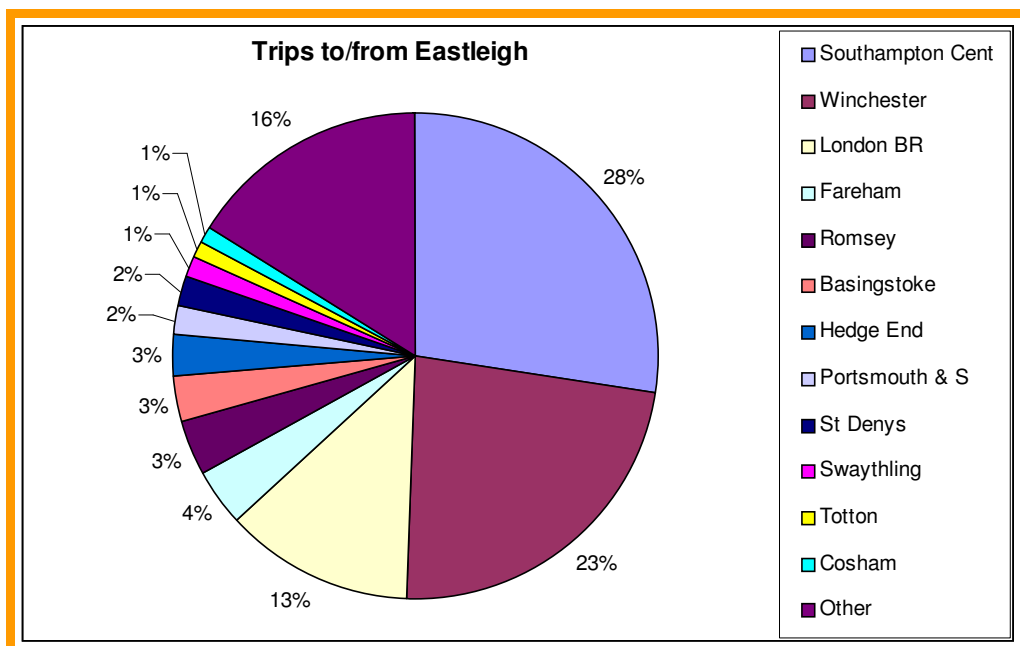
### 4.4 Strategic importance

Eastleigh offers a more diverse train service compared with Southampton Airport Parkway. Furthermore the demographic of destination stations from Eastleigh varies extensively to that from the Airport Parkway station.



**Figure 5.2 Southampton Airport Parkway Station**

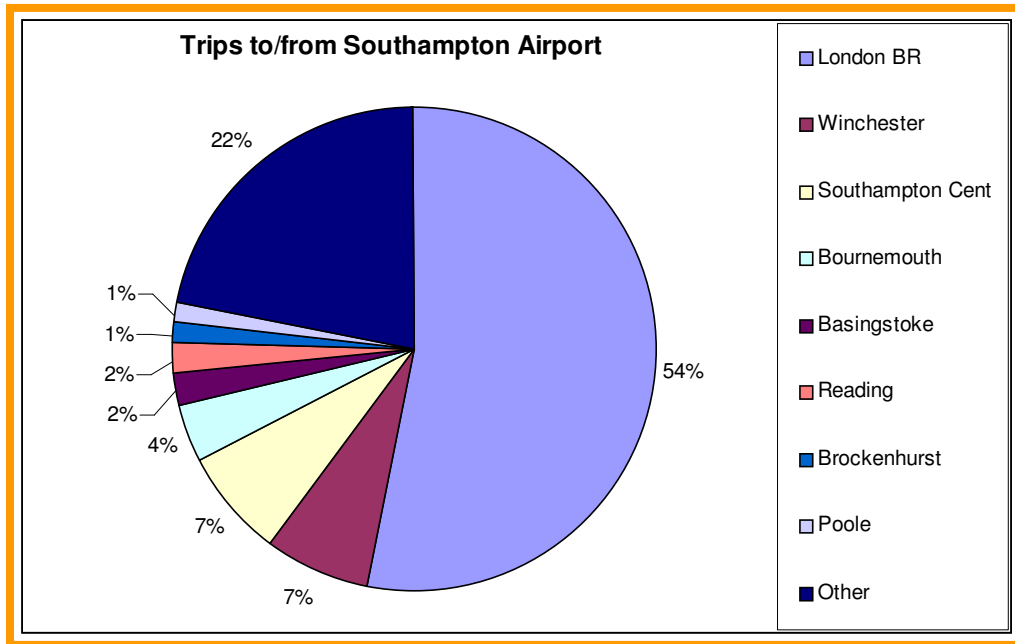
The breakdown of origin/destination data included in the Network Rail report showed that over half of all trips from Eastleigh were of a local nature to either Southampton or Winchester.



Source: Network Rail

**Figure 5.3: Origin/ destination of passenger trips to/from Eastleigh Station**

By contrast, at Southampton Airport Parkway, over half of annual journeys were to or from London.



Source: Network Rail

**Figure 5.4: Origin/ destination of passenger trips to/from Southampton Airport Parkway Station**

#### 4.5 Alternative to the Chord

The option exists to carry out no infrastructure works to Eastleigh. Diverting services from the Netley line to the Botley line and reversing the services at Eastleigh could negate the need for a Chord to be built at Eastleigh. However, this option adds approximately 10 minutes to the running time between Eastleigh and Fareham. Additionally the current timetable would only allow one of the three services per hour to reverse in platforms in Eastleigh. Widespread timetable changes would be required in order to implement three services per hour reversing at Eastleigh.

A new platform could be built at Eastleigh for reversing services however the journey times would still be approximately 10 minutes longer. Strategically Network Rail is also reluctant to support trains reversing at Eastleigh due to the potential increased performance risk and capacity reduction.

#### 4.6 Links to Southampton Airport

An alternative link to the Airport could be provided from Eastleigh station. With the current service pattern, this option would only serve suburban commuters as intercity trains already call directly at the Airport.

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The current train timetable shows that there are currently three departures per hour from Eastleigh station to Southampton Airport (Parkway) in the peak 0600-0859, 1600-1759 hours and 2200-2359 hours. At all other times there is a twice-hourly service between the two stations operating at three minutes and nineteen minutes past the hour.

There is an existing bus service, operated by Black Velvet Travel, which travels from Eastleigh Bus Station to Wide Lane, adjacent to Southampton Airport Parkway station. The service departs half-hourly during peak times and hourly outside the peaks from Eastleigh Bus Station and has a journey time of ten minutes. Given sufficient demand it seems highly likely that this bus service could also call at Eastleigh Station.

Future airport development to cater for forecast passenger numbers may see a new terminal in the North east Zone of the Airport or the expansion of the current terminal building with expansion east of the runway. This may make an Eastleigh connection to a potential Northern terminal viable or the general increase in volume may increase demand for an Eastleigh connection.

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## **5 RECOMMENDATIONS / FURTHER WORK**

It is recommended that:

- Consultation occurs with all interested third parties.
- Discussions take place with HMRI regarding the possibility of utilising level crossings for the Chickenhall Lane Link Road to cross the railway.

Further engineering and multidisciplinary option development will be required along with detailed pre-feasibility study of the preferred options presented in this study. This would include;

- further pre-feasibility design based on the actual geometry of turnouts,
- checks on radii and line speeds achieved,
- review of physical constraints which may not be apparent from the mapping, and
- review by signalling and operations specialists to confirm that the track layout could be signalled and deliver the operational requirements.

In addition, further consultation would be required with third parties to determine requirements.

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## **Appendix 1: Ownership and Leasehold Arrangements at Eastleigh**

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## **Appendix 2: Eastleigh Area Supplementary Study Drawings**

**Drawing 0001 – Current Usage of Eastleigh Sidings**

**Drawing 0002 – Optimum Alignment Options For Eastleigh Chord Option MG1 to MG6  
With Conflicts**

**Drawing 0002a - Optimum Alignment Options For Eastleigh Chord Option MG1 to MG6**

**Drawing 0003 – Indicative Location for Commercial Premises and Rail Sidings**

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### **Appendix 3: Options for the Eastleigh Chord**

Atkins has carried out two studies for Hampshire County Council in May 2004 and May 2006 with regards to potential alignments for the Eastleigh Chord and the Botley line redoubling. MVA Consultants also carried out work looking at various options for transport improvements within South Hampshire and gave an overview of potential schemes for the Eastleigh Chord and associated rail schemes. The alignment proposals are presented in detail in the following sections of the report and in **Drawing 0004 Safeguarding Requirements Eastleigh Chord Options**.

The purpose of the Eastleigh Chord is to enable rail traffic between Portsmouth and Southampton via Fareham to be diverted from the Netley route to reach Southampton Parkway Station and then Southampton without the need to reverse at Eastleigh. There are a number of key constraints associated with operations of the adjoining Southampton International Airport. Specifically strict safety requirements established by the Civil Aviation Authority (CAA), Runway End safety Area (RESA), and the Department for Transport (DfT), Public Safety Zone (PSZ).

The RESA is an open area at the end of the runway that gives a safety margin for aircraft that overrun or undershoot the runway. The CAA has defined the RESA length as 240m and width as at least twice the graded portion of the associated runway, 150m for Southampton.

Owing to the required curvature of the new chord line, it is envisaged that the turnout speed from the Southampton Main Line would be in the order of 30mph. This would place a considerable headway constraint on the main line services. It is therefore proposed to extend the chord line parallel to the main line services as far as Southampton Airport station, permitting a turnout speed in the order of 50mph, although trains scheduled to stop at the Airport station would be travelling considerably more slowly.

It is therefore proposed to provide additional running lines as far as practicable between the chord line and Southampton Airport Parkway station. The southerly limit of any new alignment would be the over bridge immediately to the country end, i.e. the southern (Southampton) end of the station. Provision of island platforms can provide two additional platform faces to accommodate the chord line and permit trains to and from Fareham to stop clear of the main line.

#### **May 2004; Atkins:**

##### **Option 1: At Grade Junction with Main Line**

This option connects the Southampton and Portsmouth (via Botley) railway lines with a grade separated connection to the Up Main Line. It has two variants at the eastern end with differing speed connection.

The proposed scheme allows for the introduction of two island platforms. The connection to the new tracks would diverge from the existing just north of the Wide lane/ Stoneham overbridge, requiring shortening of the platform at the south end and extension at the north end. The location is also conditioned by the existing track curvature.

From the north end of the station the tracks run northwards and parallel with the existing running lines where they then pass over an extension of the small underbridge UB202. The tracks continue eastwards at grade with the existing until they reach the top of the ramps which commence approximately 100m before the reinforced concrete retaining walls. The first hundred metres include the vertical hog curve transitioning from the grade to the slope and can be engineered by excavation of the local material until there is approximately one metre difference in level between the exiting new tracks.

The length of the tunnel is determined solely by the width of the runway safety zone and is 155 metres in length.



Two nominal options are offered for connecting with the Portsmouth tracks Option A and B. Option A passes close to the perimeter of the Eastleigh yard via a reverse curve making a connection using a 30mph double junction immediately west of existing underbridge UB5 'Black Drain'. Option B runs in a straight line eastward to make a connection with the existing tracks via a higher speed double junction immediately west of Overbridge 3 at Chickenhall Farm. This route passes over the Itchen Valley Country Park, the River Itchen and the Itchen Navigation and therefore requires a series of underline structures to support the tracks across these obstacles and preserve the free flow of water during flood. This option will permit trains to operate at higher speeds through this length, although the saving in journey time compared to Option A is likely to be relatively small, perhaps in the order of 20-30 seconds.

### **Option 2 – Grade Separated Junction with Main Line**

The characteristics of this option are very similar to Option 1 at the central and eastern end of the chord.

All is the same except for the length from UB 202 on the Southampton main line through to the west side of the tunnel beneath the airport runway through creation of a grade separated connection with the Up and Down Southampton tracks. The connection of the tunnel/ ramp to the Down Southampton is largely the same as Option 1 although for single track. From the fork of the tracks at the west edge of the airport safety zone, the tracks divide with the northernmost track sweeping across and under the running lines of the Southampton mains.

### **Option 3 – Tunnelled Alignment beneath Alstom Works**

In this option the chord line is located at the north end of the Alstom workshops. In view of the considerable number of siding tracks, this is proposed as twin bored tunnels.

#### **May 2006; Atkins:**

#### **Option 1 - 300m Radius**

The proposed alignment will diverge from the Botley – Eastleigh line by means of an NR60F double junction suitable for 50mph. the point of divergence will be similar to that proposed in the previous low speed (30 mph) option, namely just north of the Barge River underline bridge N0. 3.

The route will then run straight to intersect the EWS east side access lines, and run close to the south west corner of the main Alstom building, before curving left at 300m radius, probably 35 mph but possibly 40 mph, to meet and run parallel to the Eastleigh – Southampton main line, intersecting Campbell Road and the north end access to the EWS sidings.

Just north of the reconstructed Southampton Airport Parkway station, the Up line will connect into the Up Main line via a diamond crossing in the Down Main. This layout with two island platforms at the Airport Parkway station is identical with that proposed as Option 1. This option requires the relocation of the sidings and the locomotives servicing depot.

#### **Option 2 - 200m radius**

In this option the chord line is located as far north as possible with a 200m radius, which would probably require a 25mph speed restriction. The connection to the main line at Southampton Airport Parkway station remains as previously proposed. It is assumed the EWS locomotive servicing facilities can remain in their existing location.

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## **March 2008; MVA Consultancy**

### **Option Zero: No Infrastructure Changes**

This option makes no changes to the existing rail infrastructure. The expectation would be that trains using the Botley line would come into the platforms at Eastleigh and then reverse out towards Southampton Airport Parkway. The advantages of this option include zero infrastructure costs; the provision of a new through services from Botley and Hedge End to Southampton; and the provision of an additional Eastleigh to Southampton service.

### **Option One: Grade- Separated junction with Northern Alignment through former Alstom Site**

This option would provide a grade separated junction with the Up and Down main lines rising to cross over the eastbound chord line. The chord, after passing beneath the elevated Down mainline would initially follow the alignment of the mainline and then curve away at ground level through the works site towards South Junction. This would diverge from the existing railway alignment and cross the present course of Campbell Road close to the existing bridge over the main line.

This option offers the potential to site a platform to serve the employment zone in the area between Eastleigh station and South Junction although this would add to operational constraints and costs. The curve away from the mainline towards the Botley line would be tight, imposing a low speed limit. A number of difficulties arise with Option 6 associated with the viaduct arrangements. Considerable space is required to achieve grade-separation and there are very high construction costs with new structures.

Significantly, structures at the vertical elevation required to clear the Main Line could infringe the airport PSZ, even if the chord is brought down to ground level on the former Alstom site.

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### **Option Two: Grade-Separated Junction with Central Alignment Through Former Alstom Site**

This alignment would require the diverging spur to be elevated to cross the Down mainline and remain elevated while passing over Campbell Road at the point just before the road ramps up to the bridge. Both tracks of the spur would require elevation to cross Campbell Road. Once past this point the spur could descend to ground level to join the Eastleigh to Botley route in the South Junction area. However this alignment would preclude the provision of a station to serve the employment zone.

The elevated section would be no higher than the level of Campbell Road bridge crossing the railway or of the existing railway workshop buildings but would be slightly closer to the airport runway and this may make the alignment untenable as it will infringe the airport PSZ Down line flyover with spur in a cutting around airport perimeter (1 in 100000 risk contour) and may exceed the average density of occupation currently experienced within the zone.

Therefore Option Two has the major difficulty of impinging on the airport PSZ which, in effect, rules it infeasible.

### **Option Three: Grade-Separated Junction with Alignment Around Airport Perimeter**

This alignment would require the diverging (eastbound) spur to pass beneath the Down Main Line and proceed in a cutting along the airport boundary. This would require the sacrifice of some siding capacity within the EWS Depot (used mainly for holding redundant rolling stock). The alignment would though pass close to the end of the runway and may therefore be problematic. This would result in a need to tunnel the route in this area.

There may be scope to build a station platform along this alignment although this would not be particularly close to the employment area and would incur operational problems and costs.

The inclusion of tunnelling works is expected to add very considerable cost, not least due to the unfavourable ground conditions and location of major utilities in the area. This work would be necessary to avoid the airport PSZ. There would also be practical problems of working beneath an operational main line and the expected high costs and engineering problems effectively exclude this Option from further consideration.

### **Option Four: At-Grade Junction South of Parkway Station with Northern Alignment through Alstom Site**

With this arrangement, the present Down platform (2) becomes reversible. Trains from Southampton access the chord via the crossover between the M27 bridge and Parkway station, then via Platform 2 and cross over onto the chord line. An additional crossover further towards Eastleigh gives access to a new Down loop platform to allow Down main line trains to run via the loop while a chord train is standing at or signalled into Platform 2. This requires the crossovers to be sufficiently far towards Eastleigh to allow this to happen without infringing overlaps. The crossover from the Down Main to Down Loop would need to be around 50mph while the other two crossovers could be lower speed, 30 to 40mph. The Down platform at Parkway would need to be located further to the north to provide clearance for the new loop line to pass under the existing Wide Lane bridge to avoid its reconstruction. There is sufficient space between the two bridges to locate a full, low speed, double junction, although the alignment at this point is on a gentle curve. However, although Wide Lane bridge was constructed to span four tracks when it was built in the 1930s, the space under the bridge appears limited and may not meet present day standards four track spacing.

The present alignment of tracks through Wide Lane bridge has both lines immediately adjacent to the west abutment of the bridge. Unless a significant sharpening of the curve was accepted together with the reconstruction of Parkway station further to the north, the present Up platform would remain with the Down platform shortened at the south end and lengthened to the north and converted to an island platform. There would then be a need to provide a separate new Down platform for trains coming off the chord line. However there is insufficient space to accommodate such a layout without infringing on the alignment of the airport access road. Relocation of this road to the east cannot be achieved due to the presence of adjacent buildings, including the airport terminal and the aircraft standing area.

In addition this option has some operational drawbacks in that a train from the Southampton direction is required to proceed onto the chord line cannot enter Southampton Airport Parkway station if a conflicting Down Main Line movement is approaching or in the station. The train would therefore be delayed at the protecting signal blocking the Up Main Line while it did so. For these reasons this option is not progressed further in this form but some elements are carried into Option Six.

#### **Option Five: At-Grade Junction with Alignment through Former Alstom Site**

This option provides two island platforms at Parkway station with the diverging junction to the chord line north of the station. In this situation the Up Loop provides a route for Up main line trains to pass around an eastbound chord train waiting for a clear path across the Down Main line. The converging line from the chord would serve the outer face of the new Down island platform with the connection to the Down Main Line immediately beyond the platform. This would impose a signalling constraint in that a Down Main Line train would not be allowed to enter the station if a Down Chord line train was already signalled into or through the chord line platform due to the lack of an unobstructed overlap beyond the protecting signal.

This would require the Up platform at Parkway station to be moved further north and converted to an island platform which would require the demolition of the existing station building and the loss of some existing car park spaces. These two factors would be best addressed coincident with the planned redevelopment of the station. The inclusion of an at-grade junction imposes constraints but to some extent these can be overcome and in doing so, avoid major construction problems associated with grade separation.

#### **Option Six: At-Grade Junction: modified options 9 and 10**

This option is very similar to Option Five but relocates the Down line junction to the South of Parkway station as proposed in Option Four while retaining the Up line diverging junction to the north of the station. This provides the maximum possible flexibility for an at-grade junction.

Option Six combines the best features of other options to overcome practical difficulties and to minimise operating constraints. There is also scope to extend the scheme to include additional capacity on the main line with additional tracks, thereby maximising operational flexibility. Adopting the northern alignment for the chord through the former Alstom site reduces land take in that area.

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## **Appendix 4: Botley to Fareham Line**

This appendix presents a summary of existing reports. Whilst we have not undertaken a detailed validation of what has been said, we are generally in agreement with the comments made by others.

In order to meet aspirations to reroute trains from the Netley line to the Botley line, or even to introduce a new service on the Fareham – Southampton corridor routed this way, certain infrastructure works will be required between Botley and Fareham to provide the necessary line capacity.

The works required to eliminate the current sections of single line track are summarised below.

The Botley to Fareham line was formerly double-track from Eastleigh to Knowle Junction, where the Meon Valley line from Alton converged to form a short 3-track section. The Meon Valley line then continued as a single line through Fareham tunnels whilst the ‘main’ line continued as a double track via the ‘Deviation Line’. These two routes combined and joined the double-track Netley route just north of Fareham Station.

### **Track and Structures Alterations Required**

Two main options have been considered, the first providing double track from Botley to just north of Fareham tunnels, and the second providing double track throughout. In addition there is a sub-option of retaining single track through Tapnage tunnel.

In both options, the new double track commences just north of Oatlands Lane overbridge no. 18 through which the exiting single line occupies the Up line track bed. The new track will be installed on the former Down line track bed with the turnout, trap and sand drag being removed. The electrification cable route on the Down trackbed will need to be realigned.

South of Oatlands Lane Bridge, the track veers over to the centre of the track bed to pass centrally under Fairthorne overbridge no. 19. The existing track will need to be realigned.

South of Fairthorne Bridge the existing track veers to the former Down line alignment as far as lands Arch underline bridge No. 21. Installation of the second track on the former Up line track bed appears straightforward.

South of lands Arch Bridge, the single line veers over to the Up line formation. The electrification cable route will need to be diverted from the former Down line track bed.

On the approach to Tapnage Tunnel the existing line veers to the centre of the tunnel to maximise clearances. Two options have been considered for Tapnage Tunnel – the first retaining a short section of single line, the second with a new single-bore tunnel. Previous proposals to restore double track through the existing tunnel would not achieve the required freight clearances without major track lowering and would be highly disruptive involving closure of the line for a significant period of time. Some land acquisition will be required at the south end of the tunnel for the approach alignment to the new bore, and major retaining walls will be necessary at both ends.

A further option of opening out the tunnel and providing a bridge for road, thus enabling double tracking without a second bore, may be worthy of further consideration.

South of Tapnage tunnel, the line remains approximately on the centre of the formation with some deviation towards the former Down track alignment on the approach to Knowle Viaduct. Major work to the lineside sub-station on the Up Side of the track and some cable route diversions are likely to be necessary.

South of Knowle Viaduct, the new track can be installed on the former Up line formation until Knowle Hospital overbridge is approached. In order to achieve the required clearances, it may be necessary to use the former Meon Valley span for the new Down line retaining the existing track as the Up line.

South of Knowle Hospital bridge, the tracks will either (a) converge to retain the existing single line through Fareham tunnels or (b) be ‘shoe-horned’ as double track through the existing line formations, with some retaining walls and possible land purchase, as far as Funtley Road overbridge No. 25. It appears necessary to reconstruct Funtley Road Bridge to obtain the required clearances for double track.

If required, completion of the twin tracks through Fareham tunnels is proposed to be by means of a new second single track bore to the west of the existing, linking in south of the tunnels where the existing single line ends.

Further options discussed below are the reinstatement of the former ‘Deviation’ or construction of a new ‘Deviation’ line.

### **Reinstatement of Deviation Line**

The construction of a new single line on the former ‘deviation’ line which was closed on May 6 1973 has been considered as an option to re-doubling the present line through Fareham Tunnels.

The ‘deviation’ route can be divided into three sections (a) between the former junction and Highlands Road on which there has been residential development, (b) from Highlands Road northwards to the M27 motorway and from the motorway to the former Knowle Junction.

#### **Section 1: Fareham Junction to Highlands Road**

It is likely that four properties in Elgin close/ Glenelg would have to be demolished as they occupy land required for the new trackbed for the reinstated line. A further nine properties would have their access route severed and an alternative route would need to be provided. Alternative access might be possible through Gudge Heath Lane on the north side of the Fareham to Southampton line through the “Depot” area. The affected properties include 1-6 Glenelg and 1-3 Oak Glade.

Additionally the rear gardens of 38 properties in Frosthole Crescent/ Argle crescent/ Elgin Close would be shortened. In the Frosthole crescent/ Gifford Close/ Heather Gardens area, various footpaths would need to be diverted, possibly involving a footbridge.

Five properties in Craven Court, 5,7,9,11, and 15, would need to be demolished and the gardens of 13 properties in Heather Gardens and two properties in Rannoch Close, 6 and 7, would be reduced in size. A new overbridge would be required to carry Highlands Road over the railway.

The whole section of the route will require clearance of vegetation, new fencing, new track formation and track drainage, possibly also involving some limited earthworks

#### **Section 2: Highlands Road to M27 Motorway**

North of Highlands Road, the former cutting has been partially in-filled for some 400 metres. The reason for this has not been established, although it is believed that there were problems with the cutting stability in this area prior to closure of the line. The nature of the material used for fill is similarly unknown.

A car park has been established at the south end adjacent to Highlands Road.

Beyond the area of in-filling the formation is intact with a footpath bordered by extensive undergrowth and trees.

At the north end of this section the M27 motorway has been constructed on an embankment crossing and obstructing the route.

A pedestrian subway passes under the motorway to the west side of the former cutting. A new 'tunnel' will be required under the motorway, possibly a jacked box.

Extensive clearance of vegetation, a new track formation and new track drainage will be required throughout this section.

Provision may be necessary for the retention of footpath access unless the route is closed.

### **Section 3: M27 Motorway to Knowle Junction**

This section of route is mostly on an embankment with the route intact but heavily overgrown with many trees. Vegetation clearance and new track formation will be required. Provision may be necessary for retention of footpath access unless this route is closed. It is assumed that no work will be required to the bridge carrying the railway embankment over Funtley Road.

### **Fareham station to Fareham Tunnel**

It is assumed that the present layout between Fareham station and Fareham Tunnel will be retained for aggregate train access to the terminal.

A single turnout will therefore be required in the existing Up Portsmouth line to serve as the new 'Up Deviation' line. This line will then traverse the Deviation route and converge with the existing under the footbridge approaching former Knowle junction.

The two tracks will run parallel as previously proposed to join the existing double track at the south end of Botley station.

### **New Deviation Line**

This section looks at the possibility of constructing a new 'deviation' line. For the first 2 km from Fareham, where the railway is in a cutting, the proposal would require either a third track entailing extensive bored pile retaining walls and bridge works or shared running on the present eastbound track which, by utilising 'right-hand running' for trams could be restricted to westbound movements only.

The new alignment would diverge northwards from the existing railway at a point south of Henry Cort School, where rail level is approximately 23m above OD and a short cut-and-cover tunnel would probably be appropriate in this area, to minimise impact of the new railway on school environment, ground level being over 30m above OD.

The route would follow a right-hand curve of 500m radius, probably suitable for a speed of 50mph. The alignment would generally follow the 20m contour in the MEON Valley, crossing under the M27 motorway and passing east of Funtley House farm before rejoining the former deviation route at Funtley lane underbridge. The deviation route would then be followed to the former Knowle Junction.

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## Appendix 5: References

- Eastleigh a Strategic Overview of railway Operation needs (Summary); Network Rail July 2008
- <http://www.rail-reh.gov.uk/upload/pdf/319.pdf>, Policy on Level Crossings, Office of Rail Regulation; February 2007
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