South Gloucestershire Core Strategy

Henbury Rail Study

Client: South Gloucestershire Council

May 2012
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May 2012
Document history

Henbury Line Study
Bristol/South Gloucestershire Area Rail Study
Bristol City Council

This document has been issued and amended as follows:

<table>
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<th>Version</th>
<th>Date</th>
<th>Description</th>
<th>Created by</th>
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<td>1.A</td>
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<td>David Crockett</td>
<td>David Crockett</td>
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<td>3</td>
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<td>Ruannan Law</td>
<td>David Crockett</td>
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<td>Revised Final Draft</td>
<td>Ruannan Law</td>
<td>David Crockett</td>
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1 Introduction

1.1 Background

Bristol benefits from regular long-distance and regional rail services providing two trains per hour on most inter-city, inter-urban and inter-regional routes passing through Bristol. Bristol is served by two distinct rail hubs, at Temple Meads and Parkway stations; with Temple Meads oriented towards the city centre and local destinations and Parkway as a Park and Ride and interchange hub.

Beyond these two hubs are the local routes to Bristol suburbs and outlying settlements. These more localised routes and destinations, often on shared routes with longer distance services, have generally seen less of the kind development seen on the longer distance runs, leaving Bristol with a less attractive local service than many cities of comparable size and status.

South Gloucestershire Council, in partnership with the other West of England authorities, have commissioned Halcrow to examine the feasibility of improving local rail services in the West of England area; in particular, South Gloucestershire Council seeks advice on the feasibility of re-introducing passenger services on the existing Henbury (freight) Line in North Bristol. This report summarises the findings of the study into the West of England network as a whole and continues on to describe those of the Henbury Line.

1.2 Cribbs Causeway/Patchway New Development

The proposals for the Cribbs Patchway New Neighbourhood (CPNN) area are described in the South Gloucestershire Core Strategy, December 2011, incorporating post-submission changes.

The CPNN encompasses an area of land bounded by the M5 to the west, the A38 to the east, the Hallen Railway Line to the south and the commercial area at Cribbs Causeway, including Patchway Trading Estate, to the north. Provision at CPNN will be made for a major mixed-use development of approximately 5,700 dwellings in new mixed-use neighbourhoods, around 50ha of employment land and a greater diversity of commercial uses around Cribbs Causeway, together with supporting infrastructure and facilities, within the following character areas:

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1 Bristol Area Rail Study (WoE Partnership), April 2012
i) New Charlton – an area of new mixed development for approximately 3,700 dwellings with supporting community and social facilities, and incorporating strategic open spaces (this occupies the western end of the area currently occupied by Filton Airfield);

ii) Haw Wood – a new residential community to the west of the A4018 for approximately 1,000 dwellings, including sporting and community facilities and strategic green infrastructure;

iii) Filton advanced engineering and aerospace centre of excellence – an area of around 50ha of employment land to the west of the A38 (this occupies the eastern end of the area currently occupied by Filton Airfield); and

iv) Cribbs Causeway – an area of further development and diversification, including approximately 1,000 dwellings post-2021, for future designation as a sub-regional centre (conditional upon the measures set out in Policies CS14 and CS26 of the Core Strategy).

2 Existing and Future Transport Issues

2.1 Existing Rail Provision and Issues

The North Fringe is currently served by three existing local rail stations – Bristol Parkway (3.5km from centre of the development area, as crow-flies), Filton Abbey Wood (2.5km) and Patchway (2km). These stations provide access to both the local (Bristol/Bath etc) and wider national (London/Birmingham etc) rail network. There are several challenges with the current local rail network, which include:

- Constrained track capacity:
  - at Bristol Parkway and,
  - on Filton Bank approaching Bristol Temple Meads;

- Limited passenger capacity on rolling stock for local services during peak periods, including those serving Filton Abbey Wood; and

- The infrequent level of service from the nearest station to CPNN, Patchway has one train per hour through the day to Bristol Temple Meads.

The existing railway line running to the south of Filton Airfield, between Stoke Gifford junction and Severn Beach Line, facilitates the operation of freight services only. The existing rail line is dual-tracked between Severn Beach Line and North Filton, leading to single track to Filton Junction where the line continues to the diamond junction at Stoke Gifford. A former station (Filton North) is located on this line, adjacent to the A38 at Filton. The line has mainly provided access to and from the Avonmouth Bulk Handling Terminal, as well as general connections to industry and the docks area.

2.2 Future Rail Developments

Future plans for the extension of Great Western Mainline electrification westwards to Bristol and South Wales will bring journey time savings on London services and the planned use of electric and hybrid trains will bring acceleration and braking changes that will change the shape of the timetable.
Proposed frequency increases associated with the electrification will see additional long distance trains running via Bristol Parkway to and from Bristol Temple Meads, requiring appropriate line capacity and further constraining the approaches to Bristol Temple Meads along Filton Bank. The recent approval of proposed plans for a rail depot (44 acre site) at Stoke Gifford further enables the future electrification of the main line between Bristol and London. The proposed rail depot, on a triangular patch of land near Parkway Station, will include a maintenance shed and sidings to park the new electric trains when they become operational in 2016/17. Work is expected to start later this summer, ready for testing trains by the middle of 2015.

The opportunity presented by Great West Line electrification, and linked with the re-franchising of the current First Great Western services present an opportunity for the region to re-shape the provision of rail services in the region. Regional authorities (South Gloucester, Bristol, North Somerset and Bath and North East Somerset) have developed a regional rail strategy for the West of England Partnership area. Aspirations for Bristol’s local services are presented as a Greater Bristol Metro network. The proposed enhancements for the local network would operate in an integrated manner with the existing wider rail network, providing regular and more frequent train service patterns on key local routes. In the case of Greater Bristol the desire is to move to a half-hourly service on as much of the system as possible, and especially during the peak hours. More information on proposals for the Greater Bristol Metro can be found in Chapter 3.

2.3 Filton Bank

As stated in the section 2.1, challenges with the current local rail network, include the constrained track capacity on Filton Bank. Discussions with the Rail Industry have highlighted the need for improvements to rail infrastructure along this stretch of track, to proportionately improve capacity in the area and enable future expansion of services.

Without improvements to Filton Bank, constraints on capacity will increase as service provision on the Great Western Mainline develop with electrification. Network Rail recognise these constraints, and have included the provision to develop the line from the current two track, to a future four-track alignment, in their application for Rail industry Control Period 5 – 2014 to 2019 (CP5). Similarly discussions with Department for Transport (DfT) have highlighted an acceptance that Filton Bank presents a significant constraint on rail development in the Bristol area.

Therefore a proposal for the four-tracking of Filton Bank (between Filton Abbey Wood and Doctor Day’s Junction) has been identified within Network Rail’s CP5. Discussions on CP5 are currently underway between, Network Rail, Office of Rail Regulation (ORR) and DfT. Funding for the development of Filton Bank to a four-track alignment is therefore not committed.
3 Wider Bristol network

3.1 Greater Bristol Metro

The West of England Joint Local Transport Plan 3 (2011-2026) outlines that the West of England area has witnessed substantial growth in rail travel with passengers increasing by 56% over the last five years. Existing services have suffered from short formed trains leading to overcrowding and passengers left behind on stations.

The Greater Bristol Metro Rail Project has been identified as a Major Transport Scheme, which would provide:

- Enhanced half hourly clock face cross Bristol train services on Yate to Weston-super-Mare and Cardiff to Westbury (supported by Wiltshire Council) via Bath and Bristol corridors;

- New high capacity rolling stock – faster acceleration, more economical, multiple doors. This is additional rolling stock and it is not to replace existing units;

- New infrastructure including Weston-super-Mare bay platform and Yate turn back to enable trains to turn around with CCTV and Disability Discrimination Act requirements built in.

The Great Western Route Utilisation Strategy (RUS, March 2010) tested enhancing cross-Bristol train services identifying issues around the business case for the proposals.

A strategy for rail development in the West of England Region is currently being developed. The electrification of the London to Bristol lines, along with refranchising of the First Great Western franchise presents an opportunity for the Region to pursue developments in rail provision in general.

A report presented to Joint Transport Executive Committee (JTEC) on 7th March 2012 outlines a phased approach to the development of the Greater Bristol Metro system. The proposed enhancements for the local network would operate in an integrated manner with the existing wider rail network, providing regular and more frequent train service patterns on key local routes.

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2 Rail Update – Great Western Franchise Response (Item 10), JTEC, 7th March 2012
Delivery of the Phase 1 schemes is dependent on a number of things coming together:

- Filton Bank expanded to four-track;
- Capital funds are secured for the Portishead line re-opening;
- Agreement by DfT to include the concept in the franchise specification for the Great Western franchise;
- Funding for any shortfall in operating costs for Phase 1 is covered either as part of the overall costs of the franchise, or through local contributions.

3.2 Phase One

Schemes to be delivered as part of Phase 1 of the wider Greater Bristol Metro would be:

- Re-opening of the Portishead line between Portishead and Bristol Temple Meads – this would include as a minimum - new stations at Portishead and Pill, and cost in the region of £30m to £40m;
- Hourly service operating as a shuttle operation between Portishead and Bristol Temple Meads;
- Additional hourly service operating between Portishead and Severn Beach (it is assumed that Portway Park & Ride station has already been implemented on the Severn Beach Line, at which this service will call);
- Additional hourly service operating between Bath Spa and Severn Beach (as above, this service is assumed to call at Portway Park & Ride station on Severn Beach Line); and
- Removal of the current Severn Beach line services, replaced by the services highlighted above.

These proposals would provide half hourly services on three commuter routes into Bristol Temple Meads:

- Portishead to Bristol Temple Meads;
- Bath Spa and intermediate stations to Bristol Temple Meads; and
- Severn Beach to Bristol Temple Meads.

Additional changes are also sought to existing Cardiff to Taunton services. Currently an hourly service between Taunton, Bristol Temple Meads and Cardiff, it is hoped to provide additional stops at Bedminster and/or Parson Street en-route; thereby enhancing the level of commuter service provision at these sites.

Figure 3.1 outlines the Phase 1 of the Greater Bristol Metro proposals.
Figure 3.1: Greater Bristol Metro Phase 1

Proposed Rail Network - Phase 1

Key

Services
- Portishead to Severn Beach (via Bristol Temple Meads) - hourly
- Portishead to Bristol Temple Meads shuttle - hourly
- Bath to Bristol (Temple Meads) shuttle (extension to Severn Beach) - hourly
- Existing rail services (local and inter-regional)
- Additional stopping services (Cardiff to Taunton) to call at these stations

St Andrews Road
Avonmouth
Portway P&R
Shirehampton
Sea Mills
Clifton Down
Redland
Montpellier
Stapleton Road
Lawrence Hill
Temple Quarter Enterprise Area
Bristol Temple Meads
Bedminster*
Parson Street*
Keynsham
Oldfield Park
Bath Spa
Bathampton Junction (turn-back facility)
Freshford
To Taunton
To Wiltshire Towns and South Coast
To Cardiff
To Midlands
Yate
To Swindon
Severn Beach
Avonmouth/Severnside Enterprise Area
Filton Enterprise Area
Filton Abbey Wood
Science Park Enterprise Area
Weston-super-Mare Gateway Enterprise Area
Nailsea & Backwell
Yatton
Weston Milton
Worle
### 3.3 Phase Two

To follow the Phase 1 proposals, Phase 2 Metro schemes have been developed, and linked ostensibly to new developments. These relate to rail services linking Henbury to Bristol Temple Meads, and to the improvement of service levels from Yate to Bristol Temple Meads.

The proposal is for an initial hourly service on the Henbury Line, with a move to a half-hourly service, once demand has been proven. Two options have been developed for the proposed service, the variation comprising of the number of stations on the line:

<table>
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<tr>
<td>• Henbury;</td>
<td>• Henbury;</td>
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<td>• Filton North (which would serve the CCPN, Henbury and Southmead);</td>
<td>• Filton North (which would serve the CCPN, Henbury and Southmead);</td>
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<tr>
<td>• Horfield;</td>
<td>• Horfield; and</td>
</tr>
<tr>
<td>• Ashley Hill</td>
<td>• Ashley Hill</td>
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Estimated capital costs for the full scheme (four stations) are £23m in 2011 prices. The capital costs for the two station option are estimated at £14m.

The Yate service is linked to an extension of the existing Weston-super-Mare to Bristol service on an hourly basis. This requires a turn round facility at Yate with an estimated capital cost of £4.23m at 2011 prices.

The Henbury option is dependent in demand and revenue terms on the delivery of CCPN. The Yate option is linked to development of housing in the town.

**Figure 3.2** outlines the proposals for Phase 2 of the Greater Bristol Metro network, with **Figure 3.3** providing a combined map of the wider Greater Bristol Metro network (Phases 1 and 2).
Figure 3.2: Greater Bristol Metro Phase 2

Proposed Rail Network - Phase 2

Key

- Bristol Temple Meads to Yate (potential extension of existing WSM service) • hourly
- Existing Weston-super-Mare to Bristol Temple Meads service
- Henbury to Bristol Temple Meads • hourly
- Existing rail services (local and inter-regional)

Doc no: 1 Version: A Date: February 2012  Project code: GBCBCC004 Filename: GBCBCC_Henbury_Rail_Study_v5
Figure 3.3: Combined Greater Bristol Metro Proposals – Phases One and Two

Greater Bristol Metro Phases 1 & 2

Proposed Rail Network

- Existing rail services (local and inter-regional)

Services - Phase 1

- Portishead to Severn Beach (hourly)
- Portishead to Bristol Temple Meads (hourly)
- Bath to Bristol Temple Meads Shuttle (extension to Severn Beach - hourly)
- New turnback

Services - Phase 2

- Weston-super-Mare to Yate
- Additional stopping services (Cardiff to Taunton) to call at these

- Extend Weston-super-Mare to Bristol Parkway service to Yate with turnback
- Henbury to Bristol Temple Meads (hourly)

- Possible new stations (subject to business case)

Doc no: 1 Version: A Date: February 2012 Project code: GBCBC004 Filename: GBCBCC_Henbury_Rail_Sudy_v5
4 Transport Package – Henbury Railway Line

This chapter outlines the investigation process of the different options for new rail links serving the Cribbs Causeway/Patchway/New Development (Filton Airfield). The focus of the work has been to understand what is technically feasible (supply side constraints) and then to assess the relative merits of the feasible options on the basis of financial business case (demand side issues).

Options considered are:

- Henbury – Bristol Temple Meads Shuttle
- Henbury – Bristol Temple Meads (via Bristol Parkway) options
- Henbury / Severn Beach Line service options

4.1 Recommended Option - Henbury to Bristol Temple Meads Shuttle

Level of Service

This would be a dedicated service between Bristol Temple Meads and Henbury to initially deliver an hourly frequency. There is potential for a half-hourly service, and Phase 2 of the Bristol Metro assumes this to start once the patronage potential has been demonstrated.

Stations

Stations delivered as part of this scheme include Henbury and Filton North; with the potential reinstatement of former stations at Horfield and Ashley Hill. As well as allowing a rapid journey to Temple Meads, running Henbury trains via Filton Bank would also provide an additional service on that corridor that should be able to accommodate new stations without slowing down existing services or reducing calls at existing stations, thus helping enable the Horfield and Ashley Hill stations.

The core scheme presented in the Bristol Area Rail Study Phase 2 is for an hourly service with stations at Henbury and Filton North. Reinstatement of Horfield and Ashley Hill stations is considered to require further business cases to support their development. From an operational perspective stops at Horfield and Ashley Hill can be provided. The service will stop at existing station Filton Abbey Wood. It should be noted however, that additional stops at existing stations further down Filton Bank at Lawrence Hill & Stapleton Road will not be possible due operational capacity issues at these sites.

Operational Deliverability

Operational capacity of the proposed service assumed four-tracking of Filton Bank. With this facility in place there is scope to make two additional stops on the Bank en-route from Henbury to Bristol Temple Meads without compromising service reliability.

Operation of freight services from Avonmouth past Henbury and Filton North are not considered to be compromised by the operation of an hourly passenger service, for both existing and projected future freight demand.

Initial investigations suggest a half hourly service will be technically feasible, but more work is required to fully investigate the impacts on future freight paths. It is
considered that capacity exists for a half hourly service in principal, but that some additional infrastructure may be required to ensure reliability of freight and passenger services.

The service fits a neat timetable in operational terms for hourly and half hourly operation. There is limited need for layover at either end of the route, thus maximising efficiency of the service without impinging on service reliability.

4.2 Service Options via Bristol Parkway

Level of Service

Option 1: Services from Henbury to Temple Meads, via Parkway would provide an hourly link between CCPN and central Bristol. Calling at Parkway would facilitate interchange to local and regional services.

Option 2: Alternatively, a shuttle service between Henbury and Bristol Parkway would provide links to the wider local and national rail network, through interchange at Parkway. A minimum half-hourly service could be provided, but interchange would be required to travel to central Bristol.

Stations

It is assumed that new stations would be provided at Henbury and Filton North with either service option. The implementation of the Henbury to Temple Meads service via Parkway, could also potentially deliver new stations at Horfield and Ashley Hill. This service would also call at the existing station at Filton Abbey Wood.

Operational Deliverability

Option 1: The hourly rail scheme proposed via Parkway would be likely to deliver journey times from Henbury to Temple Meads of between 25 and 30 minutes.

The operational requirements to serve Temple Meads via Parkway would entail trains reversing at Parkway to continue their journey. This movement carries performance risk, which could affect the reliability of the service – and other services using Parkway. There is also a question of capacity at Parkway to facilitate this manoeuvre, particularly with the proposed electrification of the Great Western Mainline and the potential associated increase in frequency of longer distance services, as well as the proposed new rail depot at Stoke Gifford.

Option 2: With regards to a half-hourly shuttle service between Henbury and Bristol Parkway, the operational requirements of trains reversing at Parkway present similar performance risks as outlined in Option 1. The requirement for interchange for onward journeys would incur journey time penalties for passengers, which in the case of travelling to Temple Meads would likely render the service uncompetitive with existing bus services and private car travel.

There are also concerns about operational cost associated with the shuttle service, as it would involve additional empty-running to depots, which is wasteful and limits the use of the stock.
4.3 Henbury/Severn Beach Line (via Avonmouth)

Level of Service

There are two options for running Henbury services via Avonmouth, these include:

- **Option 1:** An hourly service created by running proposed Portishead trains through to Avonmouth and via Henbury to Bristol Parkway, where the train would reverse and head to Bristol Temple Meads via Filton Bank; and

- **Option 2:** The integration of the Henbury, Severn Beach, Bath and Portishead services, to establish an hourly through-service each way on the Henbury loop, hourly from Severn Beach, half-hourly at Avonmouth and with the Henbury via Filton Bank section serving Bristol Parkway.

Stations

New stations would be provided at Henbury and Filton North with either service option. There is also potential to serve new stations to serve Horfield and Ashley Hill. The following existing stations will also be served:

- Bristol Temple Meads
- Filton Abbey Wood
- Bristol Parkway
- St Andrews Road
- Avonmouth
- Portway Park & Ride (proposed station)
- Shirehampton
- Sea Mills
- Clifton Down
- Redland
- Montpelier
- Stapleton Road
- Lawrence Hill

Operational Deliverability

Running services via Avonmouth would enable integration with the Severn Beach line services and could allow connections to both Bristol Temple Meads and Bristol Parkway stations. However, journey times to Temple Meads would be long and would not be competitive against alternative rail journeys from Filton Abbey Wood, some bus journeys (Henbury has a high frequency 30 minute bus service to central Bristol) and private car travel.

In running Portishead trains through to Avonmouth and via Henbury to Bristol Parkway; through running to Portishead again could be achieved to give Portishead a half-hourly service. However this would necessitate additional infrastructure to allow trains to pass at Pill.

Problems arise when the trains running either way around this route reverse almost simultaneously at Bristol Parkway; this creates significant performance risk to a wide range of services across the Bristol rail network. Additionally, the installation of a loop at Pill undoes the separation arrangements proposed to keep freight and passenger movements apart on the Portishead line under Phase 1 of the Bristol Metro proposals; running a complete circuit back to Portishead effectively prevents freight access to Portbury and therefore is unacceptable.

The alternative approach of integrating the Henbury, Severn Beach, Bath and Portishead services would require all these services to be developed concurrently, all reversals required are subject to significant performance risk, especially at Bristol
Parkway, where there is likely to be insufficient capacity with future service patterns for the reversals to take place with grade separated junctions.

Finally, longer routes and the need to integrate with congested parts of the rail network mean there is more chance of reliability issues with services, especially when operating on the same rail lines as longer distance services. On the whole the congestion points at Bristol Parkway & Temple Meads, along with the need to accommodate freight services at Avonmouth and on the Portishead line mean the potential risks for such options are considerable, and unlikely to meet with support from the wider rail industry.

4.4 Summary of Supply Side Issues

Services operating using a shuttle from a new Henbury station to Bristol Temple Meads offer an efficient service pattern for hourly or half hourly operation.

Service options via Bristol Parkway require a reversing movement in that station. That operation itself introduces operational risks, and Bristol Parkway is a key part of the Greater Bristol rail network meaning additional operational risks are unlikely to be accepted by the rail industry.

Service options that involve longer routes via Portishead and Avonmouth can be efficient in terms of unit utilisation, but the operational risks of long routes, interfaces with freight and long distance traffic give concerns as to the reliability that would be provided by such a service.

On the basis of the above issues, the Henbury to Bristol Temple Meads option is suggested as the operationally preferable solution.

The figures below provide an overview of the Henbury – Bristol Temple Meads shuttle service.

Figure 4-1: Stations Serving CPNN (indicative sites)
4.5 Capital and Operating Costs

Capital Costs

Capital costs for the preferred Henbury Rail scheme have been developed using industry standard data. This has been a desk-based exercise and the costs have not been developed with detailed site assessments.

The costs presented are broken down into their constituent parts with appropriate allowances for management and contingency. Options have been developed for both two and four new stations for operation of the service. The estimated figures are around £14m for two stations (Henbury and Filton North) and £23m for four stations (Henbury, Filton North, Horfield and Ashley Hill) at 2011 prices; which include various assumptions on specification of stations (with booking office and some parking spaces for example). Clearly these figures and assumptions would need to be reviewed as the scheme scope is firmed up.
Operating Costs

Scheme operating costs are presented for an hourly and a half hourly service, in line with the implementation proposals in the Greater Bristol Metro. Costs include the following elements:

- Train leasing;
- Train Crew Costs;
- Fuel;
- Insurances; and
- Track & station access charges (the latter implicitly incorporating station maintenance charges).

Estimated total annual operating costs in 2011 prices are approximately:

- Hourly service - £975,000 per annum
- Half hourly, approximately double this figure at £1,950,000 per annum though there may be scope for small scale crewing efficiencies from operating a more frequent service pattern.

4.6 Demand and Revenue

Demand forecasting for the Henbury service has been based on a high level view of the likely impact from the proposals. This has involved a review of 2010 National Rail Travel Survey (NRTS) data for the Greater Bristol region, existing Journey to Work (JTW) data for the Greater Bristol region, station usage and level of service data for the region.

The forecasting process has used these datasets to develop suitable forecasts on a station by station basis. A key element has been the benchmarking of new stations with stations of similar catchment and level of service throughout the region. A key assumption for the Henbury and Filton North stations has been to assume full build out of CPNN in the demand forecasts. The figures presented therefore should be viewed as a scenario operational with the population and employment changes with the completion of the CPNN site.

The table below summarises the forecast demand resulting from potential new stations serving CPNN delivered with the proposed Henbury Line services.

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<th>Annual Demand - Hourly Service</th>
<th>Annual Demand – Half Hourly Service</th>
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<tr>
<td>Henbury</td>
<td>197,000</td>
<td>222,000</td>
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<tr>
<td>Filton North</td>
<td>218,000</td>
<td>244,000</td>
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Table 4-1: CPNN Rail Demand Estimates

Associated net additional revenue of the service is derived from demand at the stations identified above, plus additional revenue from other stops of the service at Filton Abbey Wood, as well as both with and without Horfield and Ashley Hill.
4.7 Summary of Findings

The operation of a Henbury to Bristol Temple Meads shuttle service, initially as an hourly operation, but later as a half hourly fit operational constraints in the Greater Bristol rail network better than alternative means of providing rail services from Henbury.

Capital costs for the service depends on the base level of infrastructure. Two options have been developed based on the number of new stations provided:

- Henbury and Filton North – c.£14m (2011 prices)
- Henbury, Filton North, Ashley Hill and Horfield – c.£23m (2011 prices)

The exact figure needs to be refined depending on final assumptions around station specification.

High level demand and revenue forecasting has been undertaken. These show that the scheme could roughly break even on the basis of the work thus far, but it is recommended that the demand forecasting be refined before business case decisions are made.