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*Technical Report*

# MetroWest Phase 2

## Bristol North Fringe Stations

Prepared for  
**South Gloucestershire Council**

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# Introduction

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## 1.1 Background

The Great West Mainline is being electrified between London and South Wales, and with it the lines from Bristol Parkway via Filton Bank into Temple Meads. At a local level the key features include:

- Four tracking of the line between Temple Meads and Filton, with associated potential to develop additional station infrastructure during construction;
- Additional platform at Bristol Parkway to increase reliability and flexibility of operation at the station;
- Increased parking capacity at Bristol Parkway.

Alongside the electrification plans are a number of local initiatives that would affect the rail offer in the North Fringe area:

- MetroWest Phase 2 proposals include additional station(s) on Filton Bank, and on the Henbury line, and with these the introduction of rail services into Temple Meads;
- Planned developments at Filton Airfield (the Cribbs Patchway New Neighbourhood), Harry Stoke and UWE.

With all these changes the role and function of the existing stations is changing, and the future infrastructure needs of the current and new stations needs to be considered in this light.

## 1.2 Study Objectives

The objectives of the study are set out below.

- To develop patronage forecasts for stations in the area; Bristol Parkway, Patchway, Filton Abbey Wood and potential new stations on the Henbury line; under a series of future operational scenario;
- To define the role of Filton Abbey Wood, Patchway and any proposed Henbury line stations under a number of future operational scenario;
- To define the supporting access infrastructure requirements for the stations in scope;
- To undertake a preliminary assessment of the location for stations on the Henbury line and any supporting access infrastructure; to include high level drawings and costings in support of an evidence base for re-development proposals in the Cribbs Patchway New Neighbourhood [CPNN].

This study does not address whether the Henbury Line passenger train services should run as a 'spur' or 'loop'; this will be considered through the MetroWest Phase 2 GRIP 1&2 studies.

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# Current Situation

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## 2.1 Bristol Parkway

Bristol Parkway station is an important and popular railhead, with its mix of frequent local and long distance services, for South Gloucestershire and northern Bristol in particular, but also places further afield given the stations proximity to the motorway network. The station has a ticket office, retail outlets and full waiting facilities. Several bus services stop close to the concourse entrance. There is a 1140-space charged car park, run by First Great Western (FGW); the Council operates a 200-space car park off Hunts Ground Road, which is also charged (but at a lower tariff than Parkway) and acts as an overflow car park. The on-site car park is being decked, which will add some 700 spaces in mid-2014. National Rail Travel Survey (NRTS) figures (for a 2010 average day) show that over 50% of station users park at the station; some 1054 per day.

Parkway is very well-served by local bus services, which provides connections throughout the North Fringe and beyond; some 5% of users arrive by bus. The station provides stands for cyclists and several major employment sites are within reasonable cycling distance; 3.5% cycle to/from the station. Some 35% walk to the station, with over 50% of users parking at the station.

Table 2.1 below provides a summary of the service levels at the existing stations in the area.

Table 2-1: Service To/From Existing Stations

### Availability of Hourly (or better) Direct Day-time Services from:-

Route	Parkway	FAW	Patchway
London Paddington	X		
Exeter & South West	X		
Cardiff & Newport	X	X	
Swansea (& main stations)	X		
Severn Tunnel Junction		X	X
Midlands & North	X		
Bristol TM	X	X	X
Bath & Westbury	X	X	
Soton & Portsmouth		X	
Taunton, W-s-M	X	X	X
Yate, Gloucester	X	X	

## 2.2 Filton Abbey Wood

Filton Abbey Wood is served by a range of local and regional services; it serves as a railhead for local residents and provides direct access to the MoD's Abbey Wood office complex in particular. The station has shelters and RTI, but is only manned at some peak periods. The station car park has 30 (free) spaces, but there may be overflow car parking in the adjacent business units; there is commuter parking on Nutfield Grove and adjoining residential streets, but the Council proposes introducing parking restrictions on these residential streets, which could reduce use of car to/from the station.

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The bus services 581 and X18 use a stop on the station turning circle at the end of Emma-Chris Way. These services provide three departures per hour per direction between them (most hours on weekdays and Saturdays). In addition, a number of services use the A4174 Station Road and Filton Avenue, which between them provide around 12 buses per hour in each direction, including direct links to the University of West of England (UWE), Bristol city centre, Cribbs Causeway, Stoke Gifford, Bradley Stoke and (notably) Bristol Parkway station.

NRTS and West of England rail survey data show that most people access the station on foot. Excluding MoD trips, just over 33% walk, with almost 33% parking a car 'at or near' the station and 21% using buses, the remainder cycling or being dropped off.

## 2.3 Patchway

Patchway is only served by local services to/from South Wales; it has basic facilities and a small (free) 15-space car park and commuters also park on Station Road. Patchway is not served by bus services, Station Road having poor access junctions at either end and having little frontage demand.

Walking and cycling links are via Station Road, which runs north to the A38 at Patchway and south to Gypsy Patch Lane. Links to Patchway itself are limited to a Public Right Of Way (PROW) that runs over a footbridge and then onto the A38; or along Station Road up to the A38 at the B4057 fly-over. The Council's aspiration to improve Gypsy Patch Lane over-bridge would yield a substantial improvement for pedestrians and cyclists. The station is reasonably accessible from Little Stoke to the east, although the approach via Station Road is not particularly pedestrian-friendly.

Patchway has lower patronage than Filton Abbey Wood; it has nevertheless seen significant increases in demand, trebling since 2004/05, and increasing by over 35% since 2010 (the NRTS dates from 2010). Over 42% park at/near the station, with a further 25% being dropped off. The remaining 33% walk, with no indicated bus or cycle users. However, given the small number of people involved (daily demand in 2010 was not much over 100), patterns in the NRTS are potentially unrepresentative given the statistical significance of such a small sample. Nevertheless, parking demand closely matches capacity, with 12 (42%) of origin users parking 'at or near' the station compared to a capacity of 15. As demand has already increased, it is likely that demand for parking already exceeds capacity at Patchway. Although Patchway does not benefit greatly from currently proposed rail enhancements, demand for parking is still likely to increase.

## 2.4 New Stations

MetroWest Phase 2 includes provision for up to two new stations on the Henbury Line and up to two new stations on Filton Bank (between Filton Abbey Wood and Stapleton Road); at the time of writing, the feasibility of the latter is being investigated by Bristol City Council, options for the Henbury Line stations are described in this report. Further, more detailed work on MetroWest Phase 2 (GRIP 1&2) will be commissioned by South Gloucestershire Council during 2014; this work will be led by Network Rail.

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# Demand Forecasting

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## 3.1 Introduction

A fuller Technical Note outlining the approach used and results produced for the demand forecasting is included under Appendix A. The Technical Note summarises demand forecasts for existing stations in the North Fringe (Bristol Parkway, Filton Abbey Wood and Patchway) and also for proposed new stations on the Henbury Line at Filton North and Henbury.

Within the demand forecasting, four future operating scenarios were considered:

- Base Case growth assuming current operations (i.e. a theoretical situation without any improvements);
- (a) Base Case plus committed and highly likely changes (electrification, Bristol parkway improvements (car park & 4th platform), Filton Bank 4 track respectively);
- (b) Base Case plus (a) plus MetroWest Phase 1 and new station(s) on Filton Bank; and,
- (c) Base Case plus (a) and (b) plus MetroWest Phase 2.

It has been assumed that the Henbury Line is operated as a 'spur' via Filton Bank; however, South Gloucestershire Council will be commissioning further work from Network Rail (GRIP 1&2) during 2014 to examine whether a 'loop' would be a more viable option. It has also been assumed that development in the North Fringe proceeds as planned in the Adopted South Gloucestershire Core Strategy; in particular, the re-development of Filton Airfield as part of the CPNN.

## 3.2 Outline Approach

### 3.2.1 Data Sources

The basic approach to the development of the demand forecasting has been to build upon the demand forecasting work carried out as part of the West of England Rail Study of 2012. That work in itself has been expanded to cover a wider context and more fundamentally updated to include emerging new data. The modelling itself has then been applied to the specific context and scenario of this commission as set out in 3.1 above. Data sources included and updated were:

- National Rail Travel Survey (NRTS) – to derive existing travel patterns in the area including 'true' origin and destination, plus journey characteristics such as (ticket type, journey purpose and access mode. These data are key in developing the gravity modelling around which the demand forecasting is focussed.
- West of England annual station survey, November 2013 – passenger counts at stations. The survey results are used in conjunction with ORR station statistics, principally in calibrating the demand figures for existing stations in the North Fringe.
- Office of Rail Regulation (ORR) – Station count data produced annually, and used in model calibration.
- MOIRA – industry model to assist with revenue allocation, but also able to provide important information on generalised costs of travel (used for existing stations only).
- Passenger Demand Forecasting Handbook (PDFH) – research based assessment of the impact infrastructure and service developments can have on demand for travel – elasticities



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included here are widely applied across the industry in developing demand and revenue forecasts.

### 3.2.2 Existing Stations Demand

The approach to demand forecasting for existing stations links to the base level of demand, proposed infrastructure changes and the impact such changes can have on service characteristics such as: journey time, quality, reliability, frequency etc. Given the infrastructure development assumptions set out in the various scenarios, this translates to service characteristics change assumptions as below:

#### *Bristol Parkway*

- Better reliability afforded by 4 tracking of Filton Bank and a 4<sup>th</sup> platform at Bristol Parkway;
- Increased parking capacity at Bristol Parkway – thus reducing parking space search time and the potential for passengers to fail to find a space;
- Increased service level and reduced journey times that electrification could bring; and
- Changes as a result of the MetroWest Phase 2.

#### *Filton Abbey Wood*

- Better reliability afforded by 4 tracking of Filton Bank and a 4<sup>th</sup> platform at Bristol Parkway; and
- Changes as a result of MetroWest Phase 2.

#### *Patchway*

- Better reliability afforded by 4 tracking of Filton Bank and a 4<sup>th</sup> platform at Bristol Parkway; and
- Changes as a result of MetroWest Phase 2 (in this case, knock-on affects of Henbury Line stations).

### 3.2.3 New Stations Demand Forecasting

The approach to demand forecasting for new stations requires a series of techniques to be applied:

- Estimates of trip generation at the new station; this was developed using a simple gravity model. The method takes into account the relationship between journeys and catchments at a number of similar stations. Applying regression techniques allows forecasts for the associated new station catchments to be developed. It includes the CPNN.
- Estimates of diversion from existing stations; Transfers are considered using a station logit model using generalised costs for whole journeys.
- For demand forecasting purposes the location for a “Henbury” station is a generic location for alternative station sites at the western end of the CPNN.

### 3.2.4 Future Demand

Whilst demand for rail travel has seen significant growth in recent years, such rates are not considered to continue unabated; however, a series of potential growth rates have been considered in developing our central case estimate for the study. The following assumptions have been taken in terms of general background growth for rail (that is without the impact of specific local developments):

- 2013 to 2017 – taper from recent historic growth rates at West of England stations (7.8% per annum) to RUS average of peak and off peak (3.0% per annum);
- 2018 & 2019 – RUS average rate (3.0% per annum);
- 2020 to 2023 – taper from RUS average rate (3.0% per annum) to an LTPP average rate derived from the four economic scenarios (2.3% per annum); and
- 2023 to 2043 – taper from 2023 LTPP average rate (2.3% per annum) to 2043 LTPP average rate (1.3% per annum).

Growth potential from new developments is on top of these rates.

### 3.3 Results

Table 3-1 shows the resulting profile of demand at North Fringe Stations in 2022, 2032 and 2042 for each of the three local enhancement scenarios, as well as a base case with no enhancements, including annual and daily (average day) demand. These dates are chosen such that the anticipated railway services are well-established (people have become used to them) and the North Fringe developments have been completed (especially CPNN). These growth assumptions are conservative when compared with recent actual growth in rail use, but still indicate that demand could increase substantially.

*Table 3-1: Summary Scenario Demand Forecasts by Station & Year – Annual Demand*

Year	Bristol Parkway	Filton Abbey Wood	Patchway	Henbury	Filton North
<b>Base</b>					
2013	2630k	1116k	103k	n/a	n/a
2022	3920k	1664k	154k	n/a	n/a
2032	4842k	2055k	190k	n/a	n/a
2042	5686k	2413k	223k	n/a	n/a
<b>a) Base plus Planned Infrastructure (Electrification, 4 track, BPW improvements)</b>					
2022	4463k	1712k	157k	n/a	n/a
2032	5512k	2114k	194k	n/a	n/a
2042	6473k	2483k	228k	n/a	n/a
<b>b) Base plus (a) With Metro West Phase 1 and one new Filton Bank Station</b>					
2022	4465k	1720k	158k	n/a	n/a
2032	5516k	2125k	195k	n/a	n/a
2042	6476k	2495k	229k	n/a	n/a
<b>c) Base plus (a) and (b) plus Metro West Phase 2</b>					
2022	4473k	1690k	151k	187k	149k
2032	5525k	2078k	186k	266k	218k
2042	6487k	2440k	218k	312k	256k

Notes:

- A full set of demand forecasts is included in the Technical Note in Appendix A.
- Henbury and Filton North Station car parks assumed to be free of charge.

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- CPNN and other developments proceed as planned in the Adopted South Gloucestershire Core Strategy.

Demand for Henbury station is estimated to be 266k per annum in 2032 (two-way movements). This represents some 844 trips per day by 424 individuals. At Filton North, demand forecasts suggest almost 218k trips per annum in 2032 (691 trips per day by 347 individuals). Of this, around 11% could be as a result of trips that have transferred from other stations, and is therefore not new usage for the railway; Filton North would have higher abstraction (30%) from other stations, which is unsurprising as Filton North is located closer to the existing stations at Filton Abbey Wood, Patchway than Henbury.

Note that catchment populations used in the demand forecasts make allowance for CPNN above the current (2011 Census) catchment populations. With no development of CPNN, local catchments (and hence demand) demand both Henbury and Filton North would be greatly reduced (previous studies have shown that re-opening of the Henbury Line is dependant on re-development at CPNN).

As stated previously, It has been assumed that the Henbury Line is operated as a 'spur' via Filton Bank; however, South Gloucestershire Council will be commissioning further work from Network Rail (GRIP 1&2) during 2014 to examine whether a 'loop' would be a more viable option.

The total demand forecasts have been further analysed to identify the locations that potential users of a Henbury and Filton North stations would come from, as well as the likely modes of transport they would use to reach the stations. This is based primarily on analysis of users at Filton Abbey Wood (who use the station as an outbound railhead), Patchway and Stapleton Road stations. NRTS data is used, as this provides the true origin of trips, as well as the mode of transport used to access the station.

Table 3-2 shows catchment and mode splits into passenger numbers by mode of access and catchment distance, based on the main demand forecast for Henbury of 844 trips per day. Almost half of all trips are likely to be day returns, thus suggesting some 424 individuals arriving at the station. Table 3-3 shows similar figures for Filton North, based on 691 trips per day (347 individuals).

*Table 3-2: Rail users accessing **Henbury** – by origin catchment and access mode (2032 figures)*

Catchment	Walk	Bus	Car	Car	Bicycle	Taxi	ALL
			parked	drop off			
Less than 1 km	105	-	9	6	-	10	131
from 1 to 2 km	160	43	9	4	15	-	231
from 2 to 3 km	47	2	4	2	2	-	57
from 3 to 4 km	-	-	1	-	-	-	1
from 4 to 5 km	-	-	3	-	1	-	4
from 5 to 10 km	-	-	-	-	-	-	-
More than 10 km	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>312</b>	<b>44</b>	<b>26</b>	<b>13</b>	<b>19</b>	<b>10</b>	<b>424</b>

Numbers may not add up exactly to totals due to rounding  
Assumes no parking charges

*Table 3-3: Rail users accessing **Filton North** – by origin catchment and access mode (2032 figures)*

Catchment	Walk	Bus	Car	Car	Bicycle	Taxi	ALL
			parked	drop off			
Less than 1 km	89	-	6	4	-	9	108
from 1 to 2 km	133	34	6	3	13	-	189
from 2 to 3 km	40	1	2	1	1	-	46
from 3 to 4 km	-	-	1	-	-	-	1
from 4 to 5 km	-	-	2	-	1	-	3
from 5 to 10 km	-	-	-	-	-	-	-
More than 10 km	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>263</b>	<b>35</b>	<b>16</b>	<b>9</b>	<b>15</b>	<b>9</b>	<b>347</b>

Numbers may not add up exactly to totals due to rounding  
Assumes no parking charges

Catchments of both Henbury and Filton North are likely to be local in nature. The rail service to be provided is essentially a local link, and while this will provide opportunities for people to make longer journeys on the wider rail network, neither station is anticipated to be a major railhead (of the form of Bristol Parkway). Also, the service frequency of one train per hour would not be suitable for the stations to serve as specific 'park & ride' sites for Bristol.

Forecasts indicate that some station users will park at the stations, but this is likely to be users who live or work locally and make longer-distance rail journeys; rather than people who drive in from outside the North Fringe to make a short-distance rail trip. A more frequent, 15- or 20-minute 'turn up and go', level of service is required to promote a station as a true park & ride site. The level of car park charges will also influence demand; the zero-tariff assumed is consistent with both Filton Abbey Wood and Patchway.

## 4 Henbury Line Stations

### 4.1 Introduction

The CPNN re-development presents significant opportunities in the area; at the time of writing, development of the former airfield site is expected to start in 2014, with the recent adoption of the South Gloucestershire Core Strategy and the forthcoming SPD for the CPNN. There is an outline planning application for part of the site at Fishpool Hill, which includes the developer's proposal for a new station.

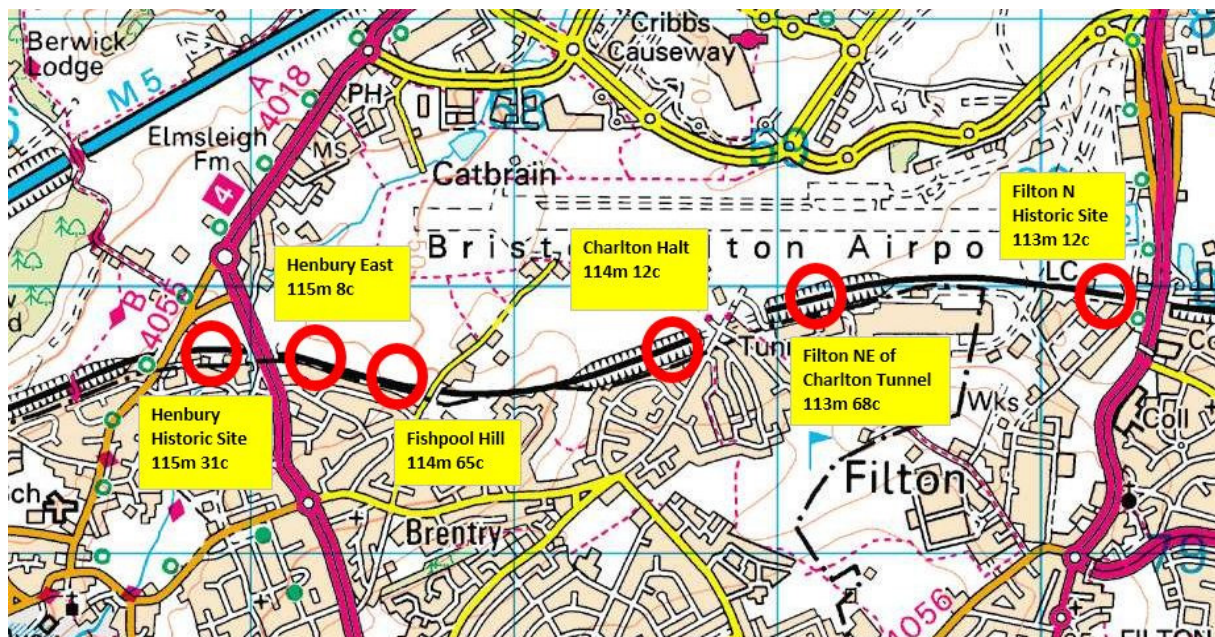
The requirements of the study are to identify the role potential stations on the line would play under each of the demand scenarios presented, and to determine potential locations and site layouts for the stations bearing in mind the defined role the stations will take and their anticipated demand.

### 4.2 Station Options

A number of station locations have been considered; Figure 4-1 below illustrates the location of the sites considered.

- Filton North – at 113m and 12chains – site of former Filton North station
- Filton NE of Charlton Tunnel – at 113m 68chains – not considered due to location
- Charlton Halt – at 114m & 12chains – site of the former Charlton Halt
- Fishpool Hill – at 114m 65chains
- Henbury East – at 115m & 8chains
- Henbury – at 115m and 31chains – site of the former Henbury Station.

Figure 4-1: Henbury Line Station options considered



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The suitability of station locations was assessed initially on the basis of engineering feasibility; firstly, a preliminary assessment of the location based on line topography (gradient and curvature) and then

on the basis of further discussions with Network Rail engineers. Designs for the short-listed station options were then developed and preliminary cost estimates worked-up.

#### 4.2.1 Station Assessments

Initial assessments provided a priority order of station locations on the basis of gradient and curvature, on the basic premise that platforms need to be built on largely straight and flat sections of track “Guidance on Station Platform Geometry” GI/RT7016 published by the Rail Safety & Standards Board (RSSB) suggests that the optimum parameters are for new stations to have a maximum radius of 1000m and a vertical alignment with a maximum of 1 in 500. The latter figure however can be flexible, and it is known that stations are constructed with vertical alignments in excess of 1 in 100. Where this is the case the station should not be a terminus station however, and if that is the case, an additional review of operational safety procedures at the site would be required with the possibility of including additional infrastructure such as catch points and Train Protection Warning System (TPWS). This latter issue is of relevance for the Henbury sites under operation as a spur.

In summary therefore whilst it is a preference for new stations to be built within the defined horizontal and vertical parameters set out, where such parameters are exceeded these need not be show stoppers. Of the station options considered here, none of them compromises the horizontal standards, and all of them exceed the guidance for vertical alignment. The latter is not a standard however, and no specific derogations are required to exceed the 1 in 500 level per se. What the parameter assessments do allow to do is to provide an initial prioritisation on the basis of the geometry alone, before considering wider aspects of the case for each station. This initial assessment produced the prioritisation as set out in Table 4-1 below.

*Table 4-1: Initial prioritisation for assessment*

<b>Location</b>	<b>Status</b>	<b>Horiz Align.</b>	<b>Vert. Align.</b>	<b>Order of Suitability</b>
Filton North	Former station	Straight	1 in 210	2
Charlton Halt	Former station	Straight	1 in 250	1
Fishpool Hill	New Station	approx. 1400m rad	1 in 120	4
Henbury East	New station	approx. 1400m rad	1 in 120	4
Henbury	Former station	approx. 1400m rad	1 in 264	3
Filton NE of Charlton Tunnel?	New Station	Approx. 1600m rad	1 in 100	6

These initial thoughts were shared with Network Rail who provided a series of comments on each of the sites. These are summarised below. However, what became apparent quite rapidly was that the ground conditions along the route in general, and around Charlton Tunnel in particular present significant difficulties. On this basis sites adjacent to Charlton Tunnel and Fishpool Hill were discounted, and more detailed plans only developed for the other three options, see Table 4-2.

Of the Henbury line section being considered here, Network Rail specifically noted the following issues:

“..this area suffers from poor drainage and formation as there are underlying fine clays which mean formation and drainage are troublesome, there are works ongoing to rectify the drainage between Charlton Tunnel west portal and Charlton Hill. The outfall at Charlton Hill is especially troublesome as we have to manage fine particles before discharging, this needs constant attention and limit the capacity of outflow. Any project to install a station would need careful consideration of the drainage assets and hydraulic design.”

Table 4-2: Summary of findings – option recommendations for further development

Location	Chainage	Comments
Filton North	113m12c	Known formation and drainage issues will need consideration; although there is an existing platform, which could be used, so it is unlikely to damage current drainage assets in the area.
Henbury East	115m8c	Existing drainage and formation issues will require attention. Noted that a drainage scheme for this location is included within CP4.
Henbury	115m31c	Known formation and drainage issues will need consideration; although there is an existing platform on the down-side, so it is unlikely to damage current drainage assets in the area.

## 4.2.2 Station Design

Existing “local” stations in the North Fringe area (Patchway and Filton Abbey Wood) are categorised as ‘F1’ according to Network Rail station standards (*Better Stations, 2009*). With forecast demand levels for the Henbury line stations expected to be between the current levels for Patchway and Filton Abbey Wood, it is appropriate that new stations on the Henbury line will be similarly categorised as ‘F1’.

The minimum design standards for the ‘F1’ category are:

- Information
  - Real-time information indicator(s) with real-time information
  - Help-point both emergency and information buttons
  - Train service poster with all current train services and engineering work advice
  - Local information local road map & useful information (e.g. bus/taxi phone numbers)
  - Useful information mandatory rail industry information including ‘contacts’ details
- Access
  - Street direction signs station signed from main road(s) with local authority
  - Station signs standard signing in Brunel alphabet
  - Totem pole rail symbol and station name (+ PTE/TfL symbol where required)
  - Cycle parking where practical minimum 4 cycle racks
  - Car parking where practical (small car park)
- Facilities
  - Ticket machine at all F1 stations unless derogation or PayTrain operation
  - Lighting adequate to give security on approaches/platform
  - Shelter or canopy on each platform with a scheduled service
  - Seating on each platform with a scheduled service (minimum 8 seats)

- Environment
  - Cleaning station regularly cleaned & graffiti free: litter bins
  - Maintenance prompt repairs & kept well painted
  - Smart environment station approaches look smart & buildings used or demolished

All new stations must meet the requirements of Disability Discrimination Act and Equality Act.

### 4.3 Proposed station facilities

In light of the likely categorisation of the new Henbury line station options (Filton North plus Henbury East or Henbury), the facilities identified above are viewed as a minimum requirement. Each proposed station has been designed to these minimum standards, plus the inclusion of step free access and safety features such as CCTV. Allowance has been made to ensure clearance for current and future freight service developments.

Outline designs for each of the stations is included in Appendix C.

#### *Proposed Filton North Station*

The site of this proposed station is located on the former station site to the west of A38 Gloucester Road, see figure overleaf, the station layout has been designed according to the F1 standard identified above, which includes facilities outlined in Table 4-3. The location of the station is noted as being significant for industry in the region and the needs to provide a gateway facility has been noted in the scheme design.

*Table 4-3: Filton North proposed station facilities and access provision*

<b>Facilities</b>	<b>Requirements</b>
Station	Two platforms (150m length by 5/6m width) with standard waiting shelters, real-time information displays, ticket machines and associated infrastructure. This is suitable to accommodate 6 car 23m 158 type units, with 6m overruns at either end.
Platforms	Access via ramps from the Airbus bridge – The ramps are designed in accordance with inclusive mobility guidance. Ramp gradient is 5% over 10m, with 2m platforms.  Stepped access required to the north of the site for vehicle parking.
Bus stop/waiting area	On site bus layby proved within the car park. Design is for 18m articulated vehicle in line with potential to link station with proposed BRT services. Bus stop provided closest to car park entrance to allow easies pull in for buses under circumstances where other vehicles are in the drop off bays.
Cycle stands	Land required for 30 cycle stands. Demand forecasts suggest 20 stands would be sufficient, but additional capacity is provided to reflect the sustainable aspirations of the CPNN site.
Vehicle drop-off zone	Zone allocated for 6 vehicles, with area laid out adjacent to the north side platforms just after the bus bay.
Vehicle parking spaces	Layout allows for 30 parking spaces, with 3 designated as disabled parking. Demand suggests a 20 space site may be sufficient, but the need to provide for bus bays and drop-off facilities, plus the swept path of the buses themselves, effectively dictates the area of land required. This equates to 30 spaces.



	<p>Level of disabled parking provision is taken from “Accessible Train Station Design for Disabled People: A Code of Practice” DfT and TS Nov 2011 – that document suggests a minimum 5% of total spaces be designated as disabled.</p> <p>It is assumed no parking charges apply.</p>
DDA and Equalities	<p>DDA to the platform is provided via ramps off Airbus Bridge. Ramps are designed in accordance with inclusive mobility guidance – ramp gradient 5% over 10m, with 2 m platforms.</p> <p>Step free access is provided from A38 Gloucester Rd via a new pedestrian footway constructed on the embankment between the railway and the current site access road.</p>
<b>Access</b>	<b>Opportunities</b>
Bus	The proposed bus/BRT corridor north of the site should be utilised.
Car	Use of free parking / or drop off facilities provided
Cycle	A38 currently forms part of a core cycle network in the N Bristol/ S Gloucestershire area with signage and suitable crossing points to a range of local demand generators such as Rolls Royce, Filton Abbey Wood station and UWE Bristol.
Pedestrian	Use of existing crossing facilities over the A38, plus the provision of a new footway constructed on an embankment between the railway and the existing site access road.

The capital costs for the proposed station designs are approximately £6.4million (excluding land acquisition); a further breakdown of costs is available in Table 4-6.

#### *Proposed Henbury Station (east site Option)*

The site of this station option is to the east of the A4018 Wyck Beck Road, see overleaf; this location has been proposed by Persimmon in its outline planning application to the Council. The station layout has been designed according to the F1 standard identified above, which includes facilities outlined in Table 4-4.

*Table 4-4: Henbury East proposed station facilities and access provision*

<b>Facilities</b>	<b>Requirements</b>
Station	<p>Two platforms (150m length by 5/6m width) with standard waiting shelters, real-time information displays, ticket machines and associated infrastructure. This is suitable to accommodate 6 car 23m 158 type units, with 6m overruns at either end.</p> <p>Design will likely require screening of the station for properties on Wolfridge Gardens.</p>
Platforms	<p>Accessed via footbridge linking north &amp; south platforms. Steps also provided to reduce walk times for able passengers. Ramps and steps will require third party land adjacent to the south platform.</p> <p>An access route using the A4018 as the bridge, with associated access ramps was also considered. This would still require third party land on the south side, and would entail a significant additional walk distance for the majority of passengers (approx 300m further) and was therefore not considered further at this stage.</p> <p>The ramps are designed in accordance with inclusive mobility</p>

	guidance. Ramp gradient is 5% over 10m, with 2m platforms.
Bus stop/waiting area	On site bus layby proved within the car park. Design is for 18m articulated vehicle in line with wider BRT aspirations for the area, and the need to future proof any layout. Bus stop provided closest to car park entrance to allow easies pull in for buses under circumstances where other vehicles are in the drop off bays.
Cycle stands	Land required for 30 cycle stands. Demand forecasts suggest 20 stands would be sufficient, but additional capacity is provided to reflect the sustainable aspirations of the CPNN site. Stands are located in blocks for 15 serving north & south platforms to reflect the balance of access from north and south of the site.
Vehicle drop-off zone	Zone allocated for 6 vehicles, with area laid out adjacent to the north side platforms just after the bus bay.
Vehicle parking spaces	<p>Layout allows for 30 parking spaces, with 3 designated as disabled parking. Demand suggests a 20 space site may be sufficient, but the need to provide for bus bays and drop-off facilities, plus the swept path of the buses themselves, effectively dictates the area of land required. This equates to 30 spaces.</p> <p>Level of disabled parking provision is taken from “Accessible Train Station Design for Disabled People: A Code of Pracice” DfT and TS Nov 2011 – that document suggests a minimum 5% of total spaces be designated as disabled.</p> <p>No parking charges apply.</p>
<b>DDA and Equalities</b>	<b>Needs commentary</b>
<b>Access</b>	<b>Opportunities</b>
Bus	<p>Requirement for a spur through the development to serve the station site.</p> <p>Wider bus/BRT corridor to be determined as part of the CPNN SPD master planning.</p>
Car	Principal vehicle access will be from the neighbouring development rather than the A4018 as part of the wider master plan.
Cycle	<p>NCN4 runs along the west side of the B4055 and A4018 to the north of the site.</p> <p>Wider cycling links to be determined as part of the Filton CPNN SPD master planning.</p>
Pedestrian	<p>Footways currently on both sides of the A4018, existing crossing points are located further south on A4018 Wyck Beck Road and Passage Road; the access to the Persimmon site will provide another crossing to the north.</p> <p>Suggested ramp to the north platform from the A4018, directly linked to the footbridge. Ramp designed in accordance with inclusive mobility guidance. Gradient is 5% over 10m 2m platforms.</p> <p>Direct pedestrian links to the south platform across existing park land via Wolfridge Gardens &amp; joining the A4018 further south are an option.</p> <p>Wider pedestrian links to be determined as part of the CPNN SPD master planning.</p>

The capital costs for the proposed station designs are approximately £6.1million (excluding land acquisition); a further breakdown of costs is available in Table 4-6.

*Proposed Henbury Station(former station site option)*

The site of this station option is the former Henbury station site between the A4018 and B4055 Station Road, see overleaf. The station layout has been designed according to the F1 standard identified above, which includes facilities outlined in Table 4-5.

*Table 4-5: Henbury proposed station facilities and access provision*

<b>Facilities</b>	<b>Requirements</b>
Station	Two platforms (150m length by 5/6m width) with standard waiting shelters, real-time information displays, ticket machines and associated infrastructure. This is suitable to accommodate 6 car 23m 158 type units, with 6m overruns at either end.
Platforms	<p>Access to platforms requires a footbridge with ramps and steps to southern platform.</p> <p>A scheme using the B4055 as the pedestrian bridge was also considered, but this was rejected as it would require the removal of telecommunication masts and equipment on the southern side of the track. It would also require a change in footway arrangements along the B4055, as the existing footway is on the “wrong” side of the bridge. Solutions could be to install a crossing (not safe on the brow of the bridge) or to move the footway to the station side (not realistic given the extent of the footway on either side of the railway). This option was therefore rejected.</p> <p>The new footbridge scheme will require third party land adjacent to the southern platform, and the demolition of associated building, including the former station building on that site.</p> <p>Further pedestrian access to the footbridge from the south is provided by steps and pedestrian access using the existing access road to the builders yard in that location. Again with will require third party land or an access agreement to the facility.</p>
Bus stop/waiting area	On site bus layby proved within the car park. Design is for 18m articulated vehicle in line with wider BRT aspirations for the area, and the need to future proof any layout. Bus stop provided closest to car park entrance to allow easies pull in for buses under circumstances where other vehicles are in the drop off bays.
Cycle stands	Land required for 30 cycle stands. Demand forecasts suggest 20 stands would be sufficient, but additional capacity is provided to reflect the sustainable aspirations of the CPNN site. Stands are located in blocks for 15 serving north & south platforms to reflect the balance of access from north and south of the site.
Vehicle drop-off zone	Zone allocated for 6 vehicles, with area laid out adjacent to the north side platforms just after the bus bay.
Vehicle parking spaces	Layout allows for 30 parking spaces, with 3 designated as disabled parking. Demand suggests a 20 space site may be sufficient, but the need to provide for bus bays and drop-off facilities, plus the swept path of the buses themselves, effectively dictates the area of land required. This equates to 30 spaces.

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	<p>Level of disabled parking provision is taken from “Accessible Train Station Design for Disabled People: A Code of Practice” DfT and TS Nov 2011 – that document suggests a minimum 5% of total spaces be designated as disabled.</p> <p>No parking charges apply.</p>
<b>Access</b>	<b>Opportunities</b>
Bus	Wider bus/BRT corridor to be determined as part of the CPNN SPD master planning.
Car	Principal vehicle access will be from the B4055 Station Road via part of the CPNN development site.
Cycle	<p>There are currently advisory routes along existing highways to the south of the site. NCN4 runs along the west side of the B4055 and A4018 to the north of the site.</p> <p>Requirement for direct cycle links as part of the CPNN SPD master planning.</p>
Pedestrian	Pedestrian access from the south is provided by use of the existing site access to the builders yard and then steps to access the bridge to the north platform, or ramps for those who require step free access. This requires third party land or an access agreement for the site, plus the upgrade of the access route itself.

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The capital costs for the proposed station designs are approximately £5.4million (excluding land acquisition); a further breakdown of costs is available in Table 4-6.

## 4.4 Capital costs for proposed station options

The capital costs have been developed accounting for civil engineering works, base construction, signalling and permanent way costs, as well as infrastructure required for access and parking costs. Consideration has also been given to non-construction costs and contingency.

Table 4-6: Capital costs of proposed stations Q2 2013

## Bristol North Fringe Railway Stations Platforms Location Study

	Filton North*	Henbury East	Former Henbury St
Platforms, shelter, signage, fencing, furniture	£519,200	£519,200	£469,200**
Footbridge, ramps, steps	£675,000	£1,137,500	£912,500
Technology (ticket machines, CCTV, PA)	£137,000	£137,000	£137,000
Infrastructure & permanent way	£1,267,841***	£654,490	£679,311
3 <sup>rd</sup> Party Land Acquisition (outwith Network Rail Land)?	Yes (to north of site)	Yes (to north and south of site)	Yes (to north and south of site)
<b>Total Base Construction Cost</b>	<b>£2,599,041</b>	<b>£2,448,190</b>	<b>£2,198,011</b>
Non Construction Costs – prelims / GRIP / Testing / possession mgmt	%42 of base construction cost		
<b>Total</b>	<b>£1,091,597.22</b>	<b>£1,028,240</b>	<b>£923,165</b>
<b>Sub Total</b>	<b>£3,690,638</b>	<b>£3,476,430</b>	<b>£3,121,176</b>
Drainage & utilities	£61,000	£61,000	£61,000
Access, parking, bus turning and cycle stands	£383,400	£433,400	£277,400
Landscaping (inc environmental mitigation), lighting and CCTV	£115,000	£115,000	£115,000
<b>Total Access &amp; Parking Cost</b>	<b>£559,400</b>	<b>£609,400</b>	<b>£453,400</b>
<b>Sub Total</b>	<b>£4,250,038</b>	<b>£4,085,830</b>	<b>£3,574,576</b>
Contingency	50%	50%	50%
<b>TOTAL</b>	<b>£6,375,057</b>	<b>£6,128,745</b>	<b>£5,361,863</b>

### Assumptions:

Prices excludes VAT

No provision for contaminated waste disposal

No provision for TOC compensation as assumed to work around existing freight traffic

Rules of the route possessions assumed

NR asset protection costs included within Project Management, GRIP 4 development, GRIP 5 detailed design and testing and commissioning

### Notes:

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\*Assumes removal of existing platform and construction of new platform, assumption taken on the basis that detailed condition of the existing asset to not yet clear and thus full costs assumed.

\*\* The cost of platforms at the old Henbury station site is cheaper as it has been assumed that the other two stations will require piled foundations for the new platforms given the waterlogged ground conditions.

\*\*\* The infrastructure and permanent way costs at Filton are almost double that for the Henbury options as this station requires retaining walls for the platforms given they're in deep cuttings (cost £675k). The other two sites are more level and hence don't require retaining walls.

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# 5 North Fringe Rail Station Strategy

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## 5.1 Introduction

The preceding sections of this report have forecast the future demand for rail under a number of rail infrastructure/services scenario; and considered the appropriate specifications and access arrangements for new stations. This section presents the overall strategy for the North Fringe Stations that defines the role each station provides and summarises the appropriate access arrangements and facilities for each.

## 5.2 Station Definition / Role

Network Rail has specific categories for the 2500+ stations on the UK network. The categories are based on a combination of volume of passengers using the facility and the importance of the station in terms of national, regional and local travel.

There have been a number of attempts over the years to take this categorisation and apply minimum service standards to be applied. The DfT document “Better Rail Stations” 2009 developed this a little further, but acknowledged that the range of stations / locations and purposes means strict standards are not necessarily helpful. The text box (taken from “Better Rail Stations”) below extracts a summary of the standards debate over the years, with Table 5-1 summarising the station categories.

### Case Study: Station Standards

There have been several attempts to introduce station standards across the train companies, but these have never been fully successful:

- The Office of Rail Franchising (OFRAF) tried to impose minimum standards after 1996, but these were lightly enforced in the mistaken belief that train companies could be left to operate on a self-enforcing basis.
- The Strategic Rail Authority (SRA) developed a Modern Facilities at Stations code in 2003 which provided gap funding for the more expensive renovations, but ran out of funding.
- Passenger Focus published a Stations Report in 2005 which drew attention to the under-funding of stations.
- The DfT strengthened minimum station standards in franchise agreements after 2004, but these were still not comprehensive and only came into force at renewal time. The 2009 Southern franchise finally brought more emphasis on station standards.

Table 5-1: Network Rail station categories

Station Category	Definition	Typical Annual Demand
A	National Hub	Over 2million
B	National Interchange	Over 2million
C <sup>1&amp;2</sup>	Important Feeder	0.5 to 2.0 million
D	Medium Staffed	0.25 to 0.5million
E	Small Staffed	Less than 0.25million
F <sup>1&amp;2</sup>	Unstaffed	Less than 0.25million

*1&2 – sub categories based on demand*

Source: *Network Route Utilisation Strategy, Stations*. Network Rail. 2011

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## *North Fringe Stations*

Existing stations within the North Fringe have been categorised as follows:

- Bristol Parkway – B – National Interchange
- Filton Abbey Wood – F1 – Unstaffed > 100k passengers per annum
- Patchway – F1 – Unstaffed

Given these standards, the level of provision at each of the stations in the area, either existing or encompassed within the design of new stations is broadly appropriate, but this is discussed further below.

### **Bristol Parkway (category B)**

The planned improvements at Parkway will maintain and improve its offer to passengers; this includes both track-side and station-side facilities. The Council's ongoing liaison with Network Rail and First Great Western should tailor the improvements to integrate with BRT; the Council is also seeking to improve access for pedestrians and cyclists to/from the south by provision of a subway or replacement bridge at Brierly Furlong.

Bristol Parkway is the key bus interchange for the North Fringe and should remain so; it offers the maximum number of train services and the maximum number of bus services and future investment should be focussed on these (an example being the Cribbs BRT Extension, which would offer a quality, high frequency link to the CPNN and The Mall).

### **Filton Abbey Wood (category F1)**

The on-station facilities are appropriate to the station's category and function; it is anticipated these will be updated as required in connection with Filton Bank 4-tracking, which includes a 4<sup>th</sup> platform. The station is currently unstaffed most of the time, but with growth in traffic the case for staffing for longer periods of the day and eventually, permanently, increase.

Pedestrian and cycle links are of an appropriate standard; they provide good access, especially to the east for MoD, the UWE Campus and Cheswick Village. Links to the west are somewhat circuitous, but there is no scope to improve this without adverse impact on adjacent residential properties (i.e. sheltered accommodation on Nutfield Grove).

Parking is limited, but free; the provision of additional parking is physically constrained and, arguably, undesirable, given the traffic congestion along the A4174. .

Most nearby bus services do not stop immediately adjacent to the station, but there are a few services that stop at the station access on Emma-Chris Way. It has been suggested that diverting local bus services off Filton Avenue to run via Nutfield Grove and Emma-Chris Way would be desirable; this is considered further in Appendix B, but in summary, given the alternative of Bristol Parkway (for bus/rail interchange) and adverse impacts for residents and existing bus users (of diverting bus services), this is not considered appropriate. If opportunities arise to run new services into Emma-Chris Way, these should be considered.

### **Patchway (category F1)**

Patchway is currently mostly used as a commuter station for access into Bristol from an immediate walk- and cycle-distance catchment area.

As noted in Chapter 2, walking and cycling links are via Station Road, which is not particularly pedestrian-friendly and could benefit from improvement to footways. The proposed improvement to the Gipsy Patch Lane Bridge would benefit access to the station; there are steep steps between Station Road and Lawford Avenue, Little Stoke, which would benefit from improvement.



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Parking provision is free and appropriate for the level of service, but currently over-subscribed, so it over-spills onto Station Road; hence, if the opportunity arises to increase provision, this should be secured.

Buses do not serve Patchway, but most areas of the North Fringe can use services that to go to/from Parkway. Future developments, such as CPNN, will be west of Patchway and can be expected to look to access rail via the Cribbs BRT Extension to Parkway or the Henbury Line stations.

### **Filton North (category F1)**

The new station would primarily cater for both existing and CPNN employment sites as a destination, as well as for residents, within a walking and cycling catchment area. Walking and cycling links to the north would be integrated into the CPNN; to the east there would be links to the A38; to the south is the controlled site access into Airbus.

The level of proposed rail service (hourly) means that a 30 space car park would be appropriate with local signage off the A38 and within the CPNN. The Council would need to decide who would own, operate and maintain the car park and whether it would charge a tariff. If the car park is free (as assumed in the current demand forecasting) then like Patchway and Filton Abbey Wood, demand could exceed supply; conversely, if charged, drivers could seek out free on-street parking on adjacent streets, which in-turn might require restrictions like those around Parkway.

It is anticipated that the local bus services and/or the Cribbs BRT Extension would stop adjacent to this station, which would provide interchange opportunities; however, given the level of train service, it is expected that Parkway would remain the main bus-rail interchange, albeit with some flows to The Mall possible. Depending on the access arrangements to the platforms, there would be good to moderate access to bus stops on the A38.

As suggested, the rail service to be provided is essentially a local link, and while it will provide opportunities for people to make longer journeys on the wider rail network, the station is not anticipated to be a major railhead (of the form of Bristol Parkway). Moreover, the service frequency of one train per hour would not be suitable for the station to serve as specific, advertised 'park & ride' site for Bristol.

### **Henbury (category F1)**

Both site options would cater for both existing and CPNN residents within a walking and cycling catchment area. By definition, the east site option would be more convenient for the Fishpool Hill area of the CPNN and Brentry; whereas the old site would be more convenient for Haw Wood and Henbury. Walking and cycling links to the north would be integrated into the CPNN and existing settlements to the south.

Like Filton North, the level of proposed rail service (hourly) means that a 30 space car park would be appropriate; the same issues arise in respect of car park ownership, operation and charging.

It is anticipated that the local bus services would stop adjacent to this station, either on the A4018 (east site) or on Station Road (former site). The site layouts include bespoke bus stops and turning circles, to safeguard options that may arise out of the CPNN.

As with Filton North, the rail service to be provided is essentially a local link and is not anticipated to serve as an advertised 'park & ride' for Bristol.

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## 6 APPENDIX A – Demand Forecasts

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<b>Project</b>	North Fringe Stations Study	<b>Date</b>	7 <sup>th</sup> March 2014
<b>Subject</b>	Demand forecasts	<b>Ref</b>	470310.AH.00.80
<b>Author</b>	CH2M HILL		

## Background

As part of MetroWest Phase 2, South Gloucestershire Council commissioned CH2m HILL to review the role of rail stations as transport interchanges in the Bristol North Fringe. This includes the existing stations of Bristol Parkway, Filton Abbey Wood and Patchway, as well as the potential new stations to be implemented as part of the MetroWest Phase 2 proposals, at Filton North and Henbury. The study considers three operating scenarios:

- Base Case – assuming current operations (theoretical situation with no improvements);
- Scenario A – base case plus committed and highly likely changes, including electrification, Bristol Parkway improvements (construction of a 4<sup>th</sup> platform and additional car parking) and Filton Bank 4-tracking;
- Scenario B – base case plus ‘A’ plus MetroWest Phase 1, including a new station(s) on Filton Bank; and
- Scenario C – base case plus ‘A’ & ‘B’ plus MetroWest Phase 2.

It has been assumed that the Henbury Line operates as a ‘spur’ via Filton Bank. However, South Gloucestershire Council will be commissioning further work from Network Rail (GRIP 1&2) during 2014 to examine whether a ‘loop’ would be a more viable option. It has also been assumed that development in the North Fringe proceeds as planned in the Adopted South Gloucestershire Core Strategy; in particular, the re-development of Filton Airfield as part of the Cribbs Patchway New Neighbourhood (CPNN).

This Technical Note describes the demand forecasts carried out. <sup>1</sup>

## Methodology

### Key data sources

#### *National Rail Travel Survey (NRTS)*

The National Rail Travel Survey (NRTS) provides estimates of the number of rail trips at stations on a notional and typical day and includes origins and destinations of trips using the rail network, both in terms of rail journeys themselves (the first, intermediate and last stations used) and the ‘true’ origin and destination of trips (including the locations where the overall journey started and finished, such as home, work or other location and the mode of station access/egress). Other journey characteristics derived from NRTS data includes ticket types, journey purposes and journey frequency. NRTS data is key to developing the bespoke gravity type model for new stations, as well as assessing potential demand changes at existing stations using PDFH derived calculations.

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<sup>1</sup> Note that MetroWest Phase 1 is assumed to include Portishead re-opening (half hourly service), and enhanced, half-hourly, services to Severn Beach and for local stations between Bath and Bristol. Phase 2 adds a half hourly service at Yate, and opening of Henbury and Filton North stations with an hourly service. This is notionally assumed to be a shuttle to Bristol Temple Meads, though the station demand forecasting methodology employed does not specifically distinguish between service patterns at the station beyond overall frequency of service.

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Prepared by	CH2M HILL	Date	7 <sup>th</sup> March 2014
Checked by		Date	
Approved by		Date	

### *Office of Rail Regulation (ORR) statistics*

Passenger counts at stations. The latest ORR station statistics were published in February 2013. ORR station totals are used in conjunction with NRTS and MOIRA2 data to update figures as required.

### *West of England annual station survey*

Passenger counts at stations. The latest West of England station survey was carried out in November 2013. The survey results are used in conjunction with ORR station statistics, principally in calibrating the demand figures for existing stations in the North Fringe.

### *MOIRA2*

MOIRA2 is used by the rail industry to forecast the impact of timetables on passenger revenue, including analysing the effect of changes such as stopping patterns, infrastructure and rolling stock on the passenger numbers carried and the revenue impact. MOIRA2 was previously provided to the study team by the DfT for use in the Metro West studies. Information from these previous analyses has been utilised in this study in generalised cost and fare/revenue calculations, though no specific assessments have been possible for this study. MetroWest was modelled using MOIRA2 as Phase 1, Phase 2 and a 'new stations package'. This sought to forecast changes in demand at existing stations as a result of changes to the rail service. As such, Henbury and Filton North have not been modelled using MOIRA2.

### *Passenger Demand Forecasting Handbook (PDFH)*

The PDFH summarises knowledge of the effects of changes to services, fares and other factors on rail passenger demand, and provides guidance on applying this to forecasts. Values in the PDFH can be used to assess demand responses to timetabling and operating decisions.

## **Existing stations**

This study has sought to assess potential changes to demand at the existing stations for each of the scenarios noted above. However, it is not the intention to provide a definitive forecast of demand that is likely to result from electrification of the Great Western Main Line, as the effects will potentially be wide-ranging and the detailed scope of future services yet to be finalised. As such, a series of specific assumptions about the effects on future demand at the existing North Fringe stations has been made in the first instance, which frames the subsequent more detailed calculations carried out.

NRTS data has been used as the basis of a simplified assessment of the potential for demand to increase as a result of increasing the size of the car park at Bristol Parkway (an expanded multi-level area for which is currently under construction), development of a 4<sup>th</sup> platform at Bristol Parkway, electrification and 4-tracking of Filton Bank. This has employed elasticities and techniques contained in the PDFH to estimate increases in demand that could result from key changes.

In addition, analysis of the effects of MetroWest were undertaken previously ('West of England Rail Study') using MOIRA2. These have not been repeated for this study (as MOIRA2 has not been available), but the results are still considered appropriate, so have been incorporated into the forecasts. This has provided the net effect of demand changes at the existing North Fringe stations forecast when MetroWest Phases 1 and 2 are implemented. In summary, demand affecting assumptions at each of the existing North Fringe stations are as follows:

### *Bristol Parkway*

- Better reliability afforded by 4-tracking of Filton Bank a 4<sup>th</sup> platform at the station;
- Increased car parking capacity at the station, which is assumed to reduce search time and the potential for passengers to fail to find a space;
- Increased service level and reduced journey times that electrification could bring; and
- Changes as a result of MetroWest (additional Yate service, changes further afield feeding through and abstraction from new stations in the vicinity, Henbury & Filton North).

#### *Filton Abbey Wood*

- Better reliability afforded by 4-tracking of Filton Bank a 4<sup>th</sup> platform at the station; and
- Changes as a result of MetroWest (additional Yate service, changes further afield feeding through and abstraction from new stations in the vicinity, Henbury & Filton North).

#### *Patchway*

- Better reliability afforded by 4-tracking of Filton Bank a 4<sup>th</sup> platform at the station; and
- Changes as a result of MetroWest Phase 2 (in particular, potential abstraction from Henbury line stations).

Redevelopment of Bristol Parkway car park is assumed to be fully complete in 2014. Electrification, including Filton Bank 4-tracking) is assumed to be partially open in 2016 (Bristol services) and fully open in 2017 (South Wales services). Enhancements associated with MetroWest Phase 1 are assumed to be operational in 2019, with Phase 2 following in 2021.

### **New stations**

A series of approaches are required to assess different aspects of new stations. These consider three main elements that together enable the net total benefit to the railway to be established, and include:

- Total trips generated by the new station;
- Existing rail trips diverted from existing trips to the new station; and
- Suppression of demand at existing stations by an extra station call.

#### *Total station demand*

This has employed a simple gravity model technique, which takes into account the relationship between journeys and catchments at a number of similar stations. Regression has been used to identify a series of demand/catchment relationships for several types of movements, including journeys made using full price tickets, reduced price tickets and season tickets, and between 'independent' stations (such as Keynsham), 'regional' stations (such as Bristol Parkway), 'urban' stations (such as Stapleton Road) and London stations, as the characteristics of such trips can differ. Stations used in the regressions are drawn from the local West of England area locations as much as possible. It includes the CPNN.

#### *Diversions of existing trips to new station*

An estimate of how many trips are new to the railway or transferring from other stations is assessed using a station choice logit model, using generalised costs calculated for whole journeys from origin (home in many cases) to destination (for example, work) via the existing station used, which NRTS data identifies, compared with a similar trip using the new station.

#### *Suppression of demand*

Overlaying the direct demand impact of the station is an appraisal of lost demand to existing rail passengers on the stopping train. Where a new station is implemented on an existing line, there is potential to affect demand on services passing through (and stopping) at the new station, as a result of lengthening journey times. This can have a significant effect on revenue if the services to be stopped at a new station are fast and/or long distance, where the journey time penalty is greater and/or fares paid are higher than more local journeys. The new stations at Henbury and Filton North are not located on an existing passenger rail line, and no existing services would be delayed to stop at them. As such, suppression of demand at existing stations does not apply to these new stations.

## Future demand

### Growth rates

Demand for rail travel has grown significantly in recent years, with, for example, an almost 70% increase in passenger numbers being recorded through stations in the West of England area between 2004/05 and 2011/12 (based on ORR figures). This includes even larger increases on specific routes, such as more than doubling of patronage on the Severn Beach line. Historic growth rates at groups of West of England stations are shown in Table 1 and Figure 1. Apart from a slight levelling in 2007/08, growth has continued in spite of the economic recession, and seems likely to continue, albeit it is debatable whether the rates will be as high as seen in recent times.

TABLE 1  
**ORR historic patronage growth in West of England area**  
 2004-2012 figures

Station groupings	2010/11 to	2009/10 to	2004/05 to	2004/05 to
	2011/12	2010/11	2011/12	2011/12
	per annum	per annum	TOTAL	per annum
Bristol main (Temple Meads & Parkway)	5.7%	6.1%	57%	6.6%
Severn Beach Line	9.8%	18.9%	163%	14.8%
Other Bristol urban	8.7%	13.3%	142%	13.5%
B&NES (incl. Keynsham)	8.7%	9.3%	54%	6.4%
South Gloucestershire (excl. Parkway)	11.8%	13.2%	115%	11.5%
North Somerset	6.0%	10.9%	56%	6.5%
OVERALL	8.7%	10.9%	69%	7.8% <sup>2</sup>

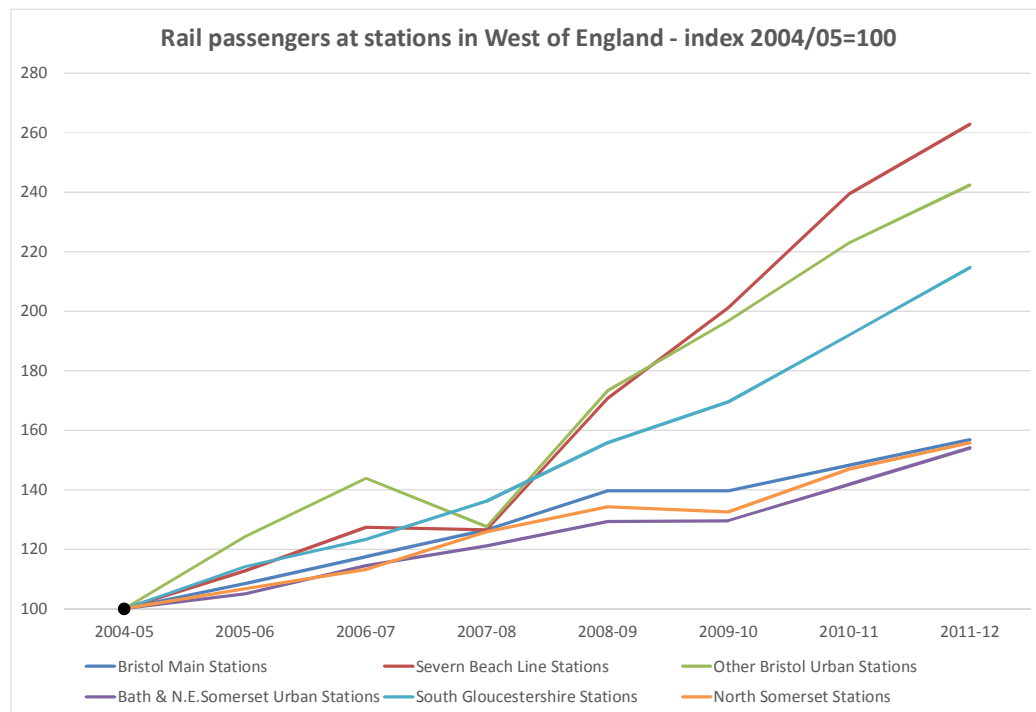


Figure 1: ORR historic growth in West of England area

<sup>2</sup> As a comparison, the West of England station survey showed a 6.5% per annum increase from 2005 to 2012

Looking into the future, the Great Western RUS (published in March 2010) forecasted that demand in the Bristol area would rise by 41% at peak times between 2008 and 2019 (a rate of 3.2% per annum), and 37% off peak (2.9% per annum), with an average growth rate of 3.0% per annum.

The LTPP Regional Urban Markets study (published October 2013) uses a series of wider economic scenarios to frame changes in rail use, and forecasts are presented for rail use in/around key urban centres. The resulting growth rates for the Bristol area vary from 0.6% per annum to 3.9% per annum. More details of the LTPP growth rates are shown in Table 2.

TABLE 2  
**Network Rail LTPP: Regional Urban Markets Study – Bristol area forecast growth**  
*(October 2013)*

Economic scenario	2013-23	2013-23	2023-2043	2023-2043
	total	per annum	total	per annum
'Prosperity in isolation'	14%	1.3%	33%	1.4%
'Global stability'	47%	3.9%	44%	1.8%
'Struggling in isolation'	6%	0.6%	15%	0.7%
'Global turmoil'	35%	3.0%	21%	1.0%
AVERAGE	26%	2.3%	29%	1.3%

In spite of recorded growth in recent years, it is possible that these rates would not continue unabated. As such, future year forecasts for North Fringe stations have been produced using a combination of decremting historic rates, RUS and LTPP figures, as follows: <sup>3</sup>

- 2013 to 2017 – taper from recent historic growth rates at West of England stations (7.8% per annum) to RUS average of peak and off peak (3.0% per annum);
- 2018 & 2019 – RUS average rate (3.0% per annum);
- 2020 to 2023 – taper from RUS average rate (3.0% per annum) to an LTPP average rate derived from the four economic scenarios (2.3% per annum); and
- 2023 to 2043 – taper from 2023 LTPP average rate (2.3% per annum) to 2043 LTPP average rate (1.3% per annum).

## Results

### New stations demand

Headline results of demand forecasts for Henbury and Filton North stations for 2022 and 2032 are shown in Table 3. Forecasts are for demand based on one train per hour operating a spur service to Bristol Temple Meads, with 2022 representing the first full year after commencement of MetroWest Phase 2 and opening of the new stations. A gradual build-out of CPNN is assumed, following a forecast profile of progress provided by South Gloucestershire Council, with the work commencing in 2014 through to full build-out in 2030. Hence, while some 70% of CPNN housing development is assumed in place by 2022, the whole of the CPNN is due to be complete before 2032. It should be noted that the daily forecasts represent an 'average day', based on a new stations annualisation factor of 315 (in turn based on analysis of data extracted from MOIRA2 ) and do not take into account fluctuations in demand from, for example, seasonal variation, and incorporate future growth assumptions described earlier.

<sup>3</sup> Given recent historic rates of growth of rail patronage, the forecast growth rates assumed can be considered comparatively conservative.

TABLE 3  
**Henbury & Filton North demand**  
 2022 & 2032 figures (1 train per hour)

Demand/revenue	Henbury		Filton North	
	2022	2032	2022	2032
Annual demand	186,566	265,898	148,956	217,769
Daily demand (average)	592	844	473	691

Demand for Henbury station is estimated to be almost 187,000 trips per annum in 2022 (total of two-way movements). This represents some 592 one-way trips per day made by around 297 individuals. This rises to almost 266,000 trips per annum in 2032 (844 one-way trips per day made by around 424 individuals). At Filton North, demand forecasts suggest almost 149,000 trips per annum in 2022 (473 trips per day by 237 individuals), rising to almost 218,000 trips per annum (691 trips per day by 347 individuals) in 2032. Of the demand forecast at Henbury, around 11% of trips could be as a result of existing rail trips that have transferred from other stations. Almost 30% of demand at Filton North could be as a result of transfers of rail trips from existing stations, which is unsurprising as Filton North is located closer to Filton Abbey Wood and Patchway stations than Henbury.

### Future demand profiles

Table 4 shows summary future year forecasts of demand at the North Fringe stations in 2013, 2022, 2032 and 2042. Figures 2-6 shows year-on-year profiles of demand from 2013 to 2043 for each of the three local enhancement scenarios, as well as a base case with no enhancements, including annual and daily (average day) demand. Growth assumptions are conservative when compared with recent actual growth in rail use, but still indicate that demand could increase substantially over current day values, in effect doubling between 2013 and around 2030.

Henbury and Filton North are only included in Phase 2 of MetroWest, which is assumed to begin operation in 2021. Demand for these stations is intrinsically linked to the development of CPNN, for which a gradual completion of the development is assumed (see previous section). This profile of development is reflected in the demand forecasts for Henbury and Filton north in Table 4 and Figure 6. Abstraction at Patchway and Filton Abbey Wood through operation of Henbury and Filton North is also specifically reflected in Table 4 and Figure 6.

TABLE 4  
**North Fringe Stations – demand forecast scenarios**  
 2013, 2022, 2032 & 2042 figures

Year	Bristol Parkway		Filton Abbey Wood		Patchway		Henbury		Filton North	
	annual '000s	daily	annual '000s	daily	annual '000s	daily	annual '000s	daily	annual '000s	daily
<b>Base case – growth applied to current levels of demand</b>										
2013	2,630k	10,400	1,116k	4,400	103k	400	-	-	-	-
2022	3,920k	15,500	1,664k	6,600	154k	600	-	-	-	-
2032	4,842k	19,100	2,055k	8,100	190k	800	-	-	-	-
2042	5,686k	22,500	2,413k	9,500	223k	900	-	-	-	-
<b>Scenario A – base plus planned changes (electrification, 4-track, BPW car park)</b>										
2013	2,630k	10,400	1,116k	4,400	103k	400	-	-	-	-
2022	4,463k	17,600	1,712k	6,800	157k	600	-	-	-	-
2032	5,512k	21,800	2,114k	8,400	194k	800	-	-	-	-
2042	6,473k	25,600	2,483k	9,800	228k	900	-	-	-	-



TABLE 4  
**North Fringe Stations – demand forecast scenarios**  
 2013, 2022, 2032 & 2042 figures

Year	Bristol Parkway		Filton Abbey Wood		Patchway		Henbury		Filton North	
	annual '000s	daily	annual '000s	daily	annual '000s	daily	annual '000s	daily	annual '000s	daily
<b>Scenario B – base plus 'A' plus Metro West Phase 1 (including new Filton Bank station)</b>										
<b>2013</b>	2,630k	10,400	1,116k	4,400	103k	400	-	-	-	-
<b>2022</b>	4,465k	17,600	1,720k	6,800	158k	600	-	-	-	-
<b>2032</b>	5,516k	21,800	2,125k	8,400	195k	800	-	-	-	-
<b>2042</b>	6,476k	25,600	2,495k	9,900	229k	900	-	-	-	-
<b>Scenario C – base plus 'A' &amp; 'B' plus Metro West Phase 2</b>										
<b>2013</b>	2,630k	10,400	1,116k	4,400	103k	400	-	-	-	-
<b>2022</b>	4,473k	17,700	1,690k	6,700	151k	600	187k	600	149k	500
<b>2032</b>	5,525k	21,800	2,078k	8,200	186k	700	266k	800	218k	700
<b>2042</b>	6,487k	25,600	2,440k	9,600	218k	900	312k	1,000	256k	800

Note: Annual demand in '000s and rounded to the nearest 1,000; daily demand rounded to nearest 100)

## Catchment and access modes

### Existing stations

#### *Bristol Parkway*

Bristol Parkway station is an important and popular railhead, with its mix of frequent local and long distance services, in for particular South Gloucestershire and northern Bristol, but also further afield and via the motorway network. NRTS figures indicate that there are almost twice as many 'origin users' of Bristol Parkway (whose origin station is Bristol Parkway and are making an outward journey of a return trip or single from) than 'destination users'.

Car access for 'origin users' is important to the station and parking demand is high, with over 50% of station origin users parking at the station, and a further 20% of being dropped-off. At current rail passenger levels, car park demand is around 1200 per day, which is greater than the stated car park capacity of 1140 spaces. Expansion of the car park is currently underway, which will add some 700 spaces in mid 2014. Growth in future patronage demand at Bristol Parkway is likely to increase pressure on the car park, the capacity of which could be under pressure again within around 5 years of the completion of electrification. South Gloucestershire Council operates a car park off Hunts Ground Road, which can cater for some overflow.

Walking directly to Bristol Parkway accounts for only 12% of origin users, with the remainder split evenly at just over 5% each using taxis, buses and two-wheelers (bicycle 3.5%, motorcycle 1.5%).

Unsurprisingly, walking from the station is more important for 'destination users' of Bristol Parkway (almost 35% do so), though car access is again significant with over 25% being picked up, and taxis take almost 20%. Buses are more important for onward trips by destination users than access for origin users, with almost 17% of arriving passengers using buses.

#### *Filton Abbey Wood*

Filton Abbey Wood station has a particular dual role as a railhead for local residents and access for workers and visitors to the MoD's Abbey Wood office complex. NRTS figures indicate that most people access the station on foot. However, this is unsurprising with such a dominant 'destination' alongside the station, and closer examination of NRTS figures for station users whose origin station is Filton Abbey Wood (making an outward journey of a return trip or single from), and are therefore more likely to be

'local' railhead movements, indicates that just over 33% walk, with almost 33% parking a car 'at or near' the station and 21% using buses, the remainder cycling or being dropped off.

This results in a comparatively high demand for parking (compared to the size of car park). The published capacity is 30 spaces, but the NRTS indicates that as many as 54 may be parking cars. It is unclear whether future access mode split would be maintained, as de facto car parking already exceeds apparent capacity and South Gloucestershire Council is proposing restrictions on commuter car parking on neighbouring residential streets. As such, walk, cycle and bus access are likely to increase.

#### *Patchway*

Patchway is a more lightly used station than Filton Abbey Wood that has nevertheless seen significant increases in demand, trebling since 2004/05, and increasing by over 35% since 2010 (the NRTS dates from 2010). Over 42% park at/near the station, with a further 25% being dropped off. The remaining 33% walk, with no indicated bus or cycle users. However, given the small number of people involved (daily demand in 2010 was not much over 100), patterns in the NRTS are potentially unrepresentative.

Nevertheless, parking demand closely matches capacity, with 12 (42%) of origin users parking 'at or near' the station compared to a capacity of 15. As demand has already increased, it is likely that demand for parking often exceeds capacity at Patchway, and commuter parking is observed in the vicinity on Station Road. Although Patchway does not benefit greatly from proposed rail enhancements, demand for parking is still likely to increase.

#### **New stations**

The total demand forecasts have been further analysed to identify the locations that potential users of a Henbury and Filton North stations would come from, as well as the likely modes of transport they would use to reach the stations. This is based primarily on analysis of users at Filton Abbey Wood (who use the station as an outbound railhead), Patchway and Stapleton Road stations. NRTS data is used, as this provides the true origin of trips, as well as the mode of transport used to access the station.

Tables 5 and 6 shows catchment distance and mode of access for Henbury, for demand forecasts in 2022 and 2032 respectively. Almost half of all one-way trips are likely to be outward and return portions of day returns, thus suggesting some 297 individuals arrive at the station in 2022 (594 trips), rising to 424 in 2032 (844 trips). Tables 7 and 8 show similar figures for Filton North with 237 individuals using the station in 2022 (473 trips) and 347 in 2032 (691 trips).

TABLE 5  
**Rail users accessing Henbury – by origin catchment and access mode**  
*2022 figures, 1 train per hour, assuming no charges for parking*

<b>Catchment</b>	<b>Walk</b>	<b>Bus</b>	<b>Car parked</b>	<b>Car drop off</b>	<b>Bicycle</b>	<b>Taxi</b>	<b>ALL</b>
Less than 1 km	74	-	6	4	-	7	92
from 1 to 2 km	112	30	6	3	11	-	162
from 2 to 3 km	33	1	3	2	1	-	40
from 3 to 4 km	-	-	1	-	-	-	1
from 4 to 5 km	-	-	2	-	1	-	3
from 5 to 10 km	-	-	-	-	-	-	-
More than 10 km	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>219</b>	<b>31</b>	<b>18</b>	<b>9</b>	<b>13</b>	<b>7</b>	<b>297</b>

numbers may not add up exactly to totals due to rounding

TABLE 6  
**Rail users accessing Henbury – by origin catchment and access mode**  
 2032 figures, 1 train per hour, assuming no charges for parking

Catchment	Walk	Bus	Car		Bicycle	Taxi	ALL
			parked	drop off			
Less than 1 km	105	-	9	6	-	10	131
from 1 to 2 km	160	43	9	4	15	-	231
from 2 to 3 km	47	2	4	2	2	-	57
from 3 to 4 km	-	-	1	-	-	-	1
from 4 to 5 km	-	-	3	-	1	-	4
from 5 to 10 km	-	-	-	-	-	-	-
More than 10 km	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>312</b>	<b>44</b>	<b>26</b>	<b>13</b>	<b>19</b>	<b>10</b>	<b>424</b>

numbers may not add up exactly to totals due to rounding

TABLE 7  
**Rail users accessing Filton North – by origin catchment and access mode**  
 2022 figures, 1 train per hour, assuming no charges for parking

Catchment	Walk	Bus	Car		Bicycle	Taxi	ALL
			parked	drop off			
Less than 1 km	61	-	4	3	-	6	74
from 1 to 2 km	91	23	4	2	9	-	129
from 2 to 3 km	27	1	2	1	1	-	32
from 3 to 4 km	-	-	0	-	-	-	0
from 4 to 5 km	-	-	1	-	1	-	2
from 5 to 10 km	-	-	-	-	-	-	-
More than 10 km	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>180</b>	<b>24</b>	<b>11</b>	<b>6</b>	<b>10</b>	<b>6</b>	<b>237</b>

numbers may not add up exactly to totals due to rounding

TABLE 8  
**Rail users accessing Filton North – by origin catchment and access mode**  
 2032 figures, 1 train per hour, assuming no charges for parking

Catchment	Walk	Bus	Car		Bicycle	Taxi	ALL
			parked	drop off			
Less than 1 km	89	-	6	4	-	9	108
from 1 to 2 km	133	34	6	3	13	-	189
from 2 to 3 km	40	1	2	1	1	-	46
from 3 to 4 km	-	-	1	-	-	-	1
from 4 to 5 km	-	-	2	-	1	-	3
from 5 to 10 km	-	-	-	-	-	-	-
More than 10 km	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>263</b>	<b>35</b>	<b>16</b>	<b>9</b>	<b>15</b>	<b>9</b>	<b>347</b>

numbers may not add up exactly to totals due to rounding

Catchments of both Henbury and Filton North are likely to be local in nature. The rail service to be provided is essentially a local link, and while this will provide opportunities for people to make longer journeys on the wider rail network, neither station is anticipated to be a major railhead (of the form of Bristol Parkway). Also, the service frequency of one train per hour would not be suitable for the stations to serve as specific 'park & ride' sites for Bristol.

Forecasts indicate that some station users will park at the station, but this is more likely to be users who live or work locally and people making longer-distance rail-head journeys and accessing the station by car, who plan a journey based on meeting the hourly service frequency. A more frequent, 'turn up and go', level of service is required to promote a station as a park & ride site.

As such, the majority of station users at both Henbury and Filton North are anticipated to come from within 2km of the stations (around 85% of demand). This is based on the likely use of the stations, as noted, and comparison of the potential Henbury and Filton North stations with similar locations elsewhere, particularly within the greater Bristol area. This is driven by a combination of comparatively poor, often congested, car access to urban stations, and a low frequency.

There is still likely to be demand for some car parking at or near the stations, slightly more at Henbury than Filton North. Daily forecasts suggest a parking demand of some 18 at Henbury in 2022 and 26 in 2032. For Filton North corresponding figures are 11 in 2022 and 16 in 2032. As the daily forecasts represent an 'average day' they do not take into account fluctuations in demand from, for example, day-by-day variation or seasonal effects, allowance should be made in translating demand into car park capacity. Note also that assumptions underlying the demand forecasts assume that no charges are levied for parking at the stations (in common with current practice at Filton Abbey Wood and Patchway stations).

There is limited catchment overlap between Filton North and Henbury. Depending on the final locations of each station, the edges of the 2km catchments could overlap by a few hundred meters at most. As such, the effect on overall demand for the two stations is also likely to be limited, so has not been specifically accounted for in the demand forecasts. The Filton North catchment does however overlap with those of Filton Abbey Wood, Patchway and Bristol Parkway. Closer examination shows that the main residential areas that will form the origin catchments for these three stations and Filton North are largely separate. Hence, overlapping catchments are reflected in the demand forecasts through an assessment of the amount of demand that could transfer from these existing stations to Filton North.

Neither Henbury nor Filton North catchments overlap (at the key 2km level) with the Ashley Down (Hill) 'historic' station location catchment, although Filton North catchment could overlap slightly with an alternative location for Ashley Down located north of the historic station site.

Note that catchment populations used in the demand forecasts make allowance for development of CPNN above the current (2011 Census) catchment populations. With no development, local catchments (and hence demand) for both Henbury and Filton North would be substantially reduced.

## ALL scenarios

Year	Bristol Parkway		Filton Abbey Wood		Patchway		Henbury		Filton North	
	Demand		Demand		Demand		Demand		Demand	
	annual	daily	annual	daily	annual	daily	annual	daily	annual	daily
<b>Base - growth applied to current levels of demand</b>										
no specific infrastructure changes included										
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-
2022	3,920,309	15,495	1,663,756	6,576	153,856	608	-	-	-	-
2032	4,842,398	19,140	2,055,085	8,123	190,044	751	-	-	-	-
2042	5,686,000	22,474	2,413,104	9,538	223,152	882	-	-	-	-
<b>Scenario A - base plus planned changes (electrification, 4-track, BPW car park)</b>										
no MetroWest services										
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-
2022	4,462,592	17,639	1,711,814	6,766	157,178	621	-	-	-	-
2032	5,512,230	21,787	2,114,446	8,357	194,148	767	-	-	-	-
2042	6,472,525	25,583	2,482,808	9,813	227,971	901	-	-	-	-
<b>Scenario B - base plus 'A' plus MetroWest Phase 1</b>										
including electrification, 4-track & BPW car park										
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-
2022	4,465,270	17,649	1,720,066	6,799	158,195	625	-	-	-	-
2032	5,515,539	21,801	2,124,640	8,398	195,404	772	-	-	-	-
2042	6,476,410	25,598	2,494,777	9,861	229,445	907	-	-	-	-
<b>Scenario C - base plus 'A' &amp; 'B' plus MetroWest Phase 2</b>										
including electrification, 4-track & BPW car park										
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-
2022	4,472,706	17,679	1,690,468	6,682	151,458	599	186,556	592	148,956	473
2032	5,524,723	21,837	2,077,823	8,213	185,625	734	265,898	844	217,769	691
2042	6,487,194	25,641	2,439,804	9,643	217,963	862	312,221	991	255,707	812

Figure 2: North Fringe Stations – all scenarios – selected years (2013, 2022, 2032 & 2042)

**Base - growth applied to current levels of demand**

no specific infrastructure changes included

Year	Bristol Parkway		Filton Abbey Wood		Patchway		Henbury		Filton North	
	Demand		Demand		Demand		Demand		Demand	
	annual	daily	annual	daily	annual	daily	annual	daily	annual	daily
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-
2014	2,834,187	11,202	1,202,812	4,754	111,230	440	-	-	-	-
2015	3,027,270	11,965	1,284,755	5,078	118,808	470	-	-	-	-
2016	3,204,947	12,668	1,360,160	5,376	125,781	497	-	-	-	-
2017	3,362,816	13,292	1,427,159	5,641	131,977	522	-	-	-	-
2018	3,496,735	13,821	1,483,993	5,866	137,232	542	-	-	-	-
2019	3,602,998	14,241	1,529,091	6,044	141,403	559	-	-	-	-
2020	3,712,491	14,674	1,575,559	6,228	145,700	576	-	-	-	-
2021	3,818,428	15,093	1,620,518	6,405	149,858	592	-	-	-	-
2022	3,920,309	15,495	1,663,756	6,576	153,856	608	-	-	-	-
2023	4,017,640	15,880	1,705,063	6,739	157,676	623	-	-	-	-
2024	4,109,940	16,245	1,744,234	6,894	161,298	638	-	-	-	-
2025	4,202,294	16,610	1,783,428	7,049	164,923	652	-	-	-	-
2026	4,294,613	16,975	1,822,608	7,204	168,546	666	-	-	-	-
2027	4,386,801	17,339	1,861,732	7,359	172,164	680	-	-	-	-
2028	4,478,765	17,703	1,900,761	7,513	175,773	695	-	-	-	-
2029	4,570,406	18,065	1,939,653	7,667	179,370	709	-	-	-	-
2030	4,661,625	18,425	1,978,366	7,820	182,950	723	-	-	-	-
2031	4,752,323	18,784	2,016,858	7,972	186,509	737	-	-	-	-
2032	4,842,398	19,140	2,055,085	8,123	190,044	751	-	-	-	-
2033	4,931,747	19,493	2,093,004	8,273	193,551	765	-	-	-	-
2034	5,020,267	19,843	2,130,571	8,421	197,025	779	-	-	-	-
2035	5,107,853	20,189	2,167,742	8,568	200,462	792	-	-	-	-
2036	5,194,401	20,531	2,204,473	8,713	203,859	806	-	-	-	-
2037	5,279,805	20,869	2,240,718	8,857	207,211	819	-	-	-	-
2038	5,363,961	21,201	2,276,433	8,998	210,513	832	-	-	-	-
2039	5,446,763	21,529	2,311,573	9,137	213,763	845	-	-	-	-
2040	5,528,106	21,850	2,346,095	9,273	216,955	858	-	-	-	-
2041	5,607,886	22,166	2,379,953	9,407	220,086	870	-	-	-	-
2042	5,686,000	22,474	2,413,104	9,538	223,152	882	-	-	-	-
2043	5,762,346	22,776	2,445,505	9,666	226,148	894	-	-	-	-

Figure 3: North Fringe Stations – Base – background growth only (no specific infrastructure improvements)

**Scenario A - base plus planned changes (electrification, 4-track, BPW car park)**

no MetroWest services

Year	Bristol Parkway		Filton Abbey Wood		Patchway		Henbury		Filton North		
	Demand		Demand		Demand		Demand		Demand		
	annual	daily	annual	daily	annual	daily	annual	daily	annual	daily	
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-	
2014	2,961,399	11,705	1,202,812	4,754	111,230	440	-	-	-	-	<< BPW enhancements
2015	3,163,149	12,503	1,284,755	5,078	118,808	470	-	-	-	-	
2016	3,405,712	13,461	1,342,102	5,305	123,652	489	-	-	-	-	<< electrification PARTIAL
2017	3,827,982	15,130	1,468,383	5,804	134,826	533	-	-	-	-	<< electrification COMPLETE
2018	3,980,426	15,733	1,526,859	6,035	140,196	554	-	-	-	-	
2019	4,101,389	16,211	1,573,259	6,218	144,456	571	-	-	-	-	
2020	4,226,027	16,704	1,621,069	6,407	148,846	588	-	-	-	-	
2021	4,346,618	17,180	1,667,327	6,590	153,093	605	-	-	-	-	
2022	4,462,592	17,639	1,711,814	6,766	157,178	621	-	-	-	-	
2023	4,573,387	18,077	1,754,314	6,934	161,081	637	-	-	-	-	
2024	4,678,453	18,492	1,794,616	7,093	164,781	651	-	-	-	-	
2025	4,783,583	18,907	1,834,943	7,253	168,484	666	-	-	-	-	
2026	4,888,671	19,323	1,875,254	7,412	172,185	681	-	-	-	-	
2027	4,993,612	19,738	1,915,509	7,571	175,881	695	-	-	-	-	
2028	5,098,297	20,151	1,955,665	7,730	179,569	710	-	-	-	-	
2029	5,202,614	20,564	1,995,680	7,888	183,243	724	-	-	-	-	
2030	5,306,452	20,974	2,035,511	8,045	186,900	739	-	-	-	-	
2031	5,409,696	21,382	2,075,115	8,202	190,536	753	-	-	-	-	
2032	5,512,230	21,787	2,114,446	8,357	194,148	767	-	-	-	-	
2033	5,613,939	22,189	2,153,461	8,512	197,730	782	-	-	-	-	
2034	5,714,703	22,588	2,192,113	8,664	201,279	796	-	-	-	-	
2035	5,814,405	22,982	2,230,358	8,816	204,791	809	-	-	-	-	
2036	5,912,924	23,371	2,268,149	8,965	208,261	823	-	-	-	-	
2037	6,010,142	23,756	2,305,441	9,112	211,685	837	-	-	-	-	
2038	6,105,939	24,134	2,342,188	9,258	215,059	850	-	-	-	-	
2039	6,200,194	24,507	2,378,344	9,401	218,379	863	-	-	-	-	
2040	6,292,790	24,873	2,413,862	9,541	221,640	876	-	-	-	-	
2041	6,383,606	25,232	2,448,699	9,679	224,839	889	-	-	-	-	
2042	6,472,525	25,583	2,482,808	9,813	227,971	901	-	-	-	-	
2043	6,559,431	25,927	2,516,144	9,945	231,032	913	-	-	-	-	

Figure 4: North Fringe Stations – Scenario A – base plus electrification, Filton Bank 4-tracking, BPW enhancements & background growth

### Scenario B - base plus 'A' plus MetroWest Phase 1

including electrification, 4-track & BPW car park

Year	Bristol Parkway		Filton Abbey Wood		Patchway		Henbury		Filton North		
	Demand		Demand		Demand		Demand		Demand		
	annual	daily	annual	daily	annual	daily	annual	daily	annual	daily	
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-	
2014	2,961,399	11,705	1,202,812	4,754	111,230	440	-	-	-	-	<< BPW enhancements
2015	3,163,149	12,503	1,284,755	5,078	118,808	470	-	-	-	-	
2016	3,405,712	13,461	1,342,102	5,305	123,652	489	-	-	-	-	<< electrification PARTIAL
2017	3,827,982	15,130	1,468,383	5,804	134,826	533	-	-	-	-	<< electrification COMPLETE
2018	3,980,426	15,733	1,526,859	6,035	140,196	554	-	-	-	-	
2019	4,103,850	16,221	1,580,844	6,248	145,391	575	-	-	-	-	<< Metro PHASE 1 (assumed)
2020	4,228,563	16,714	1,628,884	6,438	149,809	592	-	-	-	-	
2021	4,349,227	17,191	1,675,365	6,622	154,084	609	-	-	-	-	
2022	4,465,270	17,649	1,720,066	6,799	158,195	625	-	-	-	-	
2023	4,576,131	18,087	1,762,771	6,967	162,122	641	-	-	-	-	
2024	4,681,261	18,503	1,803,268	7,128	165,847	656	-	-	-	-	
2025	4,786,454	18,919	1,843,789	7,288	169,574	670	-	-	-	-	
2026	4,891,605	19,334	1,884,295	7,448	173,299	685	-	-	-	-	
2027	4,996,609	19,749	1,924,743	7,608	177,019	700	-	-	-	-	
2028	5,101,356	20,163	1,965,093	7,767	180,730	714	-	-	-	-	
2029	5,205,736	20,576	2,005,301	7,926	184,428	729	-	-	-	-	
2030	5,309,636	20,987	2,045,324	8,084	188,109	744	-	-	-	-	
2031	5,412,942	21,395	2,085,119	8,242	191,769	758	-	-	-	-	
2032	5,515,539	21,801	2,124,640	8,398	195,404	772	-	-	-	-	
2033	5,617,308	22,203	2,163,843	8,553	199,009	787	-	-	-	-	
2034	5,718,133	22,601	2,202,681	8,706	202,581	801	-	-	-	-	
2035	5,817,894	22,996	2,241,110	8,858	206,115	815	-	-	-	-	
2036	5,916,473	23,385	2,279,084	9,008	209,608	828	-	-	-	-	
2037	6,013,749	23,770	2,316,556	9,156	213,054	842	-	-	-	-	
2038	6,109,603	24,149	2,353,480	9,302	216,450	856	-	-	-	-	
2039	6,203,915	24,521	2,389,810	9,446	219,791	869	-	-	-	-	
2040	6,296,566	24,888	2,425,500	9,587	223,074	882	-	-	-	-	
2041	6,387,437	25,247	2,460,504	9,725	226,293	894	-	-	-	-	
2042	6,476,410	25,598	2,494,777	9,861	229,445	907	-	-	-	-	
2043	6,563,368	25,942	2,528,274	9,993	232,526	919	-	-	-	-	

Figure 5: North Fringe Stations – Scenario B – base plus 'A' plus MetroWest Phase 1 (including Filton Bank new station)



### Scenario C - base plus 'A' & 'B' plus MetroWest Phase 2

including electrification, 4-track & BPW car park

Year	Bristol Parkway		Filton Abbey Wood		Patchway		Henbury		Filton North		
	Demand		Demand		Demand		Demand		Demand		
	annual	daily	annual	daily	annual	daily	annual	daily	annual	daily	
2013	2,630,188	10,396	1,116,236	4,412	103,224	408	-	-	-	-	
2014	2,961,399	11,705	1,202,812	4,754	111,230	440	-	-	-	-	<< BPW enhancements
2015	3,163,149	12,503	1,284,755	5,078	118,808	470	-	-	-	-	
2016	3,405,712	13,461	1,342,102	5,305	123,652	489	-	-	-	-	<< electrification PARTIAL
2017	3,827,982	15,130	1,468,383	5,804	134,826	533	-	-	-	-	<< electrification COMPLETE
2018	3,980,426	15,733	1,526,859	6,035	140,196	554	-	-	-	-	
2019	4,103,850	16,221	1,580,844	6,248	145,391	575	-	-	-	-	<< Metro PHASE 1 (assumed)
2020	4,228,563	16,714	1,628,884	6,438	149,809	592	-	-	-	-	
2021	4,356,469	17,219	1,648,736	6,517	147,835	584	174,104	553	137,842	438	<< Metro PHASE 2 (assumed)
2022	4,472,706	17,679	1,690,468	6,682	151,458	599	186,556	592	148,956	473	
2023	4,583,751	18,118	1,730,174	6,839	154,897	612	199,017	632	160,111	508	
2024	4,689,056	18,534	1,768,445	6,990	158,246	625	208,693	663	168,651	535	
2025	4,794,424	18,950	1,807,221	7,143	161,665	639	216,712	688	175,612	557	
2026	4,899,751	19,367	1,845,939	7,296	165,076	652	224,876	714	182,711	580	
2027	5,004,929	19,782	1,884,586	7,449	168,481	666	233,084	740	189,854	603	
2028	5,109,851	20,197	1,923,095	7,601	171,871	679	241,423	766	197,123	626	
2029	5,214,405	20,610	1,961,482	7,753	175,251	693	249,691	793	204,325	649	
2030	5,318,478	21,022	2,000,255	7,906	178,696	706	255,972	813	209,639	666	
2031	5,421,956	21,431	2,039,173	8,060	182,172	720	260,952	828	213,718	678	
2032	5,524,723	21,837	2,077,823	8,213	185,625	734	265,898	844	217,769	691	
2033	5,626,662	22,240	2,116,162	8,364	189,050	747	270,804	860	221,787	704	
2034	5,727,654	22,639	2,154,144	8,514	192,443	761	275,665	875	225,768	717	
2035	5,827,582	23,034	2,191,727	8,663	195,801	774	280,474	890	229,707	729	
2036	5,926,325	23,424	2,228,863	8,810	199,119	787	285,227	905	233,599	742	
2037	6,023,763	23,809	2,265,510	8,955	202,392	800	289,916	920	237,440	754	
2038	6,119,777	24,189	2,301,620	9,097	205,618	813	294,537	935	241,224	766	
2039	6,214,246	24,562	2,337,149	9,238	208,792	825	299,084	949	244,948	778	
2040	6,307,051	24,929	2,372,053	9,376	211,911	838	303,551	964	248,606	789	
2041	6,398,073	25,289	2,406,286	9,511	214,969	850	307,931	978	252,194	801	
2042	6,487,194	25,641	2,439,804	9,643	217,963	862	312,221	991	255,707	812	
2043	6,574,297	25,985	2,472,563	9,773	220,890	873	316,413	1,004	259,140	823	

Figure 6: North Fringe Stations – Scenario C – base plus 'A' & 'B' plus MetroWest Phase 2

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## 7 APPENDIX B – Filton Abbey Wood Bus Access

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**Project** North Fringe Stations Study **Date** 13<sup>th</sup> January 2014  
**Subject** Filton Abbey Wood – potential bus link **Ref** 470310.AH.00.80  
**Author** CH2M HILL

**Background**

As part of MetroWest Phase 2, South Gloucestershire Council commissioned CH2M HILL to review the role of rail stations as transport interchanges in the Bristol North Fringe. This includes the existing stations of Bristol Parkway, Filton Abbey Wood and Patchway, as well as the potential new stations to be implemented as part of the MetroWest Phase 2 proposals, at Filton North and Henbury. The study needs to consider North Fringe stations in the context of three operating scenarios:

- Base Case – assuming current operations (theoretical situation with no improvements);
- Scenario A – base case plus committed and highly likely changes, including electrification, Bristol Parkway improvements (construction of a 4<sup>th</sup> platform and additional car parking) and Filton Bank 4-tracking;
- Scenario B – base case plus ‘A’ plus MetroWest Phase 1, including a new station(s) on Filton Bank; and
- Scenario C – base case plus ‘A’ & ‘B’ plus MetroWest Phase 2.

It has been assumed that the Henbury Line operates as a ‘spur’ via Filton Bank. However, South Gloucestershire Council will be commissioning further work from Network Rail (GRIP 1&2) during 2014 to examine whether a ‘loop’ would be a more viable option. It has also been assumed that development in the North Fringe proceeds as planned in the Adopted South Gloucestershire Core Strategy; in particular, re-development of Filton Airfield as part of the Cribbs Patchway New Neighbourhood (CPNN).

This Technical Note focuses on bus access issues to Filton Abbey Wood and includes a high level assessment of a potential bus link between Filton Avenue, Nutfield Grove and Emma-Chris Way (the station access road), capturing costs, benefits, adverse effects and impacts, as well as setting out some of the demand related effects that the potential new link and adjustments to bus services could have.

**Station demand and access**

Table 1 shows the forecast profile of demand at Filton Abbey Wood from 2013 to 2042 for each of the three local enhancement scenarios described above, as well as an ‘existing situation’ case with no enhancements, including annual and daily (average day) demand. These growth assumptions are conservative when compared with recent actual growth in rail use, but still indicate that demand could increase substantially over current day values, in effect doubling between 2013 and around 2035.

TABLE 1  
**Filton Abbey Wood – demand forecast scenarios**  
 2013, 2022, 2032 & 2042 figures

Year	Existing		Scenario A		Scenario B		Scenario C	
	annual ‘000s	daily	annual ‘000s	daily	annual ‘000s	daily	annual ‘000s	daily
<b>2013</b>	1116k	4412	1116k	4412	1116k	4412	1116k	4412
<b>2022</b>	1664k	6576	1712k	6766	1720k	6799	1690k	6682
<b>2032</b>	2055k	8123	2114k	8357	2125k	8398	2078k	8213
<b>2042</b>	2413k	9538	2483k	9813	2495k	9861	2440k	9643

Note: Forecasts are described in the North Fringe Stations Study – Demand Forecasts technical note

Prepared by	CH2M HILL	Date	13 <sup>th</sup> January 2014
Checked by		Date	
Approved by		Date	

Figures 1 and 2 show access and egress modes estimated from NRTS and West of England rail survey data for trips using Filton Abbey Wood as an origin station and destination station respectively (2013 figures). These indicate that most people access the station on foot. However, Filton Abbey Wood station has a dual role, as a railhead for local residents and secondly providing convenient access for workers and visitors to the MoD’s Abbey Wood office complex. Hence, with a significant ‘destination’ alongside the station, a large proportion of walk access would be expected. Closer examination of the ticket and journey types in NRTS figures for Filton Abbey Wood allows those journeys likely to be ‘local’ railhead movements to be identified (for instance, the outward journey of a return ticket or single ticket). This indicates that just over a third walk, with almost another third parking a car ‘at or near’ the station. Some 20% use buses, with the remainder cycling or being dropped off.

ORIGIN STATION									
50.6%	Walk	Bus	Car: parked (at/near)	Car: drop off	M/cycle	Bicycle	Taxi/ minicab		
Less than 1 km	1473	32	17	-	-	9	-	1530	
from 1 to 2 km	110	-	-	-	-	-	-	110	
from 2 to 3 km	232	23	18	-	-	70	-	343	
from 3 to 4 km	26	20	8	-	-	9	-	64	
from 4 to 5 km	7	25	17	51	-	4	-	103	
from 5 to 10 km	3	-	23	-	-	9	18	54	
More than 10 km	-	-	25	-	-	3	-	28	
	1851	100	107	51	-	105	18	2233	
Less than 1 km	66.0%	1.4%	0.8%	-	-	0.4%	-	68.5%	
from 1 to 2 km	4.9%	-	-	-	-	-	-	4.9%	
from 2 to 3 km	10.4%	1.0%	0.8%	-	-	3.1%	-	15.4%	
from 3 to 4 km	1.2%	0.9%	0.4%	-	-	0.4%	-	2.9%	
from 4 to 5 km	0.3%	1.1%	0.7%	2.3%	-	0.2%	-	4.6%	
from 5 to 10 km	0.1%	-	1.0%	-	-	0.4%	0.8%	2.4%	
More than 10 km	-	-	1.1%	-	-	0.1%	-	1.3%	
	82.9%	4.5%	4.8%	2.3%	-	4.7%	0.8%	100.0%	

Figure 1: 2013 Filton Abbey Wood demand – origin station – estimated access modes

DESTINATION STATION									
49.4%	Walk	Bus	Car: parked (at/near)	Car: drop off	M/cycle	Bicycle	Taxi/ minicab		
Less than 1 km	1413	16	17	-	-	9	-	1454	
from 1 to 2 km	104	-	-	-	-	-	-	104	
from 2 to 3 km	297	11	22	-	-	64	-	394	
from 3 to 4 km	25	16	8	-	-	9	-	58	
from 4 to 5 km	7	8	16	47	-	4	-	81	
from 5 to 10 km	3	-	23	-	-	9	25	60	
More than 10 km	-	-	25	-	-	3	-	28	
	1848	50	110	47	-	99	25	2179	
Less than 1 km	64.8%	0.7%	0.8%	-	-	0.4%	-	66.7%	
from 1 to 2 km	4.8%	-	-	-	-	-	-	4.8%	
from 2 to 3 km	13.6%	0.5%	1.0%	-	-	2.9%	-	18.1%	
from 3 to 4 km	1.2%	0.7%	0.4%	-	-	0.4%	-	2.7%	
from 4 to 5 km	0.3%	0.3%	0.7%	2.1%	-	0.2%	-	3.7%	
from 5 to 10 km	0.1%	-	1.1%	-	-	0.4%	1.1%	2.8%	
More than 10 km	-	-	1.1%	-	-	0.1%	-	1.3%	
	84.8%	2.3%	5.1%	2.1%	-	4.5%	1.1%	100.0%	

Figure 2: 2013 Filton Abbey Wood demand – destination station – estimated egress modes

There is an apparently high demand for parking compared to the size of car park. The published capacity is 30 spaces, but aerial and ‘Streetview’ photographs indicate that around 55 cars can (and do) actually park at the station itself, with scope for more to use residential streets nearby, in particular making use of the currently pedestrian only link between Nutfield Grove and Emma-Chris Way. It is unclear though whether future access mode split would be maintained, as de facto car parking is already at or exceeds apparent capacity.

Current bus-to-rail (and vice versa) movement at Filton Abbey Wood station is limited, with only some 3.5% of users accessing the station by bus (although this is around 20% when the very specific originating movement of the outward ‘local’ catchment is isolated). Overall, around 90 two-way trips per day through the station use a bus for access or egress, which are imbalanced at 60 for outgoing trip and 30 incoming, implying that there is less use of buses for onward trips after arriving by train at Filton Abbey Wood (including people forsaking the bus on onward return journeys, which implies relatively poor connections at present). It is notable that a significantly higher proportion of (a larger number of) travellers at Bristol Parkway uses buses to access the station. Given that many buses to Bristol Parkway pass near Filton Abbey Wood station, it is manifest in existing behaviour that the train service at Bristol Parkway is already more attractive for bus-to-rail users from these areas. This is discussed further below.

### Bus services and demand

Bus services 581 (hourly, Hanham-UWE-Parkway-Chipping Sodbury) and X18 (hourly, UWE-Filton-Aztec West), use a stop on the station turning circle at the end of Emma-Chris Way. In addition, a number of services (11, 12, 15, 19, 70, 73 & 74) use the A4174 Station Road and Filton Avenue, which between them provide around ~12 buses per hour in each direction, including direct links to Bristol city centre, Cribbs Causeway, Stoke Gifford, Bradley Stoke and (notably) Bristol Parkway station. It is these services that could be diverted from Station Road/Filton Avenue to the station turning circle.

The effect of diverting these services from Station Road/Filton Avenue to Emma-Chris Way/Nutfield Grove would be to remove a substantial number of bus services from the stops near the King George VI pub (on Filton Avenue). These stops are well used, as a survey undertaken in September 2013 indicates. Table 2 has summary details from the survey.

TABLE 2  
**Bus stop survey – Filton Avenue o/s King George V**  
*Boarding and alighting– 12hr survey, 07:00-19:00, 26<sup>th</sup> September 2013*

	Southbound buses (towards Bristol)		Northbound buses (towards Bristol Parkway)	
	% of board/alight	% of all movements	% of board/alight	% of all movements
<b>Boarding</b>	157	69%	84	40%
Arrive by foot from south and board	59	38%	35	42%
Arrive by foot from north and board	98	62%	49	58%
<b>Alighting</b>	72	31%	127	60%
Exit bus and turn south	38	53%	30	24%
Exit bus and turn north	34	47%	97	76%
<b>ALL movements</b>	229		211	
to/from south of the stop	97	42%	65	31%
to/from north of the stop	132	58%	146	69%

Some 440 bus passenger movements were recorded at the two bus stops over a 12-hour period (07:00 to 19:00), which were evenly split between the northbound and southbound stops (211 and 229

respectively). Directional use of the stops suggest that Bristol is a key origin/destination for bus users, with more southbound users boarding than alighting (69% versus 31%), and the reverse observed for northbound users (40% boarding versus 60% alighting).

A directional imbalance is also noted when considering where bus stop users come from to get on the bus and go to after alighting. Around 60% of people boarding both southbound and northbound buses approach from north of the stop. This rises to over 75% of people alighting northbound buses, though those alighting from southbound buses are more evenly split, with just over 50% actually leaving towards the south.

In effect, this indicates that removal of these stops in favour of new stops on the Emma-Chris Way turning circle would dis-benefit the majority of the current users of the stops, whose approach to/from the stops is north of the existing stop. That is, moving the stops introduces a longer walk to reach the bus for all these users (278 two-way movements, 63%), though could potentially reduce the walk to the stop for users from south of the stops (162 two-way movements, 37%).

### **Bus-rail interchange**

The contention is that the amount of bus-rail interchange at Filton Abbey Wood could be significantly enhanced if more bus services were routed along Emma-Chris Way, and linked through to Filton Avenue via Nutfield Grove. The wider pros and cons of this specific proposal are set out in the final section of this technical note, but it is debatable in the context of Filton Abbey Wood whether this would be the case. In the first instance, it should be noted that the Emma-Chris Way turning circle represents the closest that vehicles can approach Filton Abbey Wood station, but is still some 200m from the station itself, accessed using a footpath alongside the railway. As such, this does not now, and would still not in future, represent a particularly attractive bus-rail interchange. This is perhaps reflected in bus access and egress figures reported earlier.

It is instrumental to consider, in comparison, the use of buses for access/egress by passengers at other rail stations in the West of England area.<sup>1</sup> The highest bus access percentages are Bath Spa (16%), Bristol Temple Meads (14%) and Bristol Parkway (9%), with the average at around 6%, and most local stations much less than that. However, the best bus access shares are at the major gateway stations in the region, with a full range of train services and facilities, as well as many bus services directly at or adjacent to the station. Indeed, some of the bus services from the vicinity of Filton Abbey Wood station provide good access to Bristol Parkway already (notably the 73 & 74, which runs at 10 minute intervals).

Hypothetically, if bus-rail interchange at Filton Abbey Wood could reach 10% of rail demand, this would result in some 180 extra bus-rail trips. However, while these users would personally benefit, this is less than the number of users of the Filton Avenue King George VI bus stops who could incur dis-benefits through relocation of their services. Even achieving the same levels of bus-rail interchange as Bath Spa or Bristol Temple Meads would only have a net benefit to 70-100 people (at current levels of demand).

### **Overall Appraisal**

An abridged Appraisal Summary Table (AST) has been completed to bring together the costs, benefits, adverse effects and impacts of the suggested bus link. This is based on the full AST required for scheme appraisal in WebTAG, with some of the more detailed criteria combined or deleted. Appraisal is restricted to qualitative assessments of adverse, neutral and beneficial effects, with brief notes, of constructing a link between Nutfield Grove and Emma-Chris Way and re-routeing bus services accordingly. The abridged AST is shown in Table 3.

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<sup>1</sup> West of England Rail Survey Report 2010

TABLE 3  
**Filton Abbey Wood bus link – abridged appraisal summary table**

	Criteria	Effect	Qualitative	Summary of key impacts
<b>Economy</b>	Transport providers	✘	Adverse	Impact on existing bus service and users likely to include loss of revenue
	Reliability impact (business users)	✘	Slight adverse	Potential for bus service unreliability as a result of single lane working on new bus link and introduction of additional intersection with traffic (at junction of Nutfield Grove & Filton Avenue). Buses would no longer be able to use bus lane on Filton Avenue
	Regeneration & wider impacts	-	Neutral	No significant development impacts likely
<b>Environmental</b>	Noise	✘	Adverse	Increase in traffic on Nutfield Grove would be locally significant, not offset by slight decrease on Filton Ave
	Air Quality & greenhouse gases	✘	Adverse	Increase in traffic on Nutfield Grove would be locally significant, not offset by slight decrease on Filton Ave
	Townscape & Heritage	-	Neutral	Some adverse impact on Nutfield Grove, offset by slight improvements on Filton Ave (providing parking on nearby streets does not significantly change)
	Biodiversity & water env't	-	Neutral	Small and very limited potential for adverse impact as a result of constructing new carriageway linking Nutfield Grove and Emma-Chris Way
<b>Social</b>	Commuting and other users	✓/-/✘	Mixed effect	Benefit for travellers who chose to interchange between bus and rail; no change for through bus passengers; dis-benefit for users of bus stops near the King George VI on Filton Avenue
	Reliability impact (non-business)	✘	Slight adverse	See summary of 'Reliability impact (business users)'
	Physical activity	-	Neutral	Some extension of walking time to bus stops could be beneficial, but offset by reduced walking time for interchange passengers
	Journey quality	-	Neutral	No significant differences between routes for bus users, limited benefit for interchange
	Accidents	-	Neutral	Potential to increase accident rate on Nutfield Grove, compensated by reduction on Filton Avenue
	Security	-	Neutral	Slight reductions in walk time to rail interchange could reduce fears of personal security
	Access to services	✘	Slight adverse	Some residents would see more closely located bus stops, but others would need to walk further. On balance, the likely population impact is negative
	Affordability	-	Neutral	No changes likely to cost of travel
	Severance	✘	Adverse	Amenity of Nutfield Grove reduced for local pedestrian movements as a result of bus traffic
	Option values	✘	Slight adverse	Some residents would gain transport options from re-routing buses, but others would see dis-benefits. On balance, the likely impact is negative
<b>Public Accounts</b>	Cost to broad transport budget	✘	Adverse	Capital cost estimated by SGC at £135k (2013 prices, excluding risk and contingency). Recurring revenue cost for highway maintenance, lighting and barrier (to prevent rat running). Potential need to remove GBBN bus lane on Filton Avenue and reimburse DfT
	Tax revenue	-	Neutral	No changes likely

Where:

✓ : Positive or beneficial impact

✘ : Negative or adverse impact

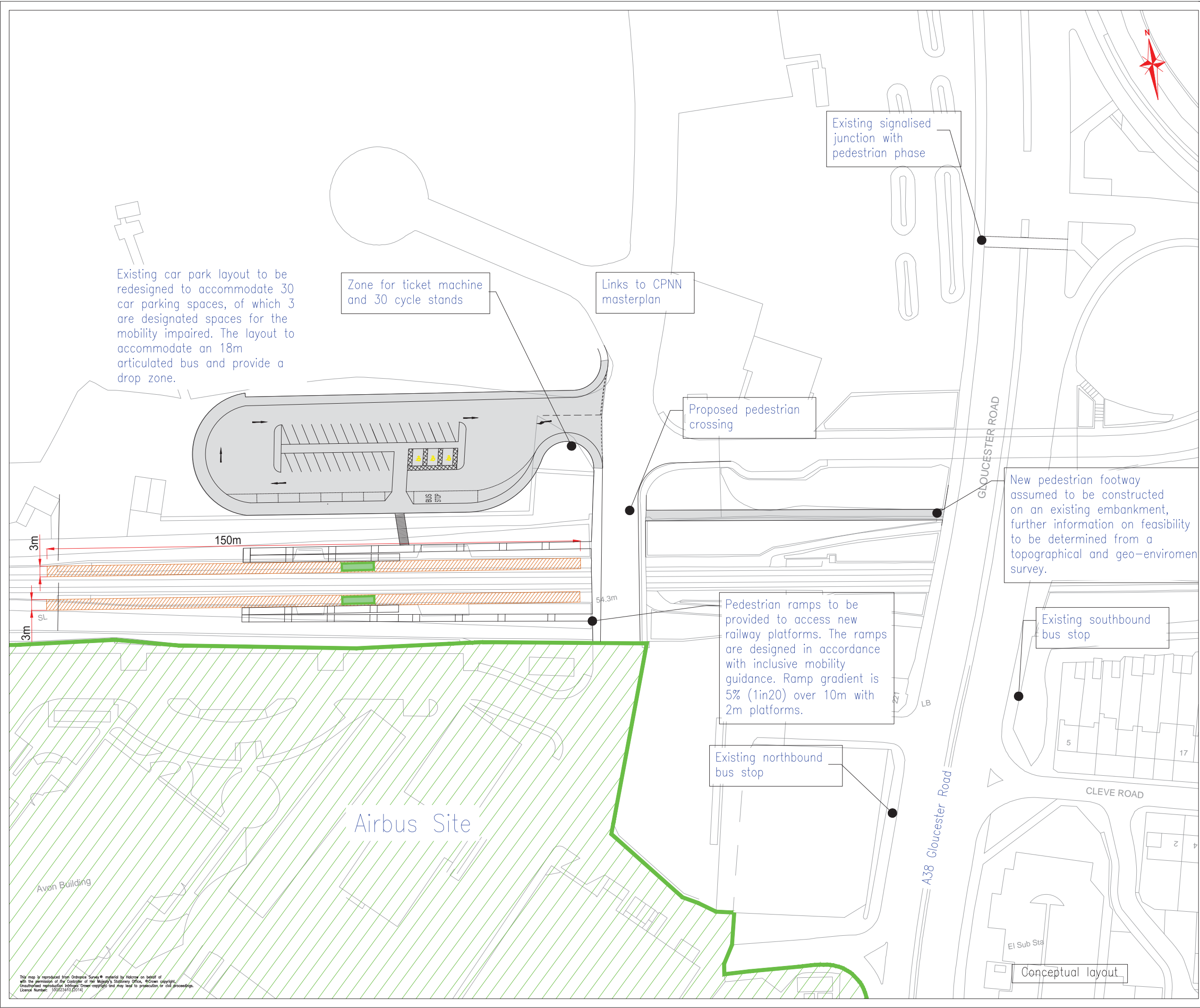
- : No change or neutral impact

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## 8 Appendix C – Outline Station Drawings

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- NOTES:
1. All road markings are indicative.
  2. This is a conceptual drawing and does not show street lighting, drainage etc.
  3. All dimensions are in metres unless stated.
  4. Existing pedestrian crossings to remain.
  5. The proposals are based on Ordnance Survey Mapping, for construction design and information on levels a Topographical Survey will need to be prepared.
  6. Swept path movements have been performed on access into and out of the proposed car park using the TFL Standard Articulated Bus 18.0 Overall length using AutoTrack software.
  7. Road marking are drawn in accordance with 'The Traffic Signs (Amendments) General Directions document.
  8. Pedestrian ramps are drawn in accordance with 'Inclusive Mobility - Guide to Best Practice on access to Pedestrian and Transport Infrastructure document. Pedestrian ramps are designed to provide a 5% gradient.

KEY:

A	PN	ND	-	16.12.13	New car park layout to accommodate articulated bus and pedestrians
Revision	By	Checked	Approved	Date	Description

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Project  
**BRISTOL NORTH FRINGE STATION STUDY**

Drawing  
**Platforms Location Study  
 Filton North**

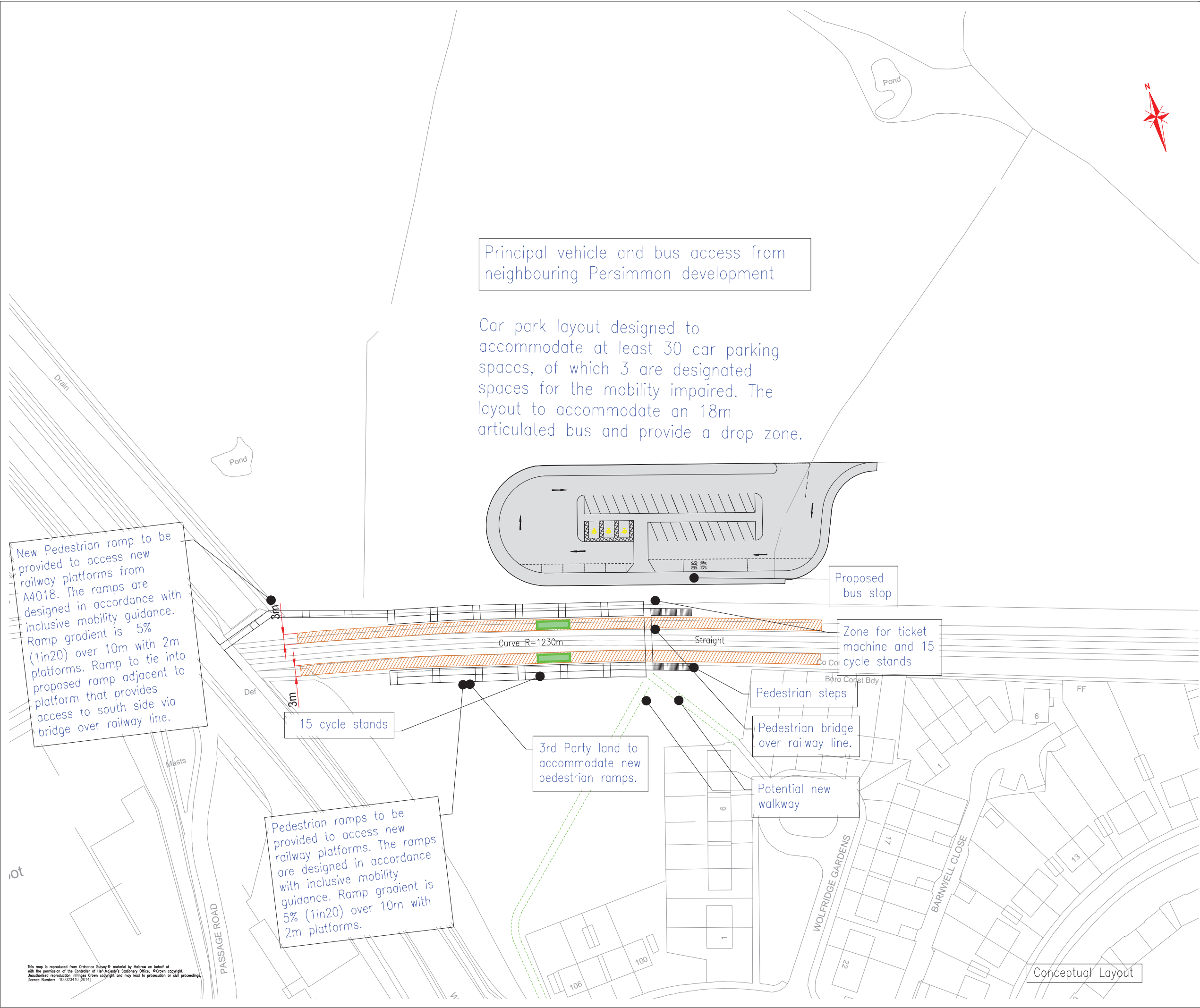
Drawn by	RPJ	Date:	26/11/13
Checked by	-	Date:	-
Authorised by	-	Date:	-

Drawing No.	Revision
470310,HA-00-80	-

Drawing Scale: NTS @A1 Plot Scale: 1:1 (A1)  
 Sheet size A1

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Principal vehicle and bus access from neighbouring Persimmon development

Car park layout designed to accommodate at least 30 car parking spaces, of which 3 are designated spaces for the mobility impaired. The layout to accommodate an 18m articulated bus and provide a drop zone.

New Pedestrian ramp to be provided to access new railway platforms from A4018. The ramps are designed in accordance with inclusive mobility guidance. Ramp gradient is 5% (1in20) over 10m with 2m platforms. Ramp to tie into proposed ramp adjacent to platform that provides access to south side via bridge over railway line.

Pedestrian ramps to be provided to access new railway platforms. The ramps are designed in accordance with inclusive mobility guidance. Ramp gradient is 5% (1in20) over 10m with 2m platforms.

- NOTES:
- All road markings are indicative.
  - This is a conceptual drawing and does not show street lighting, drainage etc.
  - All dimensions are in metres unless stated.
  - Existing pedestrian crossings to remain.
  - The proposals are based on Ordnance Survey Mapping, for construction design and information on levels a Topographical Survey will need to be prepared.
  - Swept path movements have been performed on access into and out of the proposed car park using the TFL Standard Articulated Bus 18.0 Overall length using AutoTrack software.
  - Road marking are drawn in accordance with 'The Traffic Signs (Amendments) General Directions document.
  - Pedestrian ramps are drawn in accordance with 'Inclusive Mobility - Guide to Best Practice on access to Pedestrian and Transport Infrastructure document. Pedestrian ramps are designed to provide a 5% gradient.
  - An environmental study will need to be undertaken to determine the impact on Wolfridge Gardens Housing to the south of the proposals. Mitigation may be required to address any adverse impacts.

KEY:

Revision	By	Checked	Approved	Date	Description
A	PRJ	ND	-	17.12.13	Proposed new car park layout and pedestrian ramps to platforms

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Project  
**BRISTOL NORTH FRINGE STATION STUDY**

Drawing  
**Platforms Location Study Henbury East**

Drawn by: RPJ Date: 26/11/13  
 Checked by: - Date: -  
 Authorised by: - Date: -

Drawing No. 470310.HA-00-80 Revision A

Drawing Scale: NTS @A1 Plot Scale: 1:1 (A1)  
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Sports Ground



Principal vehicle access from proposed neighbouring district centre

Car park layout designed to accommodate at least 30 car parking spaces, of which 3 are designated spaces for the mobility impaired. The layout to accommodate an 18m articulated bus and provide a drop zone.

Pedestrian ramps to be provided to access new railway platforms. The ramps are designed in accordance with inclusive mobility guidance. Ramp gradient is 5% (1in20) over 10m with 2m platforms.

Zone for ticket machine and 15 cycle stands

Existing Telecoms box and mast

Existing footway

Demolition of existing buildings which includes old station building to accommodate pedestrian ramps.

New Pedestrian steps and ramps

3rd party land required to accommodate the pedestrian ramps, cycle rack and the access route.

Pedestrian Entry/exit route

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- NOTES:
1. All road markings are indicative.
  2. This is a conceptual drawing and does not show street lighting, drainage etc.
  3. All dimensions are in metres unless stated.
  4. Existing pedestrian crossings to remain.
  5. The proposals are based on Ordnance Survey Mapping, for construction design and information on levels a Topographical Survey will need to be prepared.
  6. Swept path movements have been performed on access into and out of the proposed car park using the TFL Standard Articulated Bus 18.0 Overall length using AutoTrack software.
  7. Road marking are drawn in accordance with 'The Traffic Signs (Amendments) General Directions document.
  8. Pedestrian ramps are drawn in accordance with 'Inclusive Mobility - Guide to Best Practice on access to Pedestrian and Transport Infrastructure document'. Pedestrian ramps are designed to provide a 5% gradient.
  9. This option will require 3rd Party Land-take which may require a compulsory purchase order to be implemented.
  10. An environmental impact study will need to be undertaken to determine the impacts of the new platforms on Gifford Road housing area to the south. Mitigation may be required to address any adverse impact that are identified.

KEY:

Revision	By	Checked	Approved	Date	Description
A	PN	ND	-	17.12.13	Proposed new car park and pedestrian ramps to new platforms

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Project  
**BRISTOL NORTH FRINGE STATION STUDY**

Drawing  
**Platforms Location Study Former Henbury Station**

Drawn by	RPJ	Date:	26/11/13
Checked by	-	Date:	-
Authorised by	-	Date:	-

Drawing No.	Revision
470310.HA-00-80	A

Drawing Scale: NTS @A1 Plot Scale: 1:1 (A1)  
 Sheet size A1

conceptual layout

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