West of England Rapid Transit – North Fringe to Hengrove Package

Major Scheme Business Case – Programme Entry

March 2010





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Executive Summary

The West of England sub-region is a prosperous area with an excellent quality of life and a growing national and international profile. The travel demands that accompany this prosperity and growth are increasing pressure on infrastructure, particularly the provision of transport.

The West of England Authorities have a proven track record in working together to deliver high quality public transport measures to provide alternatives to the car that are a realistic choice for the majority of trips. This will meet the area's growing needs, whilst safeguarding its environmental and economic future.

The West of England sub-region is made up of Bath and North East Somerset, the City of Bristol, North Somerset and South Gloucestershire, as shown in Figure 1 below.

The four councils have a proven track record in working together as the West of England Partnership to tackle transport and other major strategic issues.

The North Fringe to Hengrove Package (NFH Package) is a combination of inter-related major transport projects which will deliver improved transport choices for people living and working in South Bristol and the North and East Fringes of the city, thereby promoting sustainable travel choices, supporting economic prosperity and accessibility, and a better quality of life. This will build on other transport initiatives in the region.

By providing a fast, reliable and direct public transport service, the NFH Package will improve access to employment opportunities in the Bristol North and East Fringes and for residents of South Bristol, which suffers from a lack of readily accessible employment; it will also improve links to the City Centre and Bristol International Airport (via the South Bristol Link major scheme).





Background

Around a million people live in the West of England sub-region and it provides over 520,000 jobs. Most of these people live in the major urban areas of Bristol, Bath and Weston-super-Mare and in the area's seven towns, with there being over 680,000 people of working age. In the North Fringe, East Fringe and South Bristol, there are over 170,000 people of working age which is around 25% of the total jobs in the sub-region. Of those of working age in the three areas, approximately 22.2% live in the North Fringe, 44.5% live in the East Fringe and 33.3% live in south Bristol.

The South West contributes nearly 8% towards the National Gross Value Added of the UK, with the West of England contributing one quarter of this. Government population projections show the population of the subregion rising sharply over the next 20 years. Currently emerging Core Strategies are planning to deliver some 86,500 homes and 95,500 jobs up to 2026 in the context of the draft South West Regional Spatial Strategy (RSS) which is yet to be finalised. A significant proportion of these additional jobs are likely to arise in Bristol (and Bath) city centres, as well as the Bristol North and East Fringe areas. These jobs are likely to arise due to the expansion of office work and technology based businesses as well as further growth of retailing and other services. Figure 2 below shows the direct relationship between our transport infrastructure proposals and some of the development sites proposed by the Core Strategies.





The West of England sub-region has a unique heritage and character, including Bristol's industrial and maritime past, Bath's status as a world heritage site and the rich traditions of North Somerset and South Gloucestershire. The area has a wealth of natural environmental assets spread across the urban and rural areas including parkland, landscapes and natural resources. However, it also contains areas of significant deprivation and disadvantage which suffer from poor transport links.

Congestion is already a serious problem and the Bristol area experiences the UK's lowest average car speeds of just 15 miles per hour (2006). Department for Transport (DfT) data shows increases in traffic levels from 1993 to 2008 of 28% in the sub-region: 12% in Bristol City Centre and 37% in South Gloucestershire. This has resulted in reduced air quality, transport delays, unreliable journey times and unsustainable pressure on existing infrastructure and services. The continued growth of congestion, with its undesirable effects, threatens the quality of the environment and the quality of life for people who live and work within it.

To continue our success and achieve our aspirations for economic, environmental and social development, we require an ambitious but realistic vision for our future transport.

A comprehensive transport study to assess the current and future strategic transport needs of the West of England region up to 2031 was completed in 2006. Known as the Greater Bristol Strategic Transport Study (GBSTS), it was commissioned by the Government Office for the South West in

Our Future Transport Vision aims to:

- Improve our quality of life;
- Tackle congestion;
- Improve road safety;
- Improve air quality;
- Improve access to job opportunities;
- Help us get to work and school efficiently; and
- Strengthen the local economy

partnership with the Highways Agency, South West of England Regional Development Agency and the West of England authorities.

GBSTS recommended a package of transport improvements to support the sustainable growth of the subregion, including the measures set out in the NFH Package.

Development of the North Fringe to Hengrove Package

The Bristol North/East Fringe has seen substantial development in the last two decades, with residential (Bradley Stoke, Emersons Green), employment (e.g. Aztec West Business Park, Harry Stoke), education (University of the West of England) and retail (Cribbs Causeway Regional Shopping Centre); traffic congestion is now apparent in extended peak periods. By comparison South Bristol is characterised by lower car ownership and lost employment opportunities in the 1990s, which is now being addressed by several regeneration projects; however, there remains a jobs/homes imbalance, meaning that residents need improved access to jobs in the city centre and North/East Fringe.

The distance between the North/East Fringe and South Bristol is more than 10 miles. North-south crosscity transport links by all modes are relatively poor: there are some direct bus services, but they have long journey times and get delayed by congestion; whilst rail is more rapid it serves a more limited catchment area, and car access is restricted by congestion, especially in the city centre, the A4174 Avon Ring Road and at motorway junctions. The severance of the north and south by the River Avon and Avon New Cut exacerbates this and places pressure on the three main existing crossings.

The NFH Package would address the north-south cross-city transport problems, by providing new rapid transit services linking South Bristol, the City Centre and the North/East Fringe. It would form part of a network of such services in the city, the first element of the network will be the route between the City Centre and Ashton Vale, in the south-west of the city; this scheme received Programme Entry from DfT in March 2010. The NFH Package would be complementary to the wider rapid transit network including the 'Ashton Vale to Bristol City Centre / Temple Meads' rapid transit route and the South Bristol Link, which would provide an orbital rapid transit link between Ashton Vale and Hengrove Park, linking with the NFH Package.

Supported by the recommendations in GBSTS, the NFH Package is now being put forward for Programme Entry with the DfT through submission of this Major Scheme Business Case (MSBC).





The North Fringe to Hengrove Package

The NFH Package comprises a series of complementary projects that facilitate the development of three new rapid transit routes, which link the North Fringe, East Fringe and South Bristol areas via Bristol City Centre. The rapid transit network will provide a fast, frequent and reliable public transport service. Services will run on a combination of segregated busways and bus lanes, separate from car traffic, and will be given priority over other road users at traffic signals.

The rapid transit network will provide a high quality passenger experience – ticket machines at stops, userfriendly electronic information displays, high quality stop design including CCTV and lighting, safe and secure access to stops. The rapid transit network will also provide improved pedestrian and cycling measures including new footway / cycleways and appropriate modern and safe crossing points.

Services will be run using accessible, comfortable, and low-emission bespoke rapid transit vehicles that combine the quality and feel of a high quality tram-style system. The Authorities are committed to exploring the range of alternative fuel sources with potential operators. These would offer considerable environmental improvements with lower noise levels, fewer greenhouse gas emissions and less harmful local pollutants. Access to the rapid transit infrastructure would be open to other operators of bus services provided that they meet strict quality thresholds which will govern vehicle and service standards.

In summary, the rapid transit network will include the following:

- A North Fringe Rapid Transit route which connects the main residential and employment areas in the North Fringe with Bristol City Centre with onward connections into South Bristol and the East Fringe. This rapid transit route will serve the Cribbs Causeway Regional Shopping Centre; Aztec West Business Park; Bradley Stoke; new and planned residential developments (Harry Stoke; Charlton Hayes (Filton Northfield)); the University of the West of England; Bristol Parkway Railway Station and the Parkway North and M32 park and ride sites. The route will use the Stoke Gifford Transport Link, a combined highway/rapid transit link, funded through the NFH Package that will provide the direct link between Bradley Stoke and Harry Stoke;
- An East Fringe Rapid Transit route which connects the main employment areas in the East Fringe with Bristol City Centre with onward connections into South Bristol and the North Fringe. This rapid transit route will serve the Emersons Green District Centre; the Emersons Green East development; the Science Park (SPark); the University of the West of England; and the Emersons Green East and M32 park and ride sites;
- A South Bristol Rapid Transit route which connects the main residential and employment areas in South Bristol with Bristol City Centre with onward connections into the North and East Fringe areas. This rapid transit route will serve Bedminster, Parson Street Railway Station, Imperial Park, Knowle West Regeneration Area and new and planned mixed use developments at Hengrove Park;
- A new Park and Ride Site on the M32 to enable and encourage interchange to public transport for regional traffic approaching from the strategic road network and thus reduce congestion in the M32 corridor and Bristol City Centre; and
- A Bristol City Centre route serving Cabot Circus, Broadmead and The Centre. The City Centre is a
 pivotal point of the proposed rapid transit network and will include substantial public transport and urban
 realm improvements to provide high levels of priority for public transport services. The NFH Package
 includes a new bus interchange in The Centre combined with significant streetscape improvements that
 will provide increased shared space for pedestrians and cyclists.

The NFH Package also delivers a series of wider improvements, with parallel walking and cycling routes provided wherever possible and augmented with new links to existing cycling and pedestrian routes as well as the existing and proposed improvements being progressed through the Cycling City and Connect2 initiatives.



Rapid Transit services will run on a combination of segregated busways and bus lanes, separate from car traffic, and will be given priority over other road users at traffic signals.

Core Rapid Transit services are proposed as follows:

- North Fringe to South Bristol (X90);
- Bristol Parkway Station to Bristol City Centre (X91);
- East Fringe to Bristol City Centre via the University of the West of England (UWE) (X92); and
- East Fringe to Hengrove Park (X93).

The Rapid Transit services will provide a high quality passenger experience – ticket machines at stops, userfriendly electronic information displays, high quality stop design, safe and secure access to stops. An overview plan of the NFH Package is shown in Figure 3 overleaf.

Scheme Appraisal

The benefits of the NFH Package include (see section 3 of this MSBC for further details):

- Provision of high-quality, more sustainable modes of travel (rapid transit, park and ride, cycling and walking);
- Shift of journeys to more environmentally sustainable transport modes, thereby reducing carbon emissions and local pollutants;
- Reduction in forecast accidents;
- Reduced traffic congestion;
- Improved physical activity and quality of life through encouraging walking and cycling;
- Improved access to/from areas of multiple deprivation in South Bristol;
- Facilitating the delivery of jobs and homes by providing or improving access to potential development and regeneration sites identified in Core Strategies; and
- Improved connectivity between existing centres of activity as well as links to new and proposed developments.

The NFH Package supports and is aligned to local, regional and national policies; in particular, to the *"Delivering a Sustainable Transport Strategy (DaSTS)"* goals to:

- Reduce carbon emissions;
- Support economic growth;
- Promote equality of opportunity;
- Better safety, health and security; and
- To improve quality of life.

The economic appraisal of the scheme results in a benefit to cost ratio of 2.85 representing high value for money.





Figure 3 – North Fringe to Hengrove Package: Overview Plan



The key milestones in the project programme are:

- DfT Programme Entry Bid: March 2010;
- DfT Programme Entry Approval: September 2010;
- Submission of draft applications for powers: May 2011;
- Approval of statutory powers: May 2012;
- Conditional Approval Bid to DfT: August 2012;
- Issue of Invitations to Tender: August 2012;
- Preferred Bidder and other arrangements: May 2013;
- DfT Full Approval: September 2013;
- Signing of Implementation Contract: September 2013; and
- Completion of Works / Scheme Opening: 2015 to 2017.

Through the Joint Transport Executive Committee, the West of England sub-region has a robust governance structure to progress its major schemes programme. Delivery of the NFH Package will build on the sub-region's existing proven track record and skills base for delivering transport infrastructure. It is the West of England's intention to establish a Joint Delivery Vehicle (JDV), to ensure the delivery of major infrastructure projects within the agreed timescales, specification and budget, by effective commissioning and high quality project management.

The Authorities are also reviewing a range of options for procuring the NFH Package infrastructure and services. Parts of the scheme such as information systems, CCTV, traffic signals and bus lanes are already delivered regularly by the Authorities and it is likely that existing, or extensions to existing, arrangements will be taken advantage of. The larger construction elements of the scheme are likely to be procured through a design and build contract. These options will be further reviewed at the next stage of scheme development to ensure value for money; that risk to the Authorities is managed and reduced; and a robust and deliverable programme.

The capital cost estimate for the NFH Package is £195.3million (outturn prices) which is within the agreed funding threshold for this scheme. £168.08 million is allocated in the draft South West Regional Funding Allocation (RFA2) (excluding eligible preparatory costs incurred prior to 2013/14). The South West Region fully supports the submission of a major scheme business case to DfT for this funding. It is planned that 12% of the required funding will be provided from local sources. The Authorities will seek this funding from local development contributions.

A forward programme of scheme development and associated costs has been identified and included within the MSBC submission. 50% of the eligible scheme development costs after Programme Entry will be funded by DfT and 50% by the Authorities.

Summary

The NFH Package has a very strong strategic background with its roots in the Greater Bristol Strategic Transport Study which identified these measures as part of a programme of necessary interventions to ensure sustainable growth and development of the West of England.

The West of England Authorities have undertaken considerable feasibility and assessment work to identify a deliverable and value for money package.

The NFH Package is a regional priority for the South West and is fully supported by South West Councils, the Regional Development Agency and other key stakeholders. It also has broad support from elected representatives and the general public.

Start of construction is estimated for 2013, after obtaining the required powers and planning permissions.



Introduction

This Application

This document is the Major Scheme Business Case (MSBC) submission to the Department for Transport (DfT) for the North Fringe to Hengrove Major Scheme Package ("the NFH Package"), seeking Programme Entry status. This document summarises the development work for the above Major Scheme since the identification of its constituent schemes in the Greater Bristol Strategic Transport Study in 2006 and prioritisation in the South West Regional Funding Allocation in 2009 (RFA2).

The NFH Package is part of a wider integrated programme of transport improvements planned for the West of England sub-region, and includes the third phase¹ of a network of rapid transit routes that are needed to ensure the ongoing economic development and sustainability of the West of England. As the economic hub of the South West, the performance of the West of England sub-region is vital to the wider region.

The NFH Package is a combination of four major projects which have been drawn together to make a positive difference to travelling in the North and East Fringes of Bristol and to improve links with the south of Bristol via the city centre.

The Promoters

The West of England sub-region is made up of Bath and North East Somerset, the City of Bristol, North Somerset and South Gloucestershire. An all-purpose unitary council governs each of these four areas. The four councils are working together as the West of England Partnership to tackle transport and other major strategic issues. Figure 4 overleaf shows the geographical area of the West of England sub-region.

The NFH Package is located within the boundaries of Bristol City Council and South Gloucestershire Council. Supported by the West of England Partnership, the two Authorities are joint promoters of this scheme. Contact details for the Senior Responsible Owners are outlined in the panel below.

Barbara Davies, Head of Joint Transport Team; Senior Responsible Owner – Overall Programme	West of England Partnership Office, 1 st Floor, Wilder House, Wilder Street, Bristol, BS2 8PH
Chris Sane, Strategic Head of Transport & Deputy Director Planning, Transportation & Strategic Environment; Senior Responsible Owner – South Gloucestershire Council Projects	South Gloucestershire Council, The Council Offices, Castle Street, Thornbury, Bristol, BS35 1HF Chris.sane@southglos.gov.uk 201454 863402
Alun Owen, Service Director Major Projects; Senior Responsible Owner – Bristol City Council Projects	Bristol City Council, B Bond Warehouse, Smeaton Road, Bristol, BS1 6XN ⊠ <u>alun.owen@bristol.gov.uk</u> ☎ 0117 903 7481

¹ The first rapid transit line is being delivered as part of the Bath Transportation Package; the second is being delivered as the Ashton Vale to Temple Meads and Bristol City Centre Rapid Transit Scheme.





Support for the Scheme

The NFH Package has a high level of support from a wide range of stakeholders and members of the public. A public consultation exercise was carried out between November 2009 and January 2010 and demonstrated that over 70% of respondents were dissatisfied with the current public transport provision within their area, suggesting that a step change in public transport provision is required. The full details of the public and stakeholder consultation, and analyses, are set out in Section 4 of this document.

The NFH Package is a high priority for the South West Region and the scheme is strongly supported by the South West Councils and the South West Regional Development Agency. This support is demonstrated through the Regional Funding Allocation as well as joint working with the promoters of the scheme to ensure an integrated approach to its delivery in line with associated development opportunities in the region.

In addition, and in line with the West of England Multi-Area Agreement, the NFH Package has been identified as a 'pilot' scheme with DfT and the West of England Partnership for developing and testing joint measures to increase the pace of delivery, release capacity and reduce the costs of developing and securing approval for Major Transport Schemes. This has been / will be achieved from the outset through: an early inception meeting, ensuring a better and shared understanding of major scheme objectives, elements and timescales; streamlining the detailed questioning process; agreeing and committing to a joint timetable; aligning modelling and appraisal requirements proportionate to risk and complexity; and commissioning and supervision of consultants.



Letters of support for the NFH Package are included within this MSBC as follows:

- South West Councils and Regional Development Agency Appendix 2.D;
- Network Rail Appendix 4.E;
- Highways Agency Appendix 4.E;
- Wessex Connect Appendix 4.E;
- First Group Appendix 4.E;
- Aztec West Business Park Appendix 4.E;
- Institute of Directors Appendix 4.E; and
- GWE Business West Appendix 4.E.

Structure of our Major Scheme Business Case

This document has been structured in accordance with DfT's guidance on the preparation of Major Scheme Business Cases. It is in line with the guidance document entitled "*Guidance for Local Authorities seeking Government funding for major transport schemes*" and includes our completed Application Form and MSBC checklist. The analysis presented within this document has been undertaken in accordance with current and In Draft (where appropriate) guidance on WebTAG (www.webtag.org.uk), in agreement with DfT (see Section 3 for further detail on the scheme appraisal process).

This document is structured as follows:

- Executive Summary;
- Introduction (this chapter);
- Section 1: Scheme Description;
- Section 2: The Strategic Case;
- Section 3: The Value for Money Case;
- Section 4: The Delivery Case;
- Section 5: The Commercial Case; and
- Section 6: The Financial Case.

Further, more detail supporting information is provided in a series of appendices as follows:

- Appendix 1 (Scheme Description) Scheme Plans:
 - Appendix 1.A North Fringe Rapid Transit Route and Stoke Gifford Transport Link;
 - Appendix 1.B East Fringe Rapid Transit Route;
 - Appendix 1.C South Bristol Rapid Transit Route;
 - Appendix 1.D M32 Corridor and Park and Ride;
 - Appendix 1.E Bristol City Centre Improvements Works;
 - Appendix 1.F Next Best Alternative Scheme;
 - Appendix 1.G Lower Cost Alternative Scheme;
 - Appendix 1.H Letter to DfT regarding transfer of GBBN proposals.

travel to Regland Partnership

- Appendix 2 (Strategic Case):
 - Appendix 2.Ai Joint Local Transport Plan Progress Review 2008;
 - Appendix 2.Aii Joint Local Transport Plan Progress Report 2009;
 - Appendix 2.B Options Assessment Report;
 - Appendix 2.Ci Technology Review 2009 (Executive Summary);
 - Appendix 2.Cii Technology Review 2009 (Full Report); and
 - Appendix 2.D Letter of Support from Regional Bodies.
- Appendix 3 (Value for Money Case):
 - Appendix 3.A Appraisal Specification Report;
 - Appendix 3.B Traffic Survey Report;
 - Appendix 3.C Public Transport Model Validation Report;
 - Appendix 3.Di Highway Model Validation Report;
 - Appendix 3.Dii Verification of Highway Model;
 - Appendix 3.Diii Verification of M32 Park & Ride Demand Forecasts;
 - Appendix 3.E Demand Model Validation Report;
 - Appendix 3.F Forecasting Report;
 - Appendix 3.G Economic and Cost-Benefit Appraisal Report;
 - Appendix 3.Hi Environmental Report;
 - Appendix 3.Hii Responses from Environmental Statutory Bodies;
 - Appendix 3.I NATA Worksheets;
 - Appendix 3.J Major Scheme Business Case Guidance Appendix F spreadsheets (electronic copies only).
- Appendix 4 (Delivery Case):
 - Appendix 4.A Detailed Project Programme;
 - Appendix 4.B Project Risk Register;
 - Appendix 4.C Quantified Risk Analysis Report;
 - Appendix 4.Di Public Consultation Feedback Report;
 - Appendix 4.Dii Public Consultation Feedback Addendum Report; and
 - Appendix 4.E Letters of Support from Key Stakeholders.
- Appendix 6 (Financial Case).
 - Appendix 6.Ai Detailed Cost Breakdown & Underlying Assumptions;
 - Appendix 6.Aii Detailed assumptions for rapid transit operational costs; and
 - Appendix 6.B Independent Surveyor's Report (Cost Review).

Note there are no appendices associated with Section 5 (Commercial Case).

Local Authority Major Schemes: Initial Application for Funding Support

Lead Scheme Promoter:	West of England Partnersh	ip	Region:	South West
Other Scheme Promoters:	Bristol City Council, South	Gloucestershire	Council	
	1			
Scheme Name:	North Fringe to Hengrove F	Package (The 'N	FH Package')	
				1
Has an application for DfT fu any variant of it?	Inding been previously sub	mitted for this	scheme or	No
Type of Funding (e.g. LTP Ma	ajor, TIF, CIF etc.)	LTP Major Sch	eme	
If 'Other' please specify:				
	1			
Scheme Type:	Public Transport			
Subtype:	Rapid Transit; Park and Rid	de		
Scheme Description	The NFH Package brings to	ogether four tran	sport projects w	hich together will make a
(no more than 100 words):	positive difference to travel improve links to South Brist	ling in the North tol via the City C	and East Fringe entre.	e areas of Bristol and
	The scheme includes three rapid transit routes linking the North and East Fringe areas			lorth and East Fringe areas
	to South Bristol via the City on the M32 Corridor: public	Centre; three no realm and public	ew park and ride	e sites, including a new site
	Centre; as well as highway improvements along the rapid t transport link at Stoke Gifford.			ransit routes including a new
Has an Economic Impact Re	port been included (Y/N)?	No		
Approval Sought:		Programme Er	ntry	
Name and contact details of	LA officer responsible	Barbara Davie	S,	
for submitting bid:	Head of Joint Transport Team,			
	West of England Partnership Office, 1 st Floor Wilder House Wilder Street Bristol BS2 8PH			
	⊠ barbara.davies@westofenoland.org			
	2 0117 922 4	923		
Name and contact Chris S	ane,		Alun Owen,	

Name and contact	Chris Sane,	Alun Owen,
Senior Responsible	Senior Responsible Owner – South Gloucestershire Council Projects,	Senior Responsible Owner – Bristol City Council Projects,
Officer:	South Gloucestershire Council, The Council Offices, Castle Street, Thornbury, Bristol, BS35 1HF	Bristol City Council, B Bond Warehouse, Smeaton Road, Bristol, BS1 6XN
	⊠ chris.sane@southglos.gov.uk	⊠ alun.owen@bristol.gov.uk
	2 01454 863402	2 0117 903 7481



	Scheme Costs (excluding preparatory costs)										
	Preparatory Costs (£m)	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Total (£m)
	· · ·	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(£m)	(2)
DfT Contribution requested (see note below)	3.719	0	0	0	0	18.991	58.781	61.211	28.196	0	170.898
LA Contribution / Developer Contribution / Others	9.534*	0	0	0	8.905	3.246	0.693	0	0.914	0	23.292
Total funding requirement	13.253*	0	0	0	8.905	22.237	59.474	61.211	29.110	0	194.190*
The DfT contribution should exclude VAT and optimism bias but should include costs estimated from a QRA											
All figures should include inflation. Please state what inflation assumption(s) have been used: Inflation assumptions used in calculating the outturn costs and undertaking the economic appraisal have been adjusted to take account of the current economic climate and are the DfT's WebTAG Unit 3.5.9 "Treatment and Estimation of Scheme Costs" (January 2) Draft version).					mic in line with 2010 In						

General industry wide inflation is set at 2.7%; construction inflation to 2014 is set at 2.7% and thereafter at 6%.

The QRA assessment takes account of the possibility of higher or lower than forecast inflation rates ranging from 1.79% to 8.79%.

* Excludes 2009/10 pre-Programme Entry preparatory costs (£1.091m) that have already been incurred by the local authorities. Total NFH Package costs including 2009/10 preparatory costs is £195.281m

Please provide estimated timescale in months (giving a range if necessary). (If prices are expected to be known by the time powers are in place e.g. in case of Early Contractor involvement, please leave the middle question blank). Please ensure these timescales are consistent with the spending profile supplied above.				
Between Programme Entry being granted and all necessary powers being in place (as necessary for Conditional Approval):20 months				
Between Conditional Approval being granted and Contractor prices being known (as necessary for Full Approval):	10 months			
Between Full Approval and completion of scheme:	43 months			

Major Scheme Guidance Checklist

Outlined below is our completed MSBC Checklist.

Scheme Description

Item	Section / Page
A detailed physical description of the scheme, and the other appraised	Section 1 (page 1.21);
option(s), including maps, scale diagrams and a written commentary.	Appendix 1.A to 1.H

Strategic Case

Item	Section / Page
The objectives of the scheme.	Section 2.3 (page 2.65)
A description of the process by which the scheme came to be identified as the preferred option for meeting those objectives.	Section 2.4 (page 2.68); Appendix 2.B & 2.C
How the objectives of the scheme align with wider local objectives, particularly those of the relevant Local Transport Plan.	Sections 2.5.3 & 2.5.4 (page 2.81)
How the objectives of the scheme align with sub-regional and regional objectives, (except for schemes of predominantly local significance).	Sections 2.5.1 & 2.5.2 (page 2.76)
Written endorsement from regional bodies.	Section 2.6 (page 2.94); Appendix 2.D

Value for Money Case

Cost Benefit Analysis		
Item	Section / Page	
A clear explanation of the underlying assumptions used in the Cost Benefit Analysis.	Section 3.5 (page 3.112); Appendix 3.G (section 4)	
Information on local factors used. For example the derivation of growth factors, M factors in COBA and annualisation factors in TUBA (to include full details of any calculations).	Section 3.5 (page 3.112); Appendix 3.G (section 4).	
A diagram of the network (if COBA used).	Not Applicable	
Information on the number of junctions modelled (if COBA used), for both the do-minimum and the do-something.	Not Applicable	
Details of assumptions about operating costs and commercial viability (e.g. public transport, park and ride, etc.)	Appendix 3.G (section 4).	
Full appraisal inputs/outputs (when used, COBA and/or TUBA input and output files should be supplied).	Provided on accompanying CD	
Details of the maintenance delay costs/savings.	Not Applicable	
Details of the delays during construction.	Not Applicable	



NATA Assessment		
Item	Section / Page	
Evidence of consultation with key stakeholders (including consulted and responses).	any NGOs Section 4.6.4 (page 4.190); Appendix 4.E & 3.Hii	
Assessment of Environmental Impacts, to include an env constraints map.	ironmental Section 3.6 (page 3.117); Appendix 3.H;	
· · · · · · · · · · · · · · · · · · ·	Section 3.7 (various)	
Assessment of Safety impacts and the assumed acciden (COBA output should be provided if an accident only CO	t rates presented BA has been run). Section 3.7.5 (page 3.134)	
	Section 3.5 (page 3.112);	
Assessment of Economic Impacts.	Section 3.7.2 (page 3.118).	
	Section 3.7.3.1 (page 3.124)	
Assessment of Accessibility impacts.	Section 3.7.3.3 (page 3.125)	
Assessment of Integration Impacts.	Section 3.7.4.6 (page 3.132)	
A comprehensive Appraisal Summary Table.	Section 3.7.6 (page 3.137)	
The following supporting analyses:		
Distribution and Equity.	Section 3.8.1 (page 3.140)	
Affordability and Financial Sustainability.	Section 3.8.2 (page 3.140)	
Practicality and Public Acceptability (Evidence of consultation supplied).	of public Section 3.8.3 (page 3.145)	
Contribution to 10 year plan targets.	Section 3.8.4 (page 3.146)	
NATA worksheets. Appendix 3.1		

Modelling		
ltem		Section / Page
An Exist	ing Data and Traffic Surveys Report to include:	Appendix 3.B
	Details of the sources, locations (illustrated on a map), methods of collection, dates, days of week, durations, sample factors, estimation of accuracy, etc.	Appendix 3.B
	Details of any specialist surveys (e.g. stated preference).	Appendix 3.B
	Traffic and passenger flows: including daily, hourly and seasonal profiles, including details by vehicle class where appropriate.	Appendix 3.B
	Journey times by mode, including variability if appropriate.	Appendix 3.B
	Details of the pattern and scale of traffic delays and queues.	Appendix 3.B
	Desire line diagrams for important parts of the network.	Appendix 3.B
	Diagrams of existing traffic flows, both in the immediate corridor and other relevant corridors.	Appendix 3.B
An Assig	gnment Model Validation Report to include:	Appendices 3.C, 3.Di, 3.Dii and 3.Diii



Modelling		
ltem		Section / Page
	Description of the road traffic and public transport passenger assignment model development, including model network and zone plans, details of treatment of congestion on the road system and crowding on the public transport system.	Appendix 3.C and 3.Di
	Description of the data used in model building and validation with a clear distinction made for any independent validation data.	Appendix 3.Dii and 3.Diii
	Evidence of the validity of the networks employed, including range checks, link length checks, and route choice evidence.	Appendix 3.C and 3.Di
	Details of the segmentation used, including the rationale for that chosen.	Appendix 3.E
	Validation of the trip matrices, including estimation of measurement and sample errors.	Appendix 3.C and 3.Di
	Details of any 'matrix estimation' techniques used and evidence of the effect of the estimation process on the scale and pattern of the base travel matrices.	Appendix 3.C and 3.Di
	Validation of the trip assignment, including comparisons of flows (on links and across screenlines / cordons) and, for road traffic models, turning movements at key junctions.	Appendix 3.C and 3.Di
	Journey time validation, including, for road traffic models, checks on queue pattern and magnitudes of delays / queues.	Appendix 3.Di
	Detail of the assignment convergence.	Appendix 3.Di
	Present year validation if the model is more than 5 years old.	Not Applicable
	A diagram of modelled traffic flows, both in the immediate corridor and other relevant corridors.	Appendix 3.Di
A Dema	nd Model Report to include:	Appendix 3.E
	Where no Variable Demand Model has been developed evidence should be provided to support this decision (e.g. follow guidance in WebTAG Unit 3.10.1 Variable Demand Modelling – Preliminary Assessment Procedures).	Not Applicable
	Description of the demand model.	Appendix 3.E (section 2)
	Description of the data used in the model building and validation.	Appendix 3.E (section 4)
	Details of the segmentation used, including the rationale for that chosen. This should include justification for any segments remaining fixed.	Appendix 3.E (section 2)
	Evidence of model calibration and validation and details of any sensitivity tests.	Appendix 3.E (section 4)
	Details of any imported model components and rationale for their use.	Appendix 3.E (section 3)
	Validation of the supply model sensitivity in cases where the detailed assignment modes do not iterate directly with the demand model.	Not Applicable



Modelling		
ltem		Section / Page
	Details of the realism testing, including outturn elasticities of demand with respect to fuel cost and public transport fares.	Appendix 3.E (section 4)
	Details of the demand / supply convergence.	Appendix 3.E (section 4)
A Forec	asting Report to include:	Appendix 3.F
	Description of the methods used in forecasting future traffic demand.	Appendix 3.F (section 2)
	Description of the future year demand assumptions (e.g. land use and economic growth – for the do-minimum, core and variant scenarios).	Appendix 3.F (section 3)
	Description of the future year transport supply assumptions (i.e. networks examined for the do-minimum, core scenario and variant scenarios).	Appendix 3.F (section 4)
	Description of the travel cost assumptions (e.g. fuel costs, PT fares, parking).	Appendix 3.F (section 5)
	Comparison of the local forecast results to national forecasts, at an overall and sectoral level.	Appendix 3.F (section 6)
	Presentation of the forecast travel demand and conditions for the core scenario and variant scenarios including a diagram of forecast flows for the do-minimum and the scheme options for affected corridors.	Appendix 3.F (section 7 & 8)
	If the model includes very slow speeds or high junction delays evidence of their plausibility.	Not Applicable
	An explanation of any forecasts of flows above capacity, especially for the do-minimum, and an explanation of how these are accounted for in the modelling / appraisal.	Not Applicable
	Presentation of the sensitivity tests carried out (to include optimistic and pessimistic tests).	Appendix 3.F (section 9)

Delivery Case

Item		Section / Page
Governa	ance	
	Named Senior Responsible Owner (SRO).	Section 4.3.2.3 (page 4.176)
	Proposed Governance Structure.	Section 4.3.1 (page 4.172)
	Composition of Project Board.	Section 4.3.2 (page 4.174)
	Details of resourcing level for the scheme.	Section 4.3.2 (page 4.174)
Project I	Planning	
	Project Plan (e.g. in GANNT chart form).	Section 4.4.2 (page 4.184); Appendix 4.A
	List of key milestones and dates.	Section 4.4.2.3 (page 4.185)



Item		Section / Page
	Clear critical path and dependencies.	Section 4.4.2.2 (page 4.185)
Risk Ma	nagement	
	Risk Register with likelihood, probability and mitigation measures, including Quantified Risk Assessment.	Section 4.5.1 (page 4.186); Appendix 4.B
	Description of proposed Risk Management process and escalation procedures.	Section 4.5.3 (page 4.187)
Stakeho	lder Management	
	Identification and analysis of key stakeholders and their interests.	Sections 4.6.1 to 4.6.4 (page 4.188)
	Description of public consultation already carried out.	Section 4.6.5 (page 4.195); Appendices 4.Di and 4.Dii
	Plans for future consultation and stakeholder management.	Section 4.6 (page 4.188)
	Evidence of consultation with Statutory Bodies (Natural England, English Heritage and Environment Agency) and their responses.	Section 3.6 (page 3.117) Appendix 3.Hii
Evaluati	on	
	Statement of core evaluation objectives.	Section 4.7 (page 4.196)
Assuran	ce (schemes with gross cost of £50m or more)	
	Confirmation of date Gateway Review carried out (or planned).	Section 4.8 (page 4.198)

Commercial Case

Item	Section / Page
Preferred procurement route with rationale for choice.	Section 5.2 (page 5.xxx)
For ECI proposals, contract type and risk sharing arrangement.	Not Applicable
Details of proposed risk sharing approach (for other than traditional procurement).	Section 5.3 (page 5.xxx)

Financial Case

Item	Section / Page
Detailed cost breakdown.	Section 6.2 (page 6.219); Appendices 6.Ai & 6.Aii
Evidence of how cost estimates have been derived.	Appendices 6.Ai & 6.Aii
Independent surveyor's report verifying cost estimates.	Appendix 6.B
Details of and justification for inflation assumption used.	Section 6.3.3 (page 6.223)
Costing for risk based on QRA.	Section 6.3.2 (page 6.221)
Estimate of eligible preparatory costs.	Section 6.4 (page 6.223)



Item	Section / Page
Details of measures to secure necessary third party contributions, if applicable.	Section 6.7 (page 6.227)
Description and estimate of any ongoing revenue liability (other than routine maintenance) and proposals to meet it.	Section 6.6 (page 6.225)
Section 151 Officer sign-off for cost estimates.	Section 6.7.3 (page 6.229)

1. Scheme Description

1.1 Introduction

This section provides a comprehensive description of the North Fringe to Hengrove (NFH) Package. It contains the following information:

- A description of the **overall Rapid Transit Vision** for the West of England sub-region and the network wide system characteristics and design parameters;
- A description of the individual components of the NFH Package (central case); and
- A description of the Next Best and Lower Cost Alternatives.

Each of the above is outlined in more detail in the following sections, supported by additional information in appendices as appropriate.

1.2 The North Fringe to Hengrove Package

The Bristol North/East Fringe has seen substantial development in the last two decades, with residential (Bradley Stoke, Emersons Green), employment (e.g. Aztec West Business Park, Harry Stoke), education (University of the West of England) and retail (Cribbs Causeway Regional Shopping Centre); traffic congestion is now apparent in extended peak periods. By comparison South Bristol is characterised by lower car ownership and lost employment opportunities in the 1990s, which is now being addressed by several regeneration projects; however, there remains a jobs/homes imbalance, meaning that residents need improved access to jobs in the city centre and North/East Fringe.

The distance between the North/East Fringe and South Bristol is more than 10 miles. Northsouth cross-city transport links by all modes are relatively poor: there are some direct bus services, but they have long journey times and get delayed by congestion; whilst rail is more rapid it serves a more limited catchment area, and car access is restricted by congestion, especially in the city centre, the A4174 Avon Ring Road and at motorway junctions. The severance of the north and south by the River Avon and Avon New Cut exacerbates this and places pressure on the three main existing crossings.

The NFH Package would address the north-south cross-city transport problems, by providing new rapid transit services linking South Bristol, the City Centre and the North/East Fringe. It would form part of a network of such services in the city, the first element of the network will be the route between the City Centre and Ashton Vale, in the south-west of the city; this scheme received Programme Entry from DfT in March 2010. The NFH Package would be complementary to the wider rapid transit network including the 'Ashton Vale to Bristol City Centre / Temple Meads' rapid transit route and the South Bristol Link, which would provide an orbital rapid transit link between Ashton Vale and Hengrove Park, linking with the NFH Package.

The NFH Package comprises a series of complementary projects that facilitate the development of three new rapid transit routes, which link the North Fringe, East Fringe and South Bristol areas via Bristol City Centre. The rapid transit network will provide a fast, frequent and reliable public transport service. Services will run on a combination of segregated busways and bus lanes, separate from car traffic, and will be given priority over other road users at traffic signals.

The rapid transit network will provide a high quality passenger experience – ticket machines at stops, user-friendly electronic information displays, high quality stop design including CCTV and lighting, safe and secure access to stops. The rapid transit network will also provide improved pedestrian and cycling measures including new footways / cycleways and appropriate modern and safe crossing points.



Services will be run using accessible, comfortable, and low-emission bespoke rapid transit vehicles that combine the quality and feel of a high quality tram-style system. The Authorities are committed to exploring the range of alternative fuel sources with potential operators. These would offer considerable environmental improvements with lower noise levels, fewer greenhouse gas emissions and less harmful local pollutants. Access to the rapid transit infrastructure would be open to other operators of bus services provided that they meet strict quality thresholds which will govern vehicle and service standards.

The NFH Package also delivers a series of wider improvements, with parallel walking and cycling routes provided wherever possible and augmented with new links to existing cycling and pedestrian routes as well as the existing and proposed improvements being progressed through the Cycling City and Connect2 initiatives.

The following sections outline the NFH Package in more detail. Section 1.2.1 sets out the NFH Package in the context of the wider West of England Rapid Transit Vision and sections 1.2.2 to 1.2.5 outline the various elements of the NFH Package in more detail. An overview plan is attached overleaf at Figure 1.1.





Figure 1.1 – The NFH Package: Overview Plan



1.2.1 West of England Rapid Transit Network

1.2.1.1 Rapid Transit Vision

Our vision for rapid transit across the West of England sub-region is to establish a network of sustainable public transport corridors connecting the key areas of employment, retail, leisure and housing and which offer fast, reliable and comfortable journeys which provide a real alternative to the use of private cars.

Rapid transit services will be fast, frequent and reliable with new, low-emission vehicles, high quality passenger facilities, information and interchanges and safe and secure access to stops. Services will run on segregated routes (where possible to provide) or dedicated public transport lanes and provided with high levels of priority over other road users at traffic signals. The proposed Rapid Transit Network identified in our Joint Local Transport Plan (JLTP)² consists of three cross sub-regional corridors running via Bristol City Centre from:

- Ashton Vale to Emersons Green;
- Hengrove to North Fringe; and
- Bath to Cribbs Causeway.

In addition to this are our aspirations for routes to:

- Bristol International Airport;
- Kingswood; and
- North/South route through Bath.

The Rapid Transit Network as part of a wider integrated transport vision is shown in Figure 1.2.

Figure 1.2 – West of England Rapid Transit Network



² Final Joint Local Transport Plan 2006/07 – 2010/11 (December 2006)



1.2.1.2 Network Characteristics

The Rapid Transit Network will offer a fast, reliable and attractive service which will provide a real alternative to the use of private cars. In order to achieve this objective, the key network characteristics for the rapid transit system will include:

- High frequency services which enable a 'turn up and go' service;
- High-quality, modern and comfortable vehicles (and infrastructure) which are DDA compliant;
- Competitive, and reasonably priced fares compared with other journey options;
- Improved journey times and reliability when compared to travel by private car;
- High quality waiting areas with real-time passenger information and up to date service information which is easily and readily available, including timetables, routes, fares;
- Rapid transit stops and interchange points located to maximise availability to the local catchment areas whilst targeting key origins and destinations;
- Rapid transit service information designed to be easy to understand and navigate;
- Network designed to maximise safety and security of passengers; and
- High quality walk and cycle links to the stops and interchanges.

The Rapid Transit Network will also complement the wider transport aspirations for the West of England in relation to both the Major Scheme Programme³ and the Joint Local Transport Plan. Key considerations in this regard are as follows:

- Improvement of cross sub-regional linkages, including integration with other modes;
- Provision of high quality, reliable services with circulation between key destinations within Bristol City Centre, such as transport hubs and shops, and any major new development areas in the South Bristol, North Fringe and East Fringe areas; and
- Emphasis on providing sufficient network capacity to enable a safe and convenient comfortable journey by alternative modes of transport, such as buses, cars, cyclists and pedestrians.

1.2.1.3 Network Design

To ensure consistency between the proposed NFH Package rapid transport corridors a set of network design parameters have been defined and include infrastructure, stops and interchanges and vehicles. These design parameters are consistent and complementary with those defined for the first two phases of the rapid transit network, including the 'Bath Transportation Package' and the 'Ashton Vale to Temple Meads and Bristol City Centre Rapid Transit' scheme; ensuring consistency in approach across the wider West of England Rapid Transit Network, and not only within the NFH Package itself. Further information on the network design parameters are outlined in the following sections.

Infrastructure

Where feasible, the Rapid Transit network will be segregated from the public highway. The key characteristics of the segregated areas are as follows:

The segregated section will include guided and non-guided areas. The guided areas consist
of two concrete tracks (one in each direction) on which the rapid transit vehicles are 'guided'

³ West of England RFA2 Prioritised Major Schemes Programme



through. Non-guided sections comprise a mixture of bus only lanes and roads. Where current highways exist, or new mixed use links are to be constructed, additional bus only lanes are proposed to provide a traffic free route for the rapid transit vehicles. All proposals include for appropriate levels and access to high quality rapid transit branded stops.

• Pedestrian and cycle ways have been designed to supplement and complement existing and proposed cycle provision across the network and are combined with maintenance access for the guided sections of the route. At a minimum, the new footway / cycleway path will be three metres wide with an aim for 4 metres where possible.

Where it is not feasible to segregate rapid transit vehicles from other users, combined sections of highway will be used. Suitable parking restrictions and amendments to traffic signal junctions will include appropriate measures to reduce existing queue lengths and provide reliable journey times. Modifications, for example, to road widths and pavements, to provide adequate space for the rapid transit network infrastructure will also be implemented.

Stops and Interchanges

Stops and interchanges are the first interaction point passengers will have to the rapid transit network. It is therefore important that they portray the quality image of rapid transit, providing high quality design and high levels of accessibility, information and safety. In order to achieve the above objectives, the key design parameters for stops and interchanges are as follows:

- Fully accessible stops for the visually and mobility impaired;
- Safe access to stops via dedicated crossing facilities and convenient well-lit pedestrian and cycle links;
- Real time passenger information;
- High quality shelters and passenger seating with sufficient waiting space;
- Integrated ticketing, including off-board ticketing and rapid payment facilities;
- High standard lighting and security measures for public safety;
- Distinctive branding to clearly identify services as part of the rapid transit network;
- Capacity to accommodate up to two rapid transit vehicles with multiple boarding and lighting points;
- Good access between interchanges and adjoining transport modes; and
- Stop design to consider the nature of the local environment.

Examples of what the bus stop designs and interchanges may look like are shown in Figure 1.3 overleaf.





Figure 1.3 – Examples of Bus Stop and Interchange design

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Vehicles

The types of vehicles utilised will portray the rapid transit network as a high quality and modern service which provides an efficient, accessible and comfortable journey for its passengers. The key design parameters for vehicles are as follows:

- Compliance with all relevant UK and European regulations;
- Sufficient capacity to carry the level of passengers using the service;
- Low or zero emissions (use of alternative, environmentally efficient fuel sources to be encouraged);
- High levels of passenger comfort and security;
- High levels of performance and reliability (and therefore easily maintainable by operators) and
- Vehicles provide a high quality image and are recognisable as part of the rapid transit network.

The rapid transit network vehicles will also comply with all relevant UK and European Guidelines. Examples of existing rapid transit vehicles currently in use are shown in Figure 1.4 also overleaf.





Figure 1.4 - Examples of Rapid Transit Vehicles



1.2.2 Rapid Transit

The NFH Package includes three new rapid transit routes, as shown in Figure 1.1 previously, which link the Bristol North Fringe, Bristol East Fringe and South Bristol areas via Bristol City Centre. The rapid transit network will provide a fast, frequent and reliable public transport service. Services will run on a combination of segregated busways and bus lanes, separate from car traffic, and will be given priority over other road users at traffic signals.

The rapid transit network will provide a high quality passenger experience – ticket machines at stops, user-friendly electronic information displays, high quality stop design including CCTV and lighting, safe and secure access to stops. The rapid transit network will also provide improved pedestrian and cycling measures including new footways / cycleways and appropriate modern and safe crossing points.

Services will be run using accessible, comfortable, and low-emission bespoke rapid transit vehicles that combine the quality and feel of a high quality tram-style system. The Authorities are committed to exploring the range of alternative fuel sources with potential operators. These would offer considerable environmental improvements with lower noise levels, fewer greenhouse gas emissions and less harmful local pollutants. Access to the rapid transit infrastructure would be open to other operators of bus services provided that they meet strict quality thresholds which will govern vehicle and service standards.

In summary, the rapid transit network will include the following:

- A North Fringe Rapid Transit route which connects the main residential and employment areas in the Bristol North Fringe with Bristol City Centre with onward connections into South Bristol and the Bristol East Fringe. This rapid transit route will serve the Cribbs Causeway Regional Shopping Centre; Aztec West Business Park; Bradley Stoke; new and planned residential developments (Harry Stoke; Charlton Hayes (Filton Northfield)); the University of the West of England; Bristol Parkway Railway Station and the Parkway North and M32 park and ride sites. The route will use the Stoke Gifford Transport Link, a combined highway / rapid transit link, funded through the NFH Package, that will provide the direct link between Bradley Stoke and Harry Stoke;
- An East Fringe Rapid Transit route which connects the main employment areas in the Bristol East Fringe with Bristol City Centre with onward connections into South Bristol and the Bristol North Fringe. This rapid transit route will serve the Emersons Green District Centre; the Emersons Green East development; the Science Park (SPark); the University of the West of England; and the Emersons Green East and M32 park and ride sites;
- A **South Bristol Rapid Transit** route which connects the main residential and employment areas in South Bristol with Bristol City Centre with onward connections into the Bristol North and East Fringe areas. This rapid transit route will serve Bedminster, Parson Street Railway Station, Imperial Park, Knowle West Regeneration Area and new and planned mixed use developments at Hengrove Park (where it would also connect with the rapid transit route proposed as part of the South Bristol Link major transport scheme);
- Improvements in **Bristol City Centre**, particularly around the St Augustine's Parade / Colston Avenue area which provides high levels of priority for public transport services as well as streetscape improvements and increased shared space for pedestrians and cyclists; and
- Improvements for cycling and walking along the route, through the provision of footways, cycleways and modern, safe crossing points (complementing the ongoing Cycle City measures).

Further information on the detailed routes, services, vehicles and supporting measures is outlined below. Detailed plans are provided in **Appendices 1.A to 1.E** as indicated.


1.2.2.1 Detailed Routes Description

North Fringe Rapid Transit Route

Starting from the north, the North Fringe Rapid Transit route starts at the Cribbs Causeway Regional Shopping Centre and runs along Pegasus Road, Highwood Road, Coniston Road, a new bus-only link to Waterside Drive and into the Aztec West Business Park. From here, the rapid transit scheme will run through the business park and along Bradley Stoke Way, until Parkway North Roundabout where it will meet the Stoke Gifford Transport Link (SGTL) (see section 1.2.3) as shown in Figure 1.5 below.





South of the Parkway North Roundabout, the North Fringe Rapid Transit services will run along the SGTL on a dedicated bus lane in both directions until its junction with the Harry Stoke development road. The services will run through the development site to a new bus-only arm of the junction with the A4174 Ring Road at Coldharbour Lane. The design of this section of the route will be fully integrated into the development proposals for this area.

Running along Coldharbour Lane, the rapid transit scheme will serve the University of West of England and then access the M32 motorway to Bristol City Centre through a controlled gated access from Stoke Lane serving the M32 park and ride during its opening hours (see section 1.2.4.1), as shown in Figure 1.6 overleaf.

With regards to infrastructure requirements along this section of the route, priority for the rapid transit vehicles will be provided through a combination of existing and new bus lanes; a segregated guided busway (along Bradley Stoke Way); and running in mixed traffic where congestion levels are low or where the street nature precludes the provision of additional parallel infrastructure. A brief overview of the infrastructure provisions is summarised below. Detailed scheme plans for the North Fringe Rapid Transit route are attached at **Appendix 1.A**.

Between Cribbs Causeway and Aztec West, bus lanes will be provided along Pegasus Road; these proposals were to be delivered as part of the Greater Bristol Bus Network (GBBN) programme but are now proposed as part of this major scheme (subject to DfT approval). Notification of this change along with others relating to the inclusion of wider GBBN measures has been notified to DfT (**Appendix 1.H**).





Figure 1.6 – North Fringe Rapid Transit route (Parkway North to M32 Park and Ride)

Further bus priority will be provided along the south-western section of Highwood Road through the implementation of a bus-only corridor as part of the Charlton Hayes (Filton North Field) development (other traffic being diverted onto a new parallel highway link through the development). These proposals are being delivered by development and are expected to be completed in 2011.

North-east of the Highwood Road bus-only section, the North Fringe Rapid Transit proposals will run in bus lanes to Coniston Road, then running with traffic through Patchway to the proposed bus-only link, Aztec West via Waterside Drive. The bus-only link was a GBBN proposal which could not be implemented for ordinary bus services (due to lack of operator support) and hence, is now proposed for rapid transit services as part of the NFH Package.

Within the Aztec West Business Park, priority for rapid transit vehicles will be provided in the form of an anticlockwise bus lane leading to and from the current priority junction with Waterside Drive. This will link to a revised signal controlled layout for the Aztec West Roundabout incorporating a signal controlled bus through link for eastbound buses.

Between Aztec West Roundabout and Parkway North Roundabout, a dedicated guided busway will be provided alongside the current highway, within the existing verge (a safeguarded public transport corridor in the South Gloucestershire Local Plan). Priority for rapid transit vehicles at junctions along the route will be afforded through the use of traffic signals and/or pre-signals. Priority routes will be provided for rapid transit at Patchway Brook Roundabout (at-grade through middle of roundabout) and Great Stoke Roundabout (grade separated crossing) whereas the existing roundabouts at Savages Wood, Webbs Wood, and Great Meadow will be replaced by traffic signalled controlled junctions allowing priority for the guided busway to be designed in.

The only section of this route where it is not possible to provide direct priority measures is at the viaduct over Stoke Brook – the costs of widening the viaduct to accommodate the guided busway are prohibitive, therefore rapid transit vehicles will be required to leave the guided busway for a short section to run in mixed traffic over the viaduct. However, a combination of urban traffic controlled co-ordinated signals, pre-signals and interactive traffic management at this location will maintain priority for rapid transit vehicles over general traffic.



In addition to the main North Fringe Rapid Transit route, a spur will also be provided to serve Bristol Parkway Station and the Parkway North Park and Ride site. West of Parkway North Roundabout, rapid transit services using this section of the route will run in mixed traffic along Hunts Ground Road, past the Parkway North Park and Ride site (see section 1.2.4.3), and along a dedicated route through a bus access controlled gate to the existing car park at Bristol Parkway Station where the service will terminate.

South of the Parkway North Roundabout, the North Fringe Rapid Transit services will run along the Stoke Gifford Transport Link on a bus lane in both directions until its junction with the Harry Stoke development road. The services will run through the development site to a new bus-only arm of the junction with the A4174 Avon Ring Road at Coldharbour Lane. The design of this section will be fully integrated into the development proposals for this area.

Priority for rapid transit vehicles along Coldharbour Lane will be provided by bus lanes in both directions, past the University of the West of England (UWE), which will require localised carriageway widening into the existing verge as well as the removal of some on-street parking. South of Lancelot Road, a bus lane will be provided in the southbound direction only, due to width constraints, for an additional distance of approximately 250m to a signal controlled bus gate. After this, rapid transit vehicles will be required to run in mixed traffic (in both directions) controlled by a bus gate / signals over Stoke Lane Bridge and onto the M32 motorway via a dedicated route including access to the M32 Park and Ride site (see section 1.2.4.1).

On the M32 motorway, the rapid transit vehicles will run with mixed traffic southbound over Junction 2 before joining an extension of the off-side bus lane delivered as part of the GBBN programme on Newfoundland Way. This bus lane extension is also part of the GBBN programme and is now being brought forward under the NFH Package proposals. The northbound rapid transit services will run with mixed traffic from Newfoundland Circus to the new motorway junction at Stoke Lane.

Rapid transit stops along the North Fringe route will be provided at the following locations:

- Cribbs Causeway Regional Shopping Centre;
- Highwood Road (Filton Northfield);
- Coniston Road (Patchway Roundabout);
- Aztec West Business Park (2 stops);
- Woodlands Lane;
- Patchway Brook;
- Willow Brook Centre;
- Webbs Wood / Baileys Court (Bradley Stoke South);
- Hunts Ground (Great Stoke);
- Harry Stoke;
- University of the West of England / Coldharbour Lane;
- Stoke Park;
- M32 Park and Ride Site; and
- Through the provision of a 'spur' Bristol Parkway Station and Parkway North Park and Ride Site.



East Fringe Rapid Transit Route

Starting from the east, the East Fringe Rapid Transit route begins at the Emersons Green District Centre and, crossing over the A4174 Avon Ring Road at The Rosary Roundabout, to serve the Emersons Green East Park and Ride site (see section 1.2.4.2) and SPark development. It exits the development site at the Lyde Green Roundabout where it joins the A4174. The rapid transit scheme then runs along the A4174 Avon Ring Road until M32 Junction 1 – where half of the rapid transit services will then join the M32 Motorway running directly into Bristol City Centre.

The remaining rapid transit services will continue through M32 Junction 1, along the A4174 Avon Ring Road until the junction with Coldharbour Lane where they will join with the North Fringe Rapid Transit services at UWE to continue on to Bristol City Centre. An overview of the plan is shown in Figure 1.7 below.





With regards to the infrastructure requirements along this section of the route, priority for the rapid transit vehicles will be provided via a combination of existing bus and priority vehicle lanes and new bus lanes or running in mixed traffic where it is not possible to provide additional parallel infrastructure. A brief overview of the infrastructure provisions is summarised below. Detailed scheme plans for the East Fringe Rapid Transit route are attached at **Appendix 1.B**.

For the majority of the route (between the Emersons Green District Centre and Wick Wick Roundabout on A4174 Avon Ring Road), the rapid transit services will run in mixed traffic. Between Wick Wick Roundabout and Bromley Heath Roundabout the Ring Road will be widened into the existing verge to provide a new bus lane in both directions. Between Bromley Heath Roundabout and the traffic signalled control junction at Hambrook Crossroads, the Ring Road will be widened on the northern verge to provide a new bus lane in the eastbound direction only (westbound priority being provided by the existing priority vehicle lane). The River Frome viaduct will not be widened, therefore rapid transit vehicle priority will be afforded by a bus gate in advance of the viaduct.

The junction of the A4174 Avon Ring Road and the M32 Motorway (Junction 1) is particularly complex. It is not possible to provide additional priority measures for rapid transit vehicles at this



location, over and above the existing bus lane on the eastern approach from the A4174 Avon Ring Road and the widening recently completed as part of GBBN. Rapid transit services which continue along A4174 Avon Ring Road to Coldharbour Lane will also use the GBBN priority vehicle lane proposals on this section.

Rapid transit stops along the East Fringe route will be provided at the following locations:

- Emersons Green District Centre;
- Emersons Green East Park and Ride Site;
- Science Park (SPark);
- Wick Wick;
- Bromley Heath;
- Hambrook;
- UWE / Coldharbour Lane (for half of the East Fringe services);
- Stoke Lane (for half of the East Fringe services); and
- M32 Park and Ride site (for half of the East Fringe services).

Bristol City Centre

Within Bristol City Centre, the infrastructure proposals build upon those identified for the 'Ashton Vale to Temple Meads / Bristol City Centre' Rapid Transit scheme. The main objective of the city centre proposals for the NFH Package is to provide a through route through the City Centre to allow continuous rapid transit services between South Bristol and the North and East Fringes – minimising the need to interchange.

Staring from the north of the City Centre, the rapid transit route and associated infrastructure run from the end of M32 Motorway / Newfoundland Way through Newfoundland Circus and onto Bond Street, through St James Barton Roundabout and into The Haymarket, along the gyratory at Rupert Street / Lewins Mead, through Colston Avenue gyratory, and along Broad Quay and Prince Street. The rapid transit services will then cross Prince Street Bridge and run along Wapping Road where they will cross the River Avon (New Cut) on a new bridge structure (see description for South Bristol below). This route is shown in Figure 1.8 overleaf.

A brief overview of the infrastructure provisions in the city centre is summarised below. Detailed scheme plans are attached at **Appendix 1.E**.

The majority of the improvements for rapid transit are provided at the Colston Avenue Gyratory which is known locally as 'The Centre'. The Centre provides access to significant cultural, historic, entertainment and shopping areas and provides an area of transport connection between the major quarters of Bristol City Centre. The Centre will be significantly reconfigured to become a pivotal part of the rapid transit network as well as the heart of a renaissance for public transport, walking and cycling in the City of Bristol. The proposals will comprise the closures of the east side of The Centre to general traffic – this area being reserved for public transport and where necessary service vehicles.

There will be no connection from the west side of The Centre to the Baldwin Street area for general traffic. General traffic will also be banned from The Centre ends of Colston Street and Baldwin Street. St Stephens Street will be closed to through traffic. The rapid transit route will be Rupert Street – Christmas Street – Quay Street – Colston Avenue East – Broad Quay – Prince Street (and vice versa). A rapid transit stop will be available southbound and northbound on Broad Quay. The proposals will deliver:

 The central section of the NFH Package with priority for rapid transit by designing and managing out points of congestion that would otherwise compromise free-flowing movement in each direction;

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- Bus lanes not only for rapid transit but also for the large number of existing bus services that use the area as well as new bus stops and interchange areas;
- Enhanced urban realm combined with significantly enhanced pedestrian and cycling facilities;
- Provision of coach drop off/pick up, particularly for Colston Hall, the Hippodrome and historic areas nearby; and
- Better integration of taxi drop off/pick up areas.



Figure 1.8 – Bristol City Centre Rapid Transit

Additional priority for rapid transit services will be provided northbound and southbound between St James Barton Roundabout and The Horsefair, along The Haymarket using new and enhanced bus lanes along with the enhanced bus lane southbound on Rupert Street. On Lewins Mead an existing bus lane will be used for rapid transit. South of The Centre, towards Prince Street Bridge, existing bus priority measures will be used.

Any of the rapid transit services that terminate in the City Centre will use the existing one-way loop around the city centre, making use of the additional priority being provided as part of the 'Ashton Vale to Temple Meads / Bristol City Centre' Rapid Transit scheme.

Rapid transit stops in the City Centre will be provided at the following locations:

- Cabot Circus;
- Broadmead;
- The Centre (Broad Quay); and
- Arnolfini.

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South Bristol Rapid Transit Route

Starting from the City Centre, the rapid transit route crosses the River Avon (New Cut) on a new bridge structure and runs along St John's Road and Lombard Street into Bedminster town centre. Within Bedminster town centre, the route splits due to the current one-way systems in place. In the southbound direction (towards Hengrove Park), the rapid transit services will run along Dalby Avenue, Malago Road and Sheene Road where it will then enter West Street. In the northbound direction (towards the city centre), the rapid transit services will leave West Street and run directly along East Street. Public transport and urban realm improvements are proposed for the East Street retail precinct between Sheene Road and Dalby Avenue.

From Bedminster, the rapid transit route then runs along West Street, through the Parson Street Gyratory, Hartcliffe Way, Nover's Lane, Inns Court and Creswicke Road, through an amended junction at Airport Road / Bamfield Road entering a new bus lane for approximately 200m to a new signal controlled junction at the entrance to Hengrove Park where the route terminates at the Phase 1 development. An overview plan is shown in Figure 1.9 below.



Figure 1.9 – South Bristol Rapid Transit route

With regards to the rapid transit infrastructure requirements along this section of the route, priority for the rapid transit vehicles will be provided via a combination of guided busway, existing and new bus lanes and running in mixed traffic with traffic signal upgrades and parking management where it is not possible to provide additional parallel infrastructure. A brief overview of the infrastructure provisions is summarised below. Detailed scheme plans for the South Bristol Rapid Transit route are attached at **Appendix 1.C**.

Heading south from Prince Street Bridge, the new bridge structure across the River Avon (New Cut) will be a dedicated public transport route with provision for cycling and walking. This provides an alternative route for rapid transit and other bus services, avoiding the congested Bedminster Bridge and Redcliffe Hills areas. From here, the rapid transit services will run in mixed traffic along St John's Road and Lombard Street. At the end of Lombard Street, a short section of dedicated bus corridor will provide a new connection into East Street (which is already established as a public transport corridor only) and Dalby Avenue.



Through the Bedminster area, the rapid transit services will make use of existing bus priority where available or run in mixed traffic. Due to the nature of the street, opportunities to provide new priority measures are limited, although a short section of new bus lane will be provided at the northern end of West Street on the approach to the traffic signal junction at East Street / St Johns Street.

From Bedminster, the rapid transit services will run along Parson Street, using the existing northbound bus lane, and onto Hartcliffe Way (A4174) until its junction with Nover's Lane. Hartcliffe Way will be widened into the existing verge to provide a new bus lane in the northbound direction only (with southbound vehicles running in mixed traffic) until Vale Lane. South of Vale Lane, Hartcliffe Way will be widened sufficiently to provide a new bus lane in both directions, until it's junction with Nover's Lane.

The rapid transit services will then run on-street along Nover's Lane to the junction with Creswicke Road and Leinster Avenue. Here the rapid transit service will continue on-street along Creswicke Road though to the junction of Creswicke Road / Bamfield / Hengrove Way / Airport Road. On Creswicke Road, parking restrictions will need to be considered along with the removal of traffic calming measures. The traffic calming measures would potentially be replaced with constant velocity speed cameras. It should be noted that the section of the rapid transit route between Hartcliffe Way and Hengrove Park through Knowle West is part of the Knowle West Regeneration Framework. Proposals are emerging for the regeneration of this including the consideration of new public transport systems.

At the junction of Creswicke Road / Bamfield / Hengrove Way / Airport Road the route will then head west along Hengrove Way to a new signalled junction on Hengrove Way (A4174) before entering Hengrove Park. The rapid transit services will then run through the Hengrove Park development site on a dedicated guided busway until it reaches the terminus at the southern end of the site, adjacent to Whitchurch Lane.

Rapid transit stops along the South Bristol route will be provided at the following locations:

- Bedminster (Lombard Street);
- East Street (for northbound services);
- Malago Road (near Bedminster Railway Station) (for southbound services);
- West Street;
- Parson Street Railway Station;
- Vale Lane;
- Novers Lane;
- Creswicke Road (Knowle West);
- Hengrove Park North; and
- Hengrove Park.

1.2.2.2 Detailed Services Description

Rapid Transit Operational Strategy

The operational strategy for the provision of the rapid transit services has been developed with two key principles in mind:

• To offer a 'turn up and go' frequency that will generate patronage from captive public transport users and which will be marketable to new passengers who would have previously used a car. This is generally considered to be a service at least every 10mins on the core sections of route; and



 To minimise as far as possible the resource required to operate the rapid transit services in order to achieve a service at least cost to the Authorities and to provide the optimum business case i.e. minimising service duplication.

Further development of the two key principles outlined above leads to a number of further secondary principles:

- To provide an even planned headway (i.e. buses every 5 minutes) between the M32 Park and Ride site and Bristol City Centre to maximise the opportunity for car drivers to transfer to rapid transit services;
- To provide direct services between South Bristol (Hengrove Park) and the North and East Fringe areas to maximise opportunities for improved accessibility to employment areas across the wider Bristol area;
- To provide links between the M32 Park and Ride site and the North and East Fringe areas as well as Bristol City Centre;
- To provide direct links between the East Fringe area and Bristol City Centre to maximise the
 opportunity for car drivers to transfer to rapid transit services (via Emersons Green East Park
 and Ride); and
- To provide an additional service to Bristol Parkway station and Parkway North Park and Ride site, providing a key link between Bristol Parkway station and UWE.

The resultant service pattern is shown in Figure 1.10 overleaf, with service frequencies summarised in Table 1.1 below.

Rapid Transit Route		Services per Hour (Peak)				
		North Fringe – UWE	Bristol Parkway - UWE	East Fringe	UWE to City Centre	City Centre to South Bristol
X90	North Fringe to South Bristol	6	-	-	6	6
X91	Bristol Parkway station to City Centre	-	3	-	3	-
X92	East Fringe to City Centre via UWE	-	-	3	3	3
X93	East Fringe to South Bristol	-	-	3	-	-
	Total services per hour	6	3	6	12	9
	Average headway, minutes	10min	20min	10min	5min	6/7min

Table 1.1 – NFH Rapid Transit Proposals – Service Frequencies







1.2.2.3 Journey Times

Information on existing journey times (taken from journey time surveys of similar bus journeys) and forecast journey times for the rapid transit scheme (taken from modelling forecasts) is outlined in Table 1.2 below. It can be seen that the rapid transit schemes, including the provision of the infrastructure, will reduce public transport journey times (when compared to similar journeys by parallel bus services) by up to 40% in the morning peak period. Journey time benefits will also be realised by other bus services as they are able to make use of the rapid transit infrastructure at certain points along their routes.

	20	06	2016		
North Fringe Rapid Transit Route	AM Peak (mm:ss)	Interpeak (mm:ss)	AM Peak (mm:ss)	Interpeak (mm:ss)	
Existing Service 73 (Bradley Stoke town centre to City Centre)	43:46	33:25	46:46	40:25	
Rapid Transit (Bradley Stoke town centre to city Centre)	n/a	n/a	28:02	25:17	
Existing Service 312 (UWE to Aztec West)	28:47	23:09	31:40	26:20	
Rapid Transit (UWE to Aztec West)	n/a	n/a	22:49	22:37	
	2006		2016		
East Fringe Rapid Transit Route	AM Peak (mm:ss)	Interpeak (mm:ss)	AM Peak (mm:ss)	Interpeak (mm:ss)	
Existing Services 517/518 (Emersons Green to UWE)	29:38	27:59	33:25	29:24	
Rapid Transit (Emersons Green to UWE)	n/a	n/a	28:29	23:09	
	2006 2016			16	
South Bristol Rapid Transit Route	AM Peak (mm:ss)	Interpeak (mm:ss)	AM Peak (mm:ss)	Interpeak (mm:ss)	
Existing Service 90 (Hengrove Park to City Centre)	32:22	32:14	37:29	34:41	
Rapid Transit (Hengrove Park to City Centre)	n/a	n/a	22:25	21:16	

Table 1.2 – NFH	Rapid Tran	sit Proposals -	- Journey Times
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1.2.2.4 Rapid Transit Vehicles

Vehicles will follow the overall West of England Rapid Transit Network design principles as outlined previously in section 1.2.1.3. Vehicles for the NFH Package will be high profile articulated vehicles offering a ride quality and experience similar to a tram. Examples of the types of vehicles suitable for this system are shown previously in Figure 1.4.

The quality of the wider bus services which make use of the rapid transit infrastructure will be strictly controlled though quality standards set by the Authorities. These quality standards will ensure ongoing high levels of vehicle and service quality and will be strictly enforced.

1.2.2.5 Supporting Measures

Fares and Ticketing

To ensure that the rapid transit scheme (including the park and ride services) is competitive and attractive, fares will be comparable with other public transport fares for similar journeys.

Ticket machines at rapid transit stops (facilitating off-board purchasing) and multiple doors on rapid transit vehicles will deliver faster boarding times and hence quicker and more reliable journey times. These improvements will also deliver additional benefits, such as improved driver safety and security and reduced waiting times for passengers.

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Information

Real time information will be provided at rapid transit stops and electronic visual and audio information on board vehicles, such as next stop announcements. There is an already established real time information system in the sub-region using GPS and a Private Mobile Radio (PMR) communication system. Rapid transit vehicles will be fitted with an on-board computer linked to the central RTI system and ticketing back office central server, providing 'real-time' departure times at electronic rapid transit stop displays and via the website www.nextbusbristol.co.uk. The current system is being expanded as part of the Greater Bristol Bus Network (GBBN) improvements. The technical specification allows for additional expansion, over and above GBBN, so that the rapid transit scheme can be linked into the system.

The rapid transport system will also use a simplified spider route map, under the Travel+ brand (see section 4.6.3) for the publication of the rapid transit routes and stops.

1.2.2.6 Related Development

There are a number of proposed and planned developments which will be served by the proposed rapid transit routes. These developments are outlined in Table 1.3.

Development	Type / Size	Planning Status	Timescales	
Filton Northfield / Charlton Hayes	Mixed use – 2,200 dwellings, 3,300 jobs	Allocated site with Outline Planning Permission	Infrastructure under construction, first completions expected 2010/11. Scheme complete by 2020.	
Bradley Stoke Area	Remaining element of previous Local Plan allocation for 8,000 dwellings – residual development is infill development including town centre completion – 695 dwellings & additional jobs	Full planning permission, final dwellings under construction	Completed by 2016	
Harry Stoke	Residential development – 1,200 dwellings	Allocated site with Outline Planning Permission	First completions expected 2011/12. Completion by 2020.	
Emersons Green East	Mixed use development including Science Park – 2,750 dwellings & 3,000 jobs	Allocated site – substantial master planning undertaken. Funding for Science Park recently confirmed by SWRDA.	First residential completions expected 2011/12. Construction of Science Park expected to start 2011. Scheme to be completed by 2020.	
Cheswick Village (Wallscourt Farm)	Residential development – 910 dwellings	Scheme under construction. As at October 2009, 57 dwellings completed.	Completion expected by 2016.	
Land East of Coldharbour Lane	Residential development – 500 dwellings	Allocated site. Planning application still to be submitted and	Commencement expected 2011/12. Dwellings largely to be	

Table 1.3 – Developments which will be served by the rapid transit routes

West of England Partnership



Development	Type / Size	Planning Status	Timescales	
		determined.	completed by 2016.	
East of Harry Stoke	Residential development – 2,000 dwellings	Allocated in Pre- Publication Submission Draft of the Core Strategy	Subject to remaining stages of Core Strategy production and adoption – first completions expected 2016/17.	
Cribbs / Patchway	Residential development – 1,750 dwellings	Allocation in Pre- Publication Submission Draft of the Core Strategy.	Subject to remaining stages of Core Strategy production and adoption – first completions expected 2013/14.	
University of the West of England	Substantial regeneration including 1,000 new student apartments, educational accommodation, potential sports development and public transport interchange.	Outline Planning Application for infrastructure including RT route expected summer 2010.	Substantial completion expected by 2020.	
Aztec West	Development of remaining plots and possible intensification of uses	Principal of office development established through earlier outline applications. Reserved matters dependent on market demand.	2011-2015.	
Broadmead, Cabot Circus & Old City (Nelson Street)	Mixed use development – 1,300 dwellings & 8,700 jobs	Broadmead & Cabot Circus almost complete, Nelson Street masterplanning underway	Broadmead & Cabot Circus almost complete. Nelson Street redevelopment to be largely complete by 2016. 50% of additional employment expected 2016-2031	
Temple Quay	Mixed use development – 1,600 dwellings & 2,600 jobs	Full planning permission, under construction	Dwellings largely complete by 2016, employment by 2031	
Knowle West	Residential area regeneration – 1,100 additional dwellings through higher densities	Committed, initial masterplanning commenced	50% by 2016, 50% 2016-2031	
Inns Court	Residential area regeneration – 1,800 additional dwellings through higher densities	Committed, initial masterplanning commenced	Expected 2016-2031 delivery	
Hengrove Park	Mixed use development – 1,900 dwellings & 2,900 jobs	Committed	Employment and 25% dwellings expected by 2016, 75% of dwelling construction 2016-2031	
East of Harry Stoke	Mixed use development – 3,900 dwellings & 3,100 jobs	RSS area of search, small portion committed	2016-2031	



1.2.3 Stoke Gifford Transport Link

The Stoke Gifford Transport Link (SGTL) is a new transport link between Great Stoke Way (Parkway North Roundabout) and the A4174 Avon Ring Road, as shown in Figure 1.11 below.





The SGTL will provide much-needed congestion relief for general traffic in the Stoke Gifford area, providing an alternative road crossing over the railway and bypassing existing congestion bottlenecks at Bristol Parkway station along Old Gloucester Road, Brierly Furlong and Gloucester Road North (A38). The SGTL also forms part of the North Fringe Rapid Transit route, providing access to the proposed residential developments at Harry Stoke.

The SGTL will be a dual two-lane carriageway – with one lane provided for general traffic and the other as a dedicated bus lane (operating 24 hours a day), serving the North Fringe Rapid Transit scheme. The dedicated bus lane will run between Parkway North Roundabout and the junction with the Harry Stoke development road, where the rapid transit service will divert off. A segregated footway and cycleway will run parallel to the SGTL providing pedestrian and cycle links through the area.

Starting from the north, the SGTL will connect into Great Stoke Way via the existing provision at Parkway North Roundabout. Running south, the SGTL will cross over the Great Western Main Railway Line (east of Bristol Parkway Station) on a new bridge structure. Initial discussions with Network Rail have been undertaken regarding the permissions and access requirements for the construction of this new bridge structure and they have endorsed the appointment of a commercial scheme sponsor to work with us on the development the scheme – see **Appendix 4.E**. This is discussed in more detail in Section 4.6 of this document.

A new at-grade junction will be provided at Hambrook Lane with appropriate traffic management measures in place to prevent Hambrook Lane being used as a 'rat-run' through the area (i.e. restricted movements at the junction with SGTL). A new roundabout will be provided at the junction with the Harry Stoke development road and a new traffic signalled control junction will be provided at the junction with the A4174 Avon Ring Road. These traffic signals will be carefully designed and optimised to minimise delays to strategic traffic on the Ring Road.



Plans outlining the SGTL in more detail are attached at **Appendix 1-A**.

1.2.4 Park and Ride

The NFH Package includes provision for three new park and ride sites, all of which will be served by the rapid transit network (rather than dedicated park and ride services). Further information on each of the three sites is outlined below.

1.2.4.1 M32 Park and Ride

The NFH Package includes for a new park and ride site on the M32 Motorway at Stoke Lane, as shown in Figure 1.12 below.





The M32 park and ride site includes the provision of up to 1,500 new park and ride spaces and it will be served by the rapid transit routes. The high quality park and ride site will also include an amenity building / interchange as well as security measures such as CCTV and on-site staff.

A new motorway junction is required for rapid transit services to and from the M32 Motorway. The park and ride site is located to allow access for general traffic directly from the motorway using the same new motorway bridge. The new bridge will be located approximately 200m north of the existing Stoke Lane Bridge, which will be retained. Access to the park and ride site for general users will be via the north-eastern slip roads only; permitting motorists to access the site coming southbound on the motorway and exiting the site in a northbound direction only. Variable message signs will be positioned at appropriate locations to warn when the site is full or closed to avoid abortive visits to the site.

Access to the park and ride site for the rapid transit services will be via a rapid transit only access on Stoke Lane (to / from North / East Fringe) as well as the south-western slip roads on the new motorway junction (to / from Bristol City Centre).

The new motorway junction will require approval, as well as a number of departures from highway geometry standards (due to its location in relation to Junctions 1 and 2 and the local topography) from the Highways Agency. Discussions with the Highways Agency have been undertaken



regarding this approval and a letter outlining agreement in principle (subject to further detailed design and statutory processes) has been issued to support this MSBC – see **Appendix 4.E**. This is discussed in more detail in Section 4.6 of this document.

Plans outlining the M32 park and ride in more detail are attached at Appendix 1-D.

1.2.4.2 Emersons Green East Park and Ride

The NFH Package includes for a new high quality park and ride site at Emersons Green East (adjacent to A4174 Avon Ring Road at the Rosary Roundabout) – see Figure 1.7. This site, which will include approximately 240 new park and ride spaces, will be served by the East Fringe Rapid Transit route into Bristol City Centre, with an opportunity to interchange at the University of the West of England for onward travel into the North Fringe area. This element of the scheme is anticipated to be funded in part through developer contributions (provision of the park and ride site is a requirement of the developer for Emersons Green East) and will also include enhanced facilities to meet the rapid transit criteria.

Plans outlining the Emersons Green East Park and Ride in more detail are attached at **Appendix 1-B** (East Fringe Rapid Transit route).

1.2.4.3 Parkway North Park and Ride

A park and ride site on council-owned land north of Hunts Ground Road has planning approval and will be delivered outside of the NFH Package through the LTP. Prior to the NFH Rapid Transit route being operational, its primary role would be to serve Bristol Parkway Station.

The NFH Package includes a 200-space extension to the park and ride on land to the south of Hunts Ground Road (see Figure 1.6) on a site which is safeguarded for park and ride use in the Local Plan. The bid includes the capital cost of land acquisition and purchase, park and ride construction, plus the rapid transit stops on Hunts Ground Road itself. The resultant park and ride facility will be of a high quality standard, with an amenity building / interchange as well as security measures such as CCTV and on-site staff.

The rapid transit services for this park and ride would continue to/from Bristol Parkway station, where they would turn around (see description of North Fringe Rapid Transit earlier). Plans outlining the Parkway North Park and Ride in more detail are attached at **Appendix 1-A** (North Fringe Rapid Transit route).

1.2.5 Bristol City Centre

The NFH Package includes substantial public transport and urban realm improvements to Bristol City Centre to provide high levels of priority for public transport services.

The package includes a new bus interchange in the Centre combined with significant streetscape improvements that will provide increased shared space for pedestrians and cyclists. The Centre is the main pedestrian realm within Bristol City Centre and is comprised of St Augustine's Parade, Colston Avenue, Broad Quay, Anchor Road and Lewins Mead.

The City Centre is to be a pivotal part of the proposed rapid transit network, and it will be vital to create an optimum environment for rapid transit and other public transport as well as to preserve the Centre – see Figure 1.13 overleaf. Further rapid transit measures are proposed north and south of the Centre including additional bus lanes and rapid transit stops. Plans outlining the City Centre Improvements are attached at **Appendix 1-E**.





Figure 1.13 – Bristol City Centre Improvements

1.2.6 Next Best Alternative

The Next Best Alternative option for the NFH Package Central Case comprises of a number of route variants to the rapid transit routes as follows:

- North Fringe (Cribbs Causeway to Aztec West Business Park) instead of providing a new dedicated bus link between Coniston Road and Waterside Drive into Aztec West Business Park, the rapid transit services would run along Highwood Road (developer funded road as part of Filton Northfield Development site) onto the A38 (Gloucester Road) and from here, loop around Aztec West and continue along Bradley Stoke Way. Services would however take advantage of a northbound GBBN bus lane on the A38.
- North Fringe (Stoke Gifford area) the Stoke Gifford Transport Link would be completed without rapid transit lanes; instead rapid transit services would run on existing roads through Harry Stoke between the A4174 (Coldharbour Lane) and Bristol Parkway Station (using Westfield Lane and Church Road). No additional priority for rapid transit services would be provided but they would instead take advantage of the congestion relief offered by the Stoke Gifford Transport Link.
- South Bristol (Hengrove Park area) instead of running services through the Knowle West area (via Nover's Lane, Inns Court Road and Creswicke Road), rapid transit services would continue along Hartcliffe Way and Whitchurch Lane to terminate at the edge of Hengrove Park. Appropriate rapid transit priority measures would be provided along Hartcliffe Way and Whitchurch Lane with a new bridge allowing rapid transit vehicles to bypass Hartcliffe Roundabout.

All other attributes of the NFH Package remain as per the main Central Case. Plans outlining the route variants for the Next Best Alternative are attached at **Appendix 1-F**.



1.2.7 Lower Cost Alternative

The Lower Cost Alternative option for the NFH Package Central Case comprises of a number of design variants to the overall NFH Package as follows:

- **M32 Park and Ride** the 1,500 park and ride site at Stoke Lane will be removed from the NFH Package as part of the Lower Cost Alternative, in order to reduce construction and ongoing operational and maintenance costs. However a new bus only motorway junction will still be required at this location to allow rapid transit services from the North and East Fringe areas to access the M32 Motorway from Stoke Lane / Coldharbour Lane.
- North Fringe (Cribbs Causeway to Aztec West) the route would terminate in a loop around Aztec West Business Park and would not continue to Cribbs Causeway Regional Shopping Centre; this would reduce construction and ongoing operation costs.
- North Fringe (Bradley Stoke Way) the rapid transit route would run along Bradley Stoke Way with general traffic where traffic congestion levels are lower i.e. between the bus access gate at the Willow Brook Centre and a point adjacent to The Worthys. The section of dedicated guided busway along the central section of Bradley Stoke Way would be removed from the NFH Package as part of the Lower Cost Alternative to reduce construction costs. The existing roundabouts would remain and not be reconfigured as signal-controlled junctions.
- South Bristol (Hartcliffe Way) this section of the South Bristol Rapid Transit route would follow Hartcliffe Way and Whitchurch Lane as indicated in the Next Best Alternative above. This section of the South Bristol Rapid Transit route (i.e. Hartcliffe Way and Whitchurch Lane) would run in mixed traffic along the highway where traffic congestion levels are lower. The section of dedicated bus lane along this section of the route would be removed from the NFH Package as part of the Lower Cost Alternative to reduce construction costs. However, a small section of northbound bus lane would be implemented between Headley Lane and Parsons Street.
- South Bristol (New Cut Bridge) the proposal to provide a new public transport bridge over the New Cut (River Avon) will be removed from the scheme for the Lower Cost Alternative. Rapid transit services will route via Bedminster Bridge using existing infrastructure.

All other attributes of the NFH Package remain as per the main Central Case, although a number of adjustments will be required for the service plan as a 5 minute frequency to the M32 Park and Ride site from the City Centre is no longer a requirement of the scheme. Plans outlining the design variants for the Lower Cost Alternative are attached at **Appendix 1-G**.

2. Strategic Case

2.1 Introduction

This section sets out the strategic case for the NFH Package. It contains the following information:

- A summary of the **problems** that the scheme is designed to address;
- The objectives of the scheme;
- A description of the process by which the scheme came to be identified as the preferred option for meeting those objectives;
- An outline of how the objectives of the scheme align with sub-regional and regional objectives; and
- An outline of how the objectives of the scheme align with **wider local objectives**, particularly those of the Joint Local Transport Plan.

Each of the above is outlined in more detail in the following section, supported by additional information in the appendices as appropriate.

2.2 Transport Problems & Issues

2.2.1 Background

The West of England sub-region, as shown in Figure 4 (Introduction) previously is made up of Bath and North East Somerset, the City of Bristol, North Somerset and South Gloucestershire. An all-purpose unitary council governs each of these four areas. The four councils are working together as the West of England Partnership to tackle transport and other major strategic issues.

Transport plays a pivotal role in the functioning of the West of England area, enabling people to access jobs, education and other facilities. The area has seen growth in demand for travel, through new development and increasing levels of mobility, which has outstripped the provision of transport infrastructure.

The future scale and timescale for new housing and employment is very challenging when coupled with the need for this growth to support regeneration, particularly to provide good access to jobs and services. Traffic congestion is a cost to the economy and a constraint on growth and regeneration; the Joint Local Transport Plan (JLTP) estimates that at least £350million is lost to our economy each year and this is expected to rise to £600million by 2016.

Department for Transport data estimates that overall the volume of traffic on the sub-region's roads grew by 21% between 1994 and 2004 compared to 16% nationally, and increased by a further 4% by 2008. This impacts on air quality, reduces the reliability of public transport and affects the quality of life in our area. The Greater Bristol Strategic Transport Study, published in June 2006, supported and demonstrated the need for significant investment of more than £1.5billion over the next 20 years to tackle existing problems and support the proposed growth in population, jobs and housing.

Our 2008 JLTP Progress Review and 2009 Progress Report (attached at **Appendices 2.Ai and 2.Aii**) provides more information on the background transport trends in the sub-region and shows how the West of England Authorities are progressing with the JLTP targets. Overall, in the first three years of the JLTP, significant progress has been made across a range of key indicators including bus patronage, congestion, cycling and road safety. However, the proportion of journeys to work by public transport remains relatively low in the Bristol urban area compared with



equivalent cities, and the extent of predicted housing and employment development will place further, substantial pressure on the existing transport network. Major investment in transport infrastructure to accommodate the additional trips is essential to avoid serious impacts on the economy and quality of life in the sub-region.

The NFH Package will make a positive difference to travelling in the North and East Fringes of Bristol and improve links with the south of Bristol via the city centre. The NFH Package will deliver three rapid transit routes which will form part of the wider West of England rapid transit network.

This section sets out the need for the NFH Package and considers how this programme of improvements and the wider West of England rapid transit network will impact on key performance indicators associated with the four shared priorities of congestion, accessibility, air quality and road safety embedded in the JLTP. It also outlines how the NFH Package meets the DfT's Transport Strategy goals – "*Delivering a Sustainable Transport Strategy (DaSTS)*" – to reduce carbon emissions; support economic growth; promote equality of opportunity; better safety, health and security; and improve quality of life. Furthermore, it also demonstrates how the NFH Package will link with expected employment and residential development sites in the sub-region over the next 20 years.

2.2.2 Congestion and the Economy

The main areas of traffic congestion in the sub-region are central Bath, central Bristol and the Bristol North Fringe, along with the main radial corridors that serve the central areas. The overall volume of traffic on the sub-region's roads grew by 21% between 1994 and 2004, compared to 16% nationally. In the North Fringe, where there has been large-scale growth in employment, traffic levels have grown by as much as 30%. Data from the more recent DfT Road Traffic Statistics for Local Authorities (1993 to 2008) shows increases in traffic levels of 28% in the sub-region during this time period and more locally, of 12% in Bristol City and 37% in South Gloucestershire. During peak periods the average speed in Bristol's urban area is 17.5mph (National Congestion Indicator 2008/09, DfT).

Time lost to traffic congestion is estimated to cost the local economy £350million per annum (increasing to £600million per annum by 2016). At peak periods, up to 21% of travelling time is spent stationery, leading to delays and unreliable journey times. Bus services are also often held up in congestion such that bus journeys in peak periods are often considerably longer than at other times. The attractiveness of the public transport network to existing and potential passengers is therefore compromised. These delays and unreliability can also create significant problems for the freight and logistics industry and the emergency services.

Significant levels of traffic congestion are experienced in both peak periods. In the morning peak period, all inbound radial routes into Bristol's central area are affected as are routes towards the Bristol North Fringe area, which includes the A4174 Avon Ring Road. The M32 Motorway and the section of the M4 between Junction 19 (M32) and Junction 20 (M5) also experiences significant congestion, reduced average speeds and journey time variability. During the evening peak period, although the pattern of congestion on inbound routes in the morning peak period is not necessarily mirrored on the equivalent routes in the evening peak period, raised levels of congestion are also significantly evident within the city centre and in the North Fringe area.

The JLTP includes targets to restrict the growth in area-wide traffic to 12% between 2004 and 2010/11, together with a target to restrict growth in peak period movements into Bristol City Centre to 0%. It also includes a specific congestion indicator for the Bristol urban area, an area which is also covered by a Congestion Delivery Plan, a daughter document to the JLTP. The congestion indicator for Bristol has a separate target to limit the increase in journey time on the network to a 14% increase by 2011 compared with 2005/06 conditions, whilst accommodating a 7% increase in movements on the network.



Figures 2.1 and 2.2 overleaf expand these timeframes and show that by 2031 unless further action is taken the congestion picture in Bristol is set to become substantially worse. In the future, the levels of congestion in the city centre, along the motorway network and adjoining roads, and in the North Fringe area are set to increase significantly. Other areas that do not currently experience heavy congestion will begin to do so as people seek alternative routes. Figure 2.1 outlines forecast traffic flows in the morning peak period in 2031 (taken from the G-BATS traffic model). Figure 2.2 shows the capacity of the main junctions along the road network in the morning peak in 2031 – the locations showing a red or dark red dot are those junctions which are approaching or exceed their maximum capacity and therefore experience significant delays and congestion.

A number of underlying factors cause increased congestion, including unattractive and relatively expensive public transport; growing usage of cars relative to other forms of travel; land use and development changes; road and rail infrastructure constraints; availability of workplace and retail parking in some locations. The JLTP stresses that it is not growing car ownership in itself that is the most significant problem faced in the West of England, but rather the growing pattern of car use for work, leisure and shopping trips – particularly for short trips.

Evidence of high levels of car use for travel to work and for short journeys in the study area is provided by data from the 2001 Census. This data shows that approximately 21% of journeys to work in the sub-region are less than 2km (potential walking distance), of which 45% are made by car. In addition, approximately 22% of journeys to work are between 2km and 5km (potential cycling distance) with 68% of them made by car. This problem is particularly acute in the Bristol North Fringe area where increased employment and development has not been delivered with required levels of public transport development.

When compared to a 'do-minimum' situation, the NFH Package is forecast to reduce forecast congestion levels within the North Fringe and Stoke Gifford areas, on the main radial corridors between the North Fringe and Bristol City Centre (including the M32) and on the radial corridors from South Bristol into the City Centre. By 2016, a total of over 17,000 trips will be made on the rapid transit routes on an average weekday 12 hour period, resulting in a reduction in total network delay of between 2% (evening peak) and 5% (morning peak). The Stoke Gifford Transport Link (SGTL) will provide much needed congestion relief for the local roads in and around the Stoke Gifford area.

Journey time reliability improvements are expected to be of beneficial impact. Journeys times on the rapid transit services (over existing bus services) are anticipated to decrease by up to 40% in the morning peak period (when compared to similar parallel bus services), resulting in a total journey time saving of approximately £280million over the scheme appraisal period. In addition, existing bus services will be able to make use of rapid transit infrastructure thus providing further journey time and reliability benefits.

















2.2.3 Accessibility and Integration

Accessibility is the ease with which people can access the services they need, including health, employment and education; especially for those without access to a car. There are wide variations in people's access to services in the West of England, not only influenced by geographic location but also by factors such as car ownership, income, age and mobility. The mobility of individuals can present particular difficulties with access to health, employment and education. Those with mobility problems may face challenges trying to use the current public transport system, for instance boarding and alighting buses. Other groups who may have problems with accessing services included those suffering from ill health, the elderly, ethnic minorities, young people, and those caring for others. Over 8% of the population are estimated to have some form of physical or learning disabilities.

The result of this situation is that some communities and individuals feel isolated due to the lack of convenient or attractive transport. They are unable to access services by car and the public transport alternative is often unreliable, expensive and/or offers a poor level of service.

Patterns of development in recent decades, particularly in the shopping and leisure sectors, are further exacerbating accessibility problems for those without access to a car. Out-of-town shopping centres and retail parks such as those at Cribbs Causeway, Abbey Wood and Imperial Park are generally significantly more accessible by car compared to more sustainable travel alternatives. This also applies to some out-of-town business parks, such as Aztec West in the Bristol North Fringe.

Figure 2.3 overleaf summarises the car ownership levels across the sub-region and illustrates the very significant variation in car ownership that currently exists. The JLTP estimates that approximately 22% of households in the sub-region do not own a car and are therefore reliant on other forms of transport such as public transport, walking and cycling. As can be seen from Figure 2.3, there are a number of areas which have significantly lower levels of car ownership and these include the city centre, South Bristol and North East Bristol. This indicates that a proportion of the population within the catchment area for the NFH Package rely on non-car modes of transport.

The NFH Package will significantly improve the links between the key activity centres of employment, education and retail with existing and new residential areas. In particular this will include the improvement in public transport links between areas of deprivation in Hengrove and South Bristol (including wards where over 40% of residents not have access to a car) and job opportunities in the city centre and the North and East Fringes as well as improved links to the University of the West of England and the Science Park at Emersons Green.

With the use of Accession software, it is possible to demonstrate how the NFH Package improves accessibility to areas of employment and education – as an example, accessibility to the North Fringe (Aztec West Business Park) by public transport, both before and after the NFH Package is implemented, is shown in Figure 2.4 overleaf. Further information on improvements to accessibility is discussed in Section 3 under scheme appraisal and benefits.

The development and implementation of the NFH Package will provide opportunities to connect major residential and employment areas directly without the need to interchange. This will be achieved by operating through routes through Bristol City Centre, directly connecting South Bristol and the North and East Fringes, as well as provide onward connections to other rapid transit lines being brought forward. The flexibility provided by the bus-based technology option, together with the design and development of service schedules, provides the opportunity to extend the benefits through the delivery of a network solution.





Figure 2.3 - Car Ownership Levels in Study Area



Figure 2.4 - Improvements in accessibility (by public transport) to North Fringe (Aztec West) as a result of the introduction of the NFH Package





2.2.4 Climate Change and Air Quality

There are currently two main Air Quality Management Areas (AQMAs) in the West of England sub-region – central Bath and central Bristol, including the main strategic roads (M32, A38 (north and south), A432, A4 and A37). Over 100,000 people live within the AQMAs and the Bristol AQMA covers 25% of the Bristol city area.

Transport is estimated to account for over 20% of CO_2 emissions nationally and 36% within the West of England sub-region. Motorway and trunk road traffic is the major source of emissions, accounting for about 55% of total CO_2 emissions in the West of England. Urban roads are estimated to account for approximately 30% of CO_2 emissions. Within Bristol's central AQMA, 97% of NO_x emissions are from road traffic and CO_2 emissions are expected to increase by 19% by 2011, compared to 2004 levels.

The JLTP includes targets to reduce Nitrogen Dioxide levels within the designated AQMAs. However, the JLTP 2008 Progress Review reported that progress towards air quality targets in Bristol and Bath are both off-track. The JLTP target for the Bristol AQMA is to reduce the mean roadside NO₂ levels from a 2004 baseline of 48.0ug/m³ to 46.3ug/m³ by 2010. However in reality, air quality conditions in Bristol deteriorated significantly in 2006 after which there was a modest improvement. However with NO₂ levels at 48.5ug/m³ in 2008, we are still some way from achieving our targets for 2010.

The NFH Package will result in a movement of trips away from car journeys, as people who would otherwise not use public transport realise the advantages afforded by fast and reliable journey times, comfortable and clean vehicles, an integrated network offering quick and easy access to many parts of the city. By 2016, a total of over 17,000 trips will be made on the rapid transit routes on an average weekday 12 hour period, resulting in a reduction in total network delay of between 2% (evening peak) and 5% (morning peak), which is expected to help improve air quality conditions in the Bristol AQMA.

The NFH Package will cause a reduction in vehicle kilometres and greenhouse gas emissions are expected to reduce by 0.3% overall (over the 60 year appraisal period). In addition, the vehicles to be used as part of the rapid transit network will use more environmentally friendly methods with low emissions.

2.2.5 Safety

Around 320 people are killed or seriously injured on the West of England's roads every year. Accidents involving cars accounted for around 60% of casualties (killed, seriously or slightly injured) in 2007; public transport 12%. Urban areas account for the greatest proportion of road casualties – traffic flows are higher, there are more conflicting turning movements, and the greatest potential for conflict between motor vehicles and more vulnerable road users occurs. Car occupants comprise 31% of all casualties and research indicates that one-third of all injuries are due to inappropriate speeds.

The JLTP 2008/09 Progress Report reported that the West of England road safety indicators are currently on-track. The targets are to:

- Reduce the number of people killed or seriously injured on roads by 20% by 2010;
- Reduce the number of children killed or seriously injured on roads by 25% by 2010; and
- Ensure that there is no increase in the number of slight injury casualties.

The NFH Package, as part of the wider integrated JLTP and major schemes programme, moves journeys from car to public transport which is a safer mode. Figure 2.5 overleaf shows the accident cluster sites across the Bristol urban area and the relative position of the NFH Package proposals. It is clear that the NFH Package has the potential to reduce casualties at a range of



cluster sites including the city centre, Junctions 2 and 3 on the M32, the A38 and south into Hengrove and South Bristol.

Although the safety benefits are expected to be minimal overall, those that do occur are likely to be associated with a transfer of trips away from the private car to public transport (which is a safer mode of travel) as well as a redistribution of trips away from the more congested city centre. Additional benefits will also be experienced by pedestrians as a result of priority measures and improved crossing facilities and by cyclists as a result of new and improved cycle facilities.

2.2.6 Housing and Economic Growth

The West of England has experienced strong economic growth in recent years, despite some significant shifts in employment trends. The longer term impacts of the global recession on the West of England economy are not yet known but given that economic recovery is expected to begin in the next 12 months, the recession is not anticipated to have a significant bearing on future longer-term congestion levels.

The population of the West of England is currently approximately 1.1million and it represents about 30% of the regional total. About two thirds live in the Bristol urban area and adjacent settlements while 10% live in Bath and 8% in Weston-super-Mare. The West of England economy supports levels of prosperity and rates of economic activity above regional and national averages. It has been delivering the highest growth in GDP per capita of any major city in England outside of London.

Government population projections relying on extrapolation of recent trends show the population of the sub-region rising sharply over the next 20 years. The increase in population, changes in the age structure of the population and a falling household size contribute to concerns about rising shortfalls in the supply of housing, shortages of affordable housing and the need to accelerate house-building. Currently emerging Core Strategies are planning to deliver some 86,500 homes and 95,500 jobs up to 2026 in the context of the draft South West Regional Spatial Strategy (RSS) which is yet to be finalised. A significant proportion of these additional jobs are likely to arise in Bristol (and Bath) city centres as well as the North and East Fringe areas. These jobs are likely to arise due to the expansion of office work and technology based businesses as well as further growth of retailing and other services.

Land use and development changes will continue to have a significant impact on travel behaviour, use of the car and increasing congestion levels. Figure 2.6 overleaf shows the NFH Package in relation to major new developments coming forward.

Extensive business park and office development in the North Fringe supported much of the overall growth of employment in the sub-region over the 1990s. About 140ha was taken up by new employment uses, largely accounted for by business park developments, with local employment levels rising by over 20,000. However, this employment and development has not been accompanied with the required levels of public transport development.

Significant growth in jobs is also planned for South Bristol. Many of these jobs will arise through meeting the need for services for the substantial growth in households, as outlined previously. But significant numbers of jobs are also likely to be provided by the attraction of businesses to new development locations within and on the edge of the area. In excess of 20,000 additional jobs will flow from these proposals in a range of service, technical and more traditional manual occupations.





Figure 2.5 – Accidents Locations (2003 to 2007)









A major contribution to delivering these additional jobs in South Bristol is being provided by progress with development proposals for Hengrove Park. A master plan for some 76ha is guiding a mixed use development comprising housing, business park (8ha), leisure uses including a new swimming pool and sports centre, a skills academy, and a hospital. The development could support up to 3,000 new jobs.

In recognition of the potential for the West of England to support the development of high technology industries, the South West Regional Development Agency (SWRDA) invested in the Bristol and Bath Science Park (SPark) (at Emersons Green). Some £30million has been committed to the joint venture to develop the park. The SPark will extend over 45ha and will support over 6,000 knowledge-based jobs in science related sectors. It is expected to become the region's leading centre for knowledge transfer using the research base of the sub-region's three universities and the cluster of technology companies in the sub-region. The NFH Package rapid transit proposals will provide much needed transport links between SPark and the University of the West of England and beyond.

In the Bristol North Fringe area, new housing development is already committed at key locations such as Charlton Hayes (Filton Northfield), Harry Stoke, Wallscourt Farm and East of Coldharbour Lane. The emerging South Gloucestershire Core Strategy (consultation draft, March 2010) identifies further potential development areas at Cribbs Causeway, east of Harry Stoke and Yate. These main sites, plus a few smaller ones, total 18,900 homes for completion between 2009 and 2026.

In terms of urban regeneration, the successful regeneration of South Bristol is a high priority for the West of England sub-region – with the area set to deliver up to 12,550 jobs and 12,760 homes in the period 2006-2026. Much of this growth will be achieved through programmes of estate renewal in Knowle West and brownfield land regeneration at Hengrove Park, both of which will be served by the rapid transit proposals as part of the NFH Package.

2.2.7 Quality of Life

Using the 'English Indices of Deprivation 2007' statistics, it can be seen that the West of England has relatively low levels of deprivation in comparison with other English regions. Only 9.3% of the South West's Super Output Areas (SOAs) fall within the 20% most deprived SOAs in England – the third lowest of all the regions behind the South-East and the East of England.

Nevertheless, some areas of deprivation do exist in the urban areas of Bristol – as shown in Figure 2.7 overleaf. In particular the area of Filwood in South Bristol is identified as being in the top 1% most deprived areas in the sub-region. The NFH Package will provide improved public transport provision and improved cycle and pedestrian facilities through some of the most deprived areas, giving greater transport choices for those who do not have access to a car or choose not to drive.

A key problem faced in our urban areas is congestion on busy radial and orbital routes adding to community severance. Traffic creates barriers for more vulnerable travellers, such as cyclists, pedestrians and disabled people. High traffic flows accentuate this severance and detract from the quality of life for local people by creating noise, pollution, road safety and health problems.

Work carried out in Bristol on the Showcase Bus Corridors illustrates how transport schemes can contribute to the improvement of the communities they pass through. Rather than concentrating solely on improvements to the buses and bus stops, the Showcase Bus Corridor scheme along the A420, for example, also included significant improvements to the streetscape and walking environment. Improved streetscape is consistent with the image of the rapid transit network and will do much to promote a high quality, attractive transport system to potential users. Features of the system such as new stops and street furniture and in particular the streetscape improvements in Bristol City Centre will provide significant opportunities to improve transport in its wider setting.





Figure 2.7 – Multiple Deprivation Indices (2007) in relation to NFH Package



Encouraging active lifestyles is one of the ways in which healthy communities can be promoted. Using methods such as personalised travel planning, individuals and households are encouraged to walk and cycle more as part of their everyday routines – for work, education, shopping and leisure purposes. Active travel modes are usually combined with public transport for longer distance journeys, and a high quality public transport system can encourage people to experiment with changing how they travel around. Figure 2.8 shows that approximately 18,400 existing households are within 400 metres (10 minutes walking distance) of a rapid transit stop – with new committed developments emerging along the route of the rapid transit, this will increase over time. Furthermore the implementation of improvements to pedestrian and cycle facilities along the route of the rapid transit network will bring positive benefits for improving and promoting healthy communities.







2.3 Scheme Objectives

In order to properly appraise the NFH Package and identify the most appropriate route and scheme options, it is very important to identify the policy objectives against which the performance of the system will be measured. This follows the approach adopted by DfT for the appraisal of all major transport schemes, and adds transparency and equality to the decision making process.

The scheme objectives for the NFH Package are first articulated in high level terms through the definition of "Programme Objectives", followed by more "Project Specific Objectives", as outlined in the following sections.

2.3.1 Programme Objectives

The hierarchical structure of transport policy development and delivery in the UK means that all high level policy objectives must essentially 'nest' within the framework of central Government transport objectives. This is driven by the five transport goals identified in the DfT's Transport Strategy – "Delivering a Sustainable Transport Strategy" (DaSTS). In the context of the West of England, this also includes the Greater Bristol Strategic Transport Strategy (GBSTS), the West of England Vision and the Joint Local Transport Plan.

A number of high level Programme Objectives have been identified for the NFH Package – these are outlined in the panel below.

North Fringe to Hengrove Package – Programme Objectives

- To support a buoyant economy, improve quality of life for sub-regional residents and improve local and national travel;
- To encourage the shift to new forms of public transport and realise the associated environmental, climate change, safety and health benefits;
- To tackle congestion and therefore the economic, environmental and health damage that is associated with it;
- To enhance the opportunities for regeneration and sustainable growth through the linking of areas of economic and housing expansion; and
- To promote equality of opportunity and security through improved connectivity to education, employment, leisure, health and retail facilities.

2.3.2 Project Specific Objectives

In order to distinguish between the different elements and geographical areas of the NFH Package, we have disaggregated the high level objectives into more 'project specific' objectives i.e. those that are directly related to the different geographical areas covered by the NFH Package. A total of fifteen project specific objectives have been identified and agreed within the following three categories:

- Bristol City Centre and M32 Corridor;
- North and East Fringe area; and
- South Bristol.

The project specific objectives are summarised in Table 2.1 overleaf. For ease of reference, we have 'nested' these within the five over-arching programme objectives.



Table 2.1 – NFH Package Scheme Objectives

Overarching DaSTS Goals	Support national economic competitiveness and growth; improve quality of life.	Tackling climate change; contribute to better safety, security & health.	Tackling climate change; contribute to better safety, security & health.	Support national economic competitiveness and growth; promote greater equality of opportunity.	Promote greater equality of opportunity; improve quality of life.
NFH Programme Level Objectives	Support a buoyant economy, improve quality of life for sub-regional residents and improve local and national travel.	Encourage the shift to new forms of public transport and realise the associated environmental, climate change, safety and health benefits.	Tackle congestion and therefore the economic, environmental & health damage that is associated with it.	Enhance the opportunities for regeneration and sustainable growth through the linking of areas of economic and housing expansion.	Promote equality of opportunity & security through improved connectivity to education, employment, leisure, health & retail facilities.
Bristol City Centre & M32 Corridor – Project Objectives	Support a buoyant economy; improve quality of life through an extended choice of transport modes for all; to improve access to education, retail, tourism and employment in central Bristol.	Encourage the shift to new and existing forms of sustainable transport for orbital movements through and radial journeys to/from central Bristol and the M32 Corridor, realising the associated environmental, climate change, safety and health benefits.	Tackle congestion in Bristol City Centre and the M32 Corridor to limit the economic, environmental & health damage that is associated with it.	Support sustainable development in the developments of central Bristol such as Harbourside, Temple Quay, Cabot Circus, Temple Meads, St Pauls, Old Market and Lawrence Hill, linking with South Bristol, North Fringe and East Fringe.	Promote equality of opportunity through improved connectivity for, to/from the North Fringe, East Fringe and South Bristol to central Bristol, to education and employment facilities.
North and East Fringe – Project Objectives	Support a buoyant economy; improve quality of life through an extended choice of transport modes for all; to improve access to education and employment in the North and East Fringe of Bristol, including the proposed Science Park.	Encourage the shift to new and existing forms of sustainable transport for orbital and radial journeys and realise the associated environmental, climate change, safety and health benefits, in particular on the M32 and A4174 corridors.	Tackle congestion in the Stoke Gifford area and along the A4174 and M32 corridors to limit the economic, environmental & health damage that is associated with it.	Support sustainable development in the committed developments of Harry Stoke, East of Coldharbour, Cheswick, Emerson's Green East & SPark by linking with key employment areas including Bristol City Centre and the North Fringe and onward connectivity into South Bristol.	Promote equality of opportunity through improved connectivity for the Bradley Stoke, Stoke Gifford and Emerson's Green areas to education and employment facilities as well as onward connectivity into Bristol City Centre and South Bristol.
South Bristol – Project Objectives	Support a buoyant economy; improve quality of life through an extended choice of transport modes for all; to improve access to education and employment.	Encourage the shift to new and existing forms of sustainable transport for orbital and radial journeys and realise the associated environmental, climate change, safety and health benefits.	Tackle congestion in the Bedminster area and limit the economic, environmental and health damage that is associated with it.	Support sustainable development and regeneration in South Bristol, including at Hengrove Park and Knowle West by providing transport links that facilitate inward investment in South Bristol and onward connectivity into Bristol City Centre and the North / East Fringe.	Promote equality of opportunity through improved access to employment, retail, community, leisure and educational facilities, particularly in Hengrove Park, Bedminster, Bristol City Centre and the North / East Fringe.


2.3.3 NFH Package (Central Case) and Scheme Objectives

The panel below provides a high level summary of how the NFH Package (Central Case) addresses the programme and project level scheme objectives.

NFH Package (Central Case) and Programme / Project Objectives

To support a buoyant economy, improve quality of life for sub-regional residents and improve local and national travel.

The NFH Package addresses the above objective by providing a high quality public transport service that helps to alleviate congestion on strategic and local roads; providing public transport users with improved journey time reliability; extending travel choices to a wide sector of the community; and by improving access to areas of employment in South Bristol, Bristol City Centre, and the North and East Fringes. The scheme also provides improved access to areas of education, retail, leisure and tourism.

To encourage the shift to new forms of public transport and realise the associated environmental, climate change, safety and health benefits.

The NFH Package addresses the above objective by promoting a shift to existing (i.e. park and ride) and new forms of public transport (i.e. rapid transit). The NFH Package will also result in a movement of trips away from car journeys resulting in an overall beneficial effect on greenhouse gas emissions and air quality; and road safety. Encouraging people to walk and cycle, as part of a wider public transport trip, will have beneficial health impacts on users of the system.

To tackle congestion and therefore the economic, environmental and health damage that is associated with it.

The NFH Package addresses the above objective by providing a high quality public transport service that helps to alleviate congestion on strategic and local roads, particularly along the M32 corridor; the North and East Fringe areas; the Stoke Gifford area; and Bedminster town centre. The NFH Package will result in a movement of trips away from the private car as people who would otherwise not use public transport realise the advantages afforded by fast and reliable journey times, comfortable and clean vehicles, and an integrated network offering quick and easy access to many parts of the City.

To enhance the opportunities for regeneration and sustainable growth through the linking of areas of economic and housing expansion.

- The NFH Package addresses the above objective by supporting sustainable development and onward connectivity from residential areas in many parts of the City, including Bristol City Centre; Hengrove Park and Knowle West in South Bristol; Emersons Green East and the proposed Science Park in the East Fringe; Harry Stoke, Aztec West, Coldharbour Lane and UWE in the North Fringe.

To promote equality of opportunity and security through improved connectivity to education, employment, leisure, health and retail facilities.

- The NFH Package addresses the above objective by providing direct public transport services connecting residential and employment areas in South Bristol, Bristol City Centre and the North and East Fringe areas. The scheme proposals will also connect many areas to retail, leisure, community, education and tourism facilities.

2.4 Identification of Central Case

2.4.1 History of Scheme Development

2.4.1.1 Greater Bristol Strategic Transport Study

The importance of the West of England sub-region to the South West and our current and forecast transport issues have long been recognised. A comprehensive transport study to assess the current and future strategic transport needs of the West of England region up to 2031 was completed in 2006. Known as the Greater Bristol Strategic Transport Study (GBSTS), this was commissioned by the Government Office for the South West in partnership with the Highways Agency and the West of England Authorities.

GBSTS went on to develop a series of transport strategies for the sub-region for the period up to 2031. The Plan's proposals represent a balanced and multi-modal approach to transport that takes into account the latest guidance and experience on sustainable local transport provision. It provides comprehensive proposals for all modes of transport through the Greater Bristol area, in particular identifying an integrated programme of major transport improvements. Key to this programme is the development and implementation of a comprehensive rapid transit network – a major element of the delivery of a step change in the quality of public transport in the sub-region. GBSTS also identified a need for the Stoke Gifford Transport Link to relieve congestion in the North Fringe and a new park and ride in the M32 Corridor.

The GBSTS identified that the rapid transit network should:

- Extend choice of transport modes for all, in particular for private car drivers, to encourage a shift to public transport;
- Promote sustainable development by providing high quality public transport links;
- Improve access to public transport for areas that currently have poor provision;
- Improve integration of the public transport network;
- Promote social inclusion by improving access to employment, retail, community, leisure and educational facilities; and
- Improve safety along the corridors by reducing the use of private cars.

GBSTS set out the plan for the development of a rapid transit network, identifying corridors that would serve many of the new residential and employment developments in the sub-region. Three of these corridors were embedded in the Joint Local Transport Plan 2 (JLTP2) within the Major Schemes Programme. The rapid transit network has since been refined and identified in the current Regional Funding Allocation (2009). The rapid transit network is shown previously in Figure 1.2.

2.4.1.2 Feasibility Studies

At the beginning of 2006 the West of England Authorities began to look at the delivery of the rapid transit network and commenced work on a series of detailed feasibility studies to look possible corridors and routes as well as priorities. A summary of the relevant feasibility studies is outlined below.



Public Transport Corridor Options Study (January 2007)⁴

The Public Transport Corridor Options Study was commissioned to look at the delivery of rapid transit in the sub-region and to recommend a detailed and prioritised programme of delivery. The study, which was completed in January 2007, was undertaken in two main stages:

- Stage 1a reviewed the policy and planning background to rapid transit and looked at all the potential routes within the identified rapid transit corridors to generate a long list of route options. A total of 32 different route alignments, including on-street options and segregated corridors, were identified;
- Stage 1b undertook a high level qualitative assessment which reduced the above list of 32 different route alignments to 10. Options taken forward were those rated low impact / high benefit; and
- Stage 2 involved both a qualitative and quantitative assessment (where impacts and benefits could be quantified at the stage of development) against the same criteria as Stage 1b but with the options developed to a more detailed stage.

The report concluded that there were three of four corridors which would be strong contenders for rapid transit, both in terms of meeting the aims and objectives for rapid transit but also in terms of deliverability. A number of these identified destinations to Hengrove / Hartcliffe, Emersons Green, the North Fringe and Cribbs Causeway form the basis of the rapid transit network within the NFH Package.

Corridor Options Short List Report (May 2007)⁵

Subsequent, more detailed work was undertaken on the short listed corridors identified in the Public Transport Corridor Options Study. This feasibility work looked at each corridor in more detail taking into consideration the following:

- Detailed service specification;
- Land ownership and property impacts;
- Planning and policy fit (in more detail);
- Fit with the wider West of England major schemes programme;
- Environmental issues;
- Patronage / catchment; and
- Fit with the RFA delivery programme.

This report concluded that the "Hengrove / Hartcliffe to North Fringe" route should be progressed as the second priority route after "Ashton Vale". The recommendations from the above report informed the formulation and agreement of the sub-region's RFA2 programme in Autumn 2008, and subsequently included in the South West Region's advice to Government submitted in February 2009, including the specification of the NFH Package.

 ⁴ "Greater Bristol: Public Transport Corridor Options" – Final Report, January 2007, Steer Davies Gleave.
 ⁵ "West of England Partnership: Bus Rapid Transit – Corridor Options Short List Report" – May 2007, Steer Davies Gleave.



Technology Review (September 2007⁶, September 2008⁷ and December 2009⁸)

A series of studies conducted over the past five years have exhaustively concluded that the technology best suited to the delivery of the rapid transit network in the West of England subregion is a high quality bus-based system. It is considered that bus-based technology is best suited to the delivery of the scheme objectives for the West of England sub-region, is best able to deliver within the required timescales, is most flexible in supporting development and economic growth, and is able to provide the required step change in the provision of public transport.

A technology review was first carried out in September 2007. This study looked at a wide range of technologies including monorail, conventional tram, ultra light rail tram, trolley bus, guided bus, high quality conventional bus, and enhanced bus. The study examined the different system characteristics of each technology option and considered the benefits and disbenefits of each in relation to the local context. The study concluded that a bus-based system would best meet the scheme objectives and represent value for money.

A further technology review was carried out in September 2008 for the Ashton Vale to Temple Meads / Bristol City Centre rapid transit route. This review consisted of the following:

- A high level strategic review of all the technology options identified previously;
- A technical review of the individual technologies, looking at the application, operation, opportunities and constraints of the vehicle technologies and infrastructure; and
- A comparative assessment of the individual technologies, looking at the application of the technology to the rapid transit network to assess the appropriateness of the technologies and the possible issues raised; and to provide a cost comparison of the technologies when applied to a particular route.

This study concluded that the technology options of mass rapid transit, heavy rail, light rail, conventional bus and automated people movers were not appropriate technologies for the West of England rapid transit network. Concentrating on the remaining technologies – Tram-Train, Ultra Light Rail technologies and Bus Rapid Transit – the study concluded that the risks associated with delivering a bus-based system were considerably lower and that the implementation of a Tram-Train or Ultra Light Rail system was undeliverable under the current regional funding allocations for the Ashton Vale to Temple Meads / Bristol City Centre rapid transit route.

With regard to the NFH Package, a further technology review was also carried out in December 2009 to confirm the above conclusions for the North Fringe, East Fringe and South Bristol rapid transit routes. This is discussed further in section 2.4.2.5 below.

2.4.2 Identification of NFH Central Case

The NFH Package will make a positive difference to travelling in the North and East Fringes of Bristol and improve links with the south of Bristol via the city centre. The scheme includes the following:

- Three new bus-based rapid transit routes serving the North Fringe, East Fringe and South Bristol via Bristol City Centre;
- A new transport link in the North Fringe the Stoke Gifford Transport Link;

⁶ "West of England Partnership: Greater Bristol Bus Rapid Transit (BRT): Technology Review of Systems" – September 2007, Halcrow Group Limited.

⁷ "West of England Rapid Transit: Technology Review" – Final Report, September 2008, Steer Davies Gleave.

⁸ See section 3.4.2.5 and Appendix 3.C



- New bus-based park and ride facilities for the M32 Motorway as well as sites at Emersons Green East and Parkway North; and
- Interchange and urban realm improvements in the City Centre.

The options assessment work for the selection of the NFH Package Central Case is detailed in the attached Options Assessment Report – attached at **Appendix 2.B**. A summary of the key findings is outlined below.

2.4.2.1 Stoke Gifford Transport Link

The 'Winterbourne Bypass' was first proposed in the mid-1980s to provide a strategic route between Yate and Bristol, which would bypass Winterbourne / Frampton Cotterell, and improve access to the county and motorway network.

A proposal for the bypass was included in the Avon County Structure Plan of 1994, and assessed as part of the Avon North West Sector Study.

Although the study recommended the full scheme, it showed that the economic case for the southern section of the proposed route (from the Great Stoke Way to the A4174 Avon Ring Road at Harry Stoke) was stronger than that for the northern section (from Great Stoke Way to Iron Acton).

In November 2005, consultants were commissioned by South Gloucestershire Council to undertake a review of the proposed 'Stoke Gifford Bypass' which would provide a link between Great Stoke Way (at its southern end) and the A4174 Avon Ring Road.

GBSTS also identified the Stoke Gifford Transport Link as being a particularly strong performer. The scheme was predicted by this study to provide substantial relief to roads in the North Fringe including the A38 and B4057 Winterbourne Road, as well as some relief to the motorway network and the assistance of strategic local traffic movements through a reduction in congestion at the interface of local and strategic road networks. In addition, the scheme allows improved access to Bristol Parkway station, and plays a key role in the introduction of the rapid transit alignment between Cribbs Causeway and UWE.

A first section of the bypass (now known as Great Stoke Way) was constructed and opened several years ago. It was constructed to dual carriageway standard between the B4057 Winterbourne Road and the roundabout junction with Hunts Ground Road.

As part of the NFH Package, four route options were considered for the Stoke Gifford Transport Link (formerly 'bypass'); the scheme included in this MSBC bid would complete the link between Great Stoke Way and the A4174 Avon Ring Road, crossing over the main Great Western railway line and bypassing Stoke Gifford.

2.4.2.2 M32 Park and Ride

The M32 Park & Ride scheme has been identified as an integral element of the overall NFH Package. A scheme was first identified as part of an Avon county-wide strategy for bus-based park and ride in 1992. Previous studies and analysis have established the need for M32 Park & Ride as a means of tackling transport problems in central Bristol and along the M32 corridor, including its identification in GBSTS. Notwithstanding this, as part of the review of the long list of options for the NFH Package (see Options Assessment Report), a broader range of interventions were reconsidered for this corridor to ensure that this outcome remained the most appropriate transport solution.

The development and appraisal of the M32 Park & Ride scheme has been led by Bristol City Council. Initial feasibility and assessment work on possible sites located close to the M32 corridor was carried out in 2003/2004. This was recommended and extended following the DfT decision to remove the M32 from its de-trunking programme in 2007. A total of 23 sites within the M32 corridor were considered for a high level assessment including factors such as proximity to M32;



potential to abstract M32 traffic; ease of access / egress; size / topography; likely environmental impact; and acceptability to Highways Agency. A short-list of five sites were identified for further assessment, with a further two retained as possibly being necessary to facilitate access to others.

More detailed work was undertaken in March 2008 which has since been extended to improve the assessment of the short-listed sites. The five sites identified from the initial options report were assessed on the following criteria:

- Size proposed park & ride facility accommodating 1,500 or 2,500 car parking spaces;
- Accessibility direct access to / from M32; impact on the existing local road network;
- Site operation;
- National / local policy relevant transport and land use planning policy;
- Stakeholder issues Highways Agency, South Gloucestershire Council, etc;
- Site ownership no. of land owners, likely acquisition procedures / costs, and likely accommodation works;
- Potential for expansion a qualitative assessment based on size of site; and
- Preliminary ecological assessment.

To integrate the park and ride with the rapid transit proposals, the site located east of the M32 and north of Stoke Lane (Stapleton Smallholdings) was identified as the most appropriate location for the park & ride facility. This site, which scored high on the assessment framework, was deemed to have potential for good accessibility direct from the motorway; good site operation; and benefited from the fact that the site was already within land owned by Bristol City Council.

2.4.2.3 City Centre Options – The Centre Project

Improvements to the city centre section of the NFH Package are an important part of the success of the rapid transit scheme in terms of providing improved accessibility, integration and journey time reliability in the city centre. The city centre improvements associated with the NFH Package will build upon the proposals to be implemented as part of the Ashton Vale to Temple Meads / City Centre Rapid Transit Scheme.

Feasibility work for the consideration and prioritisation of options for remodelling Bristol City Centre commenced back in 1994. At that time, the City Centre experienced conflict between public transport, general traffic and pedestrian movements and the need to promote change had been long recognised in a range of Bristol City Council policy documents including the City Centre Local Plan and the deposit Bristol Local Plan. The growing momentum behind the adjacent 'Harbourside' urban regeneration project had also highlighted the need to improve pedestrian, cycle and public transport links into this critical part of the city.

The initial feasibility work, carried out through a joint Bristol City Council / Avon County Council working group and participatory stakeholder forum, generated a total of six remodelling 'ideas'. Following further work, and public consultation in October 1994, these ideas were refined into a long-list of 4 options (options A to D). In September 1995, following reports to the City Council committees, two short-listed options were identified for further assessment as follows:

- Option A the creation of a pedestrian precinct outside The Hippodrome, with general traffic diverted onto Broad Quay and Colston Avenue (east), and a bus interchange on Colston Avenue (west); and
- Option D the removal of general traffic from Broad Quay, and closure of Baldwin Street to general traffic between Broad Quay and Marsh Street. Two-way traffic on St Augustine's Parade and Colston Avenue (west) with a bus interchange on Colston Avenue (east).



travel[•]

In April 1996 the City Council Planning, Transport and Development Committee considered both options in detail and endorsed 'Option D' as the preferred solution – now known as 'The Centre Project'. However, during 1997, the same committee decided that the implementation of the scheme should be staged to ensure that the critical removal of private vehicles from Baldwin Street would be implemented in line with the delivery of further schemes and strategies in the Avon Area Transport Plan in order to ensure that overall accessibility to the city centre by all modes was maintained. 'Stage 1' of The Centre Project was formulated to deliver the southern section of the preferred scheme but retained general traffic access to and from Baldwin Street (and the necessary junction arrangements around the northern section of the City Centre to maintain this movement). Stage 1 was completed in 1999, including the closure of Broad Quay to general traffic and the creation of a major civic space extending from the northern end of the Floating Harbour.

Since then significant progress has been made in the delivery of the schemes and strategies originally included in the Avon Area Transport Plan and subsequently included in the first Bristol Local Transport Plan (2000) and the Joint Local Transport Plan (2006).

In order to provide the additional accessibility for public transport vehicles and to allow for throughmovements through the city centre between South Bristol and the North and East Fringes, the second (and final) stage of The Centre Project is now being brought forward as part of the NFH Package.

The remodelling scheme for The Centre included in the NFH Package is a refined version of that originally endorsed by the City Council in 1996 and reflects changes to the highway network proposed prior to the completion of Stage 1 of the project. Further design modifications have been incorporated in the vicinity of Colston Street to reflect and build on the relationship between The Centre and the recently re-built Colston Hall music venue; and around Christmas Street to simplify the relationship between public transport routes and pedestrian desire lines. In addition, a wider range of public transport services will now be retained in Broad Quay and further consideration has been given to the quality of the arrangement of public space and pedestrian movement.

2.4.2.4 Rapid Transit Routes

The Options Assessment Report, attached at **Appendix 2.B** outlines in detail the process by which the preferred routes for the rapid transit schemes were identified. A summary of the process and key findings are outlined below.

A long-list of potential route alignments for the rapid transit schemes were identified through a review of previous studies and recommendations as well as close consultation with the Authorities' Project Teams. In addition, consideration was taken of the programme-level and project-level scheme objectives as well as the identified problems, opportunities and constraints. This ensured that the process was objective-led and based on evidence, rather than scheme-led, in line with current DfT guidance.

An initial sifting process was then undertaken in order to discard unpromising options and to narrow the long-list for further consideration and appraisal; the aim of this step was to develop a manageable number of route options for further assessment. This high level sifting process was carried out in line with emerging WebTAG guidance for proportionate appraisal. The approach adopted assessed each of the long-list scheme options on a qualitative basis against the following criteria:

West of England Partnership



- Its contribution towards the achievement of the programme and project objectives and the Government's five overarching transport goals; and
- The risk associated with the scheme option in terms of deliverability, affordability, and public and political acceptability.

Following the above approach a number of scheme options were identified to be taken forward for further appraisal. A more detailed assessment of the 'sifted' options was undertaken to identify the better performing options, which include the central case as well as the next best and/or low cost alternative options, to be taken forward for further or detailed appraisal. This assessment was also carried out in line with emerging WebTAG guidance for proportionate appraisal. The approach adopted assessed each of the 'sifted' scheme options against the following criteria:

- The 'Value for Money' case i.e. the likely efficiency or effectiveness of a particular package, within the context which it is being considered; and
- The 'Delivery' Case i.e. assessment of whether or not a particular package can be delivered in the required economic, geographical, social and timeframe (construction starts 2013/2014) context.

It should be noted that the 'Strategic' Case for each of the 'sifted' options i.e. its performance against the scheme objectives had already been determined as part of the initial sifting process. Only those schemes which meet the required programme and project objectives were short-listed.

The draft Options Assessment Report was issued to DfT in September 2009. Since then, it has been revisited and updated to take into consideration the findings from the public consultation exercise from November 2009 to January 2010. This ensures that our key recommendations for the NFH Package 'Central Case' and 'Next Best / Lower Cost Alternatives' continue to remain valid.

2.4.2.5 Technology Review

Following the 2008 Technology Review, consultants were commissioned by the West of England Authorities to undertake a further review of appropriate technologies that could be used to deliver the NFH Package. Following a strategic overview of a wide range of potential modes, the study, which was completed in December 2009, then concentrated on the rapid transit technologies of Light Weight Rail and Bus Rapid Transit in line with the recommendations from the previous studies (see section 2.4.1.2).

The study concluded that bus-based technology should be pursued for the NFH Package in line with previous recommendations. This technology was considered to best meet the rapid transit scheme objectives; it was considered the most cost-effective and flexible technology; and it can be delivered within the current programme and available funding.

Although Light Weight Rail (LWR) was not precluded from future suitable applications as part of a public transport network in the West of England area, it was considered that there was still significant development work needed before a major scheme application based on LWR could be put forward. Without a robust demonstration of costs in the delivery of LWR technology on the scale proposed for the NFH Package, the use of this technology would require the West of England Authorities to take on considerable capital cost and development risk which is unacceptable at this time. The risks associated with delivering Bus Rapid Transit are considerably lower than LWR.

A copy of the December 2009 Technology Review is attached at **Appendix 2.Ci** (Executive Summary) and **2.Cii** (Full Report).



2.5 Policy Context – Strategic Fit

This section outlines how the objectives of the NFH Package align with national, sub-regional and regional objectives, strategic local policy and themes identified as common to key policy documents. To this end, the main objectives, aims and aspirations of documents identified as being of particular relevance to the NFH Package have been taken into consideration. Section 2.5.5 then presents a more detailed analysis of the way in which the NFH Package aligns with specific policies, particularly in relation to the Joint Local Transport Plan, adopted Local Plans and emerging Local Development Frameworks for Bristol City and South Gloucestershire Councils.

Figure 2.9 provides an overview of the policy framework that has been used to inform the preparation of this policy context section.



Figure 2.9 – Policy Framework for NFH Package

It is important to demonstrate that the NFH Package objectives have a good strategic fit within the context of national, regional and local objectives, along with strategic planning, transport, social, economic and environmental policies. This being the case, a review of the documents identified in Figure 2.9 has been carried out as part of the options appraisal process. This is important in allowing the design team to ensure that the NFH Package objectives have been developed to generally adhere to and not conflict with the key priorities of policies and plans at all scales from national to local. The follows sections provide a summary overview of the policy considerations that are of relevance to the development of the NFH Package objectives.

2.5.1 National Policy

2.5.1.1 Delivering a Sustainable Transport System⁹

'Delivering a Sustainable Transport System' (DaSTS) sets out the Government's five goals for transport and outlines how the UK's post-2014 investment plans are to be developed. The five goals, which take full account of transport's wider impact on climate change, health, quality of life and the natural environment, include the following:

- To support national economic competitiveness and growth, by delivering reliable and efficient transport networks;
- To reduce transport's emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change;
- To contribute to better safety, security and health and longer life expectancy by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health;
- To promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society; and
- To improve quality of life for transport users and non-transport users, and to promote a healthy natural environment.

These five goals are underpinned by a set of 'challenges' for the UK which the DfT identified in its earlier publication 'Towards a Sustainable Transport System'¹⁰ (TaSTS).

Support Economic Growth

The Eddington study¹¹ identified that a comprehensive and high-performing transport system is a key enabler of sustained economic prosperity. The study recommended that the focus should be on travel for work in the urban areas, on the inter-urban corridors between these cities and on the principal international gateways through which freight and business travellers pass. Key principles within this goal are reliability, connectivity and resilience.

At the sub-regional level this goal is particularly relevant in terms of the West of England area and its role as the economic hub of the South West Region. Central to regional and local planning policy is a well-functioning Bristol urban area and Bath (as Strategically Significant Cities), sub-regional transport hubs such as Bristol Temple Meads and Bristol Parkway and their role in connecting the South West to the rest of the UK, and international connections through our Ports and Airports.

Tackle Climate Change

The Stern Review¹² made it clear that reducing global emissions of carbon dioxide (CO_2) and other greenhouse gases is vital if we are to avert dangerous climate change. In response to this, the UK Climate Change Bill will set ambitious targets for greenhouse gas emission reductions across the economy looking at least a 26% reduction in CO_2 emissions by 2020. This is a significant challenge for the transport sector and has therefore been included as one of the DaSTS goals.

Trips within urban areas make a significant contribution to emissions and, as such, planning at the sub-regional and local level is critical to achieving this target. At a local level, there is a need to

⁹ "Delivering a Sustainable Transport System", Department for Transport, November 2008.

¹⁰ "Towards a Sustainable Transport System", Department for Transport, October 2007.

¹¹ "The Eddington Transport Study", Sir Rod Eddington, 2006.

¹² "The Stern Review on the Economics of Climate Change", Sir Nicholas Stern, 2006.



change travel behaviour and/or reduce the need to travel. Critical to this is the shift of trips from private cars to public transport through provision of a high quality public transport system that competes with the private car.

Contribute to Better Safety, Security and Health

DaSTS aims not only to reduce the risks of accidents to transport systems to users, workers and third parties from transport but further looks to ensure that transport has a positive impact on life expectancy and physical well-being across the community.

At the sub-regional and local level we need to address the negative impacts of transport on public health and promote the health benefits of cycling and walking. These are central to regional and local policy and interwoven through the major schemes programme, which includes the NFH Package.

Promote Equality of Opportunity

Tackling disadvantage is local areas is a Government priority. DaSTS aims to have a transport system that not only promotes economic growth of all regions but also provides everyone with access to the goods and services, employment opportunities and social and leisure activities they desire. Transport can contribute to achieving wider aims, which will need to be considered as authorities prepare their Sustainable Community Strategies, Local Area Agreements and Local Development Frameworks.

The West of England sub-region is relatively prosperous but there are still areas where social inclusion and deprivation are significant issues. This goal relates to the South West and West of England objectives of achieving more balanced and sustainable communities.

Improve Quality of Life and a Healthy Natural Environment

DaSTS looks to ensure that transport contributes to improving the quality of our communities and environments. Transport can improve the quality of life through improved accessibility to the things people need, improved connectivity to the community, increased community empowerment and involvement in the transport network, particularly through use of public transport and reducing the harmful side effects of travelling and constructing transport schemes.

One of the key visions¹³ for the West of England sub-region is to have "a rising quality of life for all, achieved by the promotion of healthy lifestyles, access to better quality healthcare, an upturn in the supply of affordable housing of all types and the development of sustainable communities". This vision translates into a series of objectives for the delivery of an integrated transport system that will retain and improve the natural and social environment, ensure that alternatives to the car are a realistic first choice and offers an affordable, safe, reliable and simple system to use.

2.5.1.2 2008 Local Transport Act

The 2008 Local Transport Act is a key part of the Government's strategy to empower local authorities to take appropriate steps to meet local transport needs. It is intended that the Act will give local authorities the powers to improve the quality of local bus services. The West of England authorities intend to use the new powers afforded by the Act, particularly the measures that look to improve partnership working between local authorities and bus operators, including further voluntary partnership agreements and quality partnership schemes.

2.5.1.3 Planning Policy Statements and Guidance

Planning policy at the regional and local level is prepared in the context of national guidance issued by central government. This is presented in a series of Planning Policy Guidance (PPG)

¹³ "2026 – the vision for the West of England in 2026 and delivery priorities", West of England Partnership, September 2005



and Planning Policy Statements (PPS). Those considered of relevance to the development of the NFH Package proposals are as follows:

- PPS1 Delivering Sustainable Development, January 2005;
- PPG2 Green Belts, January 1995;
- PPS3 Housing, November 2006;
- PPS4 Planning for Sustainable Economic Growth, December 2009;
- PPS9 Biodiversity and Geological Conservation, August 2005;
- PPS12 Local Spatial Planning, June 2008;
- PPG13 Transport, April 2001;
- PPG15 Planning and the Historic Environment, September 1994;
- PPG16 Archaeology and Planning, November 1990;
- PPS22 Renewable Energy, August 2004;
- PPS23 Planning and Pollution Control, November 2004;
- PPG24 Planning and Noise, October 1994; and
- PPS25 Development and Flood Risk, December 2009.

In the interests of avoiding unnecessary repetition, this document does not include summaries of the various guidance documents. However, Table 2.3 highlights the common themes through the inclusion of references to the relevant PPGs and PPSs – the potential for the NFH Package to achieving compliance to the guidance is considered in this context.

2.5.2 Regional Policy

2.5.2.1 Regional Funding Allocation

In February 2009 the South West Regional Assembly submitted its 'South West Regional Funding Advice 2009-2019' (RFA2) to the Government setting out recommended priorities for major transport investment. RFA2 includes eleven major schemes in the West of England representing a total potential investment of over £600m. A total of £168.08million is identified for the North Fringe to Hengrove Package from 2013/14, as outlined in Table 2.2 below.

Sohomo	£ million (outturn prices)						
Scheme	2013/14	2014/15	2015/16	2016/17	Total		
North Fringe to Hengrove Package	£38.00m	£50.00m	£52.04m	£28.04m	£168.08m		

Table 2.2 – Extract from the South West Regiona	I Funding	Advice	2009-2	019
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The above figures exclude DfT contributions towards eligible scheme preparation costs incurred prior to 2013/14. In addition, it should be noted that since the publication of the RFA2, we have since been notified that the allocation for 2013/14 will reduce to £19m with the remaining £19m being allocated across 2014/15 and 2015/16 – the overall total remains unchanged.

The priorities for the South West Regional Funding Advice are consistent with wider national policy objectives and support an overarching objective to "*support sustainable prosperity and improved quality of life in the South West*". This objective will therefore need to be embedded within the NFH Package proposals throughout their development.



2.5.2.2 Regional Planning Guidance 10¹⁴

Regional Planning Guidance (RPG) 10 is the adopted regional planning guidance applicable to the South West of England. It sets out a Vision of the region as follows:

"Developing the region, in a sustainable way, as a national and European region of quality and diversity, where the quality of life for residents, the business community and visitors will be maintained and enhanced."

The Vision is underpinned by four aims, detailed below:

- **Protection of the Environment:** at the regional level, environmental concerns are focused on resources and the protection of those elements of the built and natural environment that are considered to be crucial in maintaining the attractiveness of the area;
- Prosperity for Communities and the Regional and National Economy: the supporting text suggests that the key rationale for this aim is to secure a stronger position for the South West at the European level;
- **Progress in Meeting Society's Needs and Aspirations:** this is primarily linked to the provision of housing and facilities; however, reference is also made to the need to deliver improved accessibility to a wider range of destinations; and
- **Prudence in Use and Management of Resources:** this aim seeks to reduce the consumption of finite resources and maximise investment in infrastructure.

2.5.2.3 Draft Regional Spatial Strategy for the South West¹⁵

The Draft Regional Spatial Strategy (RSS) for the South West 2006-2026 was published in June 2006. The Secretary of State has released Proposed Changes to the RSS following the Public Inquiry and in September 2009, the Government Office for the South West announced that further Sustainability Appraisal work needs to be carried-out on the Proposed Changes. This work has delayed the final publication of the RSS. Currently emerging Core Strategies are planning to deliver some 86,500 homes and 95,500 jobs up to 2026 in the context of the draft RSS.

The draft RSS contains four main policies. The parts of these which are relevant to the NFH Package are:

- **SD1 The Ecological Footprint** to stabilise and reduce the region's ecological footprint, including reducing reliance on the private car and improving public transport to enable a shift towards more sustainable modes;
- SD2 Climate Change reducing the region's contribution to climate change;
- SD3 The Environment and Natural Resources to protect and enhance the region's environment and natural resources, including reducing the environmental impact of the economy, transport and development;
- **SD4 Sustainable Communities** planning and managing growth and development positively, to create sustainable communities throughout the region. This includes promoting considerable improvements to public transport.

¹⁴ Regional Planning Guidance for the South West (RPG10), Government Office for the South West / Department for Transport, Local Government and the Regions, September 2001

¹⁵ The Draft Regional Spatial Strategy for the South West 2006-2026, South West Regional Assembly, June 2006



2.5.2.4 Regional Transport Strategy

Chapter 5 of the draft RSS contains the Regional Transport Strategy (RTS). This indicates that the principal aims are to support the land use aspirations of the draft RSS, which continue the RPG aim of developing Bristol as the regional capital for the north of the region (termed as one of a series of 'Strategically Significant Cities and Towns'); and reduce the rate of road traffic growth through the achievement of the following:

- "Supporting economic development (identified in the RES) by maintaining and improving the reliability and resilience of links from the region's Strategically Significant Cities and Towns (SSCTs) to other regions (particularly the South East and London), international markets and connectivity within the region;
- Addressing social exclusion by improving accessibility to jobs and services;
- Making urban areas work effectively and creating attractive places to live by developing the transport network in support of the strategy to concentrate growth and development in the SSCTs; and
- Reducing negative impacts of transport on the environment including climate change."

The RTS proposes a core set of thirteen transport policies for the South West. Policy TR11 on intra-regional public transport is of most relevance to the NFH Package: *"Improved rail, bus and coach services will be sought to facilitate sustainable travel between settlements within the region. This will be achieved through the removal of infrastructure constraints; better quality trains and buses/coaches; enhanced station and interchange facilities, station parking and passenger information".*

The RTS identifies that a strategic rapid transit network will be a vital part of the infrastructure required to support the spatial strategy, particularly in Bristol and Bath. The draft RSS Implementation Plan sets out the major infrastructure investment required in the sub-region to implement the draft RSS and specifically includes: *"strategic rapid transit network (Hengrove/North Fringe, Ashton Vale/Emerson's Green, Bath/Cribbs Causeway)"*.

2.5.2.5 Regional Economic Strategy for South West of England¹⁶

The Regional Economic Strategy (RES) was launched in May 2006. It is concerned with the economy of the South West region as a whole, within the context of achieving sustainable development – it aims to help ensure stronger and more sustainable communities in the region, as well as communities that connect and work better with each other. The Vision for the economy is stated as follows:

"South West England will have an economy where the aspirations and skills of our people combine with the quality of our physical and cultural environment to provide a high quality of life and sustainable prosperity for everyone."

The Vision is supported by three strategic objectives. The relevance of these to the development of the NFH Package is summarised below:

- **Successful and competitive businesses:** amongst other actions, the public sector must invest in infrastructure development to build the foundations to let private sector entrepreneurship thrive;
- **Strong and inclusive communities:** the RES seeks to focus on opportunities for new sustainable growth through urban and rural renaissance; and

¹⁶ Regional Economic Strategy for the South West of England, Regional Development Agency, May 2006



• An effective and confident region: one element of achieving this objective is cited as effective transportation and communication. In particular, the RES cites congestion in urban areas, rural access and reliable connections to national and international markets as key concerns.

The RES identifies 11 headline economic priorities and of these, 3A aims to 'Improve Transport Networks'. The priority specifically cites the need to reduce congestion in the main cities and towns, stating that 'we must address the problem of congestion through sustainable transport measures.' In addition to this, the RES seeks reduced journey times to major markets and increased reliability of public transport infrastructure.

2.5.3 Sub-Regional Policy

2.5.3.1 West of England Vision¹⁷

The West of England Authorities are working together as the West of England Partnership to tackle transport and other major strategic issues. As part of this, the West of England Partnership has established an overall vision for the area which guides the setting of objectives, policies and implementation. This vision is:

- "A rising quality of life for all;
- Easier local, national and international travel;
- Cultural attractions that make the West of England a place of choice;
- Approach to delivery that is energy efficient, protects air quality, minimises waste and protects and enhances the natural and built environment; and
- To make positive use of the mix of urban and rural areas".

2.5.3.2 Greater Bristol Strategic Transport Study

Local transport policy in the West of England sub-region has been informed by the findings of a major sub-regional study which was published in June 2006. The Greater Bristol Strategic Transport Study (GBSTS) assessed the current and future strategic transport needs of the West of England region up to 2031 and it recommended the implementation of a comprehensive rapid transit network as the most appropriate, flexible and cost effective concept to deliver the required upgrade to the public transport network. The study was commissioned by the Government Office for the South West (GOSW) in partnership with the Highways Agency (HA) and the four West of England authorities.

The GBSTS identified four key public transport corridors for rapid transit that would serve many of the new residential and employment developments. Three of these corridors have been incorporated into the Joint Local Transport Plan (JLTP) as follows:

- Ashton Vale to Emerson's Green;
- North Fringe to Hengrove; and
- Bath to Cribbs Causeway.

More specifically, the GBSTS investigated the potential for a rapid transit system that:

- Serves the major new development areas providing a high-quality, high-speed, public transport link between these locations and central Bristol;
- Offers new and improved links between south Bristol and central Bristol;

¹⁷ 2026 – The Vision for the West of England in 2026 and Delivery Priorities, West of England Partnership, September 2005.



- Provides new public transport links to Portishead;
- Creates new cross-Bristol linkages; and
- Builds on the network of Showcase bus corridors which are currently being implemented.

2.5.3.3 Joint Local Transport Plan¹⁸

The Joint Local Transport Plan (JLTP) for the West of England sets out the strategy and delivery plans for improving transport in the sub-region for the five years from 2006 and sets out a vision for transport over twenty to thirty years. The JLTP combines the plans of the four councils of Bath and North East Somerset, Bristol City, North Somerset and South Gloucestershire. The JLTP is also underpinned by adopted Local Plans and supported by the emerging Local Development Frameworks.

The JLTP translated the West of England vision into aims for a local transport system, which will:

- Strengthen the local economy;
- Support the rising quality of life and more effective social inclusion of disadvantaged groups;
- Improve access and links;
- Ensure that alternatives to the car are a realistic first choice for the majority of trips;
- Offer a real choice affordable, safe, secure, reliable, simple to use and available to all; and
- Meet both rural and urban needs.

In line with the Government's four shared priorities for local transport (reducing congestion, improving road safety, improving air quality and increasing accessibility), the specific aims and objectives of the JLTP are to:

- Tackle congestion by:
 - Promoting use of alternatives to the private car;
 - Encouraging more sustainable patterns of travel behaviour; and
 - Managing the demand for travel by the private car.
- Improve road safety for all road users by:
 - Ensuring significant reductions in the number of the most serious road casualties; and
 - Achieving improvements for road safety for the most vulnerable sections of the community.
- Improve air quality by:
 - Improving air quality in the Air Quality Management Areas (AQMAs); and
 - Ensuring air quality in all other areas remains better than the national standards.
- Improve accessibility by:
 - Improving accessibility for all residents to educational services;
 - Improving accessibility for all residents to health services; and
 - Improving accessibility for all residents to employment.
- Improve quality of life by:

Strategic Case

¹⁸ Final Joint Local Transport Plan 2006/07 – 2010/11, BANES, BCC, NSC, SGC, March 2006



- Ensuring quality of life is improved through the other Shared Priority objectives, contributing towards the enhancement of public spaces and of community safety, neighbourhood renewal and regeneration, healthier communities, tackling noise and protecting landscape and diversity; and
- Achieving balanced and sustainable communities.

West of England Major Scheme Programme

One of the key priorities for the GBSTS is the implementation of the Major Scheme Programme, which includes the following proposals connected to and/or which integrate with the NFH Package:

- The Greater Bristol Bus Network (GBBN) which includes bus priority and other public transport improvements on ten sub-regional bus corridors. These bus corridors will support a much wider bus network, with up to 70 different services benefiting from the proposed improvements. Implementation of the GBBN began in late Spring 2008;
- **South Bristol Link** proposals will support regeneration, deal with traffic growth and improve orbital access in South Bristol and to Bristol International Airport; and
- **Rapid Transit Network** the foundations for a rapid transit network, including the Bath Transportation Package; Ashton Value to Temple Meads / Bristol City Centre (for which a Programme Entry Major Scheme bid submission was submitted to DfT in March 2009), and routes contained within this MSBC submission.

GBSTS identified that together, delivery of these schemes, will make a significant contribution to tackling the current and proposed transport issues and challenges in the sub-region. The rapid transit network is an important and integrated mechanism for achieving the JLTP strategy.

2.5.3.4 Local and Multi Area Agreements

The West of England Authorities have developed a Multi Area Agreement (MAA) to achieve collective outcome based targets aiming to improve economic prosperity. The MAA is designed to be a cross-boundary Local Area Agreement (LAA) that brings together key players in flexible ways to tackle issues that are best addressed in partnership, at a sub-regional level.

A combined Multi-Area Agreement (MAA) for the West of England sub-region includes a number of key objectives for transport as follows:

- Tackle congestion:
 - Promote alternatives to the car, especially public transport, walking and cycling to improve air quality, health and support the economy;
 - Improve air quality and cut carbon emissions.
- Deliver transport investment to:
 - Match projected high levels of growth in homes and jobs;
 - Contribute to delivering more mixed and sustainable communities;
 - Support economic growth and competitiveness.
- Improve access to:
 - Employment, to support economic competitiveness and the regeneration of disadvantaged communities;
 - Contribute to delivering more mixed and sustainable communities.
- Improve safety for all road users.



It is also worth noting that the MAA contains a specific action to use the NFH Package, as a national pilot for developing and testing joint measures with the West of England to increase the pace of delivery, release capacity and reduce the costs of developing and securing approval for Major Transport Schemes.

2.5.4 Local Policy

2.5.4.1 Bristol Local Plan

The current Development Plan for land falling in Bristol City Council's (BCC) administrative boundary is the Bristol Local Plan. This was adopted in 1997 and is the principal document used for Development Control purposes in Bristol at the time of writing. The implications of the NFH Package on specific plan policies are considered in Section 2.5.5.

For the purposes of identifying the strategic policy fit applicable to developing the NFH Package, the forthcoming BDF (described below) is considered a more appropriate reflection of proposed policy direction than the Local Plan. To this end, no detailed summary of the Local Plan is provided here; however, the common themes are highlighted in Table 2.3 and compliance is reviewed in this context.

2.5.4.2 Bristol Development Framework

In accordance with changes introduced by the Planning and Compulsory Purchase Act 2004, BCC is currently in the early stages of formulating a Local Development Framework for the City, which is being termed the Bristol Development Framework (BDF). Upon adoption, this will replace the Local Plan as the principal document to guide development across the City.

At present, the BDF has progressed through consultation on both Preferred Options and Development Principles to the most recent 'Core Strategy Publication Version' in November 2009. This document has been issued for public consultation (closing 15th January 2010) and the strategy includes a stated desire to deliver development in the City that catalyses Bristol towards 'a prosperous, cohesive and sustainable city, a Regional and Green Capital which is a great place to live.'

The Core Strategy sets out a series of key issues affecting development in Bristol, culminating in a Spatial Vision and Objectives for the City to 2026. This includes the statement that 'Bristol will be a city of sustainable communities that combine housing, employment, retail, education, training and leisure functions, all linked by a strong public transport network. In order to tackle congestion and air pollution, our overarching vision is for a less car dependent city and an emphasis on walking, cycling, buses, rapid transit and rail. New detailed transport plans will be brought forward to develop this vision through to delivery.' The document is also linked to The 20:20 Plan, which sets out the Sustainable Development Strategy for communities in Bristol; and the Core Strategy includes five aims that are designed to underpin sustainable development:

- 'A prosperous, cohesive and sustainable city, a regional and green capital which is a great place to live.
- A safe and healthy city made up of thriving neighbourhoods with a high quality of life.
- A city with sustainable economic and housing growth.
- An accessible and digitally connected city with a transport system which meets its needs.
- A city which reduces its carbon emissions and addresses the challenges of climate change.'

The Spatial Vision and Objectives cover development in a holistic sense and will shape the form of future development control policies. Those that are considered to be especially relevant to the NFH in terms of strategic fit are summarised below:



- The transformation of South Bristol, focusing on regeneration and the development of Knowle West and Hengrove Park;
- Growth of the City Centre to become the foremost shopping and entertainment centre in the south west, acting as a multi-modal transport hub for the region;
- Supporting Bristol's centres as the hearts of their communities, including through the provision of improved transport routes and services;
- Delivering a thriving economy across Bristol, securing additional, accessible employment opportunities;
- A City of sustainable travel where transport and development proposals will be integrated, offering improved accessibility throughout Bristol. Includes the development of new Showcase bus routes and a system of rapid transit to serve the City and support its areas of growth and regeneration;
- Sustainable communities and high quality urban design, drawing inspiration from the historic environment to shape new forms of development;
- Effective responses to climate change through the adoption of a low carbon approach to development.

The Core Strategy includes a Delivery Strategy comprising 23 policies that incorporate the 'development principles' that have already been subject to public consultation. This is an indication of some level of public and stakeholder support and, as such, those policies of relevance to NFH development are outlined below and incorporated in the Key Policy Framework (Table 2.3):

- BCS1 South Bristol will be a priority focus for development and comprehensive regeneration. Knowle West and Hengrove Park will become the main centres and infrastructure will need to support 50,000m² of new office floorspace; 5-10 ha. of new industrial and warehousing space at Novers Hill/Vale Lane; and a minimum of 10,000 new homes of mixed type, size and tenure.
- **BCS2** the City Centre will be developed to strengthen its regional focus. Infrastructure will need to underpin the development of 150,000m² of new high quality office floorspace; and 9,000 new homes emphasis is placed on the need for improved public transport and connectivity, coupled with the creation of transport hubs.
- **BCS5** incorporating the specific targets for housing in South Bristol and the City Centre, the overall target is for the delivery of a minimum of 30,000 new homes to 2026. 3,000 of these are earmarked for delivery in the Northern Arc of Bristol.
- BCS6 protection is afforded to the existing Green Belt. The policy approach envisages
 partnership working with neighbouring authorities to ensure the impact of any proposed
 green belt losses is fully considered against infrastructure requirements and existing amenity.
 Policy BCS9 relates to biodiversity and emphasises the need for any loss of valuable
 land/sites to be mitigated.
- BCS7, BCS12 these policies make the link between public transport accessibility and choice and the potential to support increased densities of development in existing centres and retail areas; as well as the delivery of community infrastructure.
- **BCS8** concerned with the delivery of a thriving economy, this policy indirectly cites transport in highlighting the need for barriers to employment to be overcome.
- **BCS10** transport and accessibility improvements are recognised as a significant requirement City-wide. This policy indicates Council support for the provision of an integrated transport system that improves accessibility and supports proposed levels of



development. Within this context, specific reference is made to the rapid transit route development including the NFH Package.

- BCS13 predominantly concerned with delivering climate change resilience through the design of built development, this policy also references the need to reduce CO₂ emissions from all sources.
- **BCS21** quality urban design is an aspiration for all development within the City. The policy references the need for design to contribute to character, local distinctiveness, promote legibility and secure the harmonious integration of different uses (i.e. including public transport infrastructure) within the public realm.
- BCS23 concerned with the control of pollution, this policy cites the need to avoid adverse
 impacts from fumes, dust, noise, vibration, smell, light or other forms of air, land and water
 pollution as part of development.

2.5.4.3 The 20:20 Plan – Bristol's Sustainable City Strategy

The '20:20 Plan' has been developed by the Bristol Partnership – a group of public and private sector organisations with interests in the City – and was adopted by Bristol City Council in November 2009. It sets out a Vision for the City, linked to the following four aims:

- Reduce Health & Wealth Inequality;
- Raising the aspiration and achievement of our children, young people and families;
- Making our Prosperity Sustainable; and
- A city of Strong and Safe Communities.

2.5.4.4 South Gloucestershire Local Plan

The South Gloucestershire Local Plan (SGLP) was adopted in January 2006 and sets out the land use policies for the authority to 2011. As with the Bristol Local Plan, the implications of the NFH Package on specific plan policies are considered in Section 2.5.5.

For the purposes of identifying the strategic policy fit that must be considered in developing the NFH Package, the forthcoming South Gloucestershire Local Development Framework (LDF) (described below) is considered a more appropriate reflection of proposed policy direction than the Local Plan. To this end, no detailed summary of the Local Plan is provided here; however, the common themes are highlighted in Table 2.3 and compliance is reviewed in this context.

2.5.4.5 South Gloucestershire Local Development Framework

Similarly to Bristol City Council, South Gloucestershire Council has commenced preparation of the Local Development Framework (LDF), which will set out the intended direction of development within the County. The Cabinet of South Gloucestershire Council approved the Core Strategy Pre-Submission Draft for Consultation in March 2010.

The Draft Core Strategy sets out the spatial portrait of the District as at 2010, key issues and development vision, along with spatial objectives and a development strategy. It sets out the overarching policies to provide strategic alignment with the Sustainable Community Strategy, join up with other plans and programmes, and fulfil the Council's high level objectives for tackling climate change and delivering sustainable communities. The Draft Core Strategy deals with issues facing each part of the District and sets out spatial policies to achieve priorities such as mixed and balanced communities, economic development, job creation and transport investment. It deals with the District as six spatial areas; the two spatial areas of particular relevance to the NFH Package are 'Communities of the North Fringe of Bristol Urban Area' and 'Communities of the East Fringe of Bristol Urban Area'.



The Core Strategy recognises that the substantial level of housing and employment growth which has taken place since the 1960s, particularly in the North and East Fringes of the Bristol Urban Area, has not been matched by the provision of essential physical and social infrastructure. As a consequence, this has resulted in high rates of traffic growth, increasing congestion, unsustainable commuting patterns and longer journey times. So, fundamental to the delivery of sustainable communities, continued economic prosperity and mitigating the impact of climate change, is reduced reliance on the private car through improvements to the public transport system, and better opportunities for walking and cycling. Improving public transport and accessibility is, therefore, integral to the Core Strategy and underpins its vision, strategic objectives and development strategy. One of these objectives makes specific reference to delivering the NFH Package. New development will be concentrated in the North and East Fringes of Bristol Urban Area to support and take advantage of the planned public transport improvements.

The policies in the Draft Core Strategy express how the vision and objectives will be achieved. So, a number of policies within this Draft Core Strategy highlight the important role of the NFH Package and demonstrate the close integration between future development and public transport improvements.

Policy CS5 (Location of Development) in the Draft Core Strategy states that "Post 2016, new neighbourhoods will be developed at Cribbs/Patchway to create sustainable communities, and to the east of Harry Stoke, the latter in the event of the delivery of the Stoke Gifford Transport Link".

Policy CS7 (Strategic Transport Infrastructure) in the Draft Core Strategy includes the NFH Package and the Cribbs/Patchway New Neighbourhood Package as key strategic infrastructure projects which will be given priority. This latter package includes land and financial contribution to that part of the NFH Rapid Transit Route which will run from Aztec West to The Mall and Cribbs/Patchway New Neighbourhoods.

Policy CS25 (Communities of the North Fringe of Bristol Urban Area) includes "Make provision for and contribute towards funding the North Fringe to Hengrove Rapid Transit route and an orbital bus service linking The Mall with Emersons Green and other strategic transport infrastructure, in accordance with Policies CS 6 & 7.".

Policy CS26 (Cribbs/Patchway New Neighbourhood) specifically refers to the new neighbourhood(s) providing for "*The Cribbs/Patchway New Neighbourhood Transport Package (see Policy CS7)…*".

The Draft Core Strategy states that "whilst the Stoke Gifford Transport Link provides a road connection it also provides a public transport link. Together the road connection and public transport link will assist in addressing the issues of congestion and movement in the North Fringe." Policy CS27 (East of Harry Stoke New Neighbourhood) states that "subject to the delivery of the Stoke Gifford Transport Link and consequent removal of land from the green belt, provision will be made for a major mixed use development of 2,000 dwellings with associated infrastructure on land east of Harry Stoke, extending south from Winterbourne Road to the A4174 Avon Ring Road."

Policy CS28 (The University of the West of England) "Improved public transport connections to and through the site and stopping points, including the provision of the Cheswick bus link, a potential rapid transit route (as part of the Bristol North Fringe to Hengrove RT route), and an improved bus interchange."

Policy CS29 (Communities of the East Fringe of Bristol Urban Area) includes "Make provision for and seek contributions towards the North Fringe to Hengrove Rapid Transit route, the Temple Meads to Emersons Green route, an orbital bus service linking The Mall with Emersons Green, and other strategic transport infrastructure".



2.5.4.6 South Gloucestershire 2026 Sustainable Community Strategy

The South Gloucestershire 2026 Sustainable Community Strategy has been developed by the South Gloucestershire Partnership. It is essentially concerned with making the areas 'a greater place to live and work', through actions aimed at implementing the Vision "...for everyone who lives and works in South Gloucestershire to fulfil their potential, enjoy an excellent quality of life and support others in their communities whilst protecting the environment."

There are seven specific objectives, of which the following two are considered to be of particular relevance to the development of the NFH Package:

- Managing Future Development this includes a sub-heading relating to travel and accessibility, seeking to achieve the following:
 - 'To deliver improvements to the transport system that tackle congestion, minimise air and noise pollution, reduce high carbon travel, enhance travel choice (particularly for public transport, cycling and walking);
 - To reduce the need to travel by promoting alternative ways of working and creating more opportunities for walking and cycling.'
- Valuing the Environment specific reference is made to climate change, stating an aspiration to cut emissions of greenhouse gases and managing the impacts of climate change.

2.5.5 Summary of Key Policy Framework

Given the inter-related nature of policy formulation, there is a considerable degree of commonality between the strategic priorities as they appear in relevant policy and strategy documents. Table 2.3 overleaf presents a cross-tabulation of common themes – this has been termed the 'Key Policy Framework' and is subsequently used as the basis for describing the strategic policy fit of the NFH Package.

The development of the NFH Package as part of a comprehensive rapid transit network for Bristol offers the potential to provide a modern and sustainable transport solution for a regional transport and economic hub, which also has SSCT status.

Rapid transit was one of the modes that were considered as part of the GBSTS. The overall assessment concluded that:

- There was a high level of demand for rapid transit, with up to 20,000 trips per hour on the system in the morning peak period in 2031;
- Approximately 20% of rapid transit passengers would have previously made the journey by car;
- Journey time savings are modest for routes already served by rail;
- The rapid transit system would reduce the number of vehicle trips across the Greater Bristol area by 2% thereby reducing the car mode share from 80% to 76%;
- A 4% reduction in total highway delay, which compares favourably with most road schemes considered as part of this study; and
- Rapid transit would relieve pressure on the rail network, reducing crowding levels by around a third.

The assessment incorporated in the GBSTS provides a clear statement of potential benefits of the NFH Package as a rapid transit scheme, focused primarily upon transport outcomes. From this it is apparent that the NFH Package will provide an additional sustainable travel mode with potential



for substantial modal shift; deliver journey time savings over some other travel modes; improve journey time reliability through reduced delays; and enhance the image, experience and perceptions of safety of public transport for users.

In addition, the NFH Package will support regional policies by improving connectivity in Bristol, thereby helping development opportunities and investor confidence, which could in turn contribute to a reduction in the need for some to travel as far to access employment opportunities. Improved access to formerly undeveloped sites, specifically those earmarked for regeneration that have yet to come forward, is likely to contribute to an improved performance in terms of achieving a sequential approach to the location of development; realising brownfield redevelopment potential may in turn reduce pressure for Greenfield expansion and large scale development within the Green Belt; and focusing investment on transport infrastructure in Bristol accords with the aim of developing the Principal Urban Area (PUAs)¹⁹ in the region, of which Bristol form one of the four regional 'capitals'.

In terms of improving the integration of transportation and development proposals, the NFH Package would improve connections between key development sites (for residential and business growth) within a designated SSCT; releasing some capacity on the M4/M5/M32 motorway network, which is highlighted as being of 'national significance' in the Key Diagram supporting the draft RSS. The NFH Package would encourage modal shift; improving accessibility to jobs and services, as well as providing better connections to areas in need of regeneration; and, with appropriate environmental mitigation, would contribute to the development of sustainable transport networks. Hence the NFH Package offers a means of underpinning the delivery of a sustainable and green capital, as referenced in the BDF Preferred Strategy.

The NFH Package presents an opportunity to catalyse housing development and, as such, achieving housing provision in the preferred locations as set out in local policy (e.g. Knowle West, Hengrove Park, Emerson's Green and Bristol North Fringe).

Investment in transport infrastructure helps strengthened the regional (and national) economy. The development of effective and efficient public transport choices offers tangible opportunities to enable the strategic road network to flow more readily, as well as allowing Bristol's residential and working population to make more environmentally aware transport choices. In securing improved public transport in Bristol, the NFH Package also offers the potential to increase the attractiveness of the city to new investors and prospective residents, both in terms of connectivity as well as improved physical environment (reduced congestion, improved local air quality, reduced noise levels and high quality design). Improved public transport accessibility and network coverage will also help to unlock access to a wider range of destinations, available to all members of the community, which is a key element of delivering social inclusiveness and sustainable communities.

¹⁹ This terminology appears in the adopted RPG10. SSCTs is the broad equivalent term in the RSS.



Table 2.3 – Key Policy Framework – NFH Package

Themes relevant to NFH Package	National Policy	Regional / Sub- Regional Policy	Local Policy	Implications and Opportunities for NFH Package
ECONOMY	·		·	
Journey Reliability: Reduce lost productive time by maintaining and/or improving the reliability and predictability of journey times on key local routes for business, commuting and freight. Includes planning for resilience and effective maintenance. Reduce road traffic growth rates.	DaSTS; PPG13 (Transport)	Vision for the West of England; JLTP; RTS.	BDF; LDF.	Tackle congestion. Minimise risks of disruption to transport infrastructure. Provide additional capacity on the public transport network and encourage modal shift. Deliver attractive public transport options that compete effectively with the car to promote modal shift.
Support Housing Growth: Support the delivery of housing, in accordance with regional and local targets by facilitating the conditions for the housing to be delivered while limiting increased congestion. Ensure new development sites are fully integrated at the outset of occupation to foster sustainable travel patterns and encourage private sector investment.	DaSTS, PPS3 (Housing); PPG13 (Transport).	RSS; RES.	BDF; The 20:20 Plan; LDF; South Glos. Sustainable Community Strategy	Connect new regeneration areas to key services and facilities by effective and efficient public transport infrastructure. Support regeneration in South Bristol, including at Hengrove Park and Knowle West; the North Fringe; and Emerson's Green, by providing transport links that facilitate inward investment. Promote sustainable travel patterns.
Improve Workforce Accessibility: Support regional economic growth by increasing size of local workforce within 30 minutes of key business centres, and improving connectivity between business centres and with national / international networks.	DaSTS; PPS4 (Planning for Sustainable Economic Growth); PPG13 (Transport).	RSS; Vision for the West of England.	LTP; Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos. Sustainable Community Strategy.	Improve connectivity to key centres of population within the wider Bristol area. Improve accessibility to public transport services. Increase the attractiveness of Bristol as a focus for new employment development.
Support Sustained Economic Prosperity: Deliver a comprehensive and high-performing transport system, particularly focused on travel for work in urban areas, inter-urban corridors and principal freight and business traveller gateways. Support ambitious and sustainable economic growth.	DaSTS; Local Transport Act (LTA); PPS1 (Delivering Sustainable Development); PPS4 (Planning for Sustainable Economic Growth).	RPG10; RSS; RES; MAA	Bristol Local Plan; BDF; SGLP; The 20:20 Plan.	Improve transport choices for all, particularly for travel to work, across the wider Bristol area. Pursue improvements in partnership working between local authorities and bus operators through LTA, delivering enhanced transport networks and services. Facilitate more effective inter- urban transport, maximising the potential of existing arterial and orbital routes. Increase the attractiveness of Bristol as a focus for new employment development.
Rapid Transit Routes: Secure the delivery of rapid transit routes connecting the North Fringe to Hengrove via the City Centre, and Ashton Vale to the City Centre, reflecting safeguarded corridors.	PPS1 (Delivering Sustainable Development); PPG13 (Transport).	JLTP; Regional Funding Allocation; RFTS; MAA; GBSTS.	Bristol Local Plan; BDF; LDF	Provide extended public transport choices, offering greater reliability than bus services targeted specifically at high movement and commuting routes. Deliver full integration of proposed regeneration and expansion areas into the wider Bristol transport network. Showcase high quality services, commensurate with the community strategy visions for Bristol and South Gloucestershire.
Investment in Infrastructure to Boost Image and Confidence: Promote public sector investment in efficient public transport infrastructure to boost confidence and catalyse private sector investment.	PPS4 (Planning for Sustainable Economic Growth); PPG13 (Transport).	RES; RSS; MAA.	BDF; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Targeted investment to deliver new services as well as upgrade existing interchange facilities. Opportunity to showcase high quality design and effective delivery mechanisms through partnership working.



Themes relevant to NFH Package	National Policy	Regional / Sub- Regional Policy	Local Policy	Implications and Opportunities for NFH Package
SOCIETY				
Health and Safety: Reduce the risk of death or injury to the public due to transport accidents. Reduce the risk of death or injury for transport industry employees and those driving for work. Achieve improvements for road safety for the most vulnerable sections of the community.	DaSTS; PPS4 (Planning for Sustainable Economic Growth).	RTP; JLTP; MAA	Bristol Local Plan; BDF; The 20:20 Plan; LDF; South Glos Sustainable Community Strategy.	Tackle congestion in Bristol City Centre and on a number of key corridors (including M32 and A4174), realising the associated health and safety benefits. Encourage a shift to new and existing forms of sustainable transport on key radial and orbital corridors, therefore tackling congestion and improving air quality. Showcase high quality public transport provision, maximising opportunities to segregate rapid transit, thus reducing the risk of conflict and potentially improving safety.
Equality and Social Inclusion: Enhance social inclusion and the regeneration of deprived areas by enabling disadvantaged people to connect with employment opportunities, key local services, social networks and goods through improving accessibility, availability, affordability and acceptability. Contribute to the reduction in the gap between economic growth rates for different regions. Improve access to leisure activity and social contact that enhances people's personal wellbeing and sense of community.	DaSTS; PPS1 (Delivering Sustainable Development); PPS3 (Housing); PPS4 (Planning for Sustainable Economic Growth); PPS12 (Local Spatial Planning); PPG13 (Transport).	RPG10; Vision for the West of England; MAA	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Improve connectivity to/from the North Fringe, East Fringe, South Bristol and central Bristol to education, employment, retail and community facilities. Support regeneration in south Bristol, including at Hengrove Park and Knowle West, by providing transport links that facilitate inward investment. Incorporation of route options that will directly connect with planned regeneration areas to foster sustainable transport behaviours from the outset of community creation, facilitating sustainable communities. Support sustainable development and regeneration across the urban area and promote equality of opportunity through improved connectivity.
Crime and Fear of Crime: Reduce crime, fear of crime and anti-social behaviour on urban, regional and local transport networks.	DaSTS; PPS1 (Delivering Sustainable Development); PPS3 (Housing).		Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Meet current design standards and guidelines to ensure a safe and secure transport network, including consideration of the means of accessing stop infrastructure. Opportunity to upgrade the quality and image of public transport.
Public Health: Reduce social and economic costs of transport to public health, including air quality impacts. Improve health outcomes for individuals through encouraging and enabling more physically active and sustainable patterns of travel. Improve health and well-being.	DaSTS; PPG13 (Transport)	JLTP; MAA	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Encourage a shift to new and existing forms of sustainable transport and tackle congestion in some of the more densely populated parts of the Bristol urban area (including Bedminster). This will be likely to increase levels of walking and cycling and assist in improving local air quality.
Quality of Service: Improve the journey experience of transport users of urban, regional and local networks including at the interfaces with national networks and international networks. Encourage more sustainable patterns of travel behaviour. Foster community involvement and engagement.	DaSTS; PPS12 (Local Spatial Planning); PPG13 (Transport).	Vision for the West of England; JLTP; MAA	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Extend the choice of transport modes available across the sub-region, competing with the private car. Capitalise on the opportunity to upgrade the quality and image of public transport. Provide additional capacity on the public transport network and retain or enhance road network capacity as far as possible. Encourage a shift to new and existing forms of sustainable transport on key radial and orbital corridors, therefore tackling congestion. Provide connections to national rail networks and key public transport nodes within the City. Develop proposals in



Themes relevant to NFH Package	National Policy	Regional / Sub- Regional Policy	Local Policy	Implications and Opportunities for NFH Package
				consultation with those living and working in the sub- region.
Sustainable Communities: Bristol will be a city of sustainable communities that combine housing, employment, retail, education, training and leisure functions, all linked by a strong public transport network. Improve accessibility for all residents to educational and health services and employment. Integrate transport with planned development.	PPS1 (Delivering Sustainable Development); PPS3 (Housing); PPS4 (Planning for Sustainable Economic Growth).	RSS; JLTP; MAA	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Ensure provision maximises the potential to connect new regeneration foci directly to the RT network. Specifically support the sustainable development of housing sites across the sub-region, including Central Bristol (Harbourside and Temple Quay), the North Fringe (Harry Stoke, Chiswick, Emerson's Green East) and South Bristol (Hengrove Park, Knowle West). Improve connectivity to/from the North Fringe, East Fringe, South Bristol and Central Bristol to key services and facilities. This should support regeneration by providing transport links that facilitate inward investment.
ENVIRONMENT				
Tackle Climate Change: Deliver quantifiable reductions in CO_2 emissions on urban, regional and local networks consistent with supporting delivery of DfT strategic objectives and other wider Government goals. Support aspirations for a low carbon economy in Bristol. Deliver a less car dependent city and an emphasis on walking, cycling, buses, rapid transit and rail.	DfT; DaSTS; PPS1 (Delivering Sustainable Development); PPS22 (Renewable Energy); PPS23 (Planning and Pollution Control); PPS25 (Development and Flood Risk).	RSS; RES; MAA	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Encourage a shift to new and existing forms of sustainable transport on key radial and orbital corridors, therefore tackling congestion and reducing CO ₂ emissions. Tailor P&R provision to maximise the appeal to targeted user groups, thus tackling the most acute pockets of air quality issues and delivering benefits to the AQMA.
Reduce Noise: Reduce the contribution of transport infrastructure to overall noise pollution. Safeguard residential amenity.	DaSTS; PPG24 (Planning and Noise)	JLTP	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Tackle congestion in Bristol City Centre, on the M32 and A4174 and on the key corridors through Bedminster and Stoke Gifford. Meet current design standards and guidelines to ensure noise levels are minimised. Support the use of low noise technologies.
Improve Air Quality: Improve air quality in the AQMAs and ensure that air quality in all other areas remain better than the national standards.	National Air Quality Strategy; PPS23 (Planning and Pollution Control).	JLTP; MAA	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Tackle congestion in Bristol City Centre, on the M32 and on the A38 through Bedminster, all of which fall within the existing Bristol AQMA.
Biodiversity Impact: Minimise the impacts of transport on the natural environment and seek solutions which deliver long-term environmental benefits.	DaSTS; PPS1 (Delivering Sustainable Development); PPG2 (Green Belt); PPS9 (Biodiversity and Geological Conservation)	Vision for the West of England; JLTP	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Encourage a shift to new and existing forms of sustainable transport on key radial and orbital corridors, therefore tackling congestion and reducing CO ₂ emissions. Deliver a linear solution to enhancing public transport provision, which minimises land-take requirements.
Protect Landscape and Heritage Assets:	DaSTS; PPS1	Vision for the West of	Bristol Local Plan; BDF;	Minimise adverse impacts on heritage and landscape



Themes relevant to NFH Package	National Policy	Regional / Sub- Regional Policy	Local Policy	Implications and Opportunities for NFH Package
Minimise the impacts of transport on heritage, landscape and communities.	(Delivering Sustainable Development); PPG2 (Green Belt); PPG15 (Planning and the Historic Environment); PPG16 (Archaeology and Planning).	England; JLTP	SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy	assets by adopting a sequential design approach of 'avoid, reduce, mitigate'. Meet current design standards and guidelines to ensure quality of integration into the urban environment.
High Quality Built Environment: Deliver a high quality built environment. Improve the quality of transport integration into streetscapes and the urban environment.	PPS1 (Delivering Sustainable Development); PPS3 (Housing); PPS4 (Planning for Sustainable Economic Growth)	Vision for the West of England; RSS	Bristol Local Plan; BDF; SGLP; LDF; The 20:20 Plan; South Glos Sustainable Community Strategy.	Meet current design standards and guidelines to ensure quality of integration into the urban environment. Design transport infrastructure to make a positive addition to the townscape, in-line with urban design aspirations and the community strategy Visions for development.



2.6 Written Endorsement from Regional Bodies

The South West Regional Assembly and the South West Regional Development Agency support the NFH Package and the submission of this MSBC, in line with the allocations outlined in RFA2. A joint letter of support is provided at **Appendix 2.D**.

2.7 Summary

In summary, the Strategic Case demonstrates that the scheme is consistent with and will contribute to sub-regional/regional and local policy objectives in transport and other relevant areas.

The main points to note are as follows:

- Transport plays a pivotal role in the functioning of the West of England area, enabling people to access jobs, education and other facilities. The area has seen growth in demand for travel, through new development and increasing levels of mobility, which has outstripped the provision of transport infrastructure.
- Overall the volume of traffic growth on the sub-region's roads to date has impacted on air quality, has reduced the reliability of public transport and has affected the quality of life in our area. The extent of predicted housing and employment development will place further, substantial pressure on the existing transport network, and major investment in transport infrastructure to accommodate the additional trips is essential to avoid serious impacts on the economy and quality of life in the sub-region;
- The need for the NFH Package has been strategically identified and supported in subregional, regional and local policy. In particular the NFH Package is seen to provide an additional sustainable travel mode with potential for substantial modal shift; deliver journey time savings over some other travel modes; improve journey time reliability through reduced delays; and enhance the image, experience and perceptions of safety of public transport for users.
- The NFH Package is closely aligned to the objectives of DfT's 'Delivering a Sustainable Transport System' as well as the draft RSS and currently emerging core strategies, through encouraging modal shift; improving accessibility to jobs and services, as well as providing better connections to areas in need of regeneration; and contributing to the development of sustainable transport networks that should help to encourage less environmentally demanding transport choices.
- The NFH Package underpins Bristol City Council's aspiration to deliver a sustainable and green capital, and it also supports South Gloucestershire Council's emerging Local Development Framework in terms of tackling congestion and improving accessibility.
- The identification of the NFH Package 'Central Case' and 'Next Best / Lower Cost Alternatives' have followed emerging WebTAG guidance on proportionate appraisal and have taken into consideration the considerable amount of evidence available from current and previous feasibility studies. The public consultation undertaken from November 2009 to January 2010 has played a key part in the identification of the preferred scheme;
- The NFH Package is supported by the South West Regional Assembly and the South West Regional Development Agency.

3. The Value for Money Case

3.1 Introduction

This section sets out the Value for Money Case for the NFH Package. It contains the following information:

- A summary of the **preferred scheme description**, which forms the basis for the appraisal and value for money assessment;
- A summary of the scheme costs, including the capital costs, operating and maintenance costs as well as an outline of the assumptions for the quantified risk assessment and optimism bias;
- A summary of the key findings from the **traffic and passenger demand modelling** for the preferred scheme;
- The completed **scheme appraisal** (and **supporting analysis**) for the **Preferred Scheme**, using the standard Appraisal Summary Table format and current WebTAG guidance;
- A summary of the findings from the **sensitivity tests** undertaken to explore the robustness of the appraisal for the preferred scheme; and
- The key findings from the assessment of the Lower Cost Alternative and the Next Best Option (presented in the form of Appraisal Summary Tables).

Each of the above is outlined in more detail in the following sections, supported by additional information in the appendices as appropriate.

3.2 Scheme Summary Description

The NFH Package is an integrated programme of schemes designed to make a positive difference to travelling in the North and East Fringes of Bristol and to improve links with the south of Bristol via the city centre. The NFH Package will provide a programme of major enhancements to the quality and reliability of public transport corridors and associated interchanges to tackle congestion, reduce car dependency, facilitate economic growth and regeneration, enhance accessibility and reduce carbon emissions. The NFH Package includes the following:

- Three new bus-based rapid transit routes serving the North Fringe, East Fringe and South Bristol via Bristol City Centre;
- A new transport link in the North Fringe the Stoke Gifford Transport Link;
- New bus-based park and ride facilities for the M32 Motorway as well as sites at Emersons Green East and Parkway North; and
- Interchange and urban realm improvements in the City Centre.

A detailed description of the preferred NFH Package is outlined in Section 1 of this Major Scheme Business Case document. The NFH Package is an integral part of the Joint Local Transport Plan and its wider strategic context has been set out in Section 2.

3.3 Scheme Costs

3.3.1 Capital Costs for Appraisal

3.3.1.1 Public Accounts

A detailed breakdown of the scheme capital costs (and the underlying cost assumptions) is outlined in the Financial Case of this Major Scheme Business Case (section 6.2). The capital cost estimates have been based on widespread experience of similar capital works, supported by agreed schedules of rates with term contractors, as well as experience gained and knowledge-exchange from other similar rapid transit schemes, including the 'Ashton Vale to Bristol City Centre / Temple Meads Rapid Transit Scheme' and the South Bristol Link. An independent cost review has been undertaken, confirming the validity of the costs (see **Appendix 6.B**).

The total scheme cost estimate is £195.3million in outturn prices (£194.2million excluding pre-Programme Entry preparatory costs that have already been incurred). A summary breakdown of this is provided in Table 3.1 below, with further, more detailed information provided at **Appendix 6.A**. All costs below exclude allowance for optimism bias.

Item	£m (outturn prices)
Engineering works	£134,780,120
Land costs (excluding opportunity costs)	£18,050,087
Site Supervision costs	£4,430,846
Sub-total	£157,261,053
Preparatory costs (see Table 6.4)	£14,344,227
Risk Budget (see section 6.3.2)	£23,676,159
Total	£195,281,439

Table 3.1 – Summary of Preferred NFH Package Central Case Risk-Adjusted Capital Costs

3.3.1.2 Private Operator Investment Costs

In addition to the capital costs to public accounts (outlined above in Table 3.1), the scheme costs for appraisal also include the provision of new bespoke vehicles to operate the rapid transit services. This is equivalent to a gross cost of £6,875k in the opening year (2009 prices) for 28 new vehicles. Taking into account the likelihood of the rapid transit services replacing or leading to slight reductions in other competing conventional bus services, the net increase in vehicle investment costs in the opening year is estimated at £5,074k.

Subsequent fleet replacement costs are estimated as a net increase of £2,511k in 2009 prices for each entire fleet replacement over the 60 year appraisal period. It is assumed that after the initial fleet investment the entire fleet will then be replaced three times within the appraisal period. The estimated cost takes into account the likelihood of reduced fleet investment costs on competing conventional bus routes which may be reduced in frequency or withdrawn.

It is assumed that vehicle investment and replacement costs will be borne by the private operators. Details of the preferred procurement strategy for the provision of the public transport services is outlined in the Commercial Case (section 5).

3.3.2 Maintenance and Operating Costs

A detailed breakdown of the scheme maintenance and operating costs are included in the Financial Case of this Major Scheme Business Case (section 6.6.1) and summarised in Table 3.2



below. Similarly to the capital costs, the maintenance and operating costs have been based on widespread experience of similar schemes, as well as knowledge-exchange from other promoters / operators of similar rapid transit schemes. The independent cost review also considered some of these costs.

Itom	Costs (2009 Prices)				
item	Local Authority	Private Operator			
Annual maintenance costs (net increase)	£301k p.a.	-			
Annual operating costs	£1,106k p.a	£862k p.a.			
Sub-total	£1,407k p.a.	£862k p.a.			
Capital renewal costs over 60 year appraisal period	£37,486k				

Table 2.2 Summan	of Droforred NEU Dooks	an Maintananan and	Onersting Costs
Table 3.2 - Summar	y of Freieneu NFR Facka	ge maintenance and	Operating Costs

The annual maintenance costs for the scheme (net increase) are estimated at £301k p.a. (2009 prices). These costs, which will be borne by the local authorities, will cover the upkeep of the rapid transit infrastructure (including stops and ticketing), park & ride and highway (including major structures) infrastructure, ITS and RTPI systems and increased power (electric) costs. The estimated annual maintenance cost also covers additional grass cutting, fencing repair and drainage clearance costs.

Additional to the annual maintenance costs, capital renewal of guided busway infrastructure, resurfacing of extra highway space and full replacement of ITS / traffic signal equipment and ticketing infrastructure is estimated to amount to £37,486k (2009 prices) over the 60 year appraisal period. These costs will also be borne by the local authorities.

The annual operating costs for the scheme are estimated at £1,968k p.a. (2009 prices). These have been calculated and included in the appraisal of the scheme and comprise:

- Net increase in bus vehicle operating costs incurred as a result of the introduction of the new rapid transit services as well as operating costs saved as a result of likely changes to existing bus services (£862k p.a.);
- Operating costs incurred as a result of the operation of the three park and ride sites, including general costs (utilities, staff etc); security (including CCTV); and ongoing National Non-Domestic rate payments to central government (£976k p.a.); and
- Ongoing costs in relation to marketing and promotion of the rapid transit services (£100k p.a.); and
- Ongoing costs in relation to bus / rapid transit priority enforcement (£30k p.a.).

It is anticipated that the operating costs associated with the rapid transit services (and changes to existing bus services) will be borne by the private operator(s). The operating costs associated with the park and ride sites and the ongoing marketing, promotion and enforcement costs will be borne by the local authorities, which will explore options to fund these following programme entry.

Further, more detailed information on the annual maintenance and operating costs is provided at **Appendix 6.A**.



3.3.3 Risk Assessment and Optimism Bias

3.3.3.1 Quantified Risk Assessment

A Quantified Risk Assessment (QRA) has been undertaken for the NFH Package (see section 6 for further details). The outputs from the analysis detail a construction risk value for a number of given confidence levels. For the preferred NFH Package, the following risk exposures were calculated:

- 50% Confidence Level (without inflation) £6million; and
- 80% Confidence Level (without inflation) £12million.

Comparing the QRA estimates with the outturn costs estimates excluding all cost contingencies, the following QRA budgets have been established for the NFH Package:

- 50% Confidence Level £15.1million; and
- 80% Confidence Level £23.7million.

With inflation and associated inflationary risks taken into consideration, the outturn scheme cost is therefore estimated at:

- 50% Confidence Level £186.7million; and
- 80% Confidence Level £195.3million.

The risk-adjusted outturn cost estimate for the NFH Package includes a QRA allowance of £23.7million to uplift the outturn costs to the 80% confidence level. This ensures that scheme risks are sufficiently accounted for in the outturn cost estimates presented throughout this MSBC.

For scheme economic appraisal, the lower expected (or mean) outturn cost has been used. This is the weighted average of the distribution of QRA cost outputs and, for the NFH Package, is close to the 50% confidence level. Optimism bias at 44% (66% for structures) is then added to the expected outturn cost to ensure a robust economic appraisal. This approach to economic appraisal is in line with WebTAG Unit 3.5.9.

3.3.3.2 Risk-Adjusted Appraisal Costs

As shown in Table 3.3 overleaf, the economic appraisal costs for the preferred NFH Package, which include an allowance for cost risks and real cost increases but exclude optimism bias adjustments (see next section) are currently estimated at £165.6million (2009 prices).

The current cost base for the Department for Transport's TUBA (Transport User Benefits Appraisal) software is 2002. The risk-adjusted scheme costs set out in Table 3.3 have therefore subsequently been converted to a 2002 price base for economic appraisal purposes.



Table 3.3 – NFH Package Cent	al Case: Economic Appraisal Sche	me Costs (2009 prices)
U		

Item	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Total
Investment Costs ²⁰ excluding Risk Costs (without inflation)	-	-	-	£9.401m	£19.361m	£44.233m	£43.354m	£19.627m	-	£135.976m
Investment Costs including Risk Costs (but without inflation) – A	-	-	-	£9.401m	£20.517m	£49.231m	£48.124m	£21.729m	-	£149.002m
Preparation Costs (including contingencies without inflation) – B	£1.091m	£3.819m	£6.144m	£1.445m	£0.025m	£0.2m	£0.2m	£0.3m	£0.35m	£13.574m
Total Investment Costs without inflation (A+B)	£1.091m	£3.819m	£6.144m	£10.846m	£20.542m	£49.431m	£48.324m	£22.029m	£0.350m	£162.576m
Assumed Annual CCI (Construction Cost Inflation) ²¹ – D	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	6.0%	6.0%	6.0%	
Assumed Annual GI (General Inflation) – E	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	
Annual RI (Real Increase) (D/E)	1.000	1.000	1.000	1.000	1.000	1.000	1.032	1.032	1.032	
Cumulative RI – F	1.000	1.000	1.000	1.000	1.000	1.000	1.032	1.065	1.100	
Total Investment Costs (contribution due to real cost increases) – (A+B) x F	£1.091m	£3.819m	£6.144m	£10.846m	£20.542m	£49.431m	£49.877m	£23.468m	£0.385m	£165.603m

²⁰ Investment costs cover construction, land, preparatory and site supervision costs.

²¹ Inflation assumptions used in calculating the outturn costs and undertaking the economic appraisal have been adjusted to take account of the current economic climate and are in line with the DfT's WebTAG Unit 3.5.9 (January 2010, In Draft). Construction inflation is set at 2.7% to 2014 and thereafter at 6%. The QRA assessment takes account of the possibility of higher or lower than forecast inflation ranging from 1.79% to 8.79% and is in line with that agreed previously for the 'Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit' major scheme.

3.3.3.3 Optimism Bias

Optimism Bias is the tendency of scheme promoters to under-estimate costs and implementation programmes. The DfT has therefore established the necessary uplifts to apply to cost estimates to ensure that the risk of cost overrun is below certain pre-defined levels. The DfT guidance (WebTAG Unit 3.5.9) follows the generic guidance on optimism bias contained in 'The Green Book' (2003) and in 'The Supplementary Green Book Guidance on Optimism Bias' (2003).

As a project develops, it is expected that the scheme cost estimate will be refined over time, and hence it should be possible to better quantify and value risks, and to better capture the factors that contribute to appraisal optimism within the risk management process. Therefore, as the risk analysis improves as a scheme develops, it is expected that on average the risk-adjusted scheme cost estimate will increase while the applicable level of optimism bias will decrease.

For this Programme Entry Major Scheme Business Case, the following Optimism Bias factors have been applied to the risk-adjusted scheme costs:

- Investment costs (including construction, land, preparatory, site supervision, and capital renewal costs) – 44% uplift; and
- Structures-related investment costs (including the Stoke Gifford Transport Link bridges, Winterbourne Road rapid transit crossing, new bridge over the M32; and the New Cut crossing) – 66% uplift.

Structures-related investment costs account for approximately 9% of the main construction works costs (2009 prices).

3.4 Traffic and Passenger Demand Modelling

3.4.1 Overview

As outlined previously, the NFH Package has been identified as a 'pilot' scheme with DfT and the West of England Partnership for developing and testing joint measures to increase the pace of delivery, release capacity and reduce the costs of developing and securing approval for Major Transport Schemes. This has been / will be achieved from the outset through: an early inception meeting, ensuring a better and shared understanding of major scheme objectives, elements and timescales; streamlining the detailed questioning process; agreeing and committing to a joint timetable; aligning modelling and appraisal requirements proportionate to risk and complexity; and commissioning and supervision of consultants.

With regard to the modelling and appraisal requirements for the NFH Package, a detailed methodology was devised in discussion with DfT which was considered proportionate to the scale and nature of the impacts of the scheme. This was detailed in an **Appraisal Specification Report**, submitted to DfT in October 2009 and further discussed at a meeting in January 2010. A summary of our modelling approach is outlined in the following sections with the detailed Appraisal Specification Report attached at **Appendix 3.A**.

3.4.2 Overall Modelling Approach

3.4.2.1 G-BATS3 Transportation Model

The operational and economic assessment of the NFH Package has been based on modelling work using the G-BATS3 multi-modal transport model of the Bristol urban area. This covers the full geographic extent of the NFH Package with detailed zoning and network coverage. The assessment has been based on the current version of the G-BATS model (version 2.3).

The G-BATS model was developed to represent a 2006 base year and be compliant with WebTAG guidance on variable demand modelling such that the model would be fit for purpose for



the assessment of major schemes and of a potential TIF package for the West of England that included road pricing. The G-BATS3 model forms one part of a suite of models – the Greater Bristol Modelling Framework (GBMF) covering the West of England sub-region.

The model has been developed according to WebTAG guidance, though it is recognised that some elements of the G-BATS3 model could be improved by adding new data and further data collection to increase certainty on the estimation of certain types of scheme benefits. Under ideal circumstances, the G-BATS3 model would be revised and updated with new data to enable NFH forecasts and the business case to be developed with the improved model. However, to embark on a substantial model update before a Programme Entry submission was identified as being too significant a risk to achieving the longer term RFA2 programme (which assumes a funding window commencing 2013/14). The agreed approach, set out in the Appraisal Specification Report, was therefore to implement a limited model update to support the development of the business case – such that there is certainty that a robust case can be submitted at Programme Entry – with a full model improvement completed post-Programme Entry but before Conditional and Full Approval. This approach was accepted in principle by DfT following discussions at a meeting in January 2010.

3.4.2.2 Summary of Modelling Approach

The approach to the modelling and appraisal of the Programme Entry business case, as set out in the Appraisal Specification Report, is founded on the basis that:

- The G-BATS3 model is fundamentally sound for the modelling and appraisal of a major strategic scheme such as the NFH Package;
- Where greater certainty is needed to demonstrate the robustness of the NFH Package Programme Entry business case then this is achieved by targeted data collection and analysis and appropriately specified sensitivity tests; and
- Because the model will need to be updated to progress the elements of the NFH Package through statutory processes, it is intended that a full model enhancement will be completed post-Programme Entry and used to further demonstrate the robustness of the business case at Conditional and Full Approval stages.

The GBMF model development and subsequent forecasting performance have been subject to intense scrutiny by DfT in the past as part of other major schemes. This has resulted in wide ranging improvements to the model – especially the demand model component – as the DfT's WebTAG guidance has evolved over the past few years. More recently the G-BATS3 element of the GBMF has been reviewed in detail as part of the West of England's Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit Major Scheme – for which a Programme Entry business case was submitted in March 2009 (modelling subsequently approved by DfT in Autumn 2009).

The DfT's review of the Ashton Vale to Temple Meads and Bristol City Centre Rapid Transit Major Scheme identified a number of modelling issues which impacted on the degree of certainty associated with benefits attributable to certain elements of the scheme – and thereby overall confidence in the scheme's business case. An approach was agreed with DfT to provide additional evidence to address these issues for the purposes of the Ashton Vale to Temple Meads and Bristol City Centre Rapid Transit scheme. Given that the type of scheme benefits attributable to the NFH Package are very similar to those for the Ashton Vale to Temple Meads and Bristol City Centre Rapid Transit scheme, our appraisal and modelling approach has been devised to ensure that the evidential base for the NFH Package will address the same issues as part of this Programme Entry submission.

Our appraisal and modelling approach has comprised of three key elements:

 Data collection and focused updates of the G-BATS3 model to improve the representation of existing public transport demand;



- Data collection and off-line analysis to independently demonstrate model robustness and understanding of uncertainty associated with benefits; and
- Sensitivity testing making changes to key model input assumptions and (if appropriate) model
 parameters to demonstrate the level of certainty that can be attached to specific scheme
 benefits.

Each of these areas is discussed in more detail in the following sections.

Data Collection

A comprehensive programme of highway traffic surveys was undertaken in the Greater Bristol area, primarily in the northern part of the city, in order to update the G-BATS3 model and to inform the development of the NFH Package business case. The surveys, undertaken during November 2009, included the following:

- Origin-destination surveys at 6 sites in the North Fringe and A4174 areas;
- Manual classified counts at a total of 33 sites, including the 6 roadside interview sites outlined above;
- Automatic traffic counts at 44 sites;
- Journey time surveys along 6 routes; and
- Automatic Number Plate Recognition (ANPR) surveys on M32 Motorway.

In addition to the highway traffic surveys, a comprehensive programme of public transport surveys were also undertaken in the Greater Bristol area. The surveys, also undertaken during November 2009, included the following:

- Bus origin-destination passenger interviews on 20 bus routes within Bristol and South Gloucestershire; and
- Bus occupancy counts at 10 sites.

Further information on each of these surveys is outlined in the Traffic Survey Report attached at **Appendix 3.B**.

Update of Public Transport Model

As outlined above, our modelling approach to the appraisal of the NFH Package has included an update to the existing 2006 G-BATS3 Public Transport Model. The revisions have consisted of the following:

- Updating the movements within the North Fringe Hengrove corridor in the existing bus demand matrix to a 2009 base year, using the new bus origin-destination passenger interviews and bus occupancy counts collected in November 2009;
- Updating the coding of bus routes within the North Fringe Hengrove corridor to reflect November 2009 routes and frequencies. This ensures that the network representation is consistent with the bus demand matrices and newly-collected onboard bus count data. The update included coding the University services U1 to U5, which are not included in the existing G-BATS3;
- Incorporating recent changes made to the bus network and matrix in the South Bristol area for the South Bristol Link Major Scheme Business Case;
- Controlling end-end bus journey times to match travel times in the November 2009 timetable. Bus journey times were coded to match the observed end-to-end travel times in the current timetables, with the travel times along each service being based, pro-rata, on the travel times on the corresponding highway network; and


 Revalidating the bus network and matrices on the basis of newly collected on-board bus occupancy counts.

The Model Validation Report for the updated G-BATS3 Public Transport Model is attached at **Appendix 3.C**.

The base year for the Public Transport Model is 2006, although in terms of bus demand, new 2009 data has been incorporated, so the bus demand matrices are largely based on 2009 patterns of trip-making. Even though there will have been some changes in the demand patterns between 2006 and 2009, the 2009 origin-destination survey data is considered to be a far more robust and reliable estimate of bus demand that the previous G-BATS3 bus trip matrices.

In fact, at an overall level, the level of bus demand has not changed substantially in the West of England area between 2006 and 2009. It is therefore considered that bus matrices based on 2009 data are a reasonable representation of demand in 2006. While it would have been possible to update the Public Transport Model to a 2009 base year throughout, this would have created a mismatch between the Public Transport Model and the Demand Model, which operates on a 2006 base year.

Verification of the Highway Model

The G-BATS3 highway model was developed and validated according to approach and criteria set out in WebTAG. The Model Validation Report for the existing highway G-BATS model is attached at **Appendix 3.Di**.

The modelling approach adopted recognised the need to provide greater certainty on the estimation of the highway impacts of the NFH Package business case – particularly the estimation of highway benefits due to the SGTL and the M32 park and ride elements of the package.

A number of roadside interviews (origin-destination surveys) (RSIs) were undertaken in the North Fringe area in 2006 and used to update the earlier BATS2 model into the current G-BATS3 – though an element of the demand data in the G-BATS3 highway matrices is derived from earlier observed data collected for and used in the BATS2 model. This earlier data is not recent enough to fully comply with current WebTAG guidance so additional surveys were undertaken, as described above, to provide additional evidence to demonstrate the suitability of the current highway demand matrices for use in the business case, and to provide the basis for the development of a more detailed local area model that could then support this element of the package through necessary planning consents.

In addition, new traffic counts and travel time surveys were undertaken in the North and East Fringe – again for the purposes of the business case to demonstrate the suitability of the representation of the highway network model for determining the business case for the package. As with the RSI data the expectation is that, this too would provide an evidence base to enable the development of a more detailed local area model to support this element of the package through necessary planning consents.

Using the newly collected data an assessment was made of the suitability of the current G-BATS3 highway network model in the vicinity of the SGTL for providing estimates of NFH Package performance and, specifically, estimates of user benefits. The assessment is provided in **Appendix 3.Dii**.

The assessment concluded that patterns of demand currently represented in the G-BATS3 base year highway matrices across a east-west screenline, which includes the route of the proposed SGTL, are similar to those observed by the 2009 RSI surveys; and that the demand matrices form an appropriate basis for the estimation of traffic flows on the SGTL and travel time impacts for use in the NFH Package economic appraisal. An assessment was also made of the comparison of base year modelled flows across a number of screenlines with new observed counts. At a screenline level this indicated that the current model was satisfactory across the key east-west screenline where the RSIs were undertaken. It also concluded that base year times and speeds



represented by the current G-BATS3 model are within acceptable bounds, though noting that speeds represented in the base model are overall slightly higher than those currently observed. Potentially this could have the effect of under-estimating scheme benefits (as existing congestion levels are under-represented) and would not therefore result in the business case for the package being over-stated. To address this impact sensitivity tests were undertaken making base speeds lower; and this is reported further as part of the sensitivity test evidence.

Overall the assessment concluded that the G-BATS3 highway network in the vicinity of the SGTL was suitable for developing the NFH Package business case.

Verification of M32 Park and Ride Demand Forecasts

The existing G-BATS3 model includes a mechanism to estimate demand for park and ride for sites away from the centre of Bristol for movements to/from the city centre. The modelling approach used was an enhanced version of that applied for the 'Ashton Vale to Bristol City Centre / Temple Meads Rapid Transit' MSBC, which has recently been granted Programme Entry. Park and ride demand and benefits to park and ride users provides a substantial element of the package, and given the need to demonstrate the robustness of the forecasts (based on DfT's review of the 'Ashton Vale to Bristol City Centre / Temple Meads Rapid Transit' MSBC) we have supplemented the G-BATS3 park and ride demand forecasting process with an independent estimate of the level of likely park and ride demand at the M32 site. This is reported in **Appendix 3.Diii**, showing how the G-BATS3 forecasts compare favourably with those estimated using new data and by comparing with park and ride abstraction rates elsewhere in the West of England.

Demand Model Report

The G-BATS3 demand model has not been updated, except to incorporate the revisions to the bus matrices and network as outlined above. Nevertheless, the realism tests have been re-run to confirm that the updated version of the model is compliant with WebTAG. The Demand Model Report is attached at **Appendix 3.E**.

Sensitivity Testing

Sensitivity testing is discussed in more detail in Section 3.9.

3.4.3 Forecast Years and Scenarios

For this Programme Entry MSBC, the appraisal of the NFH Package Central Case (defined as the 'Do-Something' scenario) has been undertaken in relation to an agreed 'Do-Minimum' or 'Reference' scenario. The modelling framework has been developed on the basis of a 2009 base year and then employed in forecast mode to present forecast scenarios in 2016 and 2031.

The 'Reference' case scenario represents the transport and development situation which could be expected in the absence of the NFH Package. The forecast impacts of the NFH Package Central Case (the 'Do-Something') is then assessed against this Reference case. The Reference case has been derived taking into account DfT guidance on the 'Treatment of Uncertainty in Model Forecasting' (WebTAG Unit 3.15.5, April 2009) and it represents land use and transport scheme proposals which '*can reasonably expect to be delivered*' by the two forecast year years i.e. based on planned proposals which are 'near certain' or 'more than likely'. The Reference case was agreed with the Programme and Project Boards as well as the Joint Officers Modelling Group at the outset of the study – the latter to ensure consistency with other Major Scheme Bids (such as South Bristol Link) current being progressed.

Details of the definition of the Reference case and the Do-Something forecasting assumptions included in this appraisal is presented in the Demand Forecasting Report attached at **Appendix 3.F.**

3.4.4 Projected Demand and Impacts

3.4.4.1 Public Transport Passenger Demand

The following tables present the forecast patronage on each of the four rapid transit (RT) routes that make up the NFH Package. Table 3.4 below shows the total forecast patronage for each of the services in terms of total passenger boardings along each of the routes, including boardings at the three Park and Ride (P&R) sites. Table 3.5 overleaf shows the proportion of these boardings that are related to P&R, i.e. either boarding at the P&R in the inbound direction or alighting at the P&R in the outbound direction.

Applying annualisation factors shows that the four RT routes in total are forecast to attract 4.9 million passengers in 2016 rising to nearly 6 million for 2031, with service X90 attracting over half of the projected trips due to its routing which links both southern and northern Bristol urban areas to the city centre and the more frequent timetabling of this service. Park and Ride trips are forecast to account for just over 15% of the total trips made on the four RT services. The park and ride site along M32 corridor accounts for approximately 79% of the total park and ride trips on the rapid transit services.

Service		20	16			203	31	
	AM Peak Hour	Average IP Hour	PM Peak Hour	Annual (Million Pass.)	AM Peak Hour	Average IP Hour	PM Peak Hour	Annual (Million Pass.)
X90 Hengrove Park - Cribbs Causeway (via M32 P&R & UWE)	1284	905	1042	3.0	1544	1116	1305	3.7
X91 Bristol Centre - Parkway (via M32 P&R & UWE)	273	179	195	0.6	309	200	221	0.7
X92 Bristol Centre – Emerson's Green (via M32 P&R &UWE)	308	211	216	0.7	322	243	234	0.8
X93 Hengrove Park to Emerson's Green	218	188	195	0.6	269	256	244	0.8
Total	2083	1483	1648	4.9	2444	1815	2004	5.9

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^{*} Patronage stated as total number of boardings for each route combining northbound and southbound directions.

Table 3.5 - Summary of P&R only Rapid Transit Patronage: Central Case

Service		2016		2031				
	Total Daily RT P&R Legs*	Total Daily RT Trips**	% P&R RT Trips	Total Daily RT P&R Legs*	Total Daily RT Trips**	% P&R RT Trips		
RT Boardings	2,641	17,436	15.1%	3,175	21,076	15.1%		

* P&R leg defined as a boarding or alighting at a P&R site

** RT Trips defined by total number of boardings combining both north and southbound movements

Table 3.6 presents a comparison of public transport patronage across all public transport modes for movements within the NFH corridor – which is defined in Figure 3.1 – for 2016 and 2031 forecast years, comparing the central case forecast against the reference case.



As shown, the package is projected to increase PT trips by around 14% for both the 2016 and 2031 forecast years comparing the central case scheme with the reference case, noting that this includes the RT element of P&R trips.



Figure 3.1 – Sector System used to define movements in and around the NFH Package Corridor

Table 3.6 – Summary of Forecast Public Transport Movements* in the NFH Corridor: Reference Case and Central Case

		Referen	ce Case			Centra	al Case		Total PT
Movement	Bus (incl. P&R)	Rail	RT ²² (incl. P&R	Total PT	Bus (incl. P&R)	Rail	RT (incl. P&R	Total PT	Difference
2016									
AM Peak Hour	3942	450	144	4536	3041	370	1889	5301	765 (17%)
Average IP Hour	2767	71	71	2910	2046	54	1218	3318	408 (14%)
PM Peak Hour	3496	329	141	3967	2628	271	1512	4411	444 (11%)
Daily Totals	33666	2209	1084	36959	25273	1790	15095	42157	5198 (14%)
2031									
AM Peak Hour	4389	588	206	5183	3378	446	2234	6059	876 (17%)
Average IP Hour	3155	101	104	3360	2312	68	1474	3854	494 (15%)

²² Reference case includes rapid transit users on 'Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit' scheme.



		Referen	ce Case			Centra		Total PT		
Movement	Bus (incl. P&R)	Rail	RT ²² (incl. P&R	Total PT	Bus (incl. P&R)	Rail RT P&R		Total PT	Difference	
PM Peak Hour	3930	447	200	4577	2946	337	1817	5101	523 (11%)	
Daily Totals	38018	2973	1559	42550	28376	2199	18122	48698	6148 (14%)	

* Figures stated are in person trips, relates to trips where PT stage origin and destination entirely within NFH Corridor

3.4.4.2 Highway Demand on the Stoke Gifford Transport Link

Table 3.7 presents the forecast traffic flows on the Stoke Gifford Transport Link (SGTL) by time period and also as an Annual Average Daily Total (AADT).

Annual average daily flows on the southbound section of the SGTL are forecast to be just over 6600 vehicles in 2016 rising to over 9000 vehicles for 2031 forecast year. Northbound flows on the link are expected to be higher with over 10,000 daily vehicles forecast for 2031.

Period	2016	2031
AM Peak Hour	2,111	2,416
Average IP Hour	998	1,267
PM Peak Hour	1,373	1,805
AADT	16,299	20,134

 Table 3.7 – Summary of Forecast Traffic Flows* on the Stoke Gifford Transport Link

* Flows stated are all vehicles, both directions

3.4.4.3 Projected Package Impacts

Impact on Mode Shares

Table 3.8 provides a summary of mode shares for movements within the NFH corridor defined above. The package is projected to reduce car mode share in the corridor by close to 3%.

Highway Network Performance

Summary highway statistics for the central and reference cases are presented in Tables 3.8 to 3.13 overleaf. They show total travel times (pcu²³ hours) and distances (pcu kilometres), and average speeds (kph) for both the full network and a series of cordons defined by the sectors shown in Figure 3.1.

 $^{^{23}}$ PCU = passenger car units



		Refere	nce Case			Cent	ral Case		Change in Car Mode Share	
	РТ	Car	Total	Car Mode Share	РТ	Car	Total	Car Mode Share	between Central Case and Reference Case	
2016										
AM Peak Hour	4536	7168	11704	61.2%	5301	7247	12548	57.8%	-3.5%	
Average IP Hour	2910	10624	13534	78.5%	3318	10559	13877	76.1%	-2.4%	
PM Peak Hour	3967	10014	13981	71.6%	4411	10047	14458	69.5%	-2.1%	
Average Weekday	36959	106699	143658	74.3%	42157	106585	148742	71.7%	-2.6%	
2031										
AM Peak Hour	5183	8484	13666	62.1%	6059	8544	14603	58.5%	-3.6%	
Average IP Hour	3360	13531	16892	80.1%	3854	13426	17280	77.7%	-2.4%	
PM Peak Hour	4577	12384	16962	73.0%	5101	12449	17550	70.9%	-2.1%	
Average Weekday	42550	133357	175907	75.8%	48698	133036	181734	73.2%	-2.6%	

Table 3.8 – Summary of 2016 Forecast Car Mode Share for Movements in the NFH Corridor: Reference Case and Central Case

* Figures stated are in person trips



Network Area	2016 – Reference Case			201	6 – Central Cas	se	2016 – Difference			
	Total Travel Time (PCU Hr)	Total Travel Distance (PCU Km)	Average Speed (kph)	Total Travel Time (PCU Hr)	Total Travel Distance (PCU Km)	Average Speed (kph)	Total Travel Time (PCU Hr)	Total Travel Distance (PCU Km)	Average Speed (kph)	
Full Network	107873	6681054	61.9	106610	6682719	62.7	-1263	1665	0.8	
Within North/East Fringe	10277	312204	30.4	9369	313209	33.4	-909	1006	3.0	
Within City Centre	3481	51554	14.8	3555	52163	14.7	74	609	-0.1	
Within South Bristol	3051	75148	24.6	2998	75275	25.1	-53	128	0.5	

Table 3.9 – 2016 Forecast AM Peak Hour Highway Statistics

Table 3.10 - 2016 Forecast Inter-Peak Hour Highway Statistics

Network Area	2016	- Reference Ca	ase	201	16 – Central Cas	se	2016 – Difference			
	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed	
	(PCU Hr)	(PCU Km)	(kpn)	(PCU Hr)	(PCU Km)	(kpn)	(PCU Hr)	(PCU Km)	(kpn)	
Full Network	78645	5647839	71.8	78521	5642559	71.9	-124	-5280	0.1	
Within North/East Fringe	5500	242116	44.0	5523	242098	43.8	23	-18	-0.2	
Within City Centre	2238	43452	19.4	2231	44189	19.8	-7	737	0.4	
Within South Bristol	2122	62602	29.5	2108	63249	30.0	-14	647	0.5	



Table 3.11	- 2016 Forecast	PM Peak Hour	Highway Statistics
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Network Area	2016 – Reference Case			201	6 – Central Cas	se	2016 – Difference			
	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed	
	(PCU Hr)	(PCU Km)	(kph)	(PCU Hr)	(PCU Km)	(kph)	(PCU Hr)	(PCU Km)	(kph)	
Full Network	84841	5539576	65.3	84404	5540561	65.6	-438	985	0.3	
Within North/East Fringe	7714	280260	36.3	7481	279849	37.4	-233	-410	1.1	
Within City Centre	2704	47314	17.5	2730	48210	17.7	26	895	0.2	
Within South Bristol	2528	68124	26.9	2488	68660	27.6	-40	536	0.7	

Table 3.12 - 2031 Forecast AM Peak Hour Highway Statistics

Network Area	2016	- Reference Ca	ase	203	31 – Central Cas	se	2031 – Difference			
	Total Travel Time (PCU Hr)	Total Travel Distance (PCU Km)	Average Speed (kph)	Total Travel Time (PCU Hr)	Total Travel Distance (PCU Km)	Average Speed (kph)	Total Travel Time (PCU Hr)	Total Travel Distance (PCU Km)	Average Speed (kph)	
Full Network	154084	8000529	51.9	153075	8004065	52.3	-1009	3536	0.4	
Within North/East Fringe	16990	379171	22.3	16379	380732	23.2	-612	1561	0.9	
Within City Centre	6156	60592	9.8	6257	61282	9.8	101	689	0.0	
Within South Bristol	5559	95630	17.2	5356	95472	17.8	-203	-158	0.6	



Network Area	2016 – Reference Case			2031 – Central Case			2031 – Difference		
	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed
	(PCU Hr)	(PCU Km)	(kph)	(PCU Hr)	(PCU Km)	(kph)	(PCU Hr)	(PCU Km)	(kph)
Full Network	106606	6943242	65.1	106397	6936749	65.2	-209	-6493	0.1
Within North/East Fringe	8127	307766	37.9	8099	307093	37.9	-28	-673	0.0
Within City Centre	3585	53925	15.0	3679	54184	14.7	94	258	-0.3
Within South Bristol	3480	82264	23.6	3394	82865	24.4	-86	601	0.8

Table 3.13 - 2031 Forecast Inter-Peak Hour Highway Statistics

Table 3.14 - 2031 Forecast PM Peak Hour Highway Statistics

Network Area	2016 – Reference Case			2031 – Central Case			2031 – Difference		
	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed	Total Travel Time	Total Travel Distance	Average Speed
	(PCU Hr)	(PCU KM)	(крп)	(PCU Hr)	(PCU KM)	(крп)	(PCU Hr)	(PCU KM)	(крп)
Full Network	119994	6733249	56.1	117861	6733232	57.1	-2133	-17	1.0
Within North/East Fringe	13455	339676	25.2	11738	338463	28.8	-1717	-1213	3.6
Within City Centre	4867	57485	11.8	4857	57678	11.9	-10	193	0.1
Within South Bristol	4348	87431	20.1	4306	87641	20.4	-43	210	0.3

3.5 Cost-Benefit Appraisal

3.5.1 Methodology

The economic effects of the NFH Package are largely quantifiable and have been examined as part of a detailed economic assessment using the Transport User Benefit Appraisal (TUBA) software. The SATURN highway and the EMME/2 PT model output data was input into TUBA for the two forecast years of 2016 and 2031 for each of the following time periods:

- One peak hour (08:00 to 09:00) of the morning peak period (07:00 to 10:00);
- Average of six hours of the interpeak period (10:00 to 16:00); and
- One peak hour (17:00 to 18:00) of the evening peak period (16:00 to 19:00).

Annualisation factors are used in TUBA to convert hourly benefits, from each of the modelled hours, into annual benefits. Based on traffic count data including a combination of automatic and manual counts, appropriate factors were calculated. These factors varied by mode of transport as set out in Table 3.15.

Time Period	Highway	Bus / Rapid Transit	Rail
Morning Peak	2.0	2.2	2.2
Interpeak	6.0	6.0	6.0
Evening Peak	2.0	2.4	2.4
Weekend	6.0	6.0	6.0

Table 3.15 – Hourly Expansion Factors

Analysis of weekend traffic flows showed that a six hour period on Saturdays, from 11:00 to 17:00, had equivalent to or higher flows than the weekday interpeak period and as such benefits of the scheme over this period have been included in the assessment (based on outputs from the interpeak model). Traffic flows on Sundays were at a significantly lower level than those in any of the modelled periods so no benefits for Sundays have been assumed. Annualisation factors were calculated using the above hourly expansion and assuming 253 working days and 52 weekends a year.

Annualised benefits were calculated over a 60 year appraisal period, starting at 2016, the opening year of the scheme. Further information on the technical specifications applied in the calculation of scheme benefits, such as the treatment of new modes and the use of intermediate cost points, are discussed in the Cost Benefit Analysis Report attached at **Appendix 3.G**.

3.5.2 Economic Outputs

3.5.2.1 Introduction

Three tables provide the outputs of the cost benefit analysis:

- The Transport Economic Efficiency (TEE) table;
- The Public Accounts table; and
- The Analysis of Monetised Costs and Benefits (AMCB) table.

The overall economic performance of the NFH Package Central Case is summarised in the TEE table. This table examines the economic impacts of the NFH Package by looking at the following issues:



- User benefits related to travel time, vehicle operating costs and user charges (fares, parking fees etc). Impacts are calculated across all appropriate modes;
- Private sector provider impacts relate to the impact on the operating environment. The figures record net effects of operating and capital costs over revenue, and thus define the financial sustainability over the 60 year horizon; and
- Public sector provider impacts consider the particular impacts on public sector revenue (for example, parking charges) alongside capital and operating costs.

The public accounts table reflect the impacts on both local government and central government. For this appraisal, this includes the cost of grant towards the capital expenditure, and, loss of indirect taxation through reductions in fuel duty paid and loss of VAT due to consumers switching expenditure to public transport fares which are zero rated for VAT.

The TEE table benefits are summarised in the AMCB table which also provides value for money indicators for the scheme:

- Present Value of Benefits (PVB) is the scheme benefits including the economy benefits and monetised environmental, safety, and interchange benefits of the scheme;
- Present Value of Costs (PVC) is the cost to government and is made up of all government contributions to the building and operating, including tax revenues lost when users switch modes;
- Net Present Value (NPV) represents the net effects of benefits and costs once allowance for discounting has been made; and
- Benefit to Cost Ratio (BCR) refers to the rate at which benefits exceed (or not) costs to government.

The detailed TEE, Public Accounts and AMCB tables are presented for the NFH Package Central Case in **Appendix 3.G** (as part of the Cost Benefit Analysis Report) and summarised in Tables 3.16 to 3.18.

3.5.2.2 The TEE Table

The TEE table (see Table 3.16) displays the costs and benefits to users of the transport system and the private sector. The consumer user benefits category covers all trips which are not business trips and include commuting, leisure and education trips. The business category covers all trips during business time which have a higher value of time, but comprise of a lower proportion of the total journeys.

The travel time savings capture time saving benefits of the entire journey and therefore in the case of public transport captures journey time both in and outside of in-vehicle time and thus captures elements such as walk, wait and interchange time. In addition, for simplicity, the outputs also capture the valuation of the mode constant effects assumed which capture the differing perceptions between existing bus services and the new rapid transit services.



Table 3.16 – Central Case	: Transport Economic	Efficiency of the	Transport System
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Consumers	ALL MODES		ROA	D	BUS & COACH	RAIL	
User Benefits	TOTAL		Private	Cars & LGVs	Passengers		Passengers
Travel Time	380,845			143,543	234,199		3,103
Vehicle Operating Costs	13,431			13,431	0		0
User Charges	278			0	0		278
During construction & maintenance	0			0	0		0
NET CONSUMER BENEFITS	394,553	(1)		156,973	234,199		3,380
Business User Benefits			Goods Vehicles	Business: Cars & HGVs	Passengers	Freight	Passengers
Travel Time	180,771		59,639	73,047	46,249	0	1,837
Vehicle Operating Costs	15,313		10,673	4,640	0	0	0
User Charges	9		0	0	0	0	9
During construction & maintenance	0		0	0	0	0	0
Subtotal	196,093	(2)	70,311	77,688	46,249	0	1,846
Private Sector Provider Impac	ts				Passengers	Freight	Passengers
Revenue	60,017			-113	84,611	0	-24,481
Operating Costs	-22,849			-17,755	-5,094	0	0
Investment Costs	0			0	0	0	0
Grant / Subsidy	0			0	0	0	0
Subtotal	37,168	(3)		-17,868	79,517	0	-24,481
Other business impacts							
Developer Contributions	-1,752	(4)		-1,752	0		0
NET BUSINESS IMPACT	233,261	(5)=	(2)+(3)+(4)				
TOTAL Present Value of Transport Economic Efficiency Benefits 627,814 (6)=(1)+(5) Notes: benefits appear as positive numbers, while costs appear as negative numbers. All entries are discounted present values, in 2002 prices and values.							

Table 3.16 shows that users of all modes of transport, for both business and non-business use, receive time savings as a result of the scheme. Savings in vehicle operating costs are also received for each class of highway user. The only significant loss of benefit appearing is a reduction in revenue to the rail operator. This results from a mode switch from rail to use of the rapid transit lines and the new park and ride sites. There is also a small loss in revenue to operators of privately owned car parks, due to reduced traffic in the city centre.

3.5.2.3 The Public Accounts Table

	ALL MODES		ROAD	BUS & COACH	RAIL	OTHER		
Local Government Funding	TOTAL		Infrastructure					
Revenue	64		64	-	-			
Operating Costs	58,858		58,858	-	-			
Investment Costs	24,735		24,735	-	-			
Developer & Other Contributions	-1,752		-1,752	-	-			
Grant / Subsidy Payments	0		0	-	-			
NET IMPACT	81,905	(7)	81,905	-	-			
Central Government Funding								
Revenue	0		0	0	0			
Operating Costs	0		0	0	0			
Investment Costs	119,590		119,590	0	0			
Developer & Other Contributions	0		0	0	0			
Grant / Subsidy Payments	0		0	0	0			
Indirect Tax Revenues	18,858		8,704	13,874	-3,720			
NET IMPACT	138,448	(8)	128,294	13,874	-3,720			
TOTAL								
Present Value of Costs (PVC)	220,353	(9)=(7)+(8)						
	Notes: costs appear as positive numbers, while revenues and 'developer and other contributions' appear as negative numbers.							
All entries are discounted present values, in 2002 prices and values.								

Table 3.17 – Public Accounts Table

As shown in Table 3.17 above, the amount of indirect tax paid by highway users decreases as a result of the reduction in vehicle operating costs. As the level of bus patronage increases with the scheme in place, a greater expenditure on bus tickets, which are tax free, leads to a reduction in indirect tax paid. Similarly, a reduction in rail patronage leads to an increase in indirect tax.



3.5.2.4 The AMCB Table

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Table 3.18 – The Analysis of Monetised Costs and Benefits (AMCB) Table

Non-Exchequer Impacts		
Consumer Benefits	394,553	
Business Users and Providers	196,093	
Private Sector Provider Impacts	37,168	
Other Business Impacts	-1,752	
Accident Benefits	-728	
Carbon Benefits	1,603	
Net Present Value of Benefits (PVB)	626,937	
Local Government Funding	81,905	
Central Government Funding	138,448	
Net Present Value of Costs (PVC)	220,353	
Overall Impacts		
Net Present Value (NPV)	406,584	NPV = PVB – PVC
Benefit to Cost Ratio (BCR)	2.85	BCR = PVB / PVC
Note: this table includes costs and bene	efits which are regularly or oc	casionally presented in monetised form in transport

appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Table 3.18 shows that the NFH Package has a strong positive Benefit to Cost Ratio (BCR) of **2.85**. This categorises the scheme as "high value" according to DfT's Value for Money guidance, based on the AMCB table alone. However, it should be noted that this is without consideration of other elements that the DfT would include in its overall Value for Money consideration, including additional benefits outlined in the non-monetised impacts assessed within the New Approach to Appraisal (NATA) framework, which are also important in the overall value for money consideration (see section 3.7).

It should be noted that as of 1^{st} April 2010, the treatment of indirect taxation in the AMCB table will be adjusted, such that these revenues are deducted from the scheme benefits rather than added to the costs (which would have the effect of a BCR > 3).

Table 3.19 shows the completed 'before' and 'after' implementation table as outlined in MSBC guidance.

	Before Imp			
	Programme Entry	Conditional / Full Approval (simultaneous)	Post Implementation	
Capital Cost (£000s)	£149,550k			
Annual Operating Costs (£000s)	£1,968k			
Annual Maintenance Costs (£000s)	£925.8k			
Annual Revenue (£000s)	<i>Bus = £84.6k Rail = - £24.5k</i> Net = £60.0k	To be completed at	To be	
Annual Passenger / Vehicle Trips (m)	405m (2016) 513m (2031)	submission of Conditional / Full Approval	completed post implementation	
Annual Passenger / Vehicle kms (m)	957.4m (2016) 1082.7m (2031)			
Congestion Benefits (£m) (over 60 yr appraisal period)	£276m (highway) £280m (buses)			
Mode Shift (%)	2.9% (2016) 3.8% (2031)			

Table 3.19 – Before and After Implementation Comparisons

3.6 Environmental Assessment

As part of the assessment of scheme benefits, an Environmental Assessment has been undertaken on the scheme proposals. The detailed Environmental Report is attached at **Appendix 3.H(i)** and summaries of the various environmental impacts are outlined in section 3.7 below. Due to the timescales associated with the preparation of the bid and undertaking the detailed traffic modelling, the detailed modelling associated with noise and air quality are associated with earlier modelling outputs (January 2010) – since this, the scheme has been reevaluated in detail and optimised (in traffic management terms) to further reduce the impact on the road network. Therefore it is considered that the results outlined below in relation to noise and air quality represent a 'worse-case' scenario. This will be assessed in more detail as part of the next stage of scheme development and appraisal.

As part of the environmental appraisal the views of the statutory bodies were sought; including Natural England, English Heritage and the Environment Agency. Their responses have been taken into consideration and are incorporated into the overall environmental assessment. For ease of reference the formal written responses received from the statutory bodies are included at **Appendix 3.H(ii)** (please note that consultation with English Heritage was undertaken on a verbal basis only and therefore no formal written response has been received in this respect).

3.7 Scheme Benefits and Appraisal

In line with evolving DfT guidance, major schemes are required to be assessed against the following five goals and challenges:

• To tackle climate change;



- To support economic growth;
- To promote equality of opportunity;
- To improve quality of life and promote a healthy, natural environment; and
- To better safety, security and health.

A commentary on the extent to which the NFH Package Central Case achieves the above objectives and associated sub-objectives is provided in the following sections and summarised in the Appraisal Summary Table (AST) in section 3.7.6.

The assessment of the scheme benefits has been undertaken in accordance with the current or in draft version of the WebTAG guidance as outlined on <u>www.dft.gov.uk/webtag</u> - only current or 'in draft' WebTAG units have been used i.e. WebTAG Unit 2.5D (The Appraisal Process) and WebTAG Unit 3.2D (Appraisal). WebTAG units marked 'for consultation' have not been used, however, it is recognised that these may be used in further iterations of the Major Scheme Business Case (Conditional / Full Approval) if these are formally adopted in due course.

Detailed NATA worksheets, as appropriate, are attached at Appendix 3.I.

3.7.1 Tackle Climate Change

3.7.1.1 Reduce Greenhouse Gas Emissions

This sub-objective assesses the impact of the NFH Package proposal on greenhouse gas emissions (predominantly carbon (equivalent) emissions). This is done by calculating the difference between the relevant emissions under the 'reference' scenario (i.e. without the NFH Package) and the 'do-something' scenario (i.e. with the NFH Package). This volume of relevant emissions is then converted into a monetary value and a net present value (NPV) is calculated over a 60 year appraisal period. The assessment has been undertaken in accordance with WebTAG Unit 3.3.5.

The detailed methodology and results of the appraisal are outlined in the Environmental Report attached at **Appendix 3.H(i)**. The overall assessment concluded that there would be an overall beneficial impact from the scheme over the 60 year appraisal period which equates to an overall reduction in emissions of approximately 0.3% across the network. This is due to the fact that the scheme proposals result in a reduction in vehicle kilometres and associated emissions by encouraging mode switch to public transport.

3.7.2 Support Economic Growth

3.7.2.1 Improve Reliability

This sub-objective summarises the NFH Package's impact on the objective to improve journey time reliability for transport users on business, commuting and other journeys, including both passengers and freight. For most public transport journeys, it is usual to consider reliability in terms of lateness (i.e. difference between travellers' actual and timetabled arrival times). Due to the fact that detailed historical information on lateness and cancellation of services is not available at this time, it is not possible to carry out a detailed reliability quantitative assessment in accordance with WebTAG Unit 3.5.7.

In this instance, the reliability assessment has included the impact on highway modes only using outputs from the traffic model. Reliability in both the reference case and central case was calculated by applying the rule of a half to the standard deviation of journey times, in the same way it was applied to journey times when calculating time benefits. The value of reliability for any given user was calculated as a proportion of their value of time. This value of reliability was then multiplied by any improvement in reliability for that journey and so a monetised benefit was calculated.



This calculation was carried out for each modelled year and time period and benefits were annualised and interpolated / extrapolated over the 60 year appraisal period and discounted to 2002 prices, to generate a value of benefit comparable to the values displayed in the TEEs and AMCBs produced by TUBA. The results are shown in Table 3.20 – overall, the impact of the central case on reliability is £33.1million.

User Class	2016 Benefits	2031 Benefits	60 year Benefit
Car (business)	114.5	134.5	6,267
LGV	267.5	361.4	17,310
OGV	58.3	81.3	3,881
Car (non-business, low income)	30.8	5.4	432
Car (non-business, medium income)	98.2	110.6	5,182
Car (non-business, high income)	11.5	-0.3	66
Total	580.8	692.9	33,138

Table 3.20 – Reliability Benefits: Central Case (£000s, 2002 prices discounted to 2002)

With regard to public transport users, in general the NFH Package will provide an improved level of journey time reliability due to the implementation of extensive public transport priority measures as well as sections of segregated busways along the route, priority at signalised junctions and the provision of a regular frequency service. In addition, with other bus services being able to use the new rapid transit infrastructure, as appropriate, existing bus services will also benefit from improved reliability, when compared to the 'reference' case.

3.7.2.2 Improve Connectivity

This is a new sub-objective under the WebTAG (In Draft) guidance and current advice (WebTAG Unit 3.2D) is to use the analysis under WebTAG Unit 3.5.2 (Transport Economic Efficiency). Section 3.5 outlines the results from the cost-benefit analysis and the outputs from the TEE table are included in Table 3.16. It can be seen from this analysis that business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements. It should be noted that the G-BATS3 highway model cannot differentiate between commuting and non-commuting trips.

3.7.2.3 Support the Delivery of Housing

This sub-objective considers the extent to which the NFH Package proposals will support areas of new housing development i.e. new dwellings provided in or after the opening year of the scheme. In the first instance, it is important to note that there are no new housing developments along the route of the NFH Package which are specifically dependent on the scheme as a whole progressing. However, the South Gloucestershire Draft Core Strategy (published in March 2010) has identified the Stoke Gifford Transport Link to facilitate proposed new neighbourhood areas in the North Fringe. The transport interventions required to support any individual housing development along the NFH Package corridor will be assessed as part of the Authorities standard development control procedures.

3.7.2.4 Enhance Resilience

As no guidance is yet available to address the sub-objective 'enhance resilience' no comment is provided under this sub-objective at this time.



3.7.2.5 Wider (Economic) Impacts

"Wider Impacts" (WI) as considered by the DfT are:

- Agglomeration impacts as a result of increased concentration of economic activity in an area driven by improved transport accessibility;
- Output change in imperfectly competitive markets as a result of a reduction in business transport costs;
- Labour supply impacts as a result of people facing a new set of incentives (e.g. a reduction in transport cost) when choosing whether or not to work; and
- Move to more or less productive jobs as a result of people facing a new set of incentives (e.g. a reduction in transport cost) when locating and working in different areas.

WI is discussed in WebTAG Unit 2.8 (April 2009) and in greater detail in WebTAG Unit 3.5.14 (September 2009), currently under consultation. Although the document itself has not been formalised, the principles that underpin the new WebTAG unit do not differ from those that is planned to supersede.

Agglomeration impacts, output change labour supply impacts in imperfectly competitive markets benefits should be captured if:

- The area covered by the option fall within a Functional Urban Region (FUR); and
- The cost of the option is greater than £20 million.

A move to more or less productive jobs should be captured if a suitable Land Use Transport Interaction (LUTI) model is available. In addition, the DfT is in the process of formulating a new approach to appraisals, with particular emphasis on proportionality i.e. whether the level of benefit sought to be captured is in line with a scheme's primary objectives, are likely to be significant in magnitude and the cost of assessment is reasonable in this context.

Apart from "output change in imperfectly competitive markets", all other WI benefit streams would require substantial resources to estimate. Therefore, given the issue of proportionality, apart from "output change in imperfectly competitive markets", all WI benefit-streams have been assessed qualitatively.

Output Change in Imperfectly Competitive Markets

Traditionally, the benefits of journey time savings are monetised and presented as the societal benefit of a transport intervention. This is based on the theory that time (and hence money) saved can be redistributed elsewhere. This transfer requires, in economic theory, the existence of "perfect competition", so that businesses are forced, under competition, to reduce their prices (as a result of travel cost reductions), passing all the benefit to customers.

However, hardly any market can claim to be "perfectly competitive". Imperfectly competitive markets lead to lower production and higher prices than would exist in the case of perfectly competitive markets. A reduction in transport costs for businesses, as result of a scheme, allows for an increase in production which benefits businesses.

The DfT's prescribed methodology for capturing output change in imperfectly competitive markets is to apply 10% to business traveller journey time savings. Following this methodology, it is estimated that the 60-year discounted value for this benefit of WI is £18.1 million.

Agglomeration

Agglomeration refers to the spatial concentration of economic activity. When people come together, more ideas and efficiencies are likely to be generated, increasing productivity. When firms locate together, they are more likely to share input costs and draw on a larger pool of human resources.



There are some clear examples of agglomeration in the UK, such as Leeds focusing on nuclear fuel reprocessing, City of London and the Docklands focusing on financial services, and Cambridge with its science and technology cluster. In each case, there is a "pull" factor drawing specialists into an area where there is already a relative advantage compared to some other area. For example, given the high productivity of the Docklands area, a financial service firm may prefer to locate there instead of in a suburban town. If the gains outweigh the costs, and given the relative availability of space in the still-developing Docklands compared to a green-belt constrained suburban town, then the firm is likely to locate in Docklands. The suburban town in this case "loses out".

For areas to benefit from the relocation of firms, these firms need to be in sectors that are not tied to specific locations. For example, the financial sector is more "foot-loose" than public administration and the armed forces, the location of which is more determined by state intervention than market forces.

The concentration of firms increases the effective density in an area thereby generating agglomeration benefits through productivity gains, which are a function of sector-based elasticities applied to increased employment density.

The DfT's "Wider Impacts Economic Dataset" (September 2009)²⁴ classifies all jobs into four sector categories: manufacturing, consumer services, construction and producer services²⁵, out of which increases to producer services have the largest effect because this sector has a large elasticity with respect to effective density i.e. productivity increases the most when more employers and employees come together. Table 3.21 shows that the largest sector by employment in Bristol is in the high productivity high elasticity sector. Therefore the city as a whole is likely to gain from increased employment density (effective density upon which agglomeration benefits are derived).

Sector	GDP per worker (2002 prices)	% of employment	Elasticity
Producer services	£71,845	45%	0.083
Construction	£55,175	6%	0.034
Consumer services	£31,005	40%	0.021
Manufacturing	£62,675	9%	0.021

Table 3.21 - Sector employment and e	lasticity of productivity with	respect to effective density (2006)
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In terms of links to particular areas, the key transport element that induces agglomeration is the reduction in the generalised cost of travel between residential zones and employment zones, such that the benefiting employment zones gain a larger pool of human resources, thus attracting both more workers as well as more firms.

A large proportion of firms are located in the city centre. Figure 3.2 shows the accessibility to the city centre without (left) and with (right) the scheme (brighter colours indicating better access, with areas around the destination, i.e. the city centre in bright green), in relation to population density (darker colours in the middle picture) and new residential development areas (pink areas), as well as the scheme routes.

²⁴ http://www.dft.gov.uk/webtag/documents/expert/unit3.5.14c.php

²⁵ Producer services are intermediate inputs to further production activities that are mostly sold to other firms. Examples are business and professional, financial, insurance, and real estate services.





Figure 3.2 – Access to city centre from residential areas

Figure 3.2 shows that, on the whole, the scheme is likely to offer some benefits to accessing the city centre, supplementing the existing public transport network from the city peripherals to the centre. In addition, the provision of three new park & ride sites will provide an alternative travel choice for those accessing the city centre, hence improving public transport accessibility to the city centre in the longer term.

There are a number of areas outside the city centre where many firms are located. When access is improved between residential and employment zones, employment density in affected employment zones may increase, and hence providing agglomeration benefits. Figure 3.3 shows that there are several areas (circled in white) from where it would be easier to reach Aztec West business park in the Bristol North Fringe area. These areas include the new residential development zones in the east, city centre and south of the city.



Figure 3.3 – Access to Aztec West business park in relation to residential areas

A mixed use development is underway at Emerson's Green East. Figure 3.4 shows that the scheme is likely to improve access to and from west of Emerson's Green East, including Aztec West to the north and the city centre to the south (all circled in white). Such improvements help people living in Emerson's Green East to travel out to these areas to work, and also those people who live in these areas to come to Emerson's Green East to work.

travel



Figure 3.4 – Access to Emerson's Green East

Labour Supply Markets

In terms of labour supply impacts, when deciding whether or not to work, an individual is likely to consider travel time and costs (which include elements such as journey times, fares and comfort) against the wage rate of the job travelled to. Some jobs can be perceived as "too difficult to get to" to be "worthwhile". Such a decision needs to be supported by other factors concerning employment such as having the skills that match job requirements.

A transport scheme can reduce the time and cost of travel, thereby providing a new set of incentives for an individual when making his/her decision on employment, assuming they have the right skills.

When a transport scheme primarily aims at significantly shortening the journey time between a residential area which would otherwise be too far from an employment zone for residents to commute, then it would be possible to claim that the scheme has an impact in enlarging the catchment of the employment zone, and that unemployed residents, with the right skills, from these otherwise less accessible areas can now be employed.

The figures above have already demonstrated that access to employment zones are likely to be improved, some significantly, due to the scheme. Therefore, it can be expected that such improvements are likely to reduce transport inconvenience as a barrier to employment, and hence increase labour supply. However, it should be remembered that there are a number of other important barriers to employment, such as a lack of education and poor health. This issue is discussed in greater detail in the "Enhance Regeneration" section.

West of England Partnership



Move to More or Less Productive Jobs

In terms of the benefit from moving to more or less productive jobs, if there are two areas of employment, one with a higher productivity level but "cut off" from a residential zone, then the residents of that zone may predominantly work in the alternative lower productivity area. However, if a new transport scheme is introduced, which breaks down the barrier to the higher productivity area, then some residents may move to more productive jobs.

The DfT guidance suggests that the impact of moving to more or less productive jobs should be estimated if a Land Use Transport Integration (LUTI) model is available. A LUTI model has not been established for the study area. Given the uncertainty of impact discussed and the unavailability of a LUTI model, this WI benefit is not estimated for the Value-for-Money Case.

Overall, the scheme is likely to improve access the most for Aztec West and Emerson's Green, as shown in the figures above. This is likely to boost the attractiveness of these two development areas for firms to locate and workers to work, and hence generating agglomeration and labour supply benefits. However, the impact on the city centre is likely to be limited.

3.7.3 Promote Equality of Opportunity

3.7.3.1 Improve Accessibility

The 'improve accessibility' (previously known as access to the transport system) sub-objective is used to measure the extent to which the NFH Package improves the opportunities and choices that people have in connecting with jobs, services and friends and families. The appraisal of accessibility in this context focuses on the public transport accessibility aspects of accessing certain essential services and facilities.

Due to the timescales involved in the publication of the In Draft WebTAG guidance on 'social and distribution impacts of transport interventions' (January 2010) and the publication of this MSBC, it has not been possible to undertake a detailed analysis of the study area or the potential vulnerable groups likely to be affected by the NFH Package. However, a high level assessment has been undertaken using available evidence and Accession software. It is recognised that this analysis will be undertaken in more depth as part of the Conditional Approval stage.

As part of the Accession modelling, an examination was undertaken to determine the change in accessibility by public transport (on weekdays between 08:00 and 10:00) for residents of the West of England sub-region, as a result of the introduction of the NFH Package, to key destinations i.e. Bristol City Centre, Bedminster, Hengrove Park, Aztec West, Emerson's Green East / SPark and the University of the West of England (UWE).

The results, demonstrated that there is a trend of positive change among travel times of up to 60 minutes. The greatest improvements were shown to include access to Hengrove Park (up to 5.5% increase in accessibility); Emersons Green East / SPark (up to 2.9% increase); and UWE (up to 1.6% increase). The overall assessment is likely to be slightly beneficial. Figure 3.5 overleaf shows the improvements in public transport accessibility to Hengrove Park between the reference case and the 'do-something' (i.e. NFH Package). Further figures produced by the Accession model are also included in sections 3.7.2.5 and 3.7.3.4.





Figure 3.5 – Change in public transport accessibility to Hengrove Park as a result of NFH Package

3.7.3.2 Improve Affordability

This is a new sub-objective under the WebTAG (In Draft) guidance – WebTAG Unit 3.6.4D – and relates to the social impacts of changes in transport costs, resulting from transport interventions, experienced by younger and older people, people with disabilities and low income households.

As outlined previously, due to the timescales involved in the publication of the In Draft WebTAG guidance on '*social and distribution impacts of transport interventions*' (January 2010) and the publication of this Programme Entry MSBC, it has not been possible to undertake the detailed (and complex) analysis required by this sub-objective. It is recognised that this analysis will be undertaken in more depth as part of the Conditional Approval stage.

However, it is worth noting that the assumptions for fares policy underlying the modelling and appraisal of the NFH Package is to mirror existing public transport fares.

3.7.3.3 Reduce Severance

The severance sub-objective is used to measure the extent to which the NFH Package reduces the hindrance experienced by those using non-motorised modes, especially pedestrians. Severance changes are important where the transport scheme either creates barriers to pedestrians (a negative effect) or removes barriers (a positive effect).

The infrastructure associated with different types of rapid transit technology can result in varying degrees of severance depending on the location. For example, a guideway with high kerbs could have a significant adverse effect on pedestrian movements in a busy shopping district. The infrastructure associated with the rapid transit element of the NFH Package is unlikely to have a detrimental impact on severance as the majority of the route will follow existing roads, using onstreet infrastructure (i.e. bus lanes, priority at traffic signals). Where a segregated busway is provided, the likely severance effect will be mitigated against by providing parallel pedestrian and cycle facilities, including dedicated crossing points.



Although the introduction of the additional traffic management measures in Bristol City Centre could result in a slight increase in severance due to the introduction (and diversion) of additional public transport vehicles, this is likely to be offset by the implementation of substantially improved pedestrian and cycle priority measures and public realm enhancements as part of the detailed design. These measures will improve linkages for pedestrians, cyclists and public transport passengers between key quarters of the city centre, which currently experience severance due to the impact of general traffic. The ability to integrate the design of the rapid transit proposals within the city centre strategy will therefore reduce the likely level of severance.

3.7.3.4 Enhance Regeneration

"Enhancing Regeneration", under WebTAG Unit 2.2 in draft (January 2010) is attributable to the number of net additional jobs accruing to residents of regeneration areas. This follows the previously released WebTAG Unit 2.8 in consultation (April 2009). It is understood that the current guidance on the estimation of regeneration impacts is being re-examined to reconcile analysis of wider economic impacts, under WebTAG Unit 3.5.8 (June 2003) and to ensure that the methodology is fit for purpose.

Regardless of the detailed changes, at a high level and to be addressed on a qualitative basis, as required for this MSBC submission, the focus is increasing employment in existing underperforming areas with high unemployment.

It has already been discussed in the Wider Impacts section that there is unlikely to be a wholesale improvement in terms of accessing the city centre. Figure 3.6 places accessibility without (left) and with (right) the scheme in relation to areas of high employment deprivation (colour coded in the middle, with lighter tone indicating higher deprivation, mostly around the city centre), regeneration area (shaded grey to the south of the city centre) and employment developments (shaded green, in the city centre and at the end of the scheme routes).



Figure 3.6 – Access to city centre in relation to areas of high employment deprivation

Figure 3.7 shows that access to Aztec West business park is likely to be markedly improved for a number of areas, such as Hengrove and others circled in white. However, north of the city centre, where employment deprivation is at its highest, the scheme is unlikely to provide a significant improvement on accessing Aztec West. Nevertheless, the scheme is likely to improve access from the city centre, where employment deprivation is high, to Aztec West. Meanwhile, there are a



number of employment zones to be developed, including in the city centre. Such developments may help to regenerate areas, in addition to any direct effect the scheme may have.

Figure 3.7 – Access to Aztec West business park in relation to areas of high employment deprivation



Figure 3.8 shows that the scheme is likely to improve access to the mixed use development area of Emerson's Green East. There are a number of areas of relatively high employment deprivation (circled in white) that are likely to benefit from the scheme, including the city centre and that to the south of the city centre.







As illustrated above, the scheme is likely to improve accessibility from several areas of relatively high employment deprivation to key centres of employment. Therefore, the scheme is likely to offer some benefits in terms of "enhance regeneration". However, it should be remembered that the increase in employment among residents in these areas of high employment deprivation needs to be supported by a range of factors external to the scheme, such as resident education and health. In order to benefit from the scheme's offer of better access to employment centres, residents in these areas need to possess skills that match the requirement of firms located in these areas. In addition, there are a number of mixed developments planned, see Figure 3.9 below (circled in black). This means that jobs provided in these areas can be taken up by new residents who may be better matched to the skills required than any existing residents. However, this is not to dismiss the scheme's positive effect in linking areas of high employment deprivation to employment centre, and hence its contribution to the "enhance regeneration" agenda.

Figure 3.9 – Development areas in relation to areas of high employment deprivation



3.7.3.5 Reduce Regional Economic Imbalance

The government has an objective to reduce the gap in economic growth rates between regions. This objective is captured in WebTAG Unit 3.5.3 in draft (January 2010), under "Regional Balance: analysis of user benefits by region". Two outputs are required:

- A Regional Transport User Benefit (RTUB) table; and
- A score for the Reduced Regional Imbalance challenge for reporting in the Appraisal Summary Table (AST).

In Section 3.5.2 "Calculation of Benefits", it is estimated that the total user benefits amount to \pm 590 million (2002 PV) over a 60-year appraisal period. RTUB requires a breakdown of benefits by Government Office Region (GORs). Given the nature of this sub-regional scheme, benefits to



other (non South West) GORs are envisaged to be minimal. Of course, this is not to say that there will be no one from other GORs, who travel to the Bristol area and use the service. However, the volume of such journeys, and hence benefits, is likely to be insufficiently large to justify the attribution of benefits to other GORs.

To derive a score, total user benefits for the North East, North West, Yorkshire and the Humber, East Midlands, West Midlands and South West should be added into Group 1. Separately, total users for East of England, London and South East should be added into Group 2. If total Group 1 is greater than total Group 2 then the score is "beneficial". For this scheme, given the overwhelming number of beneficiaries are from the Bristol and its surrounding localities, the score is "beneficial".

3.7.4 Improve Quality of Life & Promote a Healthy, Natural Environment

3.7.4.1 Reduce Exposure to Noise

The assessment of this sub-objective has been undertaken in accordance with WebTAG Unit 3.3.2. The appraisal is based on predictions of traffic noise derived from the outputs of the traffic model – the difference between the 'reference' scenario and the 'do-something' scenario.

The study area for the noise appraisal has been based on the changes in noise on routes in the opening year (2016) and design year (2031) for the scheme. Where changes in traffic on routes were shown to give rise to changes in noise of at least 1dB(A) either on opening or in the design year, these were included in the study area. For each of the main areas considered, noise levels at noise sensitive locations within approximately 600m of the affected routes in the study area have been calculated. For each of the other areas in the wider road network, the changes in noise on the links have been considered by examining the changes in noise on the traffic network, the proximity of noise sensitive locations and the expected influence of the links in question on these locations.

The detailed methodology and results of the appraisal are outlined in the Environmental Report attached at **Appendix 3.H(i)**. Table 3.22 below presents the aggregated results for the full NFH Package in terms of increases and decreases in noise in the opening year and design year for the 46,440 properties included in the noise assessment.

Change in noise	Оре	ening Year (20	016)	Design Year (2031)			
level _{LA10,18th} dB at properties	Increase in noise	Decrease in noise	Magnitude	Increase in noise	Decrease in noise	Magnitude	
=0	11,124	11,124	No change	8,219	8,219	No change	
0.1-0.9	18,851	14,432	Negligible	22,125	13,958	Negligible	
1-2.9	571	1,171	Minor	536	1,266	Minor	
3-4.9	87	42	Moderate	86	32	Moderate	
>=5	98	64	Major	144	74	Major	
Total >=1	756	1,277	-	766	1,237	-	

In overall terms, the appraisal shows that there are more perceptible decreases in noise than perceptible increases in noise, although there are some moderate and major increases in noise which have the potential to be reduced with noise mitigation measures such as noise barriers. The most significant impacts are associated with the new Stoke Gifford Transport Link and the



segregated busway through Hengrove Park – both of which have the potential for complementary mitigation measures. The results in the design year (2031) are broadly similar to the results in the opening year (2016).

The data from the noise models has also been processed for use in the WebTAG Noise Spreadsheet to obtain the change in annoyance and to monetise the changes in noise from the NFH Package. This shows that there would be an NPV dis-benefit of approximately £770k due to noise. There would be 35 more people 'annoyed' by noise in the design year. It should be noted that this monetised value represents a 'worst case' scenario as this assessment has not included the areas outside that covered by the detailed noise models. Within these wider areas, the assessment concluded that there were higher numbers of properties experiencing decreases in noise than increases which, if included in the monetised value, would reduce the overall disbenefits.

3.7.4.2 Minimise Impact on Biodiversity

The assessment of this sub-objective has been undertaken in accordance with WebTAG Unit 3.3.10. The assessment included a desk study which reviewed national and local planning policy guidance; data from the Bristol Regional Environmental Record Centre and other on-line databases; historic environmental reports; and a drive-over field survey in February 2010. The detailed methodology and results of the appraisal are outlined in the Environmental Report attached at **Appendix 3.H(i)**. The assessment is based on the existing situation before the introduction of any proposed mitigation measures.

In overall terms, the assessment was deemed to be slightly adverse. However, specific impacts were identified along the following sections:

- Construction of some sections of the Bradley Stoke Way busway will involve take of habitat adjacent to the Three Brooks LNR and Savages Wood SNCI;
- Construction of the Stoke Gifford Transport Link will result in a loss of greenfield habitat (which is a potential site for badgers, reptiles, great crested newts and roosting bats) resulting in a reduction in capacity to support any common or rare species that inhabit the area. This section of the scheme will also result in habitat fragmentation both by creating a barrier within the existing habitats and also by severing existing hedges;
- Construction of the M32 park and ride site will result in loss of greenfield habitat resulting in a reduction in capacity to support any common or rare species that inhabit this area. There is evidence of use of this site by badgers, slow worms and breeding birds. This is presence of farmland weeds, species rich grassland and species rich hedges as well as the potential for roosting bats;
- Widening of the A4174 (along the East Fringe route) may cause potential threats to the Frome Valley SNCI/SNA during the construction phase, whereas the small areas of local widening will require taking mown verge habitat;
- The new bridge over the New Cut is likely to have minimal impacts on biodiversity but there is the potential that the bridge piers and abutments may impact either terrestrial habitat on the banks of the river or estuarine mud on the river or channel leading to the Bathurst Basin; and
- Widening of Hartcliffe Way (along the South Bristol route) may result in some loss of habitat at the fringes of the Crox Bottom SNCI and Pigeonhouse Stream and adjacent Meadows SNCI.

The assessment on biodiversity has also included liaison with Natural England and the Environment Agency and copies of their responses are included at **Appendix 3.H(ii)**.

Natural England stated that in principle, they "are supportive of the scheme. We regard climate change as the most significant long term threat to the natural environment. Through the



promotion of transport alternatives the scheme potentially has a role to play in combating climate change. However, we are concerned that the scheme should integrate with and not compromise existing sustainable transport routes, especially for walking and cycling. For example, one of the route options appears to intersect the Bristol / Bath cycle path and the means of crossing this will require careful consideration".

Natural England also had the following additional comments:

- "we recommend that biodiversity appraisal extends to detailed consideration of the opportunities for biodiversity enhancement alongside, or as part of, the scheme. There may be opportunities to achieve multiple benefits, for example, through the use of SUDS measures or the introduction of street trees that will make the route more attractive to users, combat future climate change impacts and contribute to biodiversity";
- "it is most important to ensure that all public rights of way and other opportunities for people to access green spaces that could be impacted, either directly or indirectly, are identified and then subject to detailed assessment of the likely impacts. Here too, we believe the first priority should be to avoid direct impacts and where this is not possible to ensure that mitigation measures are identified that can reduce the impacts to a negligible level".

The **Environment Agency** stated that they "have no objections in principle to the proposed route on biodiversity and fisheries grounds. This position will be reviewed when details of all river crossings are submitted for the EA's approval. It is worth noting the historic industrial nature of the Bathhurst Basin area and the river crossing of the route, early consultation with Bristol City Council's archaeologists is therefore vital".

3.7.4.3 Minimise Impact on Water Environment

The assessment of this sub-objective has been undertaken in accordance with WebTAG Unit 3.3.11. The assessment has been conducted as a desk study using published data sources. The detailed methodology and results of the appraisal are outlined in the Environmental Report attached at **Appendix 3.H(i)**.

In summary, the assessment concluded that as well as the local watercourses affected by the scheme, there will be effects on the River Frome, the River Avon and the floodplain. The works are generally considered as minor in nature and the impact of the NFH Package proposals is generally classed as neutral. Without mitigation, however, there would be some negative effects on the River Frome which is declared a "salmonid" water. Therefore the overall unmitigated effect of the scheme must be described as a slight negative.

It is, however, possible to mitigate the negative effects of the scheme and these will need to be taken into consideration as part of the detailed design of the scheme. Extra discharges to watercourses, which may cause increased risk of flooding, can be reduced by flow attenuation measures and measures can be designed into the construction to reduce the risks due to watercourses due to pollution from the road surface – either accidental or routine – being washed into the watercourse. Sustainable Urban Drainage Systems' (SUDS) measures would be appropriate for both of these effects. If appropriate mitigation is proved, the effect of the NFH Package proposals on the water environment will be neutral.

3.7.4.4 Minimise Impact on Heritage

The assessment on Heritage has been undertaken in accordance with WebTAG guidance as well as Volume 11, Section 3, Part 2 of the Design Manual for Roads and Bridges (DMRB). The work included a review of the South Gloucestershire and Bristol City Council Historic Environment Records and other published and on-line sources as well as an assessment of the legislative and planning context. The detailed methodology and results of the appraisal are outlined in the Environmental Report attached at **Appendix 3.H(i)**.



In summary, the assessment concluded that the NFH Package proposals pass through areas of known cultural heritage value – Stoke Park, Bristol City Centre, the City Docks and Bedminster are areas of particular high value, which is reflected in the high number of designations (including 283 Listed Buildings, 8 Conservation Areas, and 1 Registered Park and Garden. There are also a high number of non-designated assets on the South Gloucestershire and Bristol Historic Environment Records, which provides some indication for the potential of currently unrecorded archaeological deposits in some areas. However, most deposits within the urban area will be at a depth greater than the potential depth of invasive works (i.e. >500mm), with the exception of the Bedminster area where deposits are known to be shallow.

Overall throughout the whole scheme, the potential impact is likely to result in a negligible negative impact or no change. The notable exception is the proposal for a new bridge over the New Cut, which could have a detrimental impact on the historic character of the City Docks Conservation Area and adjacent Listed Buildings. Reference should be made to the '*Rapid Transport Visual Impact Guidelines*' currently being drafted by Bristol City Council for the Ashton Vale to Temple Meads / City Centre Rapid Transit scheme to inform mitigation within the City Centre and South Bristol route.

The work has also included liaison with English Heritage and their comments have been incorporated into the above assessment. The main areas of concern centred on the sensitivity of the Cenotaph area (and surrounding conservation core) in the city centre and the need for any proposed road alterations within the vicinity of this – an area of high cultural heritage value and vulnerability – to have a detailed assessment and mitigation of impacts at the design stage. In addition, the installation of new street lighting, shelters and signals, and the marking of bus lanes could impact on the setting of Listed Buildings and the character of Conservation Areas and other historic areas.

3.7.4.5 Minimise Impact on Landscape

The assessment of this sub-objective has been undertaken in accordance with WebTAG Unit 3.3.7. Landscape assessment is the systematic description and analysis of the physical features of the landscape and their values. The features may include landform, field and settlement patterns, building styles, historical and cultural elements, road and transport patterns, vegetation cover and land use, and the potential effect of a proposed development on these elements.

The assessment was undertaken through a combination of desk-top studies (including a review of the South Gloucestershire and Bristol City Council Local Plans) and a site survey within a 500m study area from the NFH Package proposals. The detailed methodology and results of the appraisal are outlined in the Environmental Report attached at **Appendix 3.H(i)**.

In overall terms, the assessment has concluded that the NFH Package is congruent with the landforms and scale of the existing landscape. The scheme is not generally visually intrusive; however in some locations they are likely to be adverse impacts on views from particularly sensitive receptors such as isolated properties at Harry Stoke and Emersons Green. Most sections of the scheme will require appropriate landscape mitigation measures, particularly in relation to the park and ride sites, to be implemented. These mitigation measures will help to create a positive effect on the landscape character and the visual amenity, and help to reduce adverse impacts in the long term. The overall assessment score under this sub-objective is slight adverse.

3.7.4.6 Improve Experience of Travel

The assessment of this sub-objective has been undertaken in accordance with WebTAG Units 3.3.13 (journey ambience); 3.6.1 (options values); and 3.7.1 (transport interchange).

With regard to journey ambience, the NFH Package will improve substantially the quality of travellers' experience. Modern vehicle designs with good heating, ventilation, seating, luggage space and ride quality will improve traveller care and the provision of better travel information,



including real time public transport information, and improvements in personal security, will reduce stress for travellers. Passengers will also benefit from new and better designed waiting and boarding facilities to and from vehicles, giving a less stressful, smoother journey. As the projected passenger demand for the NFH scheme proposals is over 17,000 passengers per day, the overall assessment is large beneficial. In addition, the de-congestion benefits provided by the Stoke Gifford Transport Link in and around the Stoke Gifford area will reduce traveller stress for motorists (as travel conditions improve) and the provision of modern, safe and dedicated walking and cycling facilities will improve the experience of travel for pedestrians and cyclists.

With regard to options values, these are associated with the unexpected use of a transport facility which is not built into the forecasts produced by the modelling, and which would otherwise not appear in the appraisal as a benefit. Hence, option values are, to some degree, a measure of the individual's attitude to uncertainty, in that it represents the amount that a person is willing to pay to have the option of using the rapid transit facility at some unknown point in the future.

Option values are related to the size of the community that is likely to be affected by the introduction (or removal) of a service. Since the introduction of the rapid transit and park & ride facilities is likely to affect an existing community of around 18,400 households (the number which is within a 400m walking distance of a rapid transit stop) (not including any new developments), then it is possible that the magnitude of the impact of the introduction of this scheme could be deemed to be large beneficial.

With regard to transport interchange, the NFH Package will have a beneficial impact on transport passenger interchange since it will facilitate improved interchange by the provision of quality waiting facilities and greatly improved public transport information (see Table 3.23 below). Operation and ease of use of the public transport system will be improved by creating new direct journey opportunities with new rapid transit routes as well as providing greater interchange opportunities with the remainder of the public transport network and other modes. In addition, it is anticipated that other bus services (meeting the quality threshold) will be able to utilise the rapid transit infrastructure (including stops and real time public transport information) along the length of the routes which will allow users of existing buses to derive benefit from the rapid transit network.

Passenger Interchange Indicator	Without NFH Package	With NFH Package
Waiting environment	Moderate Standard – some good standard bus stops provided along existing bus routes but improvement / upgrades still needed.	High Standard – new, bespoke high standard stops to be provided as part of rapid transit services and park & ride interchanges, with improvements such as RTPI and CCTV.
Level of facilities	Moderate Standard – some good facilities provided along existing bus routes but improvement / upgrades still needed.	High Standard – new, bespoke high standard stops to be provided as part of rapid transit services and park & ride interchanges, with improvements such as RTPI and CCTV.
Level of information	Moderate Standard – good provision of public transport information provided but level of information could be improved.	High Standard – significant improvements to be provided with RTPI and improved timetable information.
Visible staff presence	Moderate Standard – staff presence visible at some city centre interchange locations.	Moderate Standard – no change.
Physical linkage for next stage of journey	High Standard – physical linkage possible on existing bus stops without use of bridge, subway or changing to separate terminal.	High Standard – no change.



Passenger Interchange Indicator	Without NFH Package	With NFH Package
Connection time and risk of missing a connection	Moderate Standard – lack of available information results in a moderate risk of missing connections.	High Standard – improved reliability of public transport services; co- ordination of timetables; and improved information reduces risk of missing connections.

3.7.4.7 Improve the Urban Environment

The assessment of this sub-objective has been undertaken in accordance with WebTAG Unit 3.3.7. Townscape assessment is the systematic description and analysis of the physical and social features of the built and un-built urban environment and their values, including buildings, structures and the spaces between them, and the potential effect of the proposed development on these elements.

The assessment was undertaken in conjunction with the assessment on landscape – see section 3.7.4.5 above for details of the assessment.

3.7.4.8 Improve Access to Leisure

This is a new sub-objective under the WebTAG (In Draft) guidance and current advice (WebTAG Unit 3.2D) is to use the analysis under WebTAG Unit 3.5.2 (Transport Economic Efficiency) and WebTAG Unit 3.5.7 (Reliability). Section 3.5 outlines the results from the cost-benefit analysis and the outputs from the TEE table are included in Table 3.16. In addition, the results from the reliability analysis are outlined in Section 3.7.2.1. It can be seen from these analyses that non-business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements. It should be noted that the G-BATS3 highway model cannot differentiate between commuting and non-commuting journeys.

3.7.5 Better Safety, Security & Health

3.7.5.1 Reduce the Risk of Death or Injury

The impact of the NFH Package on the number of road traffic accidents has been assessed using guidance in WebTAG Unit 3.4.1. The potential impact on the number of accidents in the study area has been estimated using a spreadsheet model based on the COBA11²⁶ recommended methodology for calculating road accident numbers and costs, using combined link and junction accident rates.

The calculations used a combination of local Personal Injury Accident (PIA) data and default COBA accident rates, which are defined rates in terms of accidents per million vehicle kilometres and casualties per accident. A general decline in the incidence and severity of accidents through time is assumed, in line with recent trends in and policies for road safety. Accident data records were available for the study for the years 2003 to 2007 (five years) as shown in Figure 2.5 previously (Strategic Case). Table 3.24 indicates the forecast accidents by severity over the 60 year period output from the model (costs are in 2002 prices, discounted to 2002).

²⁶ COBA is a cost-benefit analysis software package



Accident Severity	Number of Accidents (reference case)	Number of Accidents (central case)
Fatalities	1,707	1,707
Serious injuries	18,440	18,448
Slight injuries	214,819	214,985
Personal injury accidents	169,187	169,255
Damage only accidents	2,405,092	2,403,575
Casualty cost (£million)	£3,973m	£3,974m
Damage only accident cost (£million)	£2,345m	£2,345m
Total accident cost (£million)	£6,318m	£6,318m
Saving (£million)	n/a	-£0.73m

The variation in cost of accidents resulting from the introduction of the NFH Package is minimal in terms of scale of overall accident costs. The analysis shows that there will be a saving in accident numbers of 1,518 (or 0.06%) over the 60 year appraisal period balancing against an increase in personal injury accidents of 69 (0.04%).

The reduced accident numbers are likely to be associated with a transfer of trips from private car to public transport as well as a redistribution of trips away from the more congested city centre. The increase in personal injury accidents appears to result from a greater number of trips being made in the urban area, where the proportion of accidents that result in an injury is significantly higher than in rural areas.

The scheme is also expected to contribute to improved safety for pedestrians as a result of the priority measures and provision of improved access to bus stops and new and improved pedestrian crossing facilities. Cyclists will also benefit from greater segregation from general traffic by being able to use new and improved cycle lanes alongside the rapid transit alignments.

3.7.5.2 Improve Health through Physical Activity

The key aim of this sub-objective is the contribution of the proposed scheme to overall health by increasing levels of physical activity. People switching to from car to public transport (including via park and ride) will achieve the recommended minimum distance/time to obtain significant fitness benefits. In this regard the NFH Package is likely to lead to a positive impact on physical fitness.

The recommended minimum level of activity for adults is to build up to thirty minutes or more of moderate activity, most days of the week. This level of activity could be integrated into everyday life, including walking to and from the rapid transit stops (for an onward journey by public transport). If it is assumed that over the course of a day, the outward and return journeys are made, then a single journey time of 15 minutes by foot would achieve this level. The accessibility analysis undertaken previously demonstrated that approximately 18,400 existing households (not including any new developments) would be within a 10minute walking distance (approximately 400km) of the rapid transit stops. In addition, the provision of safe, modern and dedicated cycling facilities as part of the scheme will promote the use of cycling as an alternative mode of travel for shorter trips. The overall assessment against this sub-objective is therefore considered to be moderately beneficial.

3.7.5.3 Reduce Air Quality Health Costs

The assessment of this sub-objective has been undertaken in accordance with WebTAG and referenced methodologies within the DMRB Volume 11 Section 3, Part 1 HA207/07 (Air Quality). The appraisal has combined a simple assessment DMRB Screening Tool and the WebTAG guidance to include the following elements:

- Examination of information on existing pollutant sources and measured ambient concentrations in the vicinity of the scheme and comparison with air quality criteria;
- Modelling of pollutant concentrations in the study area to determine current and future NO₂ and PM₁₀ concentrations – assessment of the overall change in levels of exposure and the change in mass emissions in the opening year;
- Comparison of the results against statutory air quality criteria at several receptor sites within 200 metres of the scheme study area;
- Assessment of the effects of nitrogen oxides at designated ecological sites; and
- Assessment of the change in equivalent tonnes of carbon for the whole 60 year appraisal period (see section on greenhouse gases).

The detailed methodology and results of the appraisal are outlined in the Environmental Report attached at **Appendix 3.H(i)**.

The local air quality DMRB simple level assessment suggests that the NFH Package will give rise to some increases and some decreases in pollutant concentrations across the affected network. The scheme will not cause any new exceedences of the Government's Air Quality Strategy (AQS) objectives; however within Bristol Air Quality Management Area (AQMA) increases in traffic associated with the scheme may lead to increases in pollutant concentrations. The largest increases occur at locations close to new road / busway infrastructure i.e. Stoke Gifford Transport Link and Hengrove Park, although concentrations are still well below the AQS objective.

The WebTAG local air quality assessment (as shown in Table 3.25) suggests that the NFH Package is expected to result in an overall improvement in air quality. There are no exceedences of the annual average NO_2 AQS objective at 20 metres from the road centreline at any location. Any change in NO_2 concentrations is therefore considered to be insignificant. For PM_{10} , four links have an increase in concentration considered to be significant – only one of these links has properties within 200 metres of it and this is located within the city centre (and experiences an increase in buses as part of the NFH Package proposals).

Air Quality Criteria	Assessment Score	No. of properties with improvement	No. of properties with no change	No. of properties with deterioration	
NO ₂	-1,877	18,957	365	18,974	
PM ₁₀	-547	19,420	153	18,723	

Table 3.25 – NO₂ and PM₁₀ assessments in 2016: Central Case

The regional air quality assessment suggests that the NFH Package will effect a reduction in NO_2 and PM_{10} emissions across the wider traffic network. For greenhouse gas emissions, see section 3.7.1.1.

3.7.5.4 Reduce Vulnerability to Terrorism

As no guidance is yet available to address the sub-objective 'reduce vulnerability to terrorism' no comment is provided under this sub-objective at this time.

3.7.5.5 Reduce Crime

Passengers' perceptions of their personal security can be a key influence on whether they choose to use public transport. Perceptions of lack of security can impact disproportionately on particular users at particular times of day, for example, vulnerable users (such as unaccompanied females or the elderly) may be more concerned about personal security during hours of darkness. For the NFH Package, particular attention and importance is attributed to the personal security of public transport passengers while making their way to and from the stops, waiting for services and travelling on the vehicle.

For public transport services, a number of best practice publications exist, including the DfT publication "*Get on Board: An Agenda for Improving Personal Safety*" (2006) and the previous best practice guidance from DTLR (now DfT) Mobility Unit for railway stations and public transport operators (1998). Both of these documents raise a number of key security issues and give guidance on design and management practices, which will be referred too during the ongoing design of the scheme. Although security issues have not been considered in detail at this stage in the scheme development, it is anticipated that the following improvements will be provided:

- Effective CCTV systems in place designed to encourage staff surveillance and group passengers;
- Passenger information and good lighting at rapid transit stops and accesses to stops;
- Location of stops selected to enable safe and secure access to stops including dedicated crossing facilities with convenient, well-lit and safe pedestrian links.
- The provision of facilities to ensure that the driver can see the inside of the vehicle;
- Two-way communications between the vehicle driver and the control centre;
- Good provision of emergency phones, help points, public telephones and information on emergency help procedure; and
- Provision of improved pedestrian and cycling infrastructure increasing footfall and improving natural surveillance.

The overall assessment against this sub-objective is therefore considered to be moderately beneficial.

3.7.6 Appraisal Summary Table

The completed Appraisal Summary Table for the preferred NFH package is attached overleaf at Table 3.26.



Table 3.26 – Appraisal Summary Table for NFH Package: Central Case

Option: North Fri Package (Central	nge to Hengrove I Case)	Description: Co Centre; three n	ombination of four major projects: three bus-rapid transit routes between Cribbs Causeway / North Fringe; East Fringe an ew park & ride sites; improvements to Bristol City Centre; and new transport link at Stoke Gifford (Stoke Gifford Transpo	d South Bristol via Bristol City rt Link) Date & Co Atkins, Mai	ntact: rch 2010
Objective	Sub-Objective	1	Key Points	Metrics	Assessment
Tackle Climate Change	Reduce Greenhouse Gas Emissions		Decrease in overall vehicle kilometres per day travelled over the 60 year appraisal period resulting in overall decrease in carbon emissions and a positive net present value (assumes traffic growth stops in 2031; and improvements in emission technology stop in 2025).	Change in emissions in opening year: -382 tonnes; Change in emissions over 60 yr appraisal period: -46,515 tonnes.	Benefit NPV = +£1.88m
Support Improve Reliability Economic Growth		1	The provision of dedicated priority measures and segregated infrastructure measures will provide improved reliability for the rapid transit services as well as other bus services using the new infrastructure. Highway reliability improvements of the order of £33.1million.	Not Applicable	Highway reliability benefit NPV = +£33.1m
	Improve Connectiv	vity	Business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements.	Not Applicable	Beneficial
Support the Deliver		ery of Housing	There are no new housing developments which are specifically dependent on the implementation of the NFH Package as a whole. However, the South Gloucestershire Draft Core Strategy (published in March 2010) has identified the Stoke Gifford Transport Link to facilitate proposed new neighbourhood areas in the North Fringe. The transport interventions required to support any individual housing development will be assessed as part of the Authorities standard development control procedures.	Not Applicable.	Not Applicable
	Enhance Resiliend	ce	As no guidance is yet available to address this sub-objective, no comment is provided at this time.	Not Applicable	Not Applicable
	Wider (Economic) Impacts		In overall terms, the NFH Package is likely to contribute to wider economic impacts by improving access to employment areas in the North Fringe (Aztec West) and Emersons Green East. This is likely to boost the attractiveness of these two development areas for firms to locate and workers to work, and hence agglomeration and labour supply benefits. The impact on the city centre is likely to be limited.	Not Applicable	Beneficial 60 year appraisal benefit to Wider Impacts is £18.1m
Promote Equality of Opportunity	Promote Improve Accessibility Equality of Opportunity		Although the impact on public transport accessibility of the scheme across the wider sub-region is deemed to be small, the benefits are mainly accrued locally and significant improvements to public transport accessibility are shown for Hengrove Park, Emersons Green East, SPark and UWE.	Not Applicable	Slightly Beneficial
	Improve Affordability		This sub-objective has not been assessed as part of this scheme appraisal. However, it is worth noting that the assumptions for fares policy underlying the modelling and appraisal of the NFH Package is to mirror existing public transport fares.	Not Applicable	Not Applicable
	Reduce Severance		The infrastructure associated with the rapid transit element of the NFH Package is unlikely to have a detrimental impact on severance as the majority of the route will follow existing roads, using on-street infrastructure (i.e. bus lanes, priority at traffic signals). Where a segregated busway is provided, the likely severance effect will be mitigated against by providing parallel pedestrian and cycle facilities, including dedicated crossing points. Significant benefits to pedestrian and cyclists in the city centre through improved streetscape, public realm and provision of significantly enhanced pedestrian and cycle facilities. The ability to integrate the design of the rapid transit proposals within the city centre strategy will reduce the likely level of severance.	Not Applicable	Neutral
	Enhance Regeneration		The NFH Package is likely to improve accessibility from several areas of relatively high employment deprivation to key centres of employment, therefore provide some benefits in terms of this sub-objective.	Not Applicable	Beneficial
	Reduce Regional Imbalance	Economic	As the majority of beneficiaries from the NFH Package are from the Bristol area and its surrounding localities, the impact on this sub-objective is deemed to be beneficial.	Not Applicable	Beneficial
Improve Quality of Life & Promote a Healthy Natural Environment	Reduce Exposure	to Noise	The most significant increases in noise are expected in the vicinity of the Stoke Gifford Transport Link and in the Hengrove Park areas. Adverse impacts in these areas may be limited with mitigation. Effects in the vicinity of the other scheme elements are negligible or minor. Overall there are more properties predicted to receive a perceptible decrease in noise than a perceptible increase in noise. 34,233 properties considered with 541 perceptible increases in noise and 733 perceptible decreases in noise on opening.	Population annoyed in the design year in reference case = 5079; population annoyed in the design year in do-something = 5114.	35 more people annoyed by noise. NPV = -£0.77m
	Minimise Impact o	n Biodiversity	Some loss of green field habitat and limited chance of damage to SCNIs and LNR.	Not Applicable	Slight Adverse
	Minimise Impact o Environment	n the Water	As well as the local watercourses affected by the scheme, there will be effects on the River Frome, the River Avon and the floodplain. The works are generally considered as minor in nature and the impact of the NFH Package proposals is generally classed as neutral. Without mitigation, however, there would be some negative effects on the River Frome which is declared a "salmonid" water. If appropriate mitigation is proved, the effect of the NFH Package proposals on the water environment will be neutral.	Not Applicable	Neutral
	Minimise Impact o	n Heritage	The NFH Package proposals pass through areas of known cultural heritage value – Stoke Park, Bristol City Centre, the City Docks and Bedminster are areas of particular high value, which is reflected in the high number of designations (including 283 Listed Buildings, 8 Conservation Areas, and 1 Registered Park and Garden. Overall throughout the whole scheme, the potential impact is likely to result in a negligible negative impact or no change. The notable exception is the proposal for a new bridge over the New Cut, which could have a detrimental impact on the historic character of the City Docks Conservation Area and adjacent Listed Buildings.	Not Applicable	Neutral


Option: North Fringe to Hengrove Description Package (Central Case) Centre; three		Description: Co Centre; three n	Combination of four major projects: three bus-rapid transit routes between Cribbs Causeway / North Fringe; East Fringe and South Bristol via Bristol City Date & Contact: Atkins, March 2010						
Objective	Sub-Objective		Key Points	Metrics	Assessment				
	Minimise Impact o	n Landscape	Some long term impacts on landscape character where new road infrastructure is introduced into existing open farmland. Neutral to slight adverse impacts on visual amenity. Potential short term adverse impacts on landscape character and visual amenity through the loss of existing vegetation and construction activities. Mitigation measures will reduce some impacts to neutral at design year. Some impacts will remain slight adverse.	Not Applicable	Slight Adverse				
	Improve Experience of Travel		The NFH Package will increase the transport options available to approximately 18,400 existing households in the Greater Bristol area. Modern vehicle designs with good heating, ventilation, seating, luggage space and ride quality will improve traveller care and the provision of better travel information, including real time public transport information, and improvements in personal security, will reduce stress for travellers. Passengers will also benefit from new and better designed waiting and boarding facilities to and from vehicles, giving a less stressful, smoother journey. The NFH Package will have a beneficial impact on transport passenger interchange since it will facilitate improved interchange by the provision of quality waiting facilities and greatly improved public transport information. Operation and ease of use of the public transport system will be improved by creating new direct journey opportunities with new rapid transit routes as well as providing greater interchange opportunities with the remainder of the public transport network and other modes. New interchanges will be created by the provision of park and ride facilities.	Approximately 18,400 households within 400m of rapid transit stop; Approximately 17,400 passengers using the rapid transit services per day.	Largely beneficial				
	Improve the Urban Environment		No long term impact on townscape character. Neutral to slight adverse impacts on visual amenity. Potential short term adverse impacts on townscape character and visual amenity during construction. Mitigation measures will reduce impacts to neutral at design year.	Not Applicable	Slight Adverse				
	Improve Access to Leisure		Non-business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements.	Not Applicable	Beneficial				
Better Safety, Security & Health		Juce the Risk of Death or InjuryChanging transport mode to rapid transit services will benefit car users who transfer to a safer mode (public transport); car users who continue to use the car but whose accident risk is reduced as a result of reduced road traffic levels; and pedestrians and cyclists who will benefit due to reduced car traffic. Additionally, the scheme is expected to contribute to improved safety for pedestrians as a result of the priority measures and provision of improved access to bus stops and new and improved pedestrian crossing facilities. Cyclists will also benefit from greater segregation from general traffic by being able to use new and improved cycle lanes alongside the rapid transit alignments.The variation in costs of accidents resulting from the introduction of the NFH Package is minimal in terms of scale of overall accident costs. The analysis shows that there will be a saving in accident numbers of 1,518 (or 0.06%) over the 60 year appraisal period balancing against an increase in personal injury accidents of 69 (0.04%).		Not Applicable	Benefit NPV = - £0.73m				
	Improve Health through Physical Activity		People switching to from car to public transport (including via park and ride) will achieve the recommended minimum distance/time to obtain significant fitness benefits. In this regard the NFH Package is likely to lead to a positive impact on physical fitness.	Not Applicable	Moderately Beneficial				
	Reduce Air Quality Health Costs		Overall slight improvement in air quality. No new exceedences of AQS objectives or EU limit values in 2016 as a result of the scheme. Some improvement and some deterioration in the existing AQMA. No exceedences of the annual average NO ₂ AQS objective at 20m from the road centreline at any location in either the reference case or do-something case in 2016, therefore insignificant in terms of WebTAG for PM ₁₀ . One link within 200m of receptors has an increase in concentration of 1ug/m ³ at 20m, considered significant in terms of WebTAG. Negligible effect on SSSI.	No. of properties with improvement: 18957 (NO_2) ; 19420 (PM_{10}) ; No. of properties with deterioration: 18974 (NO_2) ; 18723 (PM_{10}) ; No. of properties with no change: 365 (NO_2) ; 153 (PM_{10}) .	Concentrations weighted for exposure: NO_2 -1877, PM_{10} - 547				
	Reduce Vulnerabi	lity to Terrorism	As no guidance is yet available to address this sub-objective, no comment is provided at this time.	Not applicable	Not applicable				
	Reduce Crime		Particular attention and importance is attributed to the personal security of public transport passengers while making their way to and from the stops, waiting for services and travelling on the vehicle. Although security issues have not been considered in detail at this stage in the scheme development, it is anticipated that improvements such as effective CCTV systems; passenger information; good lighting; safe and secure access to stops etc.	Not applicable	Moderately beneficial				
Impact on Public Accounts	Broad Transport Budget		The public sector experiences costs associated with scheme construction, ongoing maintenance and operation of the scheme and loss in indirect tax revenue.	Local Gov PVC: £81.905m; Central Gov PVC: £138.448m	PVC = £220.353m; NPV = £406.584m; and BCR = 2.85				
	Wider Public Finance Impacts		Finance Impacts Business and consumer users experience travel time benefits resulting from the reduced journey times provided by the rapid transit services; Transport providers experience ongoing operating costs which are more than offset by increased revenue resulting from additional trips using the rapid transit services. Business Users PVB: £196.093m Transport Providers PVB: £37.168m Consumer Users PVB: £394.553m		NPV = £406.584m				

3.8 Supporting Analysis

Current WebTAG guidance specifies three additional Supporting Analyses to supplement the AST. These require assessments to be made of the distribution and equity impacts; the affordability and financial sustainability of the scheme; and practicality and public acceptability issues. Our key findings from these assessments are outlined in the following sections.

3.8.1 Distribution and Equity

In Draft WebTAG guidance currently recommends that the 'Distribution and Equity' supporting analysis is undertaken in accordance with the In Draft guidance on '*social and distribution impacts of transport interventions*' (January 2010). The analysis required to support this is necessarily complex and due to the short timescales between the publication of the above guidance i.e. January 2010, and the publication of this Programme Entry MSBC, it has not been possible to undertake this detailed analysis. It is however, recognised that this analysis will be undertaken in more depth as part of the Conditional Approval stage.

As a result, a qualitative assessment of the Distribution and Equity supporting analysis has been undertaken in accordance with existing DfT WebTAG guidance 2.5 and 2.7.

The NFH Package adds new bus priority infrastructure (both on-street and off-street) and new public transport services along three main radial corridors into (and through) Bristol City Centre i.e. M32 Corridor / North Fringe; East Fringe (A4174) and South Bristol (A4174). This will provide more reliable and quicker journey times for public transport users along these corridors. The new rapid transit services will provide social inclusion benefits for residents of the Greater Bristol area and link regeneration and housing areas to areas of employment, education, retail and other essential services. Services which run through the city centre, connecting South Bristol with the North and East Fringes will provide much-needed direct services, improving connectivity, reducing the need to interchange, and increasing opportunities to access areas of employment and education. Improved frequencies and reliability will provide significant benefits to those residents who have a greater dependency on public transport e.g. younger and older people and those with low incomes.

The operation of the rapid transit services will be based around the use of bespoke high quality vehicles and the construction of stops with a significant improvement to the quality of waiting facilities. In both cases, the improvements to vehicles and stops will be designed to benefit the disabled and hence create a better journey environment for them.

In terms of highway benefits, the introduction of the rapid transit services and associated highway infrastructure, such as the Stoke Gifford Transport Link, will bring about highway benefits to the wider road network. This will provide benefits in terms of noise reductions, emissions reductions, air quality improvements, road safety and severance. Although some areas will suffer from localised deteriorations in air quality and noise, mitigation plans will be implemented as part of the detailed design of the scheme to minimise these impacts where possible.

Finally, the introduction of new, modern and safe infrastructure for cyclists and pedestrians as part of the NFH Package will improve the experience of travel for these users and increase opportunities to access areas of employment, education, leisure and retail.

3.8.2 Affordability and Financial Sustainability

The Affordability and Financial Sustainability (AFS) tables have been prepared in accordance with WebTAG Unit 3.8 and associated references, making use of the following data:

• Investment and operating costs from the detailed cost spreadsheets used to collate cost data for use in the TUBA calculations;



- Revenue and indirect taxation figures from the TUBA output; and
- Parking revenue based on local car park data and the impacts of the model on car trips into the city centre.

In line with the WebTAG guidance the figures used are:

- Net of indirect taxation;
- Net of Quantified Risk Assessment and Optimism Bias allowance;
- In outturn cash prices, calculated using the following inflation assumptions:
 - General industry-wide inflation of 2.7% p.a.;
 - Construction and maintenance inflation of 2.7% p.a. until 2014 and 6% p.a. thereafter; and
 - Operating cost inflation of 2.7% p.a. until 2014 and 4% p.a. thereafter.

Tables 3.27 to 3.29 show the AFS tables for the Local Government, Central Government and Private Sector respectively and the following key points can be made in relation to each table.

- Local Government (Table 3.27) shows the local contribution to preparation and scheme construction costs in the years up to opening and the ongoing local commitment to the maintenance of the relevant elements of the scheme;
- Central Government (Table 3.28) shows the RFA2 funding (including eligible preparatory cost reimbursement) for the scheme in the years before opening and the loss of indirect taxation (over the full 60 year period) occurring as a result of the increase in expenditure on public transport fares (which do not incur taxation) and, to a lesser extent, the reduction in car use and associated fuel duty receipt by the Government; and
- Private Sector (Table 3.29) shows the investment costs required to invest and renew in the rapid transit fleet throughout the appraisal period. The operating cost section shows that the ongoing costs to the bus sector of operating the scheme are offset by the anticipated revenues received.



Table 3.27 – Local Government Affordability and Financial Sustainability

Affordability and Financial Sustainability (AFS)	- Sheet 1 of 3						
LOCAL GOVERNMENT Affordability and Finance	cial Sustainability	/					
Costs	Total (£m outtu undiscounted)	rn prices,	Breakdown by Organisation / Budget				
Investment Costs		_	Highway, R	Г, P&R			
2009/10	1.091]	1.091	Note: Fo	or completene	ss and in line	
2010/11	2.706]	2.706	included	the 2009/10	ineligible pre-	
2011/12	4.471]	4.471	which h	Programme Entry preparatory which have already been incu		
2012/13	9.985		9.985	local co	not form pai ntribution as d	iscussed in	
2013/14	3.265]	3.265	more de	tail in Section	6.	
2014/15	0.921]	0.921				
2015/16	0.235]	0.235				
2016/17	1.275]	1.275				
2017/18	0.433]	0.433				
TOTAL	24.382	(1)	24.382				
TOTAL (excluding pre-programme entry preparatory costs)	23.291		23.291				
Developer and other Contributions	3.480	(2)	3.480				
Grant from Central Government	0	(3)	0				
Grant to Private Sector	0	(4)	0				
Cost to Local Government net of contributions	20.902	(5)=(1)+(4)- (2)-(3)	20.902				
Cost to Local Government (excluding pre-programme entry preparatory costs)	19.811]	19.811				
Public Sector Operations	£m		Breakdown by Organisation / Budget				
Year 1 – 2016 (Opening Year)	Totals (excludi renewal)	ng capital	Highway, RT	P&R Site	Parking Revenue		
Change in operator costs	1.695	(6)	0.339	1.357	0		
Change in operator revenue	-0.004	(7)	0	0	-0.004		
NET IMPACT	-1.699	(8)=(7)-(6)	-0.339	-1.357	-0.004		
Year 11 – 2026		-				-	
Change in operator costs	2.213	(9)	0.442	1.771	0		
Change in operator revenue	-0.008	(10)	0	0	-0.008		
NET IMPACT	-2.221	(11)=(10)- (9)	-0.442	-1.771	-0.008		
Year 16 – 2031		_				_	
Change in operator costs	2.528	(12)	0.505	2.023	0		
Change in operator revenue	-0.011	(13)	0	0	-0.011		
NET IMPACT	-2.539	(14)=(13)- (12)	-0.505	-2.023	-0.011		



Table 3.28 – Central Government Affordability and Financial Sustainability

Affordability and Financial Sustainability (AFS) – Sheet 2 of 3								
ancial Sustainab	ility							
Total (£m outtu undiscounted)	rn prices,	by Organisation / Budget						
	_	RFA2						
0		0						
1.216]	1.216						
2.009]	2.009						
0.485		0.485						
19.000]	19.000						
58.781]	58.781						
61.211]	61.211						
28.196]	28.196						
0]	0						
170.898	(15)	170.898						
0	(16)							
0	(17)							
0	(18)							
-238.100	(19)							
408.998	(20)=(15)+(17	7)+(18)-(16)-(19)						
£m	-							
Totals (excludi renewal)	ng capital							
0	(21)							
0.272	(22)							
0.272	(23)=(22)-(21))						
	_							
0	(24)							
0.355	(25)							
0.355	(26)=(25)-(24))						
	_							
0	(27)							
0.406	(28)							
	0 1.216 2.009 0.485 19.000 58.781 61.211 28.196 0 170.898 0 0 238.100 408.998 £m Totals (excluding renewal) 0 0.272 0.272 0.355 0.355	0 1.216 2.009 0.485 19.000 58.781 61.211 28.196 0 170.898 (15) 0 170.898 (16) 0 170.898 (15) 0 (16) 0 (17) 0 (18) -238.100 (19) 408.998 (20)=(15)+(1) Em Totals (excluding capital renewal) 0 (21) 0.272 (23)=(22)-(21) 0.272 (23)=(22)-(21) 0 (24) 0.355 (25) 0.355 (25) 0.355 (25)	0 0 1.216 1.216 2.009 2.009 0.485 0.485 19.000 58.781 61.211 61.211 28.196 0 0 170.898 0 170.898 0 170.898 0 170.898 0 170.898 0 170.898 0 170.898 0 170.898 0 (15) 170.898 (16) 0 (17) 0 (18) -238.100 (19) 408.998 (20)=(15)+(17)+(18)-(16)-(19) £m (20)=(15)+(17)+(18)-(16)-(19) 0 (21) 0.272 (23)=(22)-(21) 0 (21) 0.272 (23)=(22)-(21) 0 (24) 0.355 (25) 0.355 (25)-(24)					



Table 3.29 – Private Sector Affordability and Financial Sustainability

Affordability and Financial Sustainability (AF	S) – Sheet 3 of 3				
PRIVATE SECTOR Affordability and Financia	I Sustainability				
Private Sector Investment Costs & Grants	Total (£m outtu undiscounted)	Total (£m outturn prices, undiscounted)		Breakdown by Organisa	
Investment Costs			Developer Funding	Bus Operation	
2009/10	0		0	0	
2010/11	0		0	0]
2011/12	0		0	0	
2012/13	0		0	0	
2013/14	0		0	0]
2014/15	0		0	0	
2015/16	0		0	0]
2016/17	9.594		3.480	6.114	
TOTAL	9.594	(30)	3.480	6.114	
Grants from Central and Local Government	0	(31)	0	0]
Private Sector Operators	£m	_	Breakdown	by Organisa	ation / Budget
Year 1 – 2016 (Opening Year)	Totals (excludi renewal)	ng capital	Bus, RT	Rail	Parking Revenue
Change in operator costs	2.992	(32)	2.992	0	0
Change in operator revenue	3.134	(33)	4.479	-1.342	-0.003
NET IMPACT	0.142	(34)=(33)-(32)	1.487	-1.342	-0.003
Subsidy	0	(35)	0	0	0
Year 11 – 2026					
Change in operator costs	4.506	(36)	4.506	0	0
Change in operator revenue	6.191	(37)	8.760	-2.564	-0.005
NET IMPACT	1.685	(38)=(37)-(36)	4.254	-2.564	-0.005
Subsidy	0	(39)	0	0	0
Year 16 – 2031		-			
Change in operator costs	5.148	(40)	5.148	0	0
Change in operator revenue	8.276	(41)	11.672	-3.39	-0.006
NET IMPACT	3.128	(42)=(41)-(40)	6.524	-3.39	-0.006
Subsidy	0	(43)	0	0	0
Private Sector NET IMPACT					
Investment net of capital grant	9.594				
Operations net of subsidy					
Year 1 – 2016	0.142				
Year 11 – 2026	1.685				
Year 16 – 2031	3.128				



3.8.3 Practicality and Public Acceptability

The assessment of the practicality and public acceptability of the NFH Package has been assessed throughout the options development stage and identification of the central case. Two important and interlinked considerations in developing the scheme proposals have been that:

- The scheme proposals must be practical i.e. the scheme must be capable of being implemented within the required timescales; and
- The scheme proposals must have a high degree of acceptability among both the general public and the key stakeholder groups, including those who will be involved in the implementation of the scheme.

Each of these key issues is discussed in more detail in the following sections.

3.8.3.1 Practicality

In assessing practicality, it has been necessary to consider the following issues that could hinder or block the implementation of the NFH Package.

Feasibility (technical and legal) issues

Implementation of the rapid transit services is expected to involve the use of new and evolving technology (e.g. rapid transit guidance technology) and could, therefore, present technical issues that would need to be resolved at the detailed design stage to allow the successful and timely implementation of the scheme. However, the adoption of best practice should allow these and any additional technical issues to be resolved during the detailed design of the scheme – it is considered that no elements of the scheme should require technology which has not been used before and it should therefore not present insurmountable difficulties in this regard.

The implementation of elements of the NFH Package will be subject to legislative constraints and regulation. While the requirements do not rule out the scheme, they could, in practice, delay implementation on the ground.

Enforcement

Extensive use of rapid transit / bus priority measures and running on segregated sections will require robust enforcement if rapid transit services are to operate effectively and reliability maintained. This is expected to include the use of fixed and vehicle-mounted enforcement cameras of all rapid transit routes and an appropriately administered fine system to penalise offenders (similar to that used on and anticipated for existing bus routes). Enforcement of rapid transit priority measures will also be required to tie in with on-street parking controls and enforcement as necessary.

Area of Interest / Complexity ('breadth' and 'depth' of the decision)

The NFH Package has a good level of support from the range of transport bodies in the subregion including the four Authorities who make up the West of England Partnership; the South West Councils, the Highways Agency, Network Rail and the bus operators. Ongoing liaison with Network Rail and the Highways Agency will continue throughout scheme development to ensure the timely delivery of the relevant sections of the package including the new M32 motorway junction and the bridge over the mainline railway adjacent to Bristol Parkway station. The NFH Package will be delivered by Bristol City Council and South Gloucestershire Council.

Although the NFH Package is a relatively complex scheme – consisting of a combination of rapid transit routes, park and ride sites and highway infrastructure, the Authorities have extensive experience of delivering major transport schemes within the sub-region. The commercial, governance and delivery strategies will be continued to be developed in detail to determine the most effective method of procuring and implementing the scheme within the necessary timescales and budget.

Time-scale / Phasing

The NFH Package could be implemented by 2016/2017, subject to the availability of funding, timely decision-making and the completion of all necessary statutory processes. A Project Programme for the delivery of the scheme is outlined in Section 4 of this document and attached at **Appendix 4.A**. It is anticipated that the scheme will be constructed over a four year period commencing 2013/14 which may result in a phased approach to the opening of the scheme.

Complementarily / Conflicts

The NFH Package is part of a wider programme of major schemes and is being implemented in conjunction with a number of important sub-regional schemes in particular the Greater Bristol Bus Network, the Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit scheme, and the South Bristol Link. The detailed design of the NFH Package will also complement and enhance the Bristol Cycle City programme, which is currently being implemented by the Authorities. In addition, the NFH Package will be implemented in conjunction with complementary traffic management and traffic signal measures, such as walking and cycling infrastructure, as well as improved public transport interchange measures, demand management and travel awareness campaigns.

3.8.3.2 Acceptability

There is widespread stakeholder and public support for the NFH Package and details of this can be found in Section 4.6 of this MSBC.

There is also significant political support for the scheme and this MSBC was endorsed by Bristol City Council's Cabinet on 25th March 2010 and by South Gloucestershire Council's Cabinet on 1st March 2010.

3.8.4 Treatment of 10 Year Plan Targets

To a large extent, the ten year transport plan published by the Government in 2000 (Transport 2010, The Ten Year Plan, DETR 2000) has been superseded by more recent policy instruments, including the Eddington Study, Stern Review and more recently, Delivering a Sustainable Transport System (DfT). Nevertheless, the NATA guidance (WebTAG Unit 3.8.2) requires consideration of the contribution to the ten year plan targets offered by any major scheme. An assessment of the contribution from the NFH Package is given in Table 3.30 below.

10 Year Plan Target	Assessment			
Reducing congestion on the inter-urban network and in large urban areas.	When compared to a 'do-minimum' situation, the NFH Package is forecast to reduce forecast congestion levels within the Bristol North Fringe and Stoke Gifford areas, on the main radial corridors between the Bristol North Fringe and Bristol City Centre (including the M32) and on the radial corridors from South Bristol into the City Centre. By 2016, a total of over 17,000 trips will be made on the rapid transit routes on an average weekday 12 hour period, resulting in a reduction in total network delay of between 2% (evening peak) and 5% (morning peak). The Stoke Gifford Transport Link (SGTL) will provide much needed congestion relief for the local roads in and around the Stoke Gifford area.			
Increase rail use.	Not applicable.			
Increase bus use.	The rapid transit services are anticipated to attract approximately 4.9million public transport users in 2016 rising to just under 6million passengers in 2031 – this represents an increase of approximately 14% in public transport passengers within the NFH Corridor when compared to the reference case. Journeys times on the rapid transit services (over existing bus services) are anticipated to decrease by up to 40% in the morning peak period (when compared to similar parallel bus services), resulting in a total journey time saving of approximately £280million over the scheme appraisal period. In			

Table 3.30 – Treatment of	10 Year	Plan	Targets
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10 Year Plan Target	Assessment
	addition, existing bus services will be able to make use of rapid transit infrastructure thus providing further journey time and reliability benefits.
Double light rail use.	Not applicable.
Improving air quality.	The NFH Package will result in a movement of trips away from car journeys, as people who would otherwise not use public transport realise the advantages afforded by fast and reliable journey times, comfortable and clean vehicles, an integrated network offering quick and easy access to many parts of the city. By 2016, a total of over 17,000 trips will be made on the rapid transit routes on an average weekday 12 hour period, resulting in a reduction in total network delay of between 2% (evening peak) and 5% (morning peak), which is expected to help improve air quality conditions in the Bristol AQMA.
Reducing greenhouse gases.	The NFH Package will cause a reduction in vehicle kilometres and greenhouse gas emissions are expected to reduce by 0.3% overall (over the 60 year appraisal period). In addition, the vehicles to be used as part of the rapid transit network will use more environmentally friendly methods with low emissions.
Reducing accidents	The NFH Package, as part of the wider integrated JLTP and major schemes programme, moves journeys from car to public transport which is a safer mode. Although the safety benefits are expected to be minimal overall, those that do occur are likely to be associated with a transfer of trips away from the private car to public transport (which is a safer mode of travel) as well as a redistribution of trips away from the more congested city centre. Additional benefits will also be experienced by pedestrians as a result of priority measures and improved crossing facilities and by cyclists as a result of new and improved cycle facilities.

3.9 Sensitivity Testing

In order to support the appraisal of the NFH Package Central Case, a series of sensitivity tests have been carried out in order to understand the robustness of the core appraisal as outlined in the previous sections. The sensitivity tests have been carried out in accordance with DfT WebTAG guidance and include two varieties of adjustment – one involved changes to modelling parameters and assumptions while the second set tested the sensitivity of the Central Case to economic variations.

Modelling Variations:

- Rapid transit mode constant reduced from 9 to 4.5 minutes;
- Changes to sub-mode choice sensitivity parameter (defining car/P&R and bus/rail sub-mode choices);
- Rapid transit service frequencies halved;
- Rapid Transit service frequencies halved and frequencies of other services restored to reference case levels;
- Increased highway journey times;
- Low Growth and High Growth; and
- Addition of the South Bristol Link.

Economic Variations:

- Peak period annualisation reduced to 1 hour, with no weekend benefits;
- 20% increase in operating and maintenance costs;



- Patronage reduced by 64% from forecast level, giving zero benefits;
- Capital expenditure increased by 382%, giving zero benefits;
- Assumption of zero highway benefits; and
- Assumption of zero public transport benefits.

The headline results are shown overleaf in Table 3.31. Further details of the specification of these sensitivity tests are provided in the Forecasting Report attached at **Appendix 3.F**.

The results provide a high level of confidence in the robustness of the scheme performance with respect to changes in modelling assumptions on traffic behaviour and population growth. Of the tests involving modelling variations, BCRs are all in the range 2.44 to 3.42, showing both that the level of sensitivity of the scheme to these assumptions is low and that should circumstances result in a variation such as those tested occurring, the scheme will still represent good value for money.

The effect of the tests to identify the level of change on either costs or benefits indicates that patronage levels would need to reduce very substantially and costs increase very significantly for the packages BCR to fall below 1.0.



		-		
Table 3.31 – Kev	/ Economic	Outputs	of Sensitivity	v Testina £000s

Sensitivity Test	Highway Benefits	Public Transport Benefits	Private Sector Impact	Present Value of Benefits (PVB)	Present Value of Costs (PVC)	Net Present Value (NPV)	Benefit to Cost Ratio (BCR)
Central Case	394,553	196,093	37,168	626,937	220,353	406,584	2.85
1. Halved Mode Constant	326,601	166,706	26,523	519,560	217,907	301,653	2.38
2(a). Sub Mode Choice Sensitivity Reduced	374,473	185,190	28,236	587,765	218,896	368,869	2.69
2(b). Sub Mode Choice Sensitivity Increased	470,522	231,276	90,314	792,467	231,525	560,943	3.42
3. South Bristol Link	618,498	302,343	30,441	951,413	277,860	673,553	3.42
4. Low Growth	375,266	186,341	34,154	595,792	220,687	375,105	2.70
5. High Growth	329,518	309,334	42,171	680,576	219,628	460,947	3.10
6. Reduced Frequency	286,977	183,543	59,802	530,063	216,079	313,984	2.45
7. Reduced Frequency & Operator Response	306,893	182,697	37,742	527,034	216,338	310,695	2.44
8. Variations in Highway Journey Times	429,054	242,720	38,331	709,746	219,199	490,547	3.24
9. Reduced Annualisation	325,561	135,885	14,461	474,652	214,474	260,179	2.21
10. 20% Increase in Operating Costs	394,553	196,093	32,598	622,368	232,125	390,243	2.68
11. Patronage Reduced by 64%	140,756	69,873	- 1,538	208,214	208,214	0	1.00
12. Increased Capital Cost (+382%)	394,553	196,093	37,168	626,937	626,937	0	1.00
13. Zero Highway Benefits	237,580	48,094	37,281	320,475	211,585	108,890	1.51
14. Zero Public Transport Benefits	156,973	147,999	- 22,962	281,133	210,199	70,934	1.34

Note: Accident benefits not included

3.10 Assessment of Next Best Alternative

3.10.1 Scheme Description Summary

The Next Best Alternative (NBA) is described in Section 1 of the MSBC and the method in which it was identified is outlined in the Options Assessment Report attached at **Appendix 2.B**. Detailed plans for the scheme are also attached at **Appendix 1.F**.

In summary, the NBA for the NFH Package comprises of a number of route variants to the Central Case rapid transit routes as follows:

- North Fringe (Cribbs Causeway to Aztec West Business Park) instead of providing a new dedicated bus link between Coniston Road and Waterside Drive into Aztec West Business Park, the rapid transit services would run along Highwood Road (developer funded road as part of Filton Northfield Development site) onto the A38 (Gloucester Road) and from here, loop around Aztec West and continue along Bradley Stoke Way. Services would however take advantage of a northbound GBBN bus lane on the A38.
- North Fringe (Stoke Gifford area) the Stoke Gifford Transport Link would be completed without rapid transit lanes; instead rapid transit services would run on existing roads through Harry Stoke between the A4174 (Coldharbour Lane) and Bristol Parkway Station (using Westfield Lane and Church Road). No additional priority for rapid transit services would be provided but they would instead take advantage of the congestion relief offered by the Stoke Gifford Transport Link.
- South Bristol (Hengrove Park area) instead of running services through the Knowle West area (via Nover's Lane, Inns Court Road and Creswicke Road), rapid transit services would continue along Hartcliffe Way and Whitchurch Lane to terminate at the edge of Hengrove Park. Appropriate rapid transit priority measures would be provided along Hartcliffe Way and Whitchurch Lane with a new bridge allowing rapid transit vehicles to bypass Hartcliffe Roundabout.

3.10.2 Scheme Costs

The total risk-adjusted capital cost estimate of the NBA is **£191.4million** in outturn prices (£190.3million excluding pre-Programme Entry preparatory costs have already been incurred). This represents a reduction in costs of approximately 2% from the NFH Package Central Case. The local contribution to the above costs is £22.8million (excluding pre-Programme Entry preparatory costs) which represents a local contribution of 12%.

The annual maintenance costs for the NBA (net increase) remain as per the Central Case i.e. £301k p.a. (2009 prices) whereas there is a small reduction in annual operating costs due to minimal changes in service operations (to meet the new route alignments). Annual operating costs are estimated at £1,733k p.a. (2009 prices) (which is £235k p.a. lower than the Central Case).

3.10.3 Project Demand and Impacts

3.10.3.1 Public Transport Passenger Demand

The following tables present the next best alternative forecast patronage on each of the four rapid transit (RT) routes that make up the next best alternative. Table 3.32 shows the total forecast patronage for each of the services in terms of total passenger boardings along each of the routes, including boardings at the three P&R sites. Table 3.33 shows the proportion of total boardings that are related to P&R, i.e. either boarding at the P&R in the inbound direction or alighting at the P&R in the outbound direction.



Applying annualisation factors shows that the four RT routes in total are forecast to attract 4.6 million passengers in 2016 rising to nearly 5.6 million for 2031, around 6% less than the Central Case. Park and Ride trips are forecast to account for just over 16% of the total trips made on the four RT services, slightly higher than the Central Case because using RT only for certain journeys becomes less attractive than using RT P&R.

Service		2016			2031			
	AM Peak Hour	Average IP Hour	PM Peak Hour	Annual (Million Pass.)	AM Peak Hour	Average IP Hour	PM Peak Hour	Annual (Million Pass.)
X90 Hengrove Park - Cribbs Causeway (via M32 P&R & UWE)	1,236	859	1,008	2.9	1,519	1,067	1,247	3.6
X91 Bristol Centre - Parkway (via M32 P&R & UWE)	212	115	145	0.4	229	118	153	0.4
X92 Bristol Centre – Emerson's Green (via M32 P&R &UWE)	311	239	228	0.7	336	278	242	0.8
X93 Hengrove Park to Emerson's Green	209	187	178	0.6	243	237	239	0.7
Total	1,968	1,400	1,559	4.6	2,327	1,700	1,881	5.6

Table 3.32 - Summary of Forecast Rapid Transit Total Patronage^{*}: Next Best Alternative

Patronage stated as total number of boardings for each route combining northbound and southbound directions.

able 3.33 - Summary of P&	R only Rapid Transit	Patronage: Next Best	Alternative
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Service		2016		2031			
	Total Daily RT P&R Legs*	Total Daily RT Trips**	% P&R RT Trips	Total Daily RT P&R Legs*	Total Daily RT Trips**	% P&R RT Trips	
RT Boardings	2,659	16,471	16.1%	3,184	19,834	16.1%	

* P&R leg defined as a boarding or alighting at a P&R site

** RT Trips defined by total number of boardings combining both north and southbound movements

Table 3.34 presents a comparison of public transport patronage across all public transport modes for movements within the NFH corridor – defined earlier in Figure 3.1 – for 2016 and 2031 forecast years, comparing the next best alternative against the reference case.

As shown, the next best alternative is projected to increase PT trips within the NFH corridor by around 8% for both the 2016 and 2031 forecast years comparing with the reference case, noting that this includes the RT element of P&R trips.

		Referen	ce Case		Central Case				Total PT
Movement	Bus (incl. P&R)	Rail	RT ²⁷ (incl. P&R	Total PT	Bus (incl. P&R)	Rail	RT (incl. P&R	Total PT	Difference
2016									
AM Peak Hour	3,942	450	144	4,536	3,079	377	1,818	5,275	739 (16.3%)
Average IP Hour	2,767	71	71	2,910	2,075	56	1,173	3,304	394 (13.5%)
PM Peak Hour	3,496	329	141	3,967	2,666	276	1,450	4,392	425 (10.7%)
Daily Totals	33,666	2,209	1,084	36,959	25,622	1,825	14,519	41,966	5,007 (13.5%)
2031									
AM Peak Hour	4,389	588	206	5,183	3,423	461	2,154	6,038	855 (16.5%)
Average IP Hour	3,155	101	104	3,360	2,356	71	1,405	3,832	472 (14%)
PM Peak Hour	3,930	447	200	4,577	2,980	349	1,750	5,079	502 (11%)
Daily Totals	38,018	2,973	1,559	42,550	28,816	2,280	17,370	48,466	5,916 (13.9%)

Table 3.34 – Summary of Forecast Public Transport Movements* in the NFH Corridor: Reference Case and Next Best Alternative

* Figures stated are in person trips, relates to trips where PT stage origin and destination entirely within NFH Corridor

3.10.3.2 Highway Demand on the Stoke Gifford Transport Link

Table 3.35 presents the forecast traffic flows on the Stoke Gifford Transport Link (SGTL) by time period and also as an Annual Average Daily Total (AADT). This shows that flows are broadly similar to those for the Central Case, though the link no longer carries the RT services.

Table 3.35 – Summary of Forecast Traffic Flows* on the Stoke Gifford Transport Link

Period	2016	2031
AM Peak Hour	1,898	2,105
Average IP Hour	1,015	1,245
PM Peak Hour	1,452	2,159
AADT	16,044	20,106

* Flows stated are all vehicles, both directions

3.10.4 Cost-Benefit Analysis

Using the same methodology as per the Central Case, a Cost-Benefit Analysis has been carried out for the NFH Package NBA. The detailed TEE, Public Accounts and AMCB tables are presented for the NFH Package NBA in **Appendix 3.G** (as part of the Cost Benefit Analysis Report). The headline results are summarised in Table 3.36 below.

²⁷ Reference case includes rapid transit users on 'Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit' scheme.



Indicator	Central Case	Next Best Alternative
Highway Benefits	304,972	222,290
Public Transport Benefits	285,674	257,376
Private Sector Benefits	37,168	38,644
Present Value of Benefits (PVB)	626,937	518,112
Present Value of Costs (PVC)	220,353	216,375
Net Present Value (NPV)	406,584	301,737
Benefit to Cost Ratio (BCR)	2.85	2.39

Table 3.36 – NFH Package NBA: Cost-Benefit Analysis Results

Table 3.36 shows that the NFH Package NBA results in an overall reduction in the BCR from 2.85 to 2.39, with an overall reduction in the Net Present Value of approximately 26% when compared to the Central Case. There is a reduction in highway benefits of approximately 27% and in public transport benefits of 10% when compared to the Central Case. In economic terms, the Central Case represents better value for money when compared to the NBA.

3.10.5 Scheme Benefits and Appraisal

The Appraisal Summary Table (AST) for the NFH Package NBA is shown in Table 3.37 overleaf. Due to the timescales involved in the preparation of the bid and the completion of the traffic modelling for the NBA, a proportionate approach has been undertaken to the detailed quantitative aspects of the AST, in particular in relation to noise and air quality modelling, and reliability and safety analyses. Therefore the appraisal results for the NBA are presented in mainly qualitative terms.

3.10.6 Affordability and Financial Sustainability Tables

The Affordability and Financial Sustainability (AFS) tables have also been prepared for the NBA and the results outlined in Table 3.38 to 3.40.



Table 3.37 – Appraisal Summary Table for NFH Package: Next Best Alternative

Option: North Fri Package (Next Be	nge to Hengrove est Alternative)	Description: Co Centre; three n	ombination of four major projects: three bus-rapid transit routes between Cribbs Causeway / North Fringe; East Fringe an ew park & ride sites; improvements to Bristol City Centre; and new transport link at Stoke Gifford (Stoke Gifford Transpor	d South Bristol via Bristol City t Link) Date & Con Atkins, Mar	ntact: rch 2010
Objective	Sub-Objective		Key Points	Metrics	Assessment
Tackle Climate Change	Reduce Greenhous Emissions	se Gas	Decrease in overall vehicle kilometres per day travelled over the 60 year appraisal period resulting in overall decrease in carbon emissions and a positive net present value.	Not Applicable	Beneficial
Support Economic Growth	Improve Reliability		The provision of dedicated priority measures and segregated infrastructure measures will provide improved reliability for the rapid transit services as well as other bus services using the new infrastructure.	Not Applicable	Beneficial
Growth	Improve Connectivi	ity	Business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements.	Not Applicable	Beneficial
	Support the Deliver	ry of Housing	There are no new housing developments which are specifically dependent on the implementation of the NFH Package as a whole. However, the South Gloucestershire Draft Core Strategy (published in March 2010) has identified the Stoke Gifford Transport Link to facilitate proposed new neighbourhood areas in the North Fringe. The transport interventions required to support any individual housing development will be assessed as part of the Authorities standard development control procedures.	Not Applicable.	Not Applicable
	Enhance Resilience	е	As no guidance is yet available to address this sub-objective, no comment is provided at this time.	Not Applicable	Not Applicable
	Wider (Economic) I	Impacts	In overall terms, the NFH Package is likely to contribute to wider economic impacts by improving access to employment areas in the North Fringe (Aztec West) and Emersons Green East. This is likely to boost the attractiveness of these two development areas for firms to locate and workers to work, and hence agglomeration and labour supply benefits. The impact on the city centre is likely to be limited.	Not Applicable	Beneficial
Promote Equality of Opportunity	Improve Accessibili	ity	Although the impact on public transport accessibility of the scheme across the wider sub-region is deemed to be small, the benefits are mainly accrued locally and significant improvements to public transport accessibility are shown for Emersons Green East, SPark and UWE. Due to the fact that the route options in South Bristol have changed with the NBA, accessibility to Knowle West and Hengrove Park are limited with rapid transit services operating on the periphery of this development / regeneration areas.	Not Applicable	Slightly Beneficial
	Improve Affordabilit	ty	This sub-objective has not been assessed as part of this scheme appraisal. However, it is worth noting that the assumptions for fares policy underlying the modelling and appraisal of the NFH Package is to mirror existing public transport fares.	Not Applicable	Not Applicable
	Reduce Severance		The infrastructure associated with the rapid transit element of the NFH Package is unlikely to have a detrimental impact on severance as the majority of the route will follow existing roads, using on-street infrastructure (i.e. bus lanes, priority at traffic signals). Where a segregated busway is provided, the likely severance effect will be mitigated against by providing parallel pedestrian and cycle facilities, including dedicated crossing points. Significant benefits to pedestrian and cycle facilities. The ability to integrate the design of the rapid transit proposals within the city centre strategy will reduce the likely level of severance.	Not Applicable	Neutral
	Enhance Regenera	ation	The NFH Package is likely to improve accessibility from several areas of relatively high employment deprivation to key centres of employment, therefore provide some benefits in terms of this sub-objective.	Not Applicable	Beneficial
	Reduce Regional E Imbalance	Economic	As the majority of beneficiaries from the NFH Package are from the Bristol area and its surrounding localities, the impact on this sub-objective is deemed to be beneficial.	Not Applicable	Beneficial
Improve Quality of Life & Promote a Healthy Natural Environment	Reduce Exposure t	to Noise	The most significant increases in noise are expected in the vicinity of the Stoke Gifford Transport Link. Adverse impacts in these areas may be limited with mitigation. Effects in the vicinity of the other scheme elements are negligible or minor. Overall there are more properties predicted to receive a perceptible decrease in noise than a perceptible increase in noise. Impact on Hengrove Park likely to be reduced when compared to Central Case as route now runs along Hartcliffe Way instead of through Hengrove Park itself.	Not Applicable	Neutral
	Minimise Impact on	Biodiversity	Some loss of green field habitat and limited chance of damage to SCNIs and LNR.	Not Applicable	Slight Adverse
	Minimise Impact on Environment	the Water	As well as the local watercourses affected by the scheme, there will be effects on the River Frome, the River Avon and the floodplain. The works are generally considered as minor in nature and the impact of the NFH Package proposals is generally classed as neutral. Without mitigation, however, there would be some negative effects on the River Frome which is declared a "salmonid" water. If appropriate mitigation is proved, the effect of the NFH Package proposals on the water environment will be neutral.	Not Applicable	Neutral
	Minimise Impact on	h Heritage	The NFH Package proposals pass through areas of known cultural heritage value – Stoke Park, Bristol City Centre, the City Docks and Bedminster are areas of particular high value, which is reflected in the high number of designations (including 283 Listed Buildings, 8 Conservation Areas, and 1 Registered Park and Garden. Overall throughout the whole scheme, the potential impact is likely to result in a negligible negative impact or no change. The notable exception is the proposal for a new bridge over the New Cut, which could have a detrimental impact on the historic character of the City Docks Conservation Area and adjacent Listed Buildings.	Not Applicable	Neutral



Option: North Fri Package (Next B	inge to Hengrove est Alternative)	Description: Co Centre; three no	ombination of four major projects: three bus-rapid transit routes between Cribbs Causeway / North Fringe; East Fringe an ew park & ride sites; improvements to Bristol City Centre; and new transport link at Stoke Gifford (Stoke Gifford Transpor	d South Bristol via Bristol City t Link)	Date & Con Atkins, Mar	n tact: ch 2010
Objective	Sub-Objective		Key Points	Metrics		Assessment
	Minimise Impact or	1 Landscape	Some long term impacts on landscape character where new road infrastructure is introduced into existing open farmland. Neutral to slight adverse impacts on visual amenity. Potential short term adverse impacts on landscape character and visual amenity through the loss of existing vegetation and construction activities. Mitigation measures will reduce some impacts to neutral at design year. Some impacts will remain slight adverse.	Not Applicable		Slight Adverse
	Improve Experienc	e of Travel	The NFH Package will increase the transport options available to over 18,000 existing households in the Greater Bristol area. Modern vehicle designs with good heating, ventilation, seating, luggage space and ride quality will improve traveller care and the provision of better travel information, including real time public transport information, and improvements in personal security, will reduce stress for travellers. Passengers will also benefit from new and better designed waiting and boarding facilities to and from vehicles, giving a less stressful, smoother journey. The NFH Package will have a beneficial impact on transport passenger interchange since it will facilitate improved interchange by the provision of quality waiting facilities and greatly improved public transport information. Operation and ease of use of the public transport system will be improved by creating new direct journey opportunities with new rapid transit routes as well as providing greater interchange opportunities with the remainder of the public transport network and other modes. New interchanges will be created by the provision of park and ride facilities.	Over 18,000 households within 4 rapid transit stop; Approx 16,500 passengers using transit services per day.	400m of g the rapid	Largely beneficial
	Improve the Urban	Environment	No long term impact on townscape character. Neutral to slight adverse impacts on visual amenity. Potential short term adverse impacts on townscape character and visual amenity during construction. Mitigation measures will reduce impacts to neutral at design year.	Not Applicable		Slight Adverse
	Improve Access to	Leisure	Non-business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements.	Not Applicable		Beneficial
Better Safety, Security & Health	Better Safety, Security & Health		he Risk of Death or Injury Changing transport mode to rapid transit services will benefit car users who transfer to a safer mode (public transport); car users who continue to use the car but whose accident risk is reduced as a result of reduced road traffic levels; and pedestrians and cyclists who will benefit due to reduced car traffic. Additionally, the scheme is expected to contribute to improved safety for pedestrians as a result of the priority measures and provision of improved access to bus stops and new and improved pedestrian crossing facilities. Cyclists will also benefit from greater segregation from general traffic by being able to use new and improved cycle lanes alongside the rapid transit alignments.			Neutral
	Improve Health thr Activity	ough Physical	People switching to from car to public transport (including via park and ride) will achieve the recommended minimum distance/time to obtain significant fitness benefits. In this regard the NFH Package is likely to lead to a positive impact on physical fitness.	Not Applicable		Moderately Beneficial
	Reduce Air Quality	Health Costs	No significant change expected from Central Case assessment, which concluded in an overall slight improvement in air quality. No new exceedences of AQS objectives or EU limit values in 2016 as a result of the scheme. Some improvement and some deterioration in the existing AQMA.	Not Applicable		Slight Beneficial
	Reduce Vulnerabil	ity to Terrorism	As no guidance is yet available to address this sub-objective, no comment is provided at this time.	Not applicable		Not applicable
	Reduce Crime		Particular attention and importance is attributed to the personal security of public transport passengers while making their way to and from the stops, waiting for services and travelling on the vehicle. Although security issues have not been considered in detail at this stage in the scheme development, it is anticipated that improvements such as effective CCTV systems; passenger information; good lighting; safe and secure access to stops etc.	Not applicable		Moderately beneficial
Impact on Public Accounts	Broad Transport B	udget	The public sector experiences costs associated with scheme construction, ongoing maintenance and operation of the scheme and loss in indirect tax revenue.	Local Gov PVC: £81.531m; Central Gov PVC: £134.844m		PVC = £216.375m; NPV = £301.737m; and BCR = 2.39
	Wider Public Finar	ice Impacts	Business and consumer users experience travel time benefits resulting from the reduced journey times provided by the rapid transit services; Transport providers experience ongoing operating costs which are more than offset by increased revenue resulting from additional trips using the rapid transit services.	Business Users PVB: £147.864r Transport Providers PVB: £38.6 Consumer Users PVB: £331.803	n 44m 3m	NPV = £216.375m



Table 3.38 – NBA: Local Government Affordability and Financial Sustainability

Affordability and Financial Sustainability (AFS)	- Sheet 1 of 3								
LOCAL GOVERNMENT Affordability and Financial Sustainability									
Costs	Breakdown by Organisation / Budget								
Investment Costs			Highway, R	Γ, P&R					
2009/10	1.091]	1.091						
2010/11	2.706		2.706						
2011/12	4.471		4.471						
2012/13	9.985		9.985						
2013/14	2.956		2.956						
2014/15	0.744		0.744						
2015/16	0.235]	0.235						
2016/17	1.304]	1.304						
2017/18	0.433		0.433						
TOTAL	23.925	(1)	23.925						
TOTAL (excluding pre-programme entry preparatory costs)	22.832		22.832						
Developer and other Contributions	3.480	(2)	3.480						
Grant from Central Government	0	(3)	0						
Grant to Private Sector	0	(4)	0						
Cost to Local Government net of contributions	20.445	(5)=(1)+(4)- (2)-(3)	20.445						
Cost to Local Government (excluding pre-programme entry preparatory costs)	19.352]	19.352						
Public Sector Operations	£m		Breakdown by Organisation / Budget						
Year 1 – 2016 (Opening Year)	Totals (excludi renewal)	ng capital	Highway, RT	P&R Site	Parking Revenue				
Change in operator costs	1.695	(6)	0.339	1.357	0				
Change in operator revenue	-0.002	(7)	0	0	-0.002				
NET IMPACT	-1.697	(8)=(7)-(6)	-0.339	-1.357	-0.002				
Year 11 – 2026		_							
Change in operator costs	2.213	(9)	0.442	1.771	0				
Change in operator revenue	-0.004	(10)	0	0	-0.004				
NET IMPACT	-2.217	(11)=(10)- (9)	-0.442	-1.771	-0.004				
Year 16 – 2031		_							
Change in operator costs	2.528	(12)	0.505	2.023	0				
Change in operator revenue	-0.006	(13)	0	0	-0.006				
NET IMPACT	-2.534	(14)=(13)- (12)	-0.505	-2.023	-0.006				
		_			· · · · · ·				



Table 3.39 – NBA: Central Government Affordability and Financial Sustainability

Affordability and Financial Sustainability (AFS)	- Sheet 2 of 3			
CENTRAL GOVERNMENT Affordability and Fin	ancial Sustainab	ility		
Costs Total (£m outturn undiscounted)			Breakdown	by Organisation / Budg
Investment Costs			RFA2	
2009/10	0		0	
2010/11	1.216]	1.216	
2011/12	2.009]	2.009	
2012/13	0.485		0.485	
2013/14	19.000		19.000	
2014/15	57.548		57.548	
2015/16	59.751]	59.751	
2016/17	27.469		27.469	
2017/18	0		0	
TOTAL	167.480	(15)	167.480	
Developer and other Contributions	0	(16)		
Grant to Local Government	0	(17)		
Grant to Private Sector	0	(18)		
Indirect Tax Revenues	-229.644	(19)		
Cost to Central Government of contributions	397.124	(20)=(15)+(1	7)+(18)-(16)-(19)	
Operations	£m	-		
Year 1 – 2016 (Opening Year)	Totals (excludi renewal)	ng capital		
Change in operator costs	0	(21)		
Change in operator revenue	0.272	(22)		
NET IMPACT	0.272	(23)=(22)-(21)	
Year 11 – 2026		_		
Change in operator costs	0	(24)		
Change in operator revenue	0.355	(25)		
NET IMPACT	0.355	(26)=(25)-(24)	
Year 16 – 2031				
Change in operator costs	0	(27)		
Change in operator revenue	0.406	(28)		
NET IMPACT	0.406	(29)=(28)-(27)	



Table 3.40 – NBA: Private Sector Affordability and Financial Sustainability

Affordability and Financial Sustainability (AFS)	- Sheet 3 of 3				
PRIVATE SECTOR Affordability and Financial	Sustainability				
Private Sector Investment Costs & Grants	Total (£m outtu undiscounted)	rn prices,	Breakdown	by Organisa	tion / Budge
Investment Costs			Developer Funding	Bus Operation	
2009/10	0]	0	0	
2010/11	0		0	0	
2011/12	0		0	0	
2012/13	0		0	0	
2013/14	0		0	0	
2014/15	0		0	0	
2015/16	0		0	0	
2016/17	8.931		3.480	5.451	
TOTAL	8.931	(30)	3.480	5.451	
Grants from Central and Local Government	0	(31)	0	0	
Private Sector Operators	£m	-	Breakdown	by Organisa	tion / Budge
Year 1 – 2016 (Opening Year)	Totals (excludii renewal)	ng capital	Bus, RT	Rail	Parking Revenue
Change in operator costs	2.635	(32)	2.635	0	0
Change in operator revenue	2.930	(33)	4.162	-1.228	-0.004
NET IMPACT	0.295	(34)=(33)-(32)	1.527	-1.228	-0.004
Subsidy	0	(35)	0	0	0
Year 11 – 2026		-			
Change in operator costs	3.968	(36)	3.968	0	0
Change in operator revenue	5.764	(37)	8.102	-2.331	-0.007
NET IMPACT	1.796	(38)=(37)-(36)	4.134	-2.331	-0.007
Subsidy	0	(39)	0	0	0
Year 16 – 2031		-			
Change in operator costs	4.533	(40)	4.533	0	0
Change in operator revenue	7.683	(41)	10.781	-3.088	-0.01
NET IMPACT	3.150	(42)=(41)-(40)	6.248	-3.088	-0.01
Subsidy	0	(43)	0	0	0
Private Sector NET IMPACT					
Investment net of capital grant	8.931	=(30)-(31)			
Operations net of subsidy					
Year 1 – 2016	0.295	=(34)-(35)			
Year 11 – 2026	1.796	=(38)-(39)			
Year 16 – 2031	3.150	=(42)-(43)			



3.11 Assessment of Lower Cost Alternative

3.11.1 Scheme Description Summary

The Lower Cost Alternative (LCA) is described in Section 1 of the MSBC and the method in which it was identified is outlined in the Options Assessment Report attached at **Appendix 2.B**. Detailed plans for the scheme are also attached at **Appendix 1.G**.

The Lower Cost Alternative option for the NFH Package Central Case comprises of a number of design variants to the overall NFH Package as follows:

- M32 Park and Ride the 1,500 park and ride site at Stoke Lane will be removed from the NFH Package as part of the Lower Cost Alternative, in order to reduce construction and ongoing operational and maintenance costs. However a new bus only motorway junction will still be required at this location to allow rapid transit services from the North and East Fringe areas to access the M32 Motorway from Stoke Lane / Coldharbour Lane.
- North Fringe (Cribbs Causeway to Aztec West) the route would terminate in a loop around Aztec West Business Park and would not continue to Cribbs Causeway Regional Shopping Centre; this would reduce construction and ongoing operation costs.
- North Fringe (Bradley Stoke Way) the rapid transit route would run along Bradley Stoke Way with general traffic where traffic congestion levels are lower i.e. between the bus access gate at the Willow Brook Centre and a point adjacent to The Worthys. The section of dedicated guided busway along the central section of Bradley Stoke Way would be removed from the NFH Package as part of the Lower Cost Alternative to reduce construction costs. The existing roundabouts would remain and not be reconfigured as signal-controlled junctions.
- South Bristol (Hartcliffe Way) this section of the South Bristol Rapid Transit route would follow Hartcliffe Way and Whitchurch Lane as indicated in the Next Best Alternative above. This section of the South Bristol Rapid Transit route (i.e. Hartcliffe Way and Whitchurch Lane) would run in mixed traffic along the highway where traffic congestion levels are lower. The section of dedicated bus lane along this section of the route would be removed from the NFH Package as part of the Lower Cost Alternative to reduce construction costs. However, a small section of northbound bus lane would be implemented between Headley Lane and Parsons Street.
- South Bristol (New Cut Bridge) the proposal to provide a new public transport bridge over the New Cut (River Avon) will be removed from the scheme for the Lower Cost Alternative. Rapid transit services will route via Bedminster Bridge using existing infrastructure.

All other attributes of the NFH Package remain as per the main Central Case, although a number of adjustments have been made to the service plan as a 5 minute frequency to the M32 Park and Ride site from the City Centre is no longer a requirement of the scheme.

3.11.2 Scheme Costs

The total risk-adjusted capital cost estimate of the LCA is **£143.2million** in outturn prices (£142.1million excluding pre-Programme Entry preparatory costs have already been incurred). This represents a reduction in costs of approximately 27% from the NFH Package Central Case. The local contribution to the above costs is £17million (excluding pre-Programme Entry preparatory costs) which represents a local contribution of 12%.



The annual maintenance costs for the LCA (net increase) are estimated at £201k p.a. (2009 prices) which is a reduction of £100k p.a. from the Central Case. Annual operating costs are estimated at £1,137k p.a. (2009 prices) (which is £831k p.a. lower than the Central Case).

3.11.3 Project Demand and Impacts

3.11.3.1 Public Transport Passenger Demand

The following tables present the lower cost alternative forecast patronage on each of the four rapid transit (RT) routes that make up the lower cost alternative. Table 3.41 shows the total forecast patronage for each of the services in terms of total passenger boardings along each of the routes, including boardings at the two P&R sites. Table 3.42 shows the proportion of total boardings that are related to P&R, i.e. either boarding at the P&R in the inbound direction or alighting at the P&R in the outbound direction.

Applying annualisation factors shows that the four RT routes in total are forecast to attract 3.8 million passengers in 2016 rising to nearly 4.4 million for 2031, around 22% less than the Central Case. Park and Ride trips are forecast to account for just 6% of the total trips made on the RT services.

Service		2016				2031		
	AM Peak Hour	Average IP Hour	PM Peak Hour	Annual (Million Pass.)	AM Peak Hour	Average IP Hour	PM Peak Hour	Annual (Million Pass.)
X90 Hengrove Park - Cribbs Causeway (via UWE)	928	696	750	2.2	1,074	833	895	2.7
X91 Bristol Centre - Parkway (via UWE)	189	166	171	0.5	211	185	196	0.6
X92 Bristol Centre – Emerson's Green (via UWE)	214	184	190	0.6	216	213	188	0.6
X93 Hengrove Park to Emerson's Green	165	150	141	0.5	186	185	175	0.5
Total	1,496	1,196	1,252	3.8	1,687	1,416	1,454	4.4

		*	
Table 2.44 Cummon	v of Earoacot Danid Transit	Total Datranaga I La	war Caat Alternative
Table 5.41 - Summar	V OF FORECAST RADIO TRANSIL	Total Patronade : Lo	wer Cost Alternative

Patronage stated as total number of boardings for each route combining northbound and southbound directions.

Table 3.42 - Summary of P&R only Rapid Transit Patronage: Lower Cost Alternative

Service	2016			2031			
	Total Daily RT P&R Legs*	Total Daily RT Trips**	% P&R RT Trips	Total Daily RT P&R Legs*	Total Daily RT Trips**	% P&R RT Trips	
RT Boardings	742	13,472	5.5%	937	15,697	6.0%	

* P&R leg defined as a boarding or alighting at a P&R site

** RT Trips defined by total number of boardings combining both north and southbound movements

Table 3.43 presents a comparison of public transport patronage across all public transport modes for movements within the NFH corridor – defined earlier in Figure 3.1 – for 2016 and 2031 forecast years, comparing the lower cost alternative against the reference case.

As shown, the lower cost alternative is projected to increase PT trips within the NFH corridor by around 8% for both the 2016 and 2031 forecast years comparing with the reference case, noting that this includes the RT element of P&R trips.

		Referen	ce Case			Centra		Total PT	
Movement	Bus (incl. P&R)	Rail	RT ²⁸ (incl. P&R	Total PT	Bus (incl. P&R)	Rail	RT (incl. P&R	Total PT	Difference
2016									
AM Peak Hour	3,942	450	144	4,536	3,174	380	1,341	4,895	359 (7.9%)
Average IP Hour	2,767	71	71	2,910	2,162	58	959	3,178	268 (9.2%)
PM Peak Hour	3,496	329	141	3,967	2,792	279	1,134	4,204	238 (6%)
Daily Totals	33,666	2,209	1,084	36,959	26,656	1,850	11,423	39,929	2,970 (8%)
2031									
AM Peak Hour	4,389	588	206	5,183	3,552	472	1,533	5,557	375 (7.2%)
Average IP Hour	3,155	101	104	3,360	2,467	77	1,113	3,677	317 (9.4%)
PM Peak Hour	3,930	447	200	4,577	3,145	359	1,338	4,843	266 (5.8%)
Daily Totals	38,018	2,973	1,559	42,550	30,167	2,361	13,383	45,911	3,362 (7.9%)

Table 3.43 – Summary of Forecast Public Transport Movements* in the NFH Corridor: Reference Case and Lower Cost Alternative

* Figures stated are in person trips, relates to trips where PT stage origin and destination entirely within NFH Corridor

3.11.3.2 Highway Demand on the Stoke Gifford Transport Link

Table 3.44 presents the forecast traffic flows on the Stoke Gifford Transport Link (SGTL) by time period and also as an Annual Average Daily Total (AADT). This shows that flows are slightly lower than the Central Case or Next Best Alternative.

	Table 3.44 – Summary	of Forecast	Traffic Flows*	on the Stoke	Gifford T	ransport Link
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Period	2016	2031
AM Peak Hour	1,793	2,038
Average IP Hour	1,002	1,233
PM Peak Hour	1,374	1,851
AADT	15,447	18,990

* Flows stated are all vehicles, both directions

²⁸ Reference case includes rapid transit users on 'Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit' scheme.

3.11.4 Cost-Benefit Analysis

Using the same methodology as per the Central Case, a Cost-Benefit Analysis has been carried out for the NFH Package LCA. The detailed TEE, Public Accounts and AMCB tables are presented for the NFH Package LCA in **Appendix 3.G** (as part of the Cost Benefit Analysis Report). The headline results are summarised in Table 3.45 below.

Indicator	Central Case	Lower Cost Alternative
Highway Benefits	304,972	172,239
Public Transport Benefits	285,674	167,541
Private Sector Benefits	37,168	18,084
Present Value of Benefits (PVB)	626,937	360,055
Present Value of Costs (PVC)	220,353	164,929
Net Present Value (NPV)	406,584	195,126 (reduction of 52%)
Benefit to Cost Ratio (BCR)	2.85	2.18

Table 3.45 – NFH Package LCA: Cost-Benefit Analysis Results

Table 3.45 shows that the NFH Package LCA results in an overall reduction in the BCR from 2.85 to 2.18, with an overall reduction in the Net Present Value of approximately 52% when compared to the Central Case. There is a reduction in highway benefits of approximately 44% and in public transport benefits of 41% when compared to the Central Case. In economic terms, the Central Case represents better value for money when compared to the LCA.

3.11.5 Scheme Benefits and Appraisal

The Appraisal Summary Table (AST) for the NFH Package LCA is shown in Table 3.46 overleaf. Due to the timescales involved in the preparation of the bid and the completion of the traffic modelling for the LCA, a proportionate approach has been undertaken to the detailed quantitative aspects of the AST, in particular in relation to noise and air quality modelling, and reliability and safety analyses. Therefore the appraisal results for the LCA are presented in mainly qualitative terms.

3.11.6 Affordability and Financial Sustainability Tables

The Affordability and Financial Sustainability (AFS) tables have also been prepared for the LCA and the results outlined in Table 3.47 to 3.48.



Table 3.46 – Appraisal Summary Table for NFH Package: Lower Cost Alternative

Option: North Fri Package (Lower (nge to Hengrove Cost Alternative)	Description: Co Centre; three no	ombination of four major projects: three bus-rapid transit routes between Cribbs Causeway / North Fringe; East Fringe an ew park & ride sites; improvements to Bristol City Centre; and new transport link at Stoke Gifford (Stoke Gifford Transpor	d South Bristol via Bristol City rt Link)	Date & Contact: Atkins, March 2010
Objective	Sub-Objective		Key Points	Metrics	Assessment
Tackle Climate Change	Reduce Greenhous Emissions	e Gas	Decrease in overall vehicle kilometres per day travelled over the 60 year appraisal period resulting in overall decrease in carbon emissions and a positive net present value.	Not Applicable	Beneficial
Support Economic Growth	Improve Reliability		The provision of dedicated priority measures and segregated infrastructure measures will provide improved reliability for the rapid transit services as well as other bus services using the new infrastructure. However, with a substantial reduction in the priority measures provided in South Bristol (compared to the Central Case) journey time improvements are anticipated to much lower in this section.	Not Applicable	Beneficial
	Improve Connectivi	ty	Business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements.	Not Applicable	Beneficial
	Support the Deliver	y of Housing	There are no new housing developments which are specifically dependent on the implementation of the NFH Package as a whole. However, the South Gloucestershire Draft Core Strategy (published in March 2010) has identified the Stoke Gifford Transport Link to facilitate proposed new neighbourhood areas in the North Fringe. The transport interventions required to support any individual housing development will be assessed as part of the Authorities standard development control procedures.	Not Applicable.	Not Applicable
	Enhance Resilience	9	As no guidance is yet available to address this sub-objective, no comment is provided at this time.	Not Applicable	Not Applicable
	Wider (Economic) I	mpacts	In overall terms, the NFH Package is likely to contribute to wider economic impacts by improving access to employment areas in the North Fringe (Aztec West) and Emersons Green East. This is likely to boost the attractiveness of these two development areas for firms to locate and workers to work, and hence agglomeration and labour supply benefits. The impact on the city centre is likely to be limited.	Not Applicable	Beneficial
Promote Equality of Opportunity	Improve Accessibili	ty	Although the impact on public transport accessibility of the scheme across the wider sub-region is deemed to be small, the benefits are mainly accrued locally and significant improvements to public transport accessibility are shown for Emersons Green East, SPark and UWE. Due to the fact that the route options in South Bristol have changed with the LCA, accessibility to Knowle West and Hengrove Park are limited with rapid transit services operating on the periphery of this development / regeneration areas. In addition, the LCA does not serve the Cribbs Causeway Regional Shopping Centre.	Not Applicable	Slightly Beneficial
	Improve Affordabilit	х у	This sub-objective has not been assessed as part of this scheme appraisal. However, it is worth noting that the assumptions for fares policy underlying the modelling and appraisal of the NFH Package is to mirror existing public transport fares.	Not Applicable	Not Applicable
	Reduce Severance		The infrastructure associated with the rapid transit element of the NFH Package is unlikely to have a detrimental impact on severance as the majority of the route will follow existing roads, using on-street infrastructure (i.e. bus lanes, priority at traffic signals). Where a segregated busway is provided, the likely severance effect will be mitigated against by providing parallel pedestrian and cycle facilities, including dedicated crossing points. Significant benefits to pedestrian and cycle facilities. The ability to integrate the design of the rapid transit proposals within the city centre strategy will reduce the likely level of severance.	Not Applicable	Neutral
	Enhance Regenera	tion	The NFH Package is likely to improve accessibility from several areas of relatively high employment deprivation to key centres of employment, therefore provide some benefits in terms of this sub-objective. However, when compared to the Central Case, the impacts in relation to South Bristol – in particular Knowle West Regeneration Area – the impacts are limited as the rapid transit route will only serve the periphery of this area and not run through it as per the Central Case.	Not Applicable	Beneficial
	Reduce Regional E Imbalance	conomic	As the majority of beneficiaries from the NFH Package are from the Bristol area and its surrounding localities, the impact on this sub-objective is deemed to be beneficial.	Not Applicable	Beneficial
Improve Quality of Life & Promote a Healthy Natural Environment	Reduce Exposure t	o Noise	The most significant increases in noise are expected in the vicinity of the Stoke Gifford Transport Link. Adverse impacts in these areas may be limited with mitigation. Effects in the vicinity of the other scheme elements are negligible or minor. Overall there are more properties predicted to receive a perceptible decrease in noise than a perceptible increase in noise. Impact on Hengrove Park likely to be reduced when compared to Central Case as route now runs along Hartcliffe Way instead of through Hengrove Park itself.	Not Applicable	Neutral
	Minimise Impact on	Biodiversity	Some loss of green field habitat and limited chance of damage to SCNIs and LNR.	Not Applicable	Slight Adverse
	Minimise Impact on Environment	the Water	As well as the local watercourses affected by the scheme, there will be effects on the River Frome, the River Avon and the floodplain. The works are generally considered as minor in nature and the impact of the NFH Package proposals is generally classed as neutral. Without mitigation, however, there would be some negative effects on the River Frome which is declared a "salmonid" water. If appropriate mitigation is proved, the effect of the NFH Package proposals on the water environment will be neutral.	Not Applicable	Neutral
	Minimise Impact on	Heritage	The NFH Package proposals pass through areas of known cultural heritage value – Stoke Park, Bristol City Centre, the City Docks and Bedminster are areas of particular high value, which is reflected in the high number of designations (including 283	Not Applicable	Neutral



Option: North Fri Package (Lower (nge to Hengrove Description: Co Cost Alternative) Centre; three n	ombination of four major projects: three bus-rapid transit routes between Cribbs Causeway / North Fringe; East Fringe an ew park & ride sites; improvements to Bristol City Centre; and new transport link at Stoke Gifford (Stoke Gifford Transpo	d South Bristol via Bristol City rt Link) Date & Col Atkins, Mar	n tact: ch 2010
Objective	Sub-Objective	Key Points	Metrics	Assessment
		Listed Buildings, 8 Conservation Areas, and 1 Registered Park and Garden. Overall throughout the whole scheme, the potential impact is likely to result in a negligible negative impact or no change.		
	Minimise Impact on Landscape	Some long term impacts on landscape character where new road infrastructure is introduced into existing open farmland. Neutral to slight adverse impacts on visual amenity. Potential short term adverse impacts on landscape character and visual amenity through the loss of existing vegetation and construction activities. Mitigation measures will reduce some impacts to neutral at design year. Some impacts will remain slight adverse.	Not Applicable	Slight Adverse
	Improve Experience of Travel	The NFH Package will increase the transport options available to over 16,000 existing households in the Greater Bristol area. Modern vehicle designs with good heating, ventilation, seating, luggage space and ride quality will improve traveller care and the provision of better travel information, including real time public transport information, and improvements in personal security, will reduce stress for travellers. Passengers will also benefit from new and better designed waiting and boarding facilities to and from vehicles, giving a less stressful, smoother journey. The NFH Package will have a beneficial impact on transport passenger interchange since it will facilitate improved interchange by the provision of quality waiting facilities and greatly improved public transport information. Operation and ease of use of the public transport system will be improved by creating new direct journey opportunities with new rapid transit routes as well as providing greater interchange opportunities with the remainder of the public transport network and other modes. New interchanges will be created by the provision of park and ride facilities.	Over 16,000 households within 400m of rapid transit stop; Approx 13,500 passengers using the rapid transit services per day.	Largely beneficial
	Improve the Urban Environment	No long term impact on townscape character. Neutral to slight adverse impacts on visual amenity. Potential short term adverse impacts on townscape character and visual amenity during construction. Mitigation measures will reduce impacts to neutral at design year.	Not Applicable	Slight Adverse
	Improve Access to Leisure	Non-business users experience travel time benefits resulting from the improved journey times provided by the rapid transit (and other highway) improvements.	Not Applicable	Beneficial
Better Safety, Security & Health	Reduce the Risk of Death or Injury	Changing transport mode to rapid transit services will benefit car users who transfer to a safer mode (public transport); car users who continue to use the car but whose accident risk is reduced as a result of reduced road traffic levels; and pedestrians and cyclists who will benefit due to reduced car traffic. Additionally, the scheme is expected to contribute to improved safety for pedestrians as a result of the priority measures and provision of improved access to bus stops and new and improved pedestrian crossing facilities. Cyclists will also benefit from greater segregation from general traffic by being able to use new and improved cycle lanes alongside the rapid transit alignments.	Not Applicable	Neutral
	Improve Health through Physical Activity	People switching to from car to public transport (including via park and ride) will achieve the recommended minimum distance/time to obtain significant fitness benefits. In this regard the NFH Package is likely to lead to a positive impact on physical fitness.	Not Applicable	Moderately Beneficial
	Reduce Air Quality Health Costs	No significant change expected from Central Case assessment, which concluded in an overall slight improvement in air quality. No new exceedences of AQS objectives or EU limit values in 2016 as a result of the scheme. Some improvement and some deterioration in the existing AQMA.	Not Applicable	Slight Beneficial
	Reduce Vulnerability to Terrorism	As no guidance is yet available to address this sub-objective, no comment is provided at this time.	Not applicable	Not applicable
	Reduce Crime	Particular attention and importance is attributed to the personal security of public transport passengers while making their way to and from the stops, waiting for services and travelling on the vehicle. Although security issues have not been considered in detail at this stage in the scheme development, it is anticipated that improvements such as effective CCTV systems; passenger information; good lighting; safe and secure access to stops etc.	Not applicable	Moderately beneficial
Impact on Public Accounts	Broad Transport Budget	The public sector experiences costs associated with scheme construction, ongoing maintenance and operation of the scheme and loss in indirect tax revenue.	Local Gov PVC: £63.527m; Central Gov PVC: £101.402m	PVC = £164.929m; NPV = £195.126m; and BCR = 2.18
	Wider Public Finance Impacts	Business and consumer users experience travel time benefits resulting from the reduced journey times provided by the rapid transit services; Transport providers experience ongoing operating costs which are more than offset by increased revenue resulting from additional trips using the rapid transit services.	Business Users PVB: £122.045m Transport Providers PVB: £18.084m Consumer Users PVB: £269.722m	NPV = £195.126m



Table 3.47 – LCA: Local Government Affordability and Financial Sustainability

Affordability and Financial Sustainability (AFS)	- Sheet 1 of 3				
LOCAL GOVERNMENT Affordability and Finance	cial Sustainabilit	у			
Costs	Total (£m outtu undiscounted)	urn prices,	Breakdown	ı by Organisat	tion / Budget
Investment Costs			Highway, R	T, P&R	
2009/10	1.091]	1.091]	
2010/11	2.706		2.706	-	
2011/12	4.471		4.471		
2012/13	5.335		5.335		
2013/14	1.626]	1.626		
2014/15	1.878]	1.878		
2015/16	0.235]	0.235		
2016/17	0.362		0.362		
2017/18	0.433		0.433	_	
TOTAL	18.136	(1)	18.136		
TOTAL (excluding pre-programme entry preparatory costs)	17.045		17.045		
Developer and other Contributions	3.480	(2)	3.480		
Grant from Central Government	0	(3)	0		
Grant to Private Sector	0	(4)	0		
Cost to Local Government net of contributions	14.656	(5)=(1)+(4)- (2)-(3)	14.656		
Cost to Local Government (excluding pre-programme entry preparatory costs)	13.565]	13.565		
Public Sector Operations	£m		Breakdown	by Organisat	tion / Budget
Year 1 – 2016 (Opening Year)	Totals (excludi renewal)	ng capital	Highway, RT	P&R Site	Parking Revenue
Change in operator costs	1.093	(6)	0.339	0.754	0
Change in operator revenue	-0.002	(7)	0	0	-0.002
NET IMPACT	-1.095	(8)=(7)-(6)	-0.339	-0.754	-0.002
Year 11 – 2026					
Change in operator costs	1.427	(9)	0.442	0.985	0
Change in operator revenue	-0.004	(10)	0	0	-0.004
NET IMPACT	-1.431	(11)=(10)- (9)	-0.442	-0.985	-0.004
Year 16 – 2031		_			
Change in operator costs	1.630	(12)	0.505	1.125	0
Change in operator revenue	-0.005	(13)	0	0	-0.005
NET IMPACT	-1.635	(14)=(13)- (12)	-0.505	-1.125	-0.005



Table 3.48 – LCA: Central Government Affordability and Financial Sustainability

Affordability and Financial Sustainability (AFS)	- Sheet 2 of 3			
CENTRAL GOVERNMENT Affordability and Fin	ancial Sustainab	ility		
Costs	Total (£m outtu undiscounted)	ırn prices,	Breakdown	by Organisation / Budget
Investment Costs			RFA2	
2009/10	0		0	
2010/11	1.216]	1.216	
2011/12	2.009		2.009	
2012/13	0.485		0.485	
2013/14	18.997		18.997	
2014/15	39.883		39.883	
2015/16	42.327		42.327	
2016/17	20.129		20.129	
2017/18	0		0	
TOTAL	125.046	(15)	125.046	
Developer and other Contributions	0	(16)		
Grant to Local Government	0	(17)		
Grant to Private Sector	0	(18)		
Indirect Tax Revenues	-159.865	(19)		
Cost to Central Government of contributions	284.911	(20)=(15)+(17	7)+(18)-(16)-(19)	
Operations	£m	-		
Year 1 – 2016 (Opening Year)	Totals (excludi renewal)	ng capital		
Change in operator costs	0	(21)		
Change in operator revenue	0.092	(22)		
NET IMPACT	0.092	(23)=(22)-(21))	
Year 11 – 2026		_		
Change in operator costs	0	(24)		
Change in operator revenue	0.120	(25)		
NET IMPACT	0.120	(26)=(25)-(24)	
Year 16 – 2031				
Change in operator costs	0	(27)		
Change in operator revenue	0.137	(28)		



Table 3.49 – LCA: Private Sector Affordability and Financial Sustainability

Private Sector Investment Costs & Grading outfurty Private Sector Investment CostsSector Investment Cost	Affordability and Financial Sustainability (AFS) – Sheet 3 of 3				
Private Sector Investment Costs & Grans Total (en outfur year) (endots) Breakdown by Organisation / Budget 2009/10 <	PRIVATE SECTOR Affordability and Financial	Sustainability				
Investment CostsPrivationOperation2009/10002010/11002011/12002011/12002013/14002014/15002015/16002015/16002016/178.59902016/178.59902016/178.59902016/17002016/178.59902016/178.59902016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002016/17002017/17002017/17002016/17002017/17002017/17002017/17002017/17002017/17002017/17002017/17002017/17002017/	Private Sector Investment Costs & Grants	Total (£m outtu undiscounted)	ırn prices,	Breakdown	by Organisa	ation / Budget
2009/10 0	Investment Costs			Developer Funding	Bus Operation	
2010/11 0 0 0 2011/12 0 0 0 2012/13 0 0 0 0 2013/14 0 0 0 0 0 2013/14 0 0 0 0 0 2014/15 0 0 0 0 0 2015/16 0 0 0 0 0 2016/17 8.599 (3) 0 0 0 Grants from Central and Local Government 0 0 0 0 0 Private Soctor Operators 1 729 0 0 0 0 Change in operator costs 1 1.29 0 0 0 0 0 0 Subsidy 0	2009/10	0]	0	0	
2011/12 0 0 0 2012/13 0 0 0 2013/14 0 0 0 2014/15 0 0 0 2015/16 0 0 0 2015/16 0 0 0 2015/16 0 3.480 5.120 2016/17 8.599 (3) 3.480 5.120 Grants from Central and Local Government 0 (3) 0 0 Private Sector Operators Em Bus, RT Rail Parking Revenue Change in operator costs 1.729 0 0 0 Change in operator revenue 1.484 (3) 2.711 -1.223 -0.004 NET IMPACT 0.245 (34µ(3)(32) 0.982 -1.223 -0.007 Subsidy 0 0 0 0 0 0 NET IMPACT 0.507 (38µ(37)(49) 0 0 0 0 Subsidy 0	2010/11	0	1	0	0	
2012/13 0 0 0 2013/14 0 0 0 0 2014/15 0 0 0 0 2015/16 0 0 0 0 2015/16 0 0 0 0 2016/17 8.599 (30) 3.480 5.120 Grants from Central and Local Government 0 31 0 0 Private Sector Operators Em Bus, RT Rall Parking Revenue Change in operator costs 1.729 0 0 0 0 Change in operator costs 1.729 0 0 0 0 Subsidy 0 0 0 0 0 0 NET IMPACT 2.604 (3) 2.604 0 0 0 Subsidy 0 0 0 0 0 0 0 NET IMPACT 2.604 (3) 2.607 -2.183 -0.007 Subi	2011/12	0	1	0	0	
2013/14 0 0 0 2014/15 0 0 0 2015/16 0 0 0 2015/16 0 0 0 2016/17 8.599 (30) 3.480 5.120 TOTAL 8.599 (30) 3.480 5.120 Grants from Central and Local Government 0 (31) 0 0 Private Sector Operators Em Bus, RT Rail Parking Revenue Change in operator costs 1.729 (2) 1.729 0 0 Change in operator revenue 1.484 (3) 0 0 0 Subsidy 0 0 0 0 0 0 Year 1 - 2026 (31) (31) 2.604 0 0 0 Subsidy 0 0 0 0 0 0 0 Ver 1 - 2026 2.604 0 0 0 0 0 0 0 <	2012/13	0	1	0	0	
2014/15 0 </td <td>2013/14</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td></td>	2013/14	0	1	0	0	
2015/16 0 </td <td>2014/15</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td></td>	2014/15	0	1	0	0	
2016/17 8.599 (30) 3.480 5.120 TOTAL 8.599 (30) 0 0 Grants from Central and Local Government 0 (31) 0 0 Private Sector Operators Em Beakdown by Organisation / Budget Change in operator costs 1.729 (32) 1.729 0 0 Change in operator revenue 1.484 (33) 2.711 -1.223 -0.004 Subsidy 0 (35) 0.982 -1.223 -0.004 Change in operator costs 2.604 (39) 0.5301 -2.183 -0.007 Subsidy 0 0 0 0 0 0 Year 16 - 2031 1.238 (40) 0 0 0 Change in operator costs 2.975 (40) 2.975 0 0 <td< td=""><td>2015/16</td><td>0</td><td>1</td><td>0</td><td>0</td><td></td></td<>	2015/16	0	1	0	0	
TOTAL 8.599 (30) 3.480 5.120 Grants from Central and Local Government 0 (1) 0 0 Private Sector Operators Em Breakdown by Organisation / Budget Year 1 - 2016 (Opening Year) Totals (excluding capital renewal) Bus, RT Rail Parking Revenue Change in operator costs 1.729 0 0 Change in operator revenue 1.484 (33) 2.711 -1.223 -0.004 Subsidy 0 (35) 0.982 -1.223 -0.004 Subsidy 0 (35) 0.982 -1.223 -0.004 Subsidy 0 0 0 0 0 Year 1 - 2026 (36) 2.604 0 0 0 Change in operator costs 2.604 0 0 0 0 0 Subsidy 0.507 (38)=(37)(58) 2.697 -2.183 -0.007 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td>2016/17</td> <td>8.599</td> <td></td> <td>3.480</td> <td>5.120</td> <td></td>	2016/17	8.599		3.480	5.120	
Grants from Central and Local Government 0 (a1) 0 0 Private Sector Operators Em Breakdown by Organisation / Budget Year 1 - 2016 (Opening Year) Totals (excluding capital renewal) Bus, RT Rail Parking Revenue Change in operator costs 1.729 0 0 0 Change in operator revenue 1.484 (33) 2.711 -1.223 -0.004 NET IMPACT -0.245 (34)=(33),(32) 0.982 -1.223 -0.004 Subsidy 0 (35) 0.982 -1.223 -0.004 Year 11 - 2026 (36) 2.604 0 0 0 Change in operator costs 2.604 (36) 2.604 0 0 Subsidy 0 (39) 2.607 -2.183 -0.007 Subsidy 0 (39) 0 0 0 Year 16 - 2031 2.975 0 0 0 0 NET IMPACT 1.238 (42)=(41),(40) 0 0 <t< td=""><td>TOTAL</td><td>8.599</td><td>(30)</td><td>3.480</td><td>5.120</td><td></td></t<>	TOTAL	8.599	(30)	3.480	5.120	
Private Sector Operators Em Breakdown by Organisation / Budget Year 1 - 2016 (Opening Year) Totals (excluding capital renewal) Bus, RT Rail Parking Revenue Change in operator costs 1.729 (32) 1.729 0 0 Change in operator revenue 1.484 (33) 2.711 -1.223 -0.004 NET IMPACT -0.245 $(34)=(33)+(32)$ 0.982 -1.223 -0.004 Subsidy 0 0 0 0 0 0 Subsidy 0 (35) 0 0 0 0 Year 11 - 2026 2.604 0 0 0 0 0 Subsidy 0 0 0 0 0 0 Subsidy 0 0 0 0 0 0 Ver 11 - 2026 2.975 (40) 7.071 2.848 -0.01 NET IMPACT 1.238 $(42)=(41)+(40)$ 0	Grants from Central and Local Government	0	(31)	0	0	
Year 1 - 2016 (Opening Year) Totals (excluding capital renewal) Bus, RT Rail Parking Revenue Change in operator costs 1.729 (32) 1.729 0 0 Change in operator revenue 1.484 (33) 2.711 -1.223 -0.004 NET IMPACT -0.245 (34)=(33)(32) 0.882 -1.223 -0.004 Subsidy 0 (35) 0 0 0 Year 11 - 2026 2.604 (36) 2.604 0 0 Change in operator costs 2.604 (36) 2.604 0 0 Change in operator revenue 3.111 (37) 2.697 2.183 -0.007 Subsidy 0 0 0 0 0 0 Subsidy 0 0 0 0 0 0 Subsidy 0 0 0 0 0 0 Change in operator costs 2.975 (40) 1.238 (42)=(41) 0 0 0	Private Sector Operators	-	Breakdown by Organisation / Budget			
Change in operator costs 1.729 0 0 Change in operator revenue 1.484 (3) 2.711 -1.223 -0.004 NET IMPACT -0.245 (34)=(3)-(32) 0 0 0 Subsidy 0 (35) 0 0 0 Year 11 - 2026 -0.004 0 0 0 0 Change in operator costs 2.604 (36) 2.604 0 0 Change in operator revenue 3.111 (37) 5.301 -2.183 -0.007 Subsidy 0 39 0 0 0 0 Subsidy 0 39 0 0 0 0 Subsidy 0 39 0 0 0 0 Year 16 - 2031 2.975 0	Year 1 – 2016 (Opening Year)	Totals (excludi renewal)	ng capital	Bus, RT	Rail	Parking Revenue
Change in operator revenue 1.484 (33) 2.711 -1.223 -0.004 NET IMPACT 0 (36) 0 0 0 Subsidy 0 (36) 0 0 0 Year 11 - 2026 (36) 2.604 0 0 0 Change in operator costs 2.604 (36) 2.604 0 0 Change in operator revenue 3.111 (37) 5.301 -2.183 -0.007 NET IMPACT 0.507 (38)=(37)(36) 2.697 -2.183 -0.007 Subsidy 0 0 0 0 0 NET IMPACT 0.507 (38)=(37)(36) 2.697 -2.183 -0.007 Subsidy 0 0 0 0 0 0 Year 16 - 2031 (40) 2.975 0 0 0 0 Subsidy 0 (43) 0 0 0 0 0 0 Subsidy 0 (42)=(41)(40) (40) 2.975 0 0 0 0 0	Change in operator costs	1.729	(32)	1.729	0	0
NET IMPACT -0.245 (34)=(33)-(32) 0.982 -1.223 -0.004 Subsidy 0 35 0 0 0 Year 11 - 2026 2.604 (36) 2.604 0 0 Change in operator costs 2.604 (36) 2.604 0 0 Change in operator revenue 3.111 (37) 5.301 -2.183 -0.007 NET IMPACT 0.507 (39)=(37)-(36) 2.697 -2.183 -0.007 Subsidy 0 39) 0 0 0 0 Year 16 - 2031 0 0 0 0 0 0 Change in operator costs 2.975 (40) 2.975 0 0 Change in operator revenue 4.213 (41) 7.071 -2.848 -0.01 NET IMPACT 1.238 (42)=(41)-(40) 0 0 0 0 Subsidy 0 0 0 0 0 0 0 Private	Change in operator revenue	1.484	(33)	2.711	-1.223	-0.004
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3.12 Summary

In summary, this section sets out the Value for Money Case for the NFH Package.

The main points to note are as follows:

- The total scheme cost estimate is £195.3million in outturn prices (£194.2million excluding pre-Programme Entry preparatory costs that have already been incurred). Annual maintenance costs are estimated at £301k p.a. (net impact) and annual operating costs are estimated at £1,968k p.a.
- The operational and economic assessment of the NFH Package has been based on modelling work using the G-BATS3 multi-modal transport model of the Bristol urban area.
- The Central Case scheme is forecast to attract 4.9million passengers in 2016 rising to nearly 6million passengers in 2031. Park and ride trips are forecast to account for just over 15% of the total trips made on the rapid transit services – the park and ride site along the M32 corridor accounts for approximately 79% of the total park and ride trips.
- The economic effects of the NFH Package Central Case have been examined as part of a
 detailed economic assessment using the TUBA software. The Net Present Value of the
 scheme is £406,584k and the BCR is 2.85.
- As part of the assessment of scheme benefits, an **Environmental Assessment** has been undertaken on the scheme proposals, including consultation with Natural England, the Environment Agency and English Heritage.
- The assessment of the scheme benefits and supporting analysis has been undertaken in accordance with the current or In Draft (where possible) version of the WebTAG guidance as outlined on <u>www.dft.gov.uk/webtag</u>.
- A series of sensitivity tests have been carried out in order to understand the robustness of the NFH Package Central Case. The results provide a high level of confidence in the robustness of the scheme performance with respect to changes in modelling assumptions on traffic behaviour and population growth.
- In line with current guidance a 'Next Best Alternative' and 'Lower Cost Alternative' were also appraised. This demonstrated that the 'Central Case' Package provides the best value for money scheme option which also meets all the objectives identified for the package.

4. The Delivery Case

4.1 Introduction

This section outlines the Delivery Case for the North Fringe to Hengrove (NFH) Package. It demonstrates how the West of England Authorities intend to deliver the scheme on time and to budget to ensure the successful delivery of the project.

Following this introduction, this section of the Major Scheme Business Case is structured as follows:

- **Experience from other Major Schemes** demonstrating our proven track record in the delivery of Major Transport Schemes similar to the NFH Package;
- **Governance** outlining who will be responsible for delivering the NFH Package, identifying roles and responsibilities of those involved, and how key decisions will be made;
- **Project Planning** containing our detailed Project Plan for the delivery of the NFH Package, identifying milestones, timescales, critical path and key dependencies;
- Risk Management containing our Risk Register and outlining the processes by which we have identified and costed the key project risks as well as our Risk Management Strategy for reviewing, managing and mitigating these risks as appropriate;
- Stakeholder Management demonstrating how we have engaged our key (and wider) stakeholders in the development of the NFH Package, as well as outlining the key findings from the public consultation on the proposals in December 2009;
- Engagement with the Department for Transport following the designation of the pilot status of the NFH Package and opportunities to accelerate its appraisal; and
- Evaluation / Benefits Realisation containing our Outline Evaluation Plan which outlines our proposed methodology and timescales for monitoring the project.

The West of England authorities have been seeking means to build capacity and capability to progress schemes through the development and implementation process. One aspect of this has been establishing more responsive joint authority consultancy arrangements. Building upon the three existing preferred supplier sub-regional frameworks for modelling and appraisal, transport planning and communications, work has been undertaken over recent months to bring forward enhanced arrangements for specialist major schemes support. With the support of the Regional Improvement and Efficiency Partnership (RIEP) three new frameworks have been created covering major schemes project management, procurement advice and infrastructure design. These OJEU procured 4 year frameworks have recently been awarded and will operate via a short list of 3-5 pre-qualified contractors commissioned for individual tasks via mini-competition. This approach seeks to provide effective and responsive arrangements, whilst maintaining a competitive element to confirm value for money.

In parallel the authorities have been seeking to continue to build and develop in-house major schemes capability. Examples include the involvement on authority staff in key roles in progressing the Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit scheme as it moves towards a Conditional Approval bid, the opportunity to shadow key consultant staff working on sub-regional schemes, the experience gained by local authority project managers of the Weston Package and South Bristol Link schemes, and a key emphasis on training which for example saw 21 transport staff across the four authorities undertake PRINCE2 practitioner training in February/March this year.



4.2 Experience from other Major Schemes

The West of England Authorities, both individually and working as a Partnership, have a proven track record in the successful delivery of major transport infrastructure, particularly in relation to bus-based public transport and park & ride schemes. A selection of our relevant experience is outlined in the following sections.

4.2.1 Bath Transportation Package

The Bath Transportation Package (BTP) is a £54million scheme designed to tackle congestion in Bath and the surrounding area by improving public transport and enhancing pedestrian access for the benefit of residents, commuters and visitors. The BTP, which includes the first route for the West of England Rapid Transit Network, includes the following elements:

- Expanding Bath's three existing park and ride sites and creating a new park and ride site to the east of the City, thereby increasing park and ride capacity from 1,990 to 4,510 spaces;
- Implementing the first Bus Rapid Transit (BRT) route, including a 1.4km section of 'off-street' dedicated bus route which will remove park and ride buses from congestion for a significant amount of their journey;
- Creating a more pedestrian and cyclist-friendly City Centre through the introduction of access changes on a number of streets and the expansion and enhancement of pedestrian areas;
- Improving nine bus routes to Showcase standard, including raised kerbs for better access, off-bus ticketing to speed up boarding and real-time electronic information for passengers; and
- Introducing active traffic management with real-time information to direct drivers to locations where parking spaces are available.

This scheme received Programme Entry approval from DfT in October 2007. Four planning applications for the individual elements of the package were subsequently submitted and these applications have all now been approved by the Planning Authority.

4.2.2 Ashton Vale to Temple Meads and Bristol City Centre Rapid Transit Scheme

The Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit scheme is the second line to be delivered as part of the West of England's bus-based rapid transit network. This £48million scheme will provide a fast, frequent and reliable public transport service from the existing Park and Ride site at Long Ashton into and around Bristol City Centre.

This scheme includes the construction of a two-way 4km long segregated and guided busway between Long Ashton park and ride and Bristol City Centre as well as bus priority and interchange improvements in Bristol City Centre to serve key destinations. The scheme is expected to deliver significant journey time benefits for users of the rapid transit service as well as improve connectivity and accessibility to Bristol City Centre from the south west. This scheme received Programme Entry approval from DfT in March 2010.

4.2.3 Bus Showcase Routes / Greater Bristol Bus Network

Bristol's first Bus Showcase Route was opened in December 2003. The scheme, which runs along the A38 corridor between Henbury in the north and Hartcliffe in the south, involved a total investment of £6million. Improvements included improved junctions, new bus lanes, raised kerbs, and improved shelters and passenger information. The scheme was delivered in partnership with First Bristol, who provided the dedicated fleet of modern, low-floor vehicles for the service. The



scheme resulted in a 12% increase in bus patronage on the corridor with 1,200 vehicle journeys per week removed from the route.

The second Bus Showcase Route was opened in 2008 and runs between Bristol City Centre and Kingswood Town Centre (in the east of the city). This scheme, with a total investment of £13.1million, included bus stop improvements, new bus lanes, improvements to pedestrian and cycle links, enhancements to Kingswood Town Centre as well as 42 new modern, low-floor vehicles (provided by First).

A wider network of Bus Showcase Routes is now being progressed through the Greater Bristol Bus Network (GBBN) programme. This four year project achieved Full Approval by DfT in May 2008 and includes a total investment of over £70million (including £42million funding from DfT, over £20million from First and £6million developer contributions). The GBBN programme includes ten new bus corridors covering over 60 bus routes. The improvements being delivered include the following:

- Bus priority measures such as new bus lanes and intelligent traffic signals to minimise delays and improve journey times;
- New modern buses with easy access low floors, lower emissions and improved comfort and cleanliness;
- Real time information where and when passengers need it. Simple and easy to understand information to put bus users in control of their travel options;
- Improved links to and from park and ride sites;
- More services and new routes where there is most demand;
- New shelters with raised kerbs, improved lighting, seating and CCTV to improve access, comfort and cleanliness; and
- Improved maintenance and service agreements will ensure buses and shelters remain clean and damage free.

4.2.4 Portway Park and Ride

The first phase of the Portway park and ride site was opened in April 2002 and included 278 car parking spaces, CCTV surveillance and security patrols. The site was further improved in 2007 with the introduction of a dedicated fleet of new, high-profile vehicles and further expanded in 2008 with the addition of a further 295 car parking spaces. Park and ride services now run every 10 minutes in the peak periods and incorporate several intermediate stops on route to Bristol City Centre.

The total capital investment in this project was £7.2million, with the first phase being some £3.8million and the further expansion and extended bus lane totalling £3.4million. This was funded through the core Transport Plan programme, using LTP integrated transport funding, the council's own capital resources, and developer contributions for park and ride.

The scheme is now operating successfully with average car park occupancies of approximately 50% during the working week.

4.2.5 Cycling City

In June 2008, DfT appointed Greater Bristol as England's first official 'Cycling City', making it the country's premier showcase for transforming cycling and to pioneer innovative ways to making cycling a real alternative to the car. The total investment of £11.4million by DfT is matched by funding from Bristol City Council and South Gloucestershire Council and their partners, bringing the total investment to £22.8million.



The project's ambitious target is to double the numbers of regular cyclists in Greater Bristol by 2011. The project will deliver over 13 miles of new cycling routes and 39 miles of on-road and off-road improvements. As well as new cycling routes, other initiatives are being implemented as follows:

- Two large pilot 20mph speed limit areas; accident remedial schemes; and enhancements for cyclists on Greater Bristol Bus Network corridors;
- Provision of improved signage and information to promote use of the new cycling infrastructure; and
- Promotional and training events such as one-to-one adult training; personal travel planning; loan/hire bike schemes; and funding for workplace, school and local community cycling initiatives.

Bristol's routes are being built in three phases – phase one routes have been built and phase two routes are under construction. Phase three routes will be confirmed in early 2010. South Gloucestershire's routes are all due to be completed before March 2011. Further information on the Cycling City initiative can be found at www.betterbybike.info.

4.2.6 A4174 Avon Ring Road

The A4174 Avon Ring Road Stage II was opened to traffic in September 2001. The road completed the strategic link between the M32 Motorway and the A4. The overall cost of the scheme was £33.2million. Monitoring data has demonstrated that the link successfully removed through traffic movements, particularly heavy good vehicles, from inappropriate routes and provided opportunities to enhance facilities for pedestrians, cyclists and public transport.

4.3 Governance

4.3.1 Governance Structure

This section describes the key existing features of the sub-regional governance and delivery arrangements made through the West of England Partnership.

4.3.1.1 West of England Strategic Partnership Board

The West of England Partnership Board is a cross-party member and strategic partner board. The purpose of the Partnership Board is to:

- Realise the potential of the West of England and improvements in its economy, public infrastructure, environment and quality of life for all its residents;
- Set clear long term direction to support the development and delivery of key strategies for the West of England;
- Promote the interests of the West of England regionally, nationally and in Europe;
- Add to the confidence that attracts and retains public and private investment;
- Work holistically involving local authorities, public agencies and social, economic and environmental partners;
- Provide the leadership and strategic capacity to secure the well-being of the West of England; and
- Ensure appropriate delivery arrangements and vehicles, and a performance management framework.



4.3.1.2 Joint Transport Executive Committee

In 2009 a Joint Transport Executive Committee (JTEC) was established comprising the four Executive Members of the Unitary Authorities with responsibility for transport. This arrangement has been legally constituted via a Joint Working Agreement. The JTEC is responsible for:

- Developing and recommending sub-regional policy, investment and financial frameworks;
- The specific and continuing political decision-making and oversight essential to the successful implementation of major transport strategies and investment programmes;
- Seeking authority from Cabinets where any variation to a policy and financial framework is recommended;
- Producing periodic progress reports and receiving monitoring reports on major contractors;
- Working with cross-party members and strategic partners serving on the relevant Joint Scrutiny Board of the Partnership;
- Overseeing relationships with the Department for Transport, bus and rail operators, the Highways Agency and Network Rail; and
- Ensuring the delivery of the transport elements of the Multi-Area Agreement.

4.3.1.3 Joint Scrutiny Committee

The Joint Scrutiny Committee provides advice to the JTEC on the development of policy and investment frameworks, and reviews their implementation using their scrutiny powers. The Joint Scrutiny Board supplements the cross-party member and strategic partner engagement and contribution made at the Partnership.

The role of the Joint Scrutiny Board is to:

- Provide specialist advice and recommendations to the Partnership; and
- Scrutinise proposals under consideration, and the implementation of proposals approved.

4.3.1.4 Delivery Structure

A detailed review of the activities and responsibilities required to deliver the NFH Package has been undertaken including a review of delivery structures for other similar major schemes. The Authorities have reviewed the options for the governance of the scheme delivery to ensure there are appropriate and sufficient resources in place throughout the development of the scheme and robust, ongoing and integrated processes. The preferred option for the governance for delivery of the NFH Package is set out in Section 4.3.2.

With the JTEC in place, it is the West of England's intention to establish a Joint Delivery Vehicle (JDV). The purpose of the JDV is:

- To provide consultancy services to the West of England Authorities on the best means of specifying individual major infrastructure projects, municipal waste management and homes and communities – once they are financed and approved;
- Once specified, to ensure the delivery of major infrastructure projects within the agreed timescales, specification and budget, by effective commissioning of consultants; and
- To ensure high quality project management.

Independent legal and financial advisors have been advising the Authorities on the formation of the JDV. The move to a JDV is a significant step in the evolving shared governance arrangements in the West of England. This vehicle would be the preferred option for delivery of major transport schemes in the sub region; however, prior to its establishment the proposed governance for the delivery of the NFH Package will include a legal agreement between Bristol



and South Gloucestershire Councils designating Bristol City Council as the promoting authority for the NFH Package.

4.3.2 Programme Board & Resourcing Levels

The governance and programme management arrangements for the NFH Package are shown in Figures 4.1 and 4.2. At the highest level governance rests with Full Councils supported by the challenge and advisory roles provided by the Joint Scrutiny Committee and the West of England Partnership Board.





The governance and programme management structure is endorsed by the JTEC and is therefore subject to scrutiny by the Joint Scrutiny Committee and the West of England Partnership both of which have cross-party political representation.




Figure 4.2 – West of England Project Management Structure for the NFH Package

4.3.2.1 Programme Board

The Programme Board is the group which guides and steers the direction of the NFH Package and is responsible for its delivery. The Programme Board is responsible for authorising the programme plan (and any agreed variation) and will authorise, or seek authority for strategic decisions from the JTEC.

The Programme Board consists of representatives of the Authorities at sufficiently senior level to have the authority to act on behalf of their organisation. In addition membership of the Programme Board includes a Finance Officer who represents the sub-region and provides advice and input on the financial aspects of the project. The Programme Board also has representatives of the Government Office for the South West (GOSW), South West Councils, the Highways Agency and the West of England Partnership (WEP). The Programme Board was formed at the start of the project in June 2009.

The Programme Board nominates the Senior Responsible Owner (SRO) who is responsible for chairing Programme Board meetings and providing guidance and direction to the Programme Manager and individual Project SROs. The Programme Board supports the SRO in the delivery of the NFH Package and endorses the Project Plan (also described as the Project Initiation Document).



Meetings of the Programme Board are linked to key milestones (usually every month). The Programme Board considers highlight and exception reports, changes to the risk log and other key deliverables as defined in the Project Plan.

The Programme Board is responsible for:

- Co-ordinating the constituent projects;
- Approving the Project Initiation Documents (Project Plan);
- Agreeing and overseeing the implementation of the necessary actions to secure submission of the required MSBC processes;
- Supporting and taking part in, where appropriate, the necessary Gateway Reviews;
- Reviewing the Programme and Project Plans and approving any changes necessary;
- Approving any changes to the risk log and any additional mitigating actions;
- Providing advice and input on the financial aspects of the project;
- Approving periodic Progress Reports for the JTEC, Joint Scrutiny, Directors, the Department for Transport, and the West of England Partnership Board;
- Approving the budget plan and any changes to this plan via regular highlight reports from the Programme Manager and individual Project Managers;
- Approving any changes to the Project Plan recommended by the Programme Manager / individual Project Managers via highlight reports;
- Considering any exception reports that may arise during the life of the project and requesting exception plans where appropriate; and
- Approving any exception plans that may arise.

4.3.2.2 Joint Project Boards

The Joint Project Boards steer the direction of the constituent projects and reports to the Programme Board. Each Project Board is chaired by a Project SRO and is facilitated by a Project Manager. The Project Boards meet monthly and undertake tasks including the following:

- Co-ordinating scheme progression and programme, consistent with programme objectives;
- Providing highlight reports to the Programme Board;
- Produce and endorse the Project Programme, in agreement with the Programme Manager;
- Co-ordination of officer resources to project milestones; and
- Establish and monitor project risks and budget.

4.3.2.3 Senior Responsible Owner

The overall Senior Responsible Owner (SRO) for the NFH Package is Barbara Davies from the West of England Partnership Office. For the three constituent projects within the NFH Package, the Project SROs are Alun Owen from Bristol City Council and Chris Sane from South Gloucestershire Council.

The Programme SRO is responsible for ensuring that the NFH Package meets its objectives and delivers the projected benefits within the time, cost and quality parameters. The SRO represents the sub-region and is the Chair of the Programme Board. The key responsibilities of the SRO include:

• Strategic fit of the NFH Package of its objectives and benefits and delivery of these benefits. A key part of this is the ownership of the appraisal of the scheme;



- Liaison with the Department for Transport including the endorsement of study approach in line with the pilot status of the NFH Package;
- Ownership of the Gateway Review process and ensuring any recommendations are included in the work programme;
- Stakeholder engagement in the identification of the objectives, realisation of the benefits and delivery mechanism and programme;
- Ensuring the appropriate project management structures are in place with deliverable and milestones that fit with review and decision making against the objectives and benefits of the NFH Package. The SRO is accountable for the management of the overall programme to deliver the required products within the constraints agreed with the Programme Board and to approve changes to programme, tasks and work packages within the agreed tolerances set by the Joint Transport Executive Committee;
- Problem resolution and referral. The SRO is empowered by the Programme Board to make decisions and approve changes within the Project Plan and to seek authorisation from the Programme Board, or the Joint Transport Executive Committee if required, for changes outside the Project Plan that would affect the time, cost or quality (including objectives) of the NFH Package; and
- Monitoring and evaluating project progress and change control for alterations that may affect the objectives or benefits of the NFH Package. Final assessment of the outcomes of the project once the NFH Package is delivered. The SRO is responsible for commissioning and chairing these reviews and ensuring the relevant personnel are consulted and involved in the review process.

4.3.2.4 Programme Manager

The overall Programme Manager for the NFH Package is Bill Davies from the West of England Partnership Office.

The Programme Manager is responsible for delivering the NFH Package in line with the agreed controls and procedures set out in the Project Plan. The Programme Manager reports and is accountable to the SRO and Programme Board. The Programme Manager is responsible for the highest possible level of compliance with the relevant investment and project management approaches.

The primary purpose of the Programme Manager will be to define the Project Plan, in close association with the individual Project Managers, and to ensure that the programme is delivered on time and within specification and budget, seeking additional authorities as necessary. This will involve development, monitoring, progress chasing and co-ordination of the programme as a whole and ensuring that all elements of the programme are delivered within the appropriate technical competency. In particular, the role will be:

- To obtain approval from the Programme Board for the Project Plan;
- To recommend to the Programme Board and then implement the necessary actions to secure the required Major Scheme Business Case processes;
- To plan for and co-ordinate the necessary Gateway Reviews;
- To account for the delivery of the programme, on time and within specification and budget;
- To liaise with the individual Project Managers to ensure adherence to the Project Plan;
- To produce periodic Progress Reports for the JTEC, Joint Scrutiny, Directors, DfT, and the West of England Partnership;



• To carry out day-to-day communications between DfT, the West of England and the four authorities.

4.3.2.5 Project Managers

The Project Managers for the individual elements of the NFH Package are as follows:

- Darren Pacey (Bristol City Council / Steer Davies Gleave) Hengrove Rapid Transit and Bristol City Centre;
- David Prosser (Bristol City Council) M32 Corridor and Park and Ride; and
- Alistair Rice (South Gloucestershire Council) North / East Fringe Rapid Transit and Stoke Gifford Transport Link.

The Project Managers are responsible for delivering the individual elements of the NFH Package in line with the agreed controls and procedures set out in the Project Plan. The Project Managers report and are accountable to the individual SROs and the Joint Project Board. The Project Managers are responsible for delivering the individual elements of the NFH Package on time and within specification and budget, and for ensuring consistency of approach across the three different workstreams in line with the strategic programme objectives. This will involve development, monitoring, progress chasing and co-ordination of the project as a whole and ensuring that all elements of the project are delivered within the appropriate technical competency.

4.3.2.6 Project Team

The Project Managers are supported by the Project Team. The Project Team includes nominated representatives from the relevant authorities and the West of England Partnership Office. The Project Team is the point of contact for information and liaison with colleagues within each particular organisation and members are responsible for communications about the project within their organisations. The Project Team is a source of experience and expertise and connection to expertise within their organisation.

It is recognised that the Authorities will require extra resource and a wider set of specialised skills to deliver the NFH Package. To ensure that resources are in place the Authorities' term consultancy arrangements for engineering design, modelling and appraisal, and communications have been utilised. Procurement is currently being undertaken to establish frameworks for the supply of consultancy support embracing major schemes project management, procurement advice and infrastructure design. These will be complemented by additional resources for legal support, land and finance. This is discussed further in section 4.3.2.7 below.

4.3.2.7 Delivery Team

In order to provide commentary on the Delivery Team, it is first necessary to identify the different project delivery phases associated with the NFH Package. This is discussed further below.

Project Delivery Phases

The successful delivery of the NFH Package to date will require an evolving set of project resources that is best able to respond to the specific challenges and tasks faced at any one point in the delivery of the project. The responsibilities and organisational arrangements for the development and delivery will necessarily switch to suit the following six phases:

- **Phase 0 Option Development**: identification of scheme objectives, options identification, and options assessment; and
- **Phase 1 Preferred Scheme**: design development, development of the business case and proposals to a level where it achieves Programme Entry.



Phase 0 is complete (see Section 2), and Phase 1 will culminate in the submission of this Major Scheme Business Case document, and subsequent achievement of Programme Entry. The subsequent phases beyond Phase 0 and 1 are:

- Phase 2 Powers and Planning: further development of the project and its preparation, submission and engagement with appropriate planning processes and inquiries necessary to achieve the required powers for delivery and operation;
- **Phase 3 Final Design**: following grant of appropriate powers, this phase will include detailed technical design sufficient to enable successful procurement of the necessary contractors to construct and operate the rapid transit scheme;
- **Phase 4 Construction**: the mobilisation of contractors, construction and testing of the rapid transit scheme and service agreements; and
- **Phase 5 Operation**: operation of services and post-implementation review for lessons learned from its delivery and evaluation of the final scheme with final approval appraisal.

These phases are shown in the Implementation Process Map (see Figure 4.3 below), which draws together the main workstreams and required funding streams to deliver the NFH Package.



Figure 4.3 – Implementation Process Map

Phases 2 and 3 Delivery Team

Phases 2 and 3 consist of two main strands of work: further detailed and iterative design of the scheme to understand the impacts and benefits of delivery and; procuring the required powers and planning authorisations. A Transport and Works Act Order (TWAO) may be considered for



the delivery of the guided sections of the scheme. However, the remainder will have to be delivered using a combination of planning applications, compulsory purchase orders and traffic regulation orders etc.

The Delivery Team for Phases 2 and 3 is shown in Figure 4.4 overleaf. The design aspects of the work will include:

- Further engagement and consultation with local communities and stakeholders to inform the detailed design, including the optimisation of scheme elements such as complementary cycling and walking infrastructure;
- Detailed design of the city centre in consideration of operational, townscape, public space, heritage and traffic management requirements;
- Working with Network Rail to conclude the Working Agreement for the railway crossing for the Stoke Gifford Transport Link and the rapid transit spur to Bristol Parkway Station;
- Working with the Highways Agency and their Agents to design, in further detail, the new junction on the M32 Motorway to provide access to the rapid transit network and the M32 park and ride site, and submit and assess a submission for a relaxation in standards to facilitate the new junction;
- Detailed design of interfaces with major developments along the rapid transit routes;
- Detailed design of the rapid transit, highway and park and ride infrastructure in consideration
 of operational, townscape, landscape, ecological, water, flooding, air quality, noise,
 archaeological, heritage and traffic management (including pedestrians and cyclists). Items
 will include structures, on-street and off-street bus priority measures (including guided
 busway), interfaces with the three park and ride sites, and changes to any public rights of
 way requirements (if needed);
- Detailed financial modelling and refinement of the commercial strategy including detailed design of the rapid transit service specification; and
- Detailed programme development to enable the phased delivery and operational implementation of the works.

The potential TWAO works to obtain the necessary powers include the preparation of the necessary documents potentially for public inquiries. A provision has been made for this activity. The key areas of work include:

- Legal (draft TWAO and/or planning applications, land purchase / CPO and supporting documents);
- Engineering works and land plans;
- Environmental Statement (assessment will be linked with scheme design);
- Statutory consultation;
- Public Inquiries (where required);
- Working Agreements with the Highways Agency and Network Rail; and
- Detailed design of the city centre in consideration of operational, townscape, public space, heritage and traffic requirements.







Phase 4 Delivery Team

Phase 4 will require a different set of specialised skills and level of support. The work will focus on procurement of the elements of the scheme and contract management. There are four main work strands: rapid transit services procurement; design and build contract management; city centre works management; and system wide services management. This will be reviewed as further scheme development work is undertaken and exact contractual arrangements are confirmed. The Delivery Team for Phase 4 is shown in Figure 4.5 overleaf.



Figure 4.5 – Phase 4 Delivery Team



Procurement of Additional Resources

It is envisaged that the procurement of additional resources will be required in the following areas.

Powers and Planning

Construction and operation of the rapid transit network will require a significant number of legal consents and approvals. Suitable routes for each element of the NFH Package will be pursued to obtain the necessary powers. Specialist resources will be required to support the Delivery Team. These resources will be specialist appointments, such as parliamentary agents, barrister and expert witnesses from our consultant team of term advisors. Costs directly related to acquiring powers and planning consents have been treated as ineligible preparatory costs in terms of DfT funding. This is explained further in Section 6 of this document.

Project Management, Design and Tendering

Additional staff resources may be secured externally to ensure delivery of the NFH Package. The Authorities' existing partnership arrangements with term consultants will be utilised for design, consultation and implementation and similar arrangements established to provide legal support through the tender process. The preparatory costs included within this MSBC have assumed the costs of both internal and external staff working on the project.

Consultation Packages

In addition to statutory consultation, during the detailed design of the scheme there will be further targeted and robust full consultation with interest groups including residents, traders, businesses, emergency services and utilities, together with the general public. To ensure that this process is effectively managed, existing partnerships with term consultants may be utilised. These resources will work with the Delivery Team to co-ordinate the programme of consultation.

Construction Packages

Tendering will be undertaken for individual construction elements of the scheme, potentially supported by the JDV. This is further discussed in Section 6 of this document. The main packages of work are:



- Tenders will be invited through the OJEU process for the guided busway; on-line widening; city centre works; park and ride sites and their accesses; the Stoke Gifford Transport Link; and new bridge structures. Due to the volume of work it is envisaged that there will be multiple tenders;
- Highway works to deliver on-street bus priority improvement works will generally be procured using an established schedule of rates for improvement works in Bristol and South Gloucestershire (depending on the location of the works);
- Traffic signal works will be secured through the schedule of rates or through existing (or renewed) contracts where the Councils have guaranteed prices for the purchase of traffic signal equipment; and
- System wide works, such as CCTV and real time passenger information (RTPI) will be
 procured using existing (or renewed) arrangements in place for these area-wide systems.
 The contract to be established for the RTPI system and information displays for GBBN will be
 used to extend the system for the rapid transit scheme. The GBBN contracts have been
 agreed to allow for items for the rapid transit scheme.

Existing arrangements have been through a competitive tender process and therefore have been tested for value for money but this will be reviewed at the next stage of work.

It is anticipated that additional support will be required to provide site supervision and undertake the role of Employer's Agent. The former will include supervisors and quantity surveyors to assess work done and authorise payment of the contractors. These staff will be provided by the various framework contracts that will be put in place at the time of the works.

Rapid Transit Service Provision

Section 5 sets out our proposed approach to procurement of operators to run the rapid transit services. These arrangements have to be comprehensively detailed to ensure the scheme objectives are met. The Authorities have considerable in-house expertise across the sub-region given the different legal and contractual arrangements in place for different bus services. This expertise will also be complemented by current, emerging reviews of the conventional bus network, progress through GBBN with the drafting of Quality Partnership Schemes for key corridors, and synergy with the rapid transit network services from Ashton Vale, Hengrove and the North and East Fringe and associated feeder services. However, additional legal assistance is likely to be required to ensure that the appropriate agreements or contracts are in place with operators prior to the opening of the scheme. It is anticipated that there will be a phasing element to these arrangements / contracts to meet the requirements for the opening of different elements of the scheme.

Evaluation and Monitoring

A combination of internal and external resources will be utilised to establish the monitoring programme and undertake the necessary survey and assessment work. Again it is envisaged that existing and future partnership arrangements with term consultants will be utilised for this including independent arrangements (such as advisors for s151 Officers).

4.4 Project Planning

4.4.1 Project Plan

The project is managed through the Project Plan which is updated regularly and includes:

- Scheme description / project scope and deliverables;
- Scheme plans;
- Project programme overview and detailed;
- Team structure / work breakdown structure;
- Issues Register;
- Risk Register;
- Budget and Funding Sources;
- Communications Strategy; and
- Team management and project controls.

4.4.2 Project Programme

4.4.2.1 Programme

The detailed Project Programme (in the form of a Gantt Chart) for the delivery of the NFH Package from the submission of this Programme Entry MSBC to construction, operation and evaluation on the ground is attached at **Appendix 4.A**. A summary programme, which outlines the key activities, is shown in Figure 4.6 below.

The Project Programme has been derived using experience gained on similar projects, with inputs provided by specialist advisors on funding approvals, procurement processes and construction timeframes.

Progr	ngrove to North Finige MSBC Syranme																						
ID	۵	Task Name	Duration	Start	Finish	Predecessors		2010		2011		2012		2013		2014		2015		2016		2017	
1		Programme Entry	26 wks	Fri 26/03/10	Thu 23/09/10)	H2	H1		H1 rogramme	H2 Entry	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
		,							•	5	.,												
9		Preliminary Design	53.2 Wks	Fri 16/04/10	Frl 22/04/1	1					Preliminar	y Design											
15		Consultation and Stakeholder Engagement	36 wks	Fri 11/06/10	Thu 17/02/1	ſ	_	,	-	Con	sultation a	and Stake	holder En	gagemen	t								
18		Transport and Works Act Order	99 wks	Mon 21/06/10	Fri 11/05/12	2			-			-	Transport	t and Wor	ks Act Ord	ler							
28		Conditional Approval	48.2 wks	Thu 01/09/11	Fri 03/08/12	2					-		Cond	litional Ap	oproval								
35		Compulsary Purchase Order	48 wks	Mon 06/08/12	Fri 05/07/1	3							-		🛡 Compi	Isary Pure	chase Ord	er					
37		Full Approval	166.2 wks	Fri 01/10/10	Fri 06/12/13	3			-							Full App	roval						
71		Advanced Works	24 wks	Mon 01/04/13	Fri 13/09/10	3								-	Ad 🗸	vanced Wo	orks						
73		Construction - Main Works	184 wks	Fri 13/09/13	Fri 24/03/17	1						Cons	truction -	Main Wo	rks 🛡							-	
111		Service Implementation	88 wks	Mon 14/09/15	Fri 19/05/17	1										Se	ervice Impl	ementa	ion 🖵				

Figure 4.6 – Summary Project Programme for NFH Package

4.4.2.2 Critical Path and Dependencies

The programme has been developed with a view to enabling construction activities to commence during the financial year 2013/2014 in line with the Regional Funding Allocation. The programme is structured around the DfT Major Scheme Funding process and the approval stages of Programme Entry, Conditional Approval and Full Approval.

Key Programme Dependencies

The key programme dependencies at this stage are as follows:

- Programme Entry:
 - Completion of Office of Government Commerce (OGC) Gateway 1 Approval; and
 - DfT Programme Entry Approval.
- Conditional Approval:
 - Preliminary design;
 - Completion of environmental habitat surveys and Environmental Statement;
 - Submission of draft TWAO / Planning applications and other consents;
 - Completion of OGC Gateway 2 Approval;
 - Land clearance requirements, re-allocation and purchase; and
 - TWAO and/or necessary planning permission granted by Secretary of State and DfT Conditional Approval.
- Full Approval:
 - Pre-tender design;
 - Release of tenders for construction and operation;
 - Final agreements with service providers and Final Approval submission to DfT;
 - Accommodation works;
 - Final Approval and start of works; and
 - Completion of works and start of operational data collection for scheme evaluation.

Critical Path

The critical path is primarily driven by the requirement to complete the TWAO and/or planning application process prior to submission to DfT for Conditional Approval. The significant activities on the critical path are as follows:

- Completion of environmental habitat surveys and Environmental Statement;
- Submission of draft TWAO and granting of TWAO by the Secretary of State and/or submission of necessary planning applications;
- Achievement of Conditional Approval from DfT including successfully completing OGC Gateway 2; and
- Tender contracts and Full Approval from DfT including successfully completing OGC Gateway 3.

4.4.2.3 Key Milestones

The key project milestones are set out in Table 4.1 overleaf.



Table 4.1 -	- Key	Project	Milestones
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Milestone	Date
DfT Programme Entry Bid	March 2010
DfT Programme Entry Approval	September 2010
Submission of draft applications for powers	May 2011
Approval of statutory powers	May 2012
Conditional Approval Bid to DfT	August 2012
Issue of Invitations to Tender	August 2012
Preferred Bidder and other term arrangements in place	May 2013
DfT Full Approval	September 2013
Signing of Design and Build	September 2013
Start of Works	September 2013
Completion of Works / System Opening	2015-2017 [†]

^{*f*} due to the large scale of works, some elements of the project may be operational prior to completion of the works as a whole.

4.5 Risk Management

The risk management strategy sets out the processes for identifying and managing project risks. Risk workshops have been conducted for the NFH Package during December 2009 and February 2010. These risk workshops were used to produce a risk register which will be used to inform the project, and with the risk identification and management process also taken through a Quantified Risk Assessment (QRA) process.

Although these risk workshops have formed the main reviews of the risk register at the current time, the project risk register will continue to remain a live document. Regular updating and reporting of the risk register will be undertaken through the process of reporting to the Project and Programme Boards. This continual review is important to ensure that the most appropriate risk managers are allocated to specific risks, that new risks are being identified as appropriate, and that existing (and new) risks are being adequately monitored and actioned as required.

4.5.1 Risk Register

As outlined above, the project risk register is a live document and will continue to be regularly reviewed and updated by the Project Team. Formal reviews for changes to risk profile will be undertaken as part of reporting to the Joint Project Board and Programme Board, and this will form part of a standard agenda item at such meetings.

The detailed project risk register is attached at **Appendix 4.B**. Table 4.2 overleaf summarises the current top five project risks in relation to the NFH Package.



Ref No.	Description	Status	Rating	Action
33	Failure to secure necessary powers.	No change	High	Ensure political support; Robust technical case in preparation for Public Inquiry / Early confirmation of delivery mechanism; Reduce opposition to scheme as far as possible.
57	Capital costs escalate resulting in failure to secure DfT funding.	No change	High	Robust Major Scheme Bid; Strict change control processes; Independent Review of Costs.
43	Delay and/or failure to achieve Highways Agency acceptance of formal departure from standards.	No change	High	Maintain ongoing discussions with Highways Agency.
76	Technical problems with structural / civil works which come to light during construction.	No change	High	Ensure appropriate provision made in scheme cost estimate (QRA); Contractual transfer of risk to contractor; Independent review of cost allowances; Progress detailed design work on high risk items.
77	Technical problems with Network Rail interface.	No change	High	Advance survey and design work.

Table 4	4.2 – Тор	Five Key	Risks
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4.5.2 Quantified Risk Assessment

The Quantified Risk Assessment (QRA) has been determined using the Monte Carlo risk simulation methods and the @RISK software. This risk exposure has been estimated with due regard for the Optimism Bias factors, based on Department guidance. The risk exposure has been included in the economic analysis, to determine an appropriate benefit-to-cost ratio.

The QRA has been used to determine the appropriate level of risk to include with regard to cost inflation. This is explained further in Section 6 of this document – a report on the process of the QRA is also provided at **Appendix 4.C**.

The key results of the QRA in relation to programme indicate that the greatest risk to programme is the possible delay in reaching contract award. The main concerns related to a longer than expected decision on Programme Entry which may occur as a result of the forthcoming General Election.

The key results of the QRA in relation to costs are outlined in Section 6 of this document.

4.5.3 Risk Management – Mitigation Plans

An initial assessment of potential mitigation measures is included in the risk register attached at **Appendix 4.B**. The Project Teams will continue to develop mitigation actions for all identified risks, and detailed action plans for major risks, including the identification of individual risk owners. These plans will be reviewed regularly to ensure the most appropriate course of action is being taken. Mitigation plans will be comprehensive for all risks but more focus will be placed on the highest risks and this will be adjusted as these are reduced and/or resolved.

4.6 Stakeholder Management

4.6.1 Overview

Engagement with stakeholders has formed an extremely important part of the development of the NFH Package. First carried out in 2005 at the concept stage, as part of the Joint Local Transport Plan 2 (JLTP2) consultation programme, stakeholder engagement has remained ongoing.

Stakeholders or consultees can generally be grouped depending on their level of involvement or interest in the NFH Package. Grouping stakeholders/consultees assists in determining the consultation framework. Broadly, the categories of consultees consist of:

- Land owners or affected parties those individuals and groups that will be directly affected in some way by the scheme. Consultation with this group is very important in terms of minimising negative impacts and ensuring a clear, understandable process that they can be involved in;
- Decision Makers elected members, funders and officers who are all involved in decision making on the scheme or preparatory work for decision making;
- Statutory Bodies those organisations with whom the Authorities will have a statutory obligation to consult. These include utility companies, emergency services and environmental groups;
- Sub-regional Stakeholders those organisations and groups which have an interest in the economic, social well-being and development of the sub-region and the impacts rapid transit may have;
- Special interest groups identified groups who have a particular interest related to the scheme such as transport or the environment and who are not statutory consultees;
- Industry groups organisations which have an interest in transport in the sub-region; and •
- Potential Users future users of rapid transit including residents within the catchment and employers, shops, health and leisure facilities along the route.

The type and frequency of communication will relate to the level of involvement of consultees in the scheme and their need for information and/or involvement. Figure 4.7 sets out the type of communication channels available and potential suitability to different stakeholders/consultees.



Figure 4.7 – Communication Framework for Stakeholder Consultation



The communications and stakeholder management strategy for the NFH Programme is set out in the Communications Strategy and Framework which supports the Programme Initiation Document. The individual Communications Strategies prepared for Bristol City Council and South Gloucestershire Council (the 'Authorities') draw down from the overall Communications Strategy and Framework and are specific to the needs of each Authority.

4.6.2 Communications Framework

The Communications Framework for the NFH Package is based upon the following principles:

- Specific communication activities are to be focussed at the right level for particular consultees. Different types of consultees will have different concerns and require either a different level of information and will have different issues in the project (e.g. landowners versus statutory authorities);
- The relevant project team will need to seek the appropriate level of feedback from consultees and this is incorporated into the iterative design process;
- · Concerns of potential objectors are addressed as far as possible; and
- An appropriate statutory consultation is undertaken in compliance with relevant planning applications.

Government guidance to consultation includes the "Code of Practice on the Dissemination of Information during Major Infrastructure Developments, 1999" and the "Guide to TWA Procedures, 2001". These guidance notes are not prescriptive of what should be undertaken to consult thoroughly, but advise that adequate consultation reduces the risk of objection to the scheme. In addition the NFH Package has adhered to local consultation guidance which includes:

- "Statement of Community Involvement", Bristol City Council, 2008; and
- "Consultation Toolkit", South Gloucestershire Council, 2009.

The two promoting Authorities for the NFH Package have differing consultation needs and this has been addressed through the use of the above guidance which is specific to each Authority.

South Gloucestershire Council's toolkit can be found on the following web link: <u>http://www.southglos.gov.uk/NR/rdonlyres/14C71F35-AAE8-45EF-86E0-5BD41708DFD9/0/CEX090043.pdf</u>

Bristol City Council's consultation information can be found on the following web link: <u>http://www.bristol.gov.uk/ccm/content/Environment-Planning/Planning/planning-policy-</u> <u>documents/bristol-development-framework/sci_data/statement-of-community-involvement.en</u>

4.6.3 The transport 'brand' for the West of England

The Authorities have developed "Travel+" to represent the four Authorities of the West of England Partnership to provide added value and to promote change in the approach to delivering sustainable transport improvements for the future. This is detailed in the Authorities JLTP2 and Our Future Transport (the Authorities 20 year transport vision).

The themed approach allows promotion of a vision for the NFH Package. It quickly, easily and simply explains the reason for the work and allows various schemes to be separate but linked, identifying all schemes as part of the joint working (unity of purpose) the West of England Partnership is undertaking.

Certain key messages are linked to the Travel+ identification and are repeated at every possibility. These are:

• Travel+ projects sit at the core of the local authorities vision for change;



- Together these projects will delivery realistic, integrated, sustainable and equitable travel choices for all our communities across the area;
- Travel+ offers real alternatives to the private car for local journeys and should help encourage a change to travel behaviour; and
- Travel+ projects will help manage congestion and maintain our quality of life, delivering real choice and supporting future economic growth.

The Travel+ website can be found at the following web link: http://travelplus.org.uk/

4.6.4 Stakeholder Management

Stakeholder management has been ongoing through the scheme development, particularly with parties potentially affected by the proposals. The approach to Stakeholders takes various forms and consists of:

- Individual meetings and interaction with parties concerned about the proposals with specific interests in certain elements of the scheme, such as transport organisations, developers etc to obtain input into the design of the scheme at an early stage;
- Presentations to and/or meetings with groups of people with similar interests, such as
 resident groups, industry groups or special interest groups such as the Bristol Neighbourhood
 Partnerships, the North Bristol Travel to Work Partnership and Sustrans. This can be a
 valuable way of disseminating information (and negating incorrect rumours about the
 scheme) as well as obtaining feedback and identifying appropriate mitigation measures
 where necessary;
- Appropriate, formal statutory consultation with relevant planning authorities, environmental authorities etc; and
- Regular and formal communication with decision makers and funders e.g. the Regional Development Agency and the Department for Transport. These processes are already in place through project governance structures.

The nature of the engagement to date has been targeted to the specific stakeholder - either through regular meetings and briefing (such as GWE Business West) or on an 'as needed' basis for stakeholders such as Network Rail.

More generally, stakeholders are kept informed about the scheme development through the West of England regular transport newsletter which is widely distributed. A copy of the newsletter is included as part of the Public Consultation Report attached at **Appendix 4.D** (see section 4.6.5). All stakeholders were sent an invitation to the public exhibitions programme in November 2009 as part of the wider public consultation. A summary of the stakeholder views is provided in the following sections with the full stakeholder analysis provided in the Public Consultation Report as outlined above. Letters of Support from various Stakeholders are attached at **Appendix 4.E**.

4.6.4.1 Councillor and MP Consultations

There have been a number of briefings of members of both Bristol City and South Gloucestershire Councils. Members of Parliament (MPs) were also advised of the consultation and the work being undertaken for the Major Scheme Bid Submission.

Bristol City Council officers have undertaken the standard process of briefing the Sustainable Development and Transport Scrutiny Committee at regular intervals as well as briefing the Executive Member for Transport and all interested ward members. The Sustainable Development and Transport Scrutiny Committee recorded their formal support for the submission of the bid on 1st March 2010. Bristol City Council Cabinet gave their backing to the scheme on 25th March 2010.



South Gloucestershire Council officers have gone through the standard process of briefing the Executive Member, Chief Officers and Leaders of all political parties. A report was tabled at the 24th February 2010 South Gloucestershire Select Committee seeking their recommendations to Cabinet. The Select Committee recorded their formal support for the submission of the bid. South Gloucestershire Council Cabinet gave their backing to the scheme on 1st March 2010.

4.6.4.2 Business Community

GWE Business West is supportive of the proposals being put forward. GWE Business West, representing over 2,300 businesses in the West of England, has previously stated that *"improving transport systems across the west of England is the top priority for business."* They are particularly interested in the proposals being put forward for the City Centre and we have been in regular consultation to discuss the implication for businesses in the heart of the City, particularly around the Centre and at Cabot's Circus and Broadmead. A letter of support from GWE Business West is attached at **Appendix 4.E**.

As one of the major employment sites within South Gloucestershire, the University of the West of England (UWE), as part of their own masterplan proposals are making provision for a route through the heart of the new site for the proposed rapid transit. With the late addition to the scheme scope to extend the rapid transit route to Cribbs Causeway, The Mall has voiced support for the proposals.

4.6.4.3 Developers

A number of developers have been contacted directly and are supportive in principle. Their issues relate to specific areas and interfaces with the NFH Package. The project has been actively engaged with the related developments to ensure an integrated design between the developments and the NFH Package.

Bristol City Council has been developing the Knowle West Regeneration Framework in South Bristol and is working with developers in Hengrove Park as well as engaging with GWE Business West, particularly focussing on the city centre.

There have been ongoing discussions with SPark and the Emersons Green East developers which have resulted in their development plans accommodating rapid transit vehicles and stops.

South Gloucestershire Council have been working with Harry Stoke at this early stage to seek optimal alignment through the development.

4.6.4.4 Specialist Interest Groups

A Neighbourhood Planning Network (NPN), along with Neighbourhood Partnership Groups (NPG), have been established in the Bristol City Council area. The NPN currently represents a growing network of over 40 interest groups within Bristol which include residents groups, transport groups, ward members and business groups. Within the City of Bristol, these are extremely important for stakeholder engagement.

As part of the process in the development of route options in South Bristol, five meetings were held with the NPN over a period of three months. The initial meetings focussed on the concept of rapid transit, the DfT MSBC assessment criteria and various questions/issues raised. The final two meetings allowed the group to score the 'options' being put forward as well as encouraging other potential route options not considered. This was seen as a pilot approach to more meaningful engagement with the public which was very well received.

The NPN will be actively involved in further stages of the project. Figure 4.8 overleaf sets out the relationship between the scheme development process and community engagement activities. This diagram is used to explain the level communications and ability for communities to influence the scheme at different stages of development. Responses from community interest groups vary depending on the specific issues, concerns and proximity to the proposed route. There is a



general level of acceptance of the scheme, apart from one or two groups concerned about localised impacts or technology choice. These groups have detailed considerations which will be incorporated into the next stage of work.

Within South Gloucestershire there are regular local area forums. These are for each ward in South Gloucestershire and are a means of consulting with local residents and an opportunity to engage. During the consultation period exhibition stands and materials were sent to the Southern Brookes (covering Bradley Stoke area), Kings Forest (covering Emersons Green area) and Frome Vale area forums.

South Gloucestershire Council Spatial Planning team held stakeholder workshops on the future planning and development of the North Fringe in December 2009 at the University of West of England. NFH Package exhibition boards were displayed and consultation leaflets were available at these workshops. Representatives attended to explain the consultation and seek feedback.

4.6.4.5 Environmental Organisations

As part of the environmental assessment of the NFH Package, a number of environmental organisations, including Natural England, the Environment Agency and English Heritage were consulted on the emerging NFH Package proposals. Their responses, both verbal and written, have been incorporated into the environmental assessment – see Section 3.6 and **Appendix 3.Hii** for further details.

4.6.4.6 Utility Companies

Bristol City Council chairs the New Roads and Street Works Act Co-ordination Group - an existing group of utility companies, service providers and emergency service groups who meet quarterly to co-ordinate works affecting the public highway. This group has been used to provide information about the proposals including provision of overarching plans, programme and discussion on technology choice. The bus-based rapid transit option avoids utility diversion costs where possible. Additional consultation will be undertaken at further stages with the process.

4.6.4.7 Transport Groups

Transport operators, First Group and Wessex Connect, have confirmed their support for the Rapid Transit Scheme in letters accompanying this submission (see **Appendix 4.E**). Liaison with Network Rail has been ongoing (their letter of support is also contained in **Appendix 4.E**) over the last 6 months with further ongoing engagement expected through the design and construction phases. For the South Gloucestershire elements of the work, Network Rail has endorsed the appointment of a Commercial Scheme Sponsor to work with the scheme promoter through a Basic Asset Protection Agreement (BAPA). This agreement is aligned with the current arrangement already in place with Bristol City Council as part of development of the Ashton Vale to Temple Meads / Bristol City Centre rapid transit proposals. The role of the Commercial Scheme Sponsor is to assist in the future development of the project and protect the interests of the national rail network.

The Highways Agency (HA) has a key role in the development of the package owing to the requirement for a new rapid transit access onto the M32 motorway (including junction arrangements for access to the park and ride site south of Junction 1), and also the extension of the southbound bus lane from its current limit at the end of motorway regulations to a point just south of Junction 2. Liaison with the Highways Agency has been ongoing for a few years as part of GBBN for the bus lane and in options assessment work for the M32 park and ride. Further engagement has taken place as part of the development of the MSBC submission and the HA are represented on the programme board. The HA's main concerns are the impact of the proposals on the strategic road network, particularly in terms of congestion and road safety. A letter of support is appended in **Appendix 4.E**.



There has also been dialogue with Sustrans in relation to the principles of the NFH Package and the provision of new and enhanced walking and cycling facilities. They are also interested with the proposals for the City Centre and how the project would integrate with the wider Cycling City project which is currently being implemented for Bristol and South Gloucestershire.

Previous schemes have met some opposition from groups promoting rail-based solutions. This appears to be based on a broad objection to bus-based alternatives, and the completion of a robust Technology Review will assist future dialogue on this issue.



Figure 4.8 – Community Engagement and Scheme Development Processes



4.6.5 Public Consultation

Public consultation for the NFH Package consisted of advertised public consultations, un-staffed public exhibitions, stakeholder presentations, online consultation and public consultation meetings which were undertaken from November 2009 through to February 2010. Public Consultation on Bristol City Centre was undertaken from December 2009 through to February 2010 on the "Ask Bristol" consultation website developed by Bristol City Council.

South Gloucestershire Council and Bristol City Council underwent a joint consultation exercise for the NFH Package proposals to provide people who could potentially use the system and any other interested parties with the opportunity to comment. The Public Consultation Report is attached at **Appendix 4.D**. Due to the size of the scheme and various different options proposed for the rapid transit route, the authorities decided to produce separate materials for the proposals within their boundaries. All materials used the standard Travel+ brand and also referenced where the reader could obtain additional information if they were interested in both sections of the scheme. The materials are included in the Public Consultation Report.

The consultation process consisted of the following elements shown in Table 4.3.

Consultation Method	Number
Postcards distributed	71,000
Staffed exhibitions	10
Attendees at staffed exhibitions	575
Static exhibitions	5
Venues hosting information boards	9
Public meetings	5
Questionnaires returned (by post)	151
Questionnaires returned (online)	230
Comments posted on Ask Bristol (Bristol City Council Consultation)	156
Letters received	10
Emails received	5
Phone calls received	10

Table 4.3 – Summary of Consultation Activities

The combined questionnaire response rate when compared to the number of postcards distributed was 0.5%, which is in a comparable range to response rates for rapid transit public consultations on other schemes. The response rate for South Gloucestershire Council was 0.8%. Bristol City Council received a lower response rate of 0.3%, which was considered to be lower due to the higher number of local resident group meetings held. Note that the postcards did not contain a questionnaire, rather information of the exhibitions and website where the questionnaires could be accessed.

In the consultation material there were several different options the route could take for parts of the scheme. The responses to this fed into the selection of the Central Case scheme, as described in Section 1 of this document. Overall there is a good level of support for the NFH Package proposals in South Gloucestershire and Bristol, tempered by some concern around specific elements such as which bus operator would run the service and where the stops were to be located.

4.7 Monitoring and Evaluation

4.7.1 Joint Local Transport Plan Monitoring

Indicators and targets are the key to the success of the West of England's Joint Local Transport Plan (JLTP2). The current JLTP contains focussed and locally relevant indicators and targets for the region. This has been through a robust consultation process to ensure they tackle key issues and are realistic yet stretching.

The current JLTP runs through to 2010/11, and contains 23 indicators and targets that are monitored during the Plan lifetime. Whilst the Package will not become operational until beyond the lifetime of the current JLTP, a number of the key indicators are still expected to have continued relevance to the NFH Package as part of the successor document 'Joint Local Transport Plan 3 (JLTP3)'.

It is anticipated that there will be a close alignment between JLTP2 and JLTP3 between the objectives and outcomes of NFH Package and the National Indicators. Formulation of indicators for JLTP3 is currently underway, and is likely to include:

- Public Transport (Bus) Patronage;
- Passenger Transport User Satisfaction;
- Bus Punctuality;
- Changes in Peak Period traffic flows and congestion;
- Changes to air quality in the designated Air Quality Management Areas (AQMAs);
- Casualty reduction;
- Park and Ride; and
- Number of cycling trips.

The single set of National Indicators (NI) published as part of the New Performance Framework for Local Authorities will be reviewed, to establish which of these are most appropriate to act as potential proxy measures against the scheme objectives as well as consideration of local indicators (such as cycling). These NIs will be utilised within (JLTP3) and as such, this work will be undertaken once Programme Entry is granted, to ensure the timely identification of appropriate indicators.

4.7.2 Outline Monitoring and Evaluation Plan

Due to the long lead in time for projects of this nature, it is arguably too early to establish a fully detailed and robust Monitoring and Evaluation Plan at this stage. However, it is envisaged that a detailed Plan will be developed following Programme Entry, for consideration at Conditional Approval. Reference to DfT's guidance document '*The Evaluation of Local Authority Transport Schemes: A Guide*' will be made, and it will set out details and justification of the monitoring objectives and timescales for data collection and evaluation.

The anticipated report structure is set out in Table 4.3 overleaf.



Stage	Description
Identify Scheme Objectives	As set out in Section 3 of this document.
Evaluation Scoping	Process / methodology, programme and funding identified.
Identify and Appraise Baseline Data	Baseline data identified. Gap analysis undertaken to ensure that the scheme objectives and indicators are fully represented by the available data.
Collect Required Data	Timescales and data sources identified.
Analysis and Reporting	Timescales for analysis and evaluation.

Table 4.4 – Key Stages of Outline Monitoring and Evaluation Plan

The Plan will be aligned with the anticipated benefits generated by the scheme, to ensure that along with the target performance levels, they can be fully realised.

4.7.3 Scheme Specific Monitoring

As part of the wider project delivery, there is an existing governance structure that provides a three-tiered approach to the overall programme management of the NFH Package. Upon appointment, the preferred system operator of the NFH network will be invited to join both the Programme Board and Project Boards.

Specific quantitative rapid transit data is expected to be made available by the operator that will help monitor and evaluate the performance of the Package. In particular;

- Patronage and revenue levels on the Package this will be measured through a combination
 of count and ticketing data. This will provide a key local indicator of success for the scheme,
 measured against the expected (modelled) demand;
- Reliability and Punctuality this will be measured against agreed service levels to the Programme Board; and
- Customer Satisfaction Levels this will be measured against agreed service levels to the Programme Board.

Baseline and monitoring surveys will also be undertaken post implementation, to identify any changes in travel behaviour brought about by the introduction of the scheme. These will be specified to inform the evaluation process of the identified benefits but could comprise the following:

- environmental data;
- existing patronage on routes that are likely to be affected by the introduction of the scheme;
- traffic levels on key highways;
- junction performance including queues at critical junctions;
- mode choice surveys; and
- safety and accident records.

Use of any existing data, as part of the regular data gathering process, will be utilised where possible to ensure the best use of resources.

An amount which is equivalent to approximately 0.5% of the capital cost estimate has been set aside to ensure the scheme can be monitored effectively.



4.8 Assurance

An arrangement has been established to provide Quality Assurance (QA). QA is defined here as a system for ensuring that quality is built into, and followed by, the project management processes of the scheme. The approach for the NFH Package follows an agreed sub-regional approach applied across the major schemes programme.

The QA arrangements will operate in the form of:

- Individual investigation by the Programme Board's QA nominees. For the NFH Package these are Peter Dawson, Bath and North East Somerset Council, and Colin Medus, North Somerset Council;
- A Strategic Review Group reporting to the West of England Partnership JTEC;
- An internal 'challenge' by a Peer Review Group convened at the discretion of the Project Board's QA nominee; and
- External Quality Reviews convened at the discretion of the Project Board.

These QA activities will be supplemented as appropriate by Gateway Reviews. Independent process approval will be obtained through the OGC Gateway Review process. This process will appraise the scheme at critical stages of development to provide assurance that it can progress successfully to the next stage. It will add value to the project by ensuring that appropriate skills are utilised and realistic timeframes and cost targets are set and achieved.

Gateway Review Stage 1 is programmed for Autumn 2010. Gateway Review Stage 2 will be undertaken in advance of Conditional Approval. Gateway Review Stage 3 will take place following receipt of tenders but in advance of obtaining Full Approval for the proposals from DfT.

4.9 Summary

In summary, the Delivery Case demonstrates that how the West of England Authorities intend to deliver the scheme on time and to budget to ensure the successful delivery of the project.

The main points to note are as follows:

- The Authorities have a proven track record in the delivery of Major Transport Schemes;
- In conjunction with the Ashton Vale to Temple Meads / City Centre Rapid Transit Scheme, where the rapid transit proposals involves more bespoke or innovative technology the Authorities have already established relationships with other scheme promoters to share best practice and learn from experience. It is our intention to continue to develop these relationships and to work with other rapid transit scheme promoters as the project progresses. The Authorities have also procured specialist advisors with experience in designing and procuring rapid transit schemes across the UK;
- The establishment of the Joint Transport Executive Committee for the West of England has
 provided the necessary governance structure to ensure joint working between the
 Authorities. These joint governance arrangements significantly strengthen our ability to
 successfully deliver Major Transport Schemes in the sub-region. The new Joint Working
 Agreement formally constitutes the joint working arrangements and legally binds the
 Authorities with appropriate assurances and indemnifications;
- Bristol City Council / South Gloucestershire Councils are the lead Authorities for the delivery of the scheme;
- Robust and proven project management structures are well established and the necessary resources and skills required for the Delivery Team have been identified and sourced;
- Risk management is an important and integral part of the scheme development and project governance. The project risk register has been established and is regularly reviewed and



monitored both formally and informally. A Quantified Risk Assessment has been completed and the key findings incorporated within the Major Scheme Business Case;

- Good communications have formed an integral part of the development of the project and a high level of stakeholder and public support for the scheme is apparent. Effective relationships with community groups and stakeholders have been established and will continue through the delivery of the project;
- The Monitoring and Evaluation Plan is outline at this stage. It will be formalised as the scheme progresses, in line with the New Performance Framework for Local Authorities and the next Joint Local Transport Plan period (JLTP3). Objectives of the Monitoring and Evaluation Plan will be formed from a combination of the scheme objectives and key relevant DfT objectives.
- Gateway Review Stage 1 is programmed for Autumn 2010.



5. The Commercial Case

5.1 Introduction

This section sets out the Commercial Case for the NFH Package. It contains the following information:

- Details of the **preferred procurement route for the construction of the scheme**, along with the rationale for the choice;
- Details of the **preferred procurement option for the provision of the public transport services** (rapid transit and park and ride), along with the rationale for the choice; and
- Details of our proposed **commercial risk management approach**, including risk sharing, mitigation and management measures.

Each of the above is outlined in more detail in the following section, supported by additional information in the appendices as appropriate.

The MSBC for Programme Entry stage is required to indicate what the preferred procurement route is for the NFH Package and provide an explanation of how and why this was identified as the preferred procurement option. The Authorities at this stage have identified a number of potential procurement routes with regard to service provision and this will require further detailed work in preparation for the Conditional Approval stage.

The NFH Package has been designed to enable construction, operation and maintenance to be undertaken using established and well known procedures and techniques where possible. Where certain elements of the package, such as the rapid transit elements, involve more bespoke or innovative approaches (e.g. open access arrangements to infrastructure and the need to set standards), the Authorities will ensure consistency in approach with the other three major rapid transit projects currently being progressed in the West of England i.e. the Bath Transportation Package, the Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit scheme and the South Bristol Link. In addition, the Authorities have established relationships with other scheme promoters to share best practice and learn from experience, thus developing an informed approach to the procurement strategy and commercial risk management.

It is also recognised that the Authorities will have to ensure that adequate technical capability, wider resources and risk management processes are available to enable the successful delivery of the commercial aspects of the NFH Package. The discussion of resources is set out in Section 5 earlier.

5.2 Outline Procurement Strategy

5.2.1 Background

In assessing the procurement options for the construction of the NFH Package and the provision of the relevant public transport services, and in identifying a preferred approach(s), the following steps have been undertaken:

- Identifying objectives for the procurement process;
- Identifying the procurement options and undertaking an analysis of their strengths, weaknesses, threats and opportunities (SWOT analysis) as well an assessment of their ability to meet the procurement objectives;
- An assessment of the likelihood or risk of meeting the scheme objectives; and



• Consideration of the financial implications of the different procurement options.

5.2.1.1 Procurement Objectives

The objectives of the outline procurement strategy are to ensure:

- All scheme elements that require procuring are identified;
- Timely and cost effective procurement consistent with the overall delivery of the programme;
- The process is consistent with all legal requirements; and
- Contract requirements can be delivered over the length of the programme.

5.2.1.2 Programme Objectives

The key objectives for the NFH Package are as follows:

- To support a buoyant economy, improve quality of life for sub-regional residents and improve local and national travel;
- To encourage the shift to new forms of public transport and realise the associated environmental, climate change, safety and health benefits;
- To tackle congestion and therefore the economic, environmental and health damage that is associated with it;
- To enhance the opportunities for regeneration and sustainable growth through the linking of areas of economic and housing expansion; and
- To promote equality of opportunity and security through improved connectivity to education, employment, leisure, health and retail facilities.

5.2.1.3 NFH Package System Characteristics

In order for the NFH Package to offer an attractive, competitive choice to the car, the characteristics of the scheme, in particular the rapid transit services must provide:

- High frequency services which enable a 'turn up and go' service;
- High-quality, modern and comfortable vehicles (and infrastructure) which are DDA compliant;
- Competitive, and reasonably priced fares compared with other journey options;
- Improved journey times and reliability when compared to travel by private car;
- High quality waiting areas with real-time passenger information and up to date service information which is easily and readily available, including timetables, routes, fares;
- Rapid transit stops and interchange points located to maximise availability to the local catchment areas whilst targeting key origins and destinations;
- Rapid transit service information designed to be easy to understand and navigate;
- Network designed to maximise safety and security of passengers; and
- High quality walk and cycle links to the stops and interchanges.

5.2.2 NFH Package – Design Parameters

The above objectives and system characteristics have resulted in a set of design parameters for the NFH Package which include:

• A high quality rapid transit service where vehicle, service frequencies and fares are consistent with the vision described by the Authorities;



- Fast and reliable journey times through investment in appropriate infrastructure and priority measures along the rapid transit routes. The measures include guided busways; bus only roads; bus lanes and signalling priorities that cover a high proportion of the planned network;
- A process that is scalable so that over time services can be added incrementally and efficiently to create the core of a strategic network;
- Affordability by maximising the investment made by the private sector (developers and transport operators);
- Interoperable ticketing to facilitate ease of use and interchange;
- Integration to facilitate the use of extended / connecting services feeding into and from the core network; and
- Highway investment to integrate with rapid transit services, interchanges and new development.

The procurement and programme objectives, system characteristics and design parameters underpin the procurement option assessment process. The following sections outline our assessment of procurement options for the scheme construction and for the provision of public transport services; and provide our recommendations for a preferred approach(s).

5.2.3 Outline Procurement Strategy – Scheme Construction

5.2.3.1 Infrastructure Elements of Scheme

The infrastructure elements of the scheme comprise primarily of dedicated busways split into the following categories:

- Rapid transit priority measures, both guided and non-guided;
- On street running sections
- Structures
- Park and Ride sites
- Major structures
- Traffic signal junctions; and
- System wide elements.

Each of these is outlined in more detail below.

New construction of rapid transit priority measures

These are the main work elements of the works that form the majority of the NFH Package. These comprise a mixture of guideways, segregated sections of carriageway and bus lanes alongside other highways. The route comprises the following elements:

- Non-guided bus ways and bus lanes:
 - From the Interchange at Cribbs Causeway the route travels along Pegasus Road with sections of bus lane in each direction;
 - One carriageway of Highwood Road dual carriageway converted to bus way (along central section);
 - Bus link between Coniston Road and Waterside Drive (Aztec West);
 - Aztec West, nearside anti-clockwise bus lane around the park;
 - Bus lane cut-through bypassing eastbound congestion on Aztec West Roundabout;



- New 2-lane dual carriageway between Parkway North Roundabout and Harry Stoke development roundabout (the Stoke Gifford Transport Link) comprising a normal traffic lane and nearside bus lanes in both directions;
- New 2 way bus lanes from A4174 at Coldharbour Lane to the roundabout at the University of the West of England;
- Single southbound bus lane along Stoke Lane to a dedicated bus gate near to the Stoke Lane Motorway Bridge;
- New gated and controlled two-way bus access junction between Stoke Lane and the M32 to the south, including access to the M32 park and ride site;
- Provision of eastbound bus lane from M32 Junction 1 to a dedicated bus gate on the approach to the existing structure across the River Frome;
- 2 way bus lanes from Bromley Heath Roundabout to Wick Wick roundabout adjacent to existing HOV lane in the west bound direction;
- Bus gate to/from the Science Park off Lyde Green Roundabout;
- New southbound bus lane on the M32 south of Junction 2 to link to the current section of bus lane provided by GBBN approaching the Newfoundland Circus;
- New northbound bus lane on Haymarket;
- New section of two-way bus way on Lombard Street in Bedminster; and
- New 2 way bus way along Hartcliffe Way from Parsons Street to Novers Lane.
- Guided busway sections
 - Bradley Stoke Way between Aztec West Roundabout to Parkway North Roundabout: a two-way guided busway and stop platforms;
 - Bradley Stoke Way at Winterbourne Road: a new bus way crossing over Winterbourne Road;
 - Harry Stoke development: a new two-way bus gate approaching A4174 Ring Road; and
 - Hengrove Park development: a new two-way guided bus way and stop platforms.

On-Street sections of the route

- For several areas the level of congestion does not warrant the provision of priority measures for rapid transit vehicles or, surrounding constraints preclude such measures. These sections will run on existing or widening highway, assisted by priority for rapid transit vehicles at signal junctions. The on-street sections of the NFH Package include the following:
 - The immediate approach to the Cribbs Causeway Interchange;
 - The route navigates the roundabout to join Pegasus Road. Bus lanes have been added to first roundabout with shopping precinct. A single lane takes the route travelling westbound to the new signal junction with the Filton Northfield development. A second full signalised junction allows the rapid system to rejoin on street running from the bus link;
 - The route travels along the south-western section of Highwood Road;
 - The short dual carriageway entry / exit to Aztec West;
 - The route through the Harry Stoke development;
 - Stoke Lane northbound (between M32 park and ride and Coldharbour Lane);
 - M32 southbound (from new southbound on-slip to south of Junction 2);



- M32 northbound (from Newfoundland Circus to new northbound off-slip);
- A4174 Avon Ring Road, between Wick Wick roundabout and Lyde Green roundabout;
- From there the route continues westbound to The Rosary Roundabout where it turns right to access an interchange stop with the District Centre;
- Through the Science Park and Emersons Green East development;
- Bond Street northbound (from St James Barton roundabout to Newfoundland Circus);
- Prince Street (between The Grove junction and existing bus lanes into Broad Quay);
- Wapping Road (between Prince Street bridge and new bridge over the New Cut);
- From the new bridge across the New Cut the route follows St Johns Road to the junction with East Street where it joins the current A38 showcase corridor bus priority measures along Malago Road to West Street and the Parsons Street Gyratory; and
- From the junction of A4174 Hartcliffe Way and Novers Lane in Knowle West the route travels along Novers lane to the roundabout junction with Inns Court Road. It then proceeds along Creswicke Road removing the existing traffic calming to a modified junction with Airport Road.

Park and Ride:

- A new park and ride site, with up to 1,500 car parking spaces, north-east of Stoke Lane and alongside the M32 Motorway;
- A new 240 space park and ride site at Emersons Green East (partially developer funded); and
- An extension (200 spaces) to the park and ride facility at Parkway North (land to the south of Hunts Ground Road).

Interchanges

• Interchanges / rapid transit stops are provided at key places along the rapid transit routes. The detailed locations are outlined in the scheme description in Section 1 of this document.

Major Structures:

- Two structures associated with the Stoke Gifford Transport Link: new bridge over railway and a stream crossing;
- New motorway Bridge associated with the junction and associated approaches for M32 park and ride site; and
- A new river crossing over River Avon (New Cut) for South Bristol rapid transit scheme (to be access controlled).

Traffic Signal Works:

- Highwood Road with Durban Road and Callicroft Road;
- Highwood Road with Coniston Road and new development access;
- Waterside Drive shuttle signals;
- Aztec Roundabout (amended junction with eastbound cut through link);
- Bradley Stoke Way / Woodlands Drive;
- Bradley Stoke Way / Patchway Brook;
- Bradley Stoke Way / Webbs Wood Junction;

- travel to England Partnership
- Bradley Stoke Way / Stoke Brook Bridge (north);
- Bradley Stoke Way / Stoke Brook Bridge (south);
- Bradley Stoke Way / Great Meadow Junction;
- Bradley Stoke Way / Trevelyn Walk Junction;
- Bradley Stoke Way / Parkway North Junction;
- A4174 Avon Ring Road / Stoke Gifford Transport Link;
- A4174 Avon Ring Road / B4058 Bristol Road (Hambrook Crossroads);
- A4174 Avon Ring Road / Bromley Heath Rapid Transit Gate;
- Avon Ring Road / Coldharbour Lane junction;
- Coldharbour Lane Puffin Crossing;
- Stoke Lane Rapid Transit Gate;
- M32 Park and Ride Barriers System linked to signal junction;
- Stoke Lane / Frenchay Park Junction;
- St James Barton Roundabout (re-signalise);
- Lewins Mead / Rupert Street / Christmas Street (new junction);
- Scissors Junction / north end of The Centre by Electricity House (signals removed);
- Colston Avenue outside No. 33 (new controlled junction);
- Colston Avenue outside No. 35 (relocated controlled crossing);
- Scissors Junction / middle of The Centre near St Stephen's Avenue (signals removed);
- St Augustine's Parade / Colston Avenue (west) / Colston Street / new bus-only road connecting to Baldwin Street (new junction);
- Baldwin Street / Colston Avenue (east) / Broad Quay / new bus-only road (new crossings);
- Baldwin Street / Colston Avenue (east) / Broad Quay (signals removed);
- St Augustine's Parade at Hippodrome (amended crossing);
- St Augustine's Parade near Denmark Street (new controlled crossing);
- Broad Quay near No. 11 (revised crossing);
- Cumberland Road (north of new bridge with gated and controlled access to the new bridge over the New Cut);
- Coronation Road (south of new bridge with gated and controlled access to the new bridge over the New Cut);
- Dalby Avenue / Lombard Road / East Street revised signals;
- Sheene Lane / Malago Road and bus gate revised signals;
- Parsons Street / Bedminster Road bus gate / crossing revised signals;
- Hartcliffe Way / Novers Lane revised signals;
- Airport Road / Bamfield Road / Creswicke Road revised signals; and
- Hengrove Way / New Hengrove development Bus Access.



System Wide Elements

In addition to the above engineering works, there are also a number of system wide elements required. These include the following:

- Intelligent Transport Systems;
 - CCTV provision of CCTV cameras at all signals and all junctions;
 - End to end communications using wireless technology for part of the route;
 - Bus priority fitted to all signals; and
 - Real Time Public Transport Information (RTPI).
- Rapid transit stop furniture and off-board ticketing at all stops.

5.2.3.2 Procurement Options

A review of the procurement options for the construction of the NFH Package has been undertaken and our key findings are outlined in the following sections.

Rapid Transit – System Wide Elements

For the system wide elements of the rapid transit proposals, there are already existing contracts in place which have been through a competitive tendering process and which demonstrate value for money. Therefore, use of these existing contracts (or extensions to them) will be used to deliver these works wherever possible.

Real time information will be provided at rapid transit stops and electronic visual and audio information on board vehicles, such as next stop announcements. There is an already established real time information system in Bristol using GPS and a Private Mobile Radio (PMR) communication system. Rapid transit vehicles will be fitted with an-board computer linked to the ticket machine, providing 'real-time' departure times at electronic rapid transit stop displays and via the website www.nextbusbristol.co.uk.

The Councils have an existing RTPI system, provided by ACIS. The current system will be expanded and its supply re-tendered as part of the Greater Bristol Bus Network (GBBN) improvements. The technical specification will allow for additional expansion, over and above GBBN, so that the rapid transit scheme can be linked into the system. The provision of ITS equipment comprising CCTV cameras, fibre cabling and cabinets, are included within the contract provision of the main works contract as access to the works areas and power provision will be dependent on the main construction work timescales. This will include the communications to link all of the systems together. All of the power supplies will be provided in this manner including street lighting, shelters, ticket machines, CCTV and traffic signals.

The provision of the electronic equipment, cabling and street furniture for traffic signals is contracted with Siemens until 2013. The Councils believe these existing arrangements offer value for money and would seek to continue the arrangement with Siemens or an equivalent contractor after a competitive tendering process. It is suggested that the specialist contractor would be included in the construction contract as a novated sub-contractor. This will be reviewed at Conditional Approval stage however it is likely to be retained given the increased flexibility it will offer.

It is proposed to let a specific, traditional contract for rapid transit stop furniture and ticketing. The Councils have established relationships with providers of shelters and ticket machine providers.

The term / framework contracts for system wide works for the Councils expire in 2012/2013. The works for the NFH Package are programmed for after this date. Therefore, it is proposed that when these contracts are re-tendered, the appointed contractors can carry out work in both Bristol and South Gloucestershire. It is also noted that these proposed works represent a significant



additional workstream compared to typical day-to-day operations required from the contractor. This feature will be accounted for in the tendering and appointment of the contractors.

All other NFH Package Infrastructure Elements

Construction of the infrastructural elements of the NFH Package is outside the scope of 'regular' works delivered through existing tendered contracts. Therefore a review of procurement options has been undertaken for the delivery of these works. The options considered are as follows:

- Build only contract;
- Design and Build contract;
- Early Contractor Involvement; and
- PPP/PFI.

5.2.3.3 Assessment of Options

Each of these options has been assessed in consideration of their strengths, weaknesses, threats and opportunities. The summary of this is shown in Table 5.1 overleaf.



Table 5.1 – SWOT Analysis of Procurement Options – Infrastructure

	Strengths	Weaknesses	Opportunities	Threats
Build Only Contract	A competitive price through tendering	Extended programme to allow for detailed design prior to tender; No input from Contractor – "buildability"; Incentive to bid low and claim; Increased risk of failure at public inquiry due to lack of contractor involvement; No linkage between service provision and operation; No linkage between construction costs and income streams.	Long experience of contract type; Opportunity to divide works into packages and support emerging local contractors.	History of claims associated with this procurement method.
Design and Build Contract	Greater cost certainty using pain/gain method; Shorter delivery programme.	The lowest tendered price might exceed budget; Risk of confrontation should risks not be correctly allocated or priced; Opportunities for the contractor to manipulate the target cost through the exclusion of risk; Little opportunity for contractor to influence construction methodology during the design stage; Greater risk of failure at public inquiry due to lack of early involvement; Contractor will only provide level of quality defined in the specification.		
Early Contractor Involvement	Co-operation between designer and contractor leading to optimum design; Beat value achieved through early contractor input; Early pricing by the contractor leading to improved cost certainty; Robust orders improving probability of success at planning and public inquiries; Incentivisation through pain/gain mechanism; Continuity through design and construction; Improved CDM through input on buildability; Reduced programme through reduced delay between decision making and construction start.	Difficulty in demonstrating value for money; Lack of price certainty in practice – difficulty in compiling an accurate employer's budget and impact of construction and actual costs; Higher costs during the planning stage (should be offset by later savings).		
PPP/PFI	Improved efficiency owning to the integration of design, finance and operation; Improved risk management over the life of the project; Stability in service delivery due to length of contract.	A complex and time-consuming process; very high initial cost of delivery; Most previous local authority schemes procured through PPP/PFI are still in early stages of service development.	The contractor arranges for finance for project assets.	Availability of credit may be restricted.



A procurement options risk assessment (see Table 5.2) has also been undertaken and acts as a sifting process to eliminate options that will not deliver the project objectives and to shortlist options that warrant further consideration.

The following scores were used: None = 0, Low = 1, Medium = 2 and High = 3.

The highest possible score was 9 and the Risk Rating i.e. the risk of the associated procurement option ability to meet the scheme objectives, was spread uniformly as follows:

- Low Risk 0 to 3
- Moderate Risk 4 to 6
- High Risk 7 to 9

Table 5.2 shows that the procurement option with the highest likelihood of meeting the procurement objectives is a 'Design and Build' contract. At this stage, a Design and Build procurement strategy is favoured with a single or multiple contracts let (possibly up to 3 or 4 contracts). This will be reviewed in detail at the next stage of scheme development.

Criteria	Build Only	Design and Build Contract	Early Contractor Involvement	PPP/PFI
Ensure timely and cost effective procurement	High	Low	Medium	High
Consistent with legal requirements	Medium	Low	Low	Medium
Ensure contract requirements delivered over the length of the programme	Medium	Low	Low	Medium
Aggregate Score	7	3	4	7
Risk Rating	High	Low	Moderate	High

Table 5.2 – Procurement Options (Infrastructure) Risk Assessment

5.2.4 Outline Procurement Strategy – Provision of Services

5.2.4.1 Procurement Options

Overview

The procurement options available for the NFH Package Public Transport Services stem from the legislation available to the authorities and under which public transport services in Great Britain outside London operate. The regime introduced by the Transport Act 1985 is a market that is contestable on the road, with operators able to alter, introduce or withdraw services at 56 days notice and under no obligation to maintain any particular service. Local Transport Authorities (LTAs) tender services that the market cannot provide.

The Local Transport Acts 2000 and 2008 expanded the circumstances both for local authorities to tender services and in which commercially-provided services can be co-ordinated. However, there is still the need to ensure that LTAs do not act in a way that distorts the contestable market except in the circumstances specifically permitted by the legislation. LTAs also need to be wary of the possibility of having to increase support costs for other services as a result of their actions.

Taking into account the available powers to the local authority, the broad options available for public transport procurement are:

Commercial provision by operator(s);


- Contracts procured by competitive tender or by 'de minimis' arrangement;
- Voluntary Partnership Agreements (VPA);
- Quality Partnership Schemes (QPS);
- Quality Contract Schemes (QCS); and
- (for sections of route constructed on non-highway land) Transport and Works Act 1992 powers.

These options are outlined in more detail below.

Voluntary Partnership Agreements

Voluntary Partnership Agreements (VPAs) (formerly often known as Quality Bus Partnerships) allow a transport authority and bus operator(s) to align their transport objectives and add value from investment in the quality of service along a corridor. VPAs typically involve transport authority investment in road infrastructure (bus priorities, segregated lanes, travel information, signalling and improvements to bus shelters/ bus stops) and bus operators in return committing to investment to improve the quality of vehicles, driver training and the reliability of the services.

The Local Transport Act 2008 (LTA 2008) broadens the scope of a VPA to enable a Local Transport Authority (LTA) to specify minimum frequencies and maximum fares. Any such agreement would be subject to the Part Two Competition Test in Schedule 10 to the Transport Act 2000 (as amended by the Local Transport Act 2008) and any significant restriction of competition must be justified in terms of:

- securing improvements in the quality of vehicles or facilities;
- securing other improvements in local services of benefit to the users; or
- reducing or limiting traffic congestion, noise or air pollution.

Restrictions on competition must be proportionate to achieving those objectives. Despite these restrictions on competition, a VPA cannot be used to prevent a new entrant to the market on the same corridor; it can only be used to specify standards that apply to the operator(s) signing up to the scheme.

Quality Bus Partnership Schemes (QBPS)

In a QBPS an LTA undertakes to provide specific facilities and imposes standards for those operators who wish to use the infrastructure. It is not an agreement. The LTA 2008 provides more flexibility than hitherto. Infrastructure measures and changes to vehicle standards can now be phased in over a period of time. The minimum duration for a scheme is five years - there is no upper limit but it is advised that an end-date should be specified. A scheme would require operators to provide vehicles to a certain standard (e.g. standards of passenger comfort or emissions standards). Any operator able and willing to meet those standards would need to give an undertaking to that effect to the traffic commissioner and be subject to financial or licence penalties if they failed to meet the standards. Operators not willing to participate would be prohibited from using the facilities provided under the QBPS (but of course cannot be prevented from using the highway) and would be subject to penalties if they used them without authorisation.

QBPS schemes are subject to the Part 1 Competition Test in Schedule 10 to the Transport Act 2000, broadly similar to Part 2 described above. The LTA 2008 broadens the scope of a QPS (as per a VPA) to specify minimum frequency and maximum fare.

A QBPS scheme could apply to the whole of the system (or separate schemes for each corridor if preferred) covering the area through which services to and from the Rapid Transit would run, as long as these services benefited from some improvement in infrastructure (say, real time information at stops). This could ensure an evenness of standards on and around the Rapid



Transit scheme, and may possibly be used to ensure that the appropriate services were provided distributing to and from the infrastructure provided they were considered to be in the "corridor". In terms of process, QBPS are well documented although very few have been implemented and none so far using the additional powers contained in LTA 2008.

Through the implementation of GBBN, the four authorities are currently progressing QPSs for the major bus corridors.

Quality Contracts Scheme

This option could provide greater control over the operation of buses in the area of the Rapid Transit scheme. The contract would replace an incumbent operator's right to compete in an open market with a system whereby bidders compete for the right to be the only operator of specific services within a closed market. In principle, the outcome (and commercial risk) lies squarely with the LTA. The LTA 2008 strengthened considerably the process for introducing a QCS. However, no LTA has yet concluded a QCS, and whilst many of the Passenger Transport Executives have been progressing proposals, the Conservative Party has stated that should it form the next Government it will repeal the legislation enabling them. It would therefore seem imprudent to follow the QCS process.

Transport and Works Act 1992 (TWA) / Licensing

A Transport and Works Act 1992 (TWA) Order, used to provide the powers to construct busway infrastructure, could also make provision for the operation of services along the busway. A TWA order may give the Authorities the exclusive right to operate the busway and to permit others to do so on such terms as it sees fit, through the use of licences. We believe that to qualify, the busway does not have to be guided, simply off the public highway. Authorities may specify amongst other things service frequency and fares. An order would be made under the same primary legislation as tramway orders, and so far as relevant, could cover the same issues. Should any objections be received, a Public Inquiry will be held.

Previous Department for Transport advice is that a TWA Order only allows direct specification of services along the segregated sections of busway. It could therefore only generally be used in the context of the Bradley Stoke corridor. Given that Bradley Stoke services will project to central Bristol and possibly Hengrove it seems that the TWA process will be of limited value in securing services. Nonetheless, it could be reasonable to test this advice, as if this is not the case then control of the M32 bus-only slips (if these are secured using TWA powers) would enable services serving the Park and Ride to be controlled in this way.

Contracted Services via Competitive Tender

The Transport Act 1985 (as amended by the Transport Act 2000 and LTA 2008) introduced the provisions which govern the duties of local passenger transport authorities to secure local bus services where these would not otherwise be met by commercial services. In the majority of cases these services have to be secured through competitive tender and can fully specify the route, schedule, fare and quality standards of the service.

The TA 1985 also provided a requirement for authorities contracting services to demonstrate that there are no adverse effects on competition, and frequently this has been interpreted that new services should not (as far as possible) duplicate existing commercial services. However, Office of Fair Trading Guidance (Note No. 393) is less restrictive than this. It states that providing tendered services alongside commercial services is not necessarily anti-competitive provided that the commercial operator has the opportunity to bid for their operation. However, it does state that should a reduced level of service overall result (from consequent commercial service withdrawals) then the OFT would regard this tendering activity as anti-competitive. In addition, it would probably be regarded as anti-competitive if fares on the supported service were lower than on the parallel commercial services. This is an important consideration in the context of Park and Ride.



The advantages of a contracted service are that the authorities would have the ability to specify and incentivise adherence to the whole range of service and quality standards that together deliver the desired service attributes.

The Authorities could seek to supplement the commercial sections of the network if necessary, by contracting for additional services and specify service and quality standards. The LTA 2008 contains provisions to extend the scope of supported services to include existing routes that are not operated to the standards required by the Authority.

The LTA 2008 extends the maximum period of a service tender from 5 years to 8 years, although any tender more than 5 years will be subject to the Part 1 Competition Test described above. If the operators are to be responsible for vehicle procurement, this provision may enable tenderers to finance vehicles over a longer period, and hence enable the LTAs to obtain better value.

In terms of the size of tenders, OFT guidance is now quite specific about 'bundling'. It is happy for LTAs to tender in such a way that tenderers can choose to bundle contracts (and hence achieve savings through operational synergy) but it regards LTA bundling of tenders as foreclosing the market and hence potentially anti-competitive. This should be borne in mind when considering how the RT services will be specified.

5.2.4.2 Assessment of Options

Each of the procurement options outline above have been assessed in consideration of their strengths, weaknesses, threats and opportunities. The summary of this is shown in Table 5.3 overleaf. A procurement options risk assessment (see Table 5.4 overleaf) has also been undertaken and acts as a sifting process to eliminate options that will not deliver the project objectives and to shortlist options that warrant further consideration.

The following scores were used: None = 0, Low = 1, Medium = 2 and High = 3.

The highest possible score was 30 and the Risk Rating i.e. the risk of the associated procurement option ability to meet the scheme objectives was spread uniformly as follows:

Very High Risk – 1 to 6	Low Risk – 19 to 24
High Risk – 7 to 12	Very Low Risk – 25 to 30
Moderate Risk – 13 to 18	

The procurement options with the highest ability to meet the project objectives are Quality Contract, TWA / Licensing or Contracted service. These three options have a considerably lower risk rating than the other options.

A contracted service approach would not encompass existing commercial bus services using the proposed infrastructure – most likely to be either short stretches of bus priority on the Hengrove and Emersons Green corridors – or interurban services from South Wales and Yate using the M32 corridor. It could be used to specify rapid transit services. Alternatively, depending on the degree of overlap with existing local bus services, rapid transit services could be specified by VPA or QBPS.

The implication is that a mixed procurement approach using two procurement options would be needed to safeguard the successful delivery of the project objectives.

For example a contracted approach could be utilised to procure the Rapid Transit service with a Statutory Quality Partnership Scheme or Voluntary Quality Partnership utilised to secure standards of existing commercial services. As noted above, a Quality Contract approach, while rated as low risk is an untested procurement avenue and in terms of political process may now be high risk.



	Strengths	Weaknesses	Opportunities	Threats
Voluntary Partnership Agreement	Does not require statutory processes. Easy to establish and implement. New powers to specify minimum levels of service.	Uncertainty over quality of services; lack of prescriptive powers over access, and hence potentially limited control over fares and frequencies. Lack of experience in delivering VPA under LTA 2008 powers.	May be used together with TWA order. May be formulated to constitute a legally binding agreement.	Need for operator to maintain commercial flexibility may ultimately mean a lack of control on the part of the LTA, so may not meet the needs and expectation of users, the wider public and stakeholders.
Quality Bus Partnership Scheme	Ensures use of infrastructure is given to operators providing high quality services. New powers to specify minimum levels of service.	Greater control over service quality and provision than in a VPA but still some uncertainty, compounded by lack of experience in delivering QBPS using LTA 2008 Act powers.	May be used together with TWA order. May be used to ensure quality standards of conventional services using RT infrastructure.	Potential to procure whole system under QBPS but this requires operators to take commercial risk. This limits LTA control over service delivery and so process may not meet needs and expectations of users, the wider public and stakeholders.
Quality Contract Scheme	Ability to specify all key aspects of bus services that integrate seamlessly with the RT network; Manage out risks in bus tendering process; Control over fares and frequencies.	Risks (and associated costs) for bus operations accrue to the public sector; Lengthy, complicated and costly process of introduction.	Starting the QC process may galvanise operators towards earlier achievement of a voluntary agreement.	The scheme is not delivered within the desired timescale. An incoming government may repeal legislation enabling QCS
Transport and Works Act	One, combined process for procuring infrastructure and services; Fares and frequencies can be specified as can interoperability of ticketing.	Only applicable to segregated sections of the busway – as currently planned the Bradley Stoke corridor. Unlikely to align well with service specification.	Provision of rights to use busway could be linked to QBPS for services in the wider network.	TWA process more complex and potentially more high profile in terms of objections; may require a Public Inquiry
Contracted service	Competitive tender allows for the specification and incentivising of a comprehensive range of quality standards including route, frequency, fare and vehicle standards.	LTAs need to exercise care when procuring services in competition with existing commercial services. Lack of quality monitoring and performance management has traditionally been a weakness of local bus tendering.	LTA 2008 provides more scope to use tendering powers and extends potential length of tender to 8 years.	The contract is likely to involve greater commercial risk on the part of the LTAs and the risk would need to be assessed in order to ascertain the financial implications.

Table 5.3 – SWOT Analysis of Pr	ocurement Options – Services
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Criteria	Commercial Service	Voluntary Partnership Agreements	Statutory Quality Partnership Schemes	Quality Contract	Transport & Works Act	Contracted Service
Ability to specify vehicle & service quality standards and ensure adherence	None	Low	High	High	High	High
Ability to specify operational Quality Standards and incentivise / penalise operator performance	None	Low	Medium	High	Medium	High
Ability to specify minimum service patterns – service frequency	None	Medium	Medium	High	High	High
Ability and flexibility to implement changes to service patterns	None	Low	Low	High	Medium	Medium
Ability to specify other bus services in the corridor	None	None	Medium	High	High	None
Ability to specify inter-operable ticketing	Medium	Medium	Medium	High	High	Medium
Ability to specify fare structure and set fares	None	Low	Low	High	Medium	Medium
Ability to integrate service into wider transport network	Low	Low	Medium	High	High	High
Certainty over continuity of service provision	Low	Low	Low	Medium	Medium	High
Ability to apply or redeem an access charge (off-highway only)	High	High	High	High	High	High
Aggregate Score	7	13	19	29	26	24
Risk Rating	High Risk	Moderate Risk	Low Risk	Very Low Risk	Very Low Risk	Very Low Risk

Table 5.4 – Rapid Transit Service Procurement Options Risk Assessment – Ability to meet system characteristics / design parameters



Where the rapid transit alignment is substantially new (on-street), it is possible that a competitive contract will be the most effective means of procuring the service provided that the operator is properly incentivised (potentially through revenue risk, but also through monitoring) to provide high quality services and to promote growth. A binding VPA or QBPS could deliver the similar outcomes, but because the LTA 2008 powers in this area are as yet untested, the authorities may enjoy less certainty as to delivery of specified standards.

The requirement to serve park and ride in a way in which the authorities retain the income stream pushes us in the direction of contracting these services. However, this also means that the authorities are likely to have to take the commercial risk on this element at least, depending on revenue projections for the site.

Where the rapid transit alignment is shared with existing local bus services, it is reasonable to assume that the bus operator will wish to make use of the RT infrastructure. A QBPS would facilitate this and provide some assurance over service levels and quality.

It may be useful to pursue use of TWA powers but only if these can be extended to specify services on the public highway.

5.3 Commercial Risks

The procurement strategy has been developed taking account of the commercial risks identified to date. During the next phase of scheme development for Conditional Approval, the outline procurement strategy will be developed in further detail, including the process for managing commercial risk. Continued integration with the general risk management process will be maintained and reflected in the Quantified Risk Assessment to ensure that all risks are identified and managed and to ensure that no risks fall between the two processes.

The main commercial risks identified are:

- The need to secure the timely provision of the rapid transit services;
- The need to ensure the continuation of existing bus services within the study area, particularly within South Bristol; and
- The financial implications for the authorities in respect of the continuity of service provision of the above services and the future development of the rapid transit network in the sub-region.

5.3.1 Analysis of the local market for bus services

The rapid transit services will duplicate some existing commercial bus services, particularly in South Bristol. However, the Park and Ride sites introduce a requirement for a new service.

The marketplace for bus services is moderately buoyant; there are two large bus operators (First and Wessex Connect), with several smaller operators providing commercial and contracted bus services in the area. There is a good degree of competition for contracted bus services. In the most recent tender rounds for park and ride services (including the Long Ashton Park and Ride) an average of three tender bids was received. There are limited concerns over the capacity and appetite of the marketplace to deliver the Rapid Transit service and corridor bus services. The underlying local factors and dynamics are such that there is an effective marketplace for contracted services while the extent of commercial bus service competition is more limited.

5.3.2 Revenue Risk & Strategic Considerations

The procurement options risk assessment shown at Table 5.4 has led to the short listing of two procurement options.

The following are discounted:



- Quality Contract approach, because it is an untested procurement avenue with uncertain timescales and faces political uncertainty; and
- Commercial Service, because there is not control over service quality and provision.

The TWA Order approach requires further consideration. If firstly it is to be used to procure delivery of the rapid transit infrastructure; and secondly it can be demonstrated that it can be used to licence service provision on sections of route on the public highway, then it is worthy of consideration because of the level of control it gives the authorities over services. However, the complexity of the TWA process and the possibility that a Public Inquiry may result mean that the powers should only be considered if both points 1 and 2 above can be confirmed.

Revenue Risk

A QBPS/VPA approach or Contracted Service approach (or combination) is considered the most practical means for securing the provision of the rapid transit services and the operation of existing commercial bus services. The main differences between these two options are consideration of where revenue risk lies against the level of control over service specification and quality.

In the case of a QBPS/VPA approach the service is operated on a commercial basis and the revenue risk is with the operator. In the case of a contracted service approach, the revenue risk will be specified in the contract and can be on the operator, the Authorities or can be shared. Where this revenue risk can lie will depend on whether the service is entirely new (in which case, it is likely to have to lie with the authority), or whether it is replicating an existing commercial service.

The modelling work to date indicates that fare revenue is likely in time to cover the operating costs of providing the rapid transit services, thereby providing a revenue neutral service or an operating surplus. Further work is needed to refine the assumptions and examine the revenue risks in more detail. The Authorities will underwrite the revenue risk. This work will be undertaken during the next phase of project development for Conditional Approval.

Vehicle Procurement

The Authorities have concluded that there would be no advantage in owning the vehicles, so the procurement strategy is being developed on the basis that the operator will provide the vehicles. For an operator to have confidence to commit to such an investment there needs to be a degree of certainty that the infrastructure will be in place when the vehicles are delivered and the assumptions regarding the operational environment and the potential for the operator to face competition for market share within the main segregated section of route. The Authorities equally need to have confidence that an operator will commit to timely investment in vehicles, so that vehicles are delivered in time for the completion of infrastructure. The Authorities also need to have certainty regarding the continuity of service provision.

A benefit of a competitive tender would be that it would reduce risks to both the operator and the authorities. The award of a contract to operate the rapid transit services would enable the operator to under-write investment in vehicles on the basis (£ value) of the contract, thereby resulting in reduced financial exposure compared with a commercially led investment.

Integration with Existing Bus Services

There is still uncertainty over how the operators of conventional bus services will respond. If the operator of parallel local bus services is different from the rapid transit operator, he can respond by competing (on price) or by reducing or withdrawing services. Implementation of a Quality Bus Partnership Scheme for operators sharing rapid transit infrastructure will reduce the scope for price competition since these operators will be tied in to providing a specific level of quality and hence will have limited scope to reduce their cost base.



In respect of the existing commercial bus services in the corridor, the main procurement issues arising are:

- the re-routing of these services into the rapid transit infrastructure; and
- the quality standards of these and any other bus service using the rapid transit infrastructure.

In order to safeguard quality standards and the delivery of the scheme objectives, it will be necessary for the Authorities to have the ability to set certain service and quality thresholds, in respect of commercial bus services. This will avoid the possibility of low quality commercial bus services operating on the rapid transit infrastructure.

Provided that the quality threshold is set at realistic and practical levels (and considers issues of the commercial viability of bus operator investment) a QBPS for on-highway sections of the rapid transit should certainly be pursued, particularly given the current progress being made towards QBPs for the GBBN corridors, in order to meet the scheme objectives. This is particularly the case if the rapid transit infrastructure parallels existing commercial bus services. This will be in part informed by the commercial assessment of the scheme by operators and the ability to adjust the risk assessment accordingly. It is therefore proposed that close discussion with potential operators continue throughout the next phase of scheme development to ensure all potentially beneficial options are considered.

5.4 Summary

In summary, the Commercial Case sets out the preferred procurement route for the construction of the scheme and the provision of the rapid transit services. It also outlines our commercial risk management approach.

The main points to note are as follows:

- The Authorities have established a framework for identifying and assessing procurement options which includes the establishment of procurement objectives;
- In conjunction with the Ashton Vale to Temple Meads / City Centre rapid transit scheme, where the rapid transit scheme involves more bespoke or innovative approaches the Authorities have already established relationships with other scheme promoters to share best practice and learn from experience. It is our intention to continue to develop these relationships and to work with other rapid transit scheme promoters as the project progresses. The Authorities have also procured specialist advisors with experience in designing and procuring rapid transit schemes across the UK;
- For system wide aspects, such as CCTV and real time passenger information, existing contractual relationships exist which have already been assessed for value for money and deliverability. This will be reviewed at Conditional Approval stage;
- Construction of the highway, park and ride and rapid transit works are additional to the 'regular' works delivered through existing tendered contracts. Therefore a review of procurement options for the construction of the scheme has been undertaken. This shows that a design and build procurement strategy is favoured at the present time with a single or multiple contracts let. This will be reviewed and developed as the scheme develops;
- The Authorities have identified a number of procurement options for the delivery of the rapid transit services and a review of these options has been undertaken. This review shows that a Contracted Service supported by statutory Quality Partnership Schemes may be the best approach to meet the project objectives. It is also considered that a TWA order approach merits further consideration. Further, more detailed work, will be undertaken in preparation for the Conditional Approval stage;
- It is recognised that, with the increased levels of funding coming through this bid, the Authorities will have to ensure that adequate technical capacity, wider resources and risk management processes are available to ensure the delivery of the commercial aspects of the scheme. The costs for this are included in the submission.

6. The Financial Case

6.1 Introduction

This section sets out the Financial Case for the NFH Package. It contains the following information:

- A detailed **breakdown of the capital costs**, including evidence of how the cost estimates have been derived;
- Details, and justification for, the treatment of risk and inflation in the cost estimates;
- An estimate of the **eligible preparatory costs** for the scheme between Programme Entry and Full Approval;
- Ongoing financial sustainability, maintenance and operating costs for the scheme; and
- Sources of funding, including the associated payment profile and Section 151 Officer sign-off.

Each of the above is outlined in more detail in the following section, supported by additional information in the appendices as appropriate.

6.2 Capital Cost Breakdown

The capital cost estimates have been based on widespread experience of similar capital works, supported by agreed schedules of rates with term contractors. Where the scheme involves more bespoke or innovative technology, such as that required by the rapid transit schemes (i.e. guideway construction), the Authorities have used their previous experience in costing previous rapid transit schemes. In addition, the Authorities have also established relationships with other scheme promoters to share best practice and learn from their experience. This includes Cambridgeshire County Council and First Group, the latter having been involved in bus-based rapid transit schemes in Leeds, Bradford, York and Swansea.

The capital cost estimated has been calculated in Q4 2009 prices. Outturn cost estimates have then been made up lifting the Q4 2009 prices to take account of inflation over the scheme development and construction period. A Quantified Risk Assessment has been undertaken and includes a provision for differing rates of construction cost inflation – this is outlined in section 6.3.

The total risk-adjusted capital cost estimate is **£195.3million** in outturn prices (£194.2million excluding pre-Programme Entry preparatory costs that have already been incurred). A summary breakdown of this is provided in Table 6.1 overleaf, with further, more detailed information, including detailed cost assumptions, provided at **Appendix 6.A**.

An independent review of the capital costs has been undertaken by Quantity Surveyors, Cyril Sweett. The independent review has concluded that the capital cost estimate provided in this MSBC is robust. A copy of the detailed report is attached at **Appendix 6.B**.



Item	£m (outturn prices)
Engineering works	£134,780,120
Land costs (excluding opportunity costs)	£18,050,087
Site Supervision costs	£4,430,846
Sub-total	£157,261,053
Preparatory costs (see Table 6.4)	£14,344,227
Risk Budget (see section 6.3.2)	£23,676,159
Total	£195,281,439

Table 6.1 – NFH Package (Central Case) – Summary Cost Breakdown

6.3 Treatment of Risk and Inflation

6.3.1 Treatment of Risk

A Quantified Risk Assessment (QRA) has been carried out to support this Programme Entry MSBC. The main purpose of this QRA is to predict the level of Capex contribution required in order to have a high level of confidence that the estimated outturn costs will cover the construction of the system, making sufficient allowance for risks. The QRA is confined to the capital cost elements of the project, and the construction programme. Risks to operational costs, performance or revenues have not been quantified at this stage. The detailed QRA Report is attached at **Appendix 4.C**.

The risk model has been constructed using an excel spreadsheet model, with a proprietary package, @RISK, adding the capacity for probabilistic modelling. This approach integrates both cost and time within the risk model, so that in addition to producing predictions of outturn cost, the model gives the project team a view of potential schedule slippage and thus, generates risk-based predictions of possible cash flow with impact of inflation. The model adopts Monte-Carlo simulation theory, which replicates the project being implemented several thousand times. Confidence levels of cost and time values are then derived from the distribution of the results from simulation. These probabilistic predictions relating to cost and timescale allow the project sponsors to plan budgets at their selected level of confidence.

The principal inputs to the risk analysis consist of estimates of baseline capital cost and programme schedule, the tolerance (or uncertainty) attached to elements within the estimates, and discrete risks. A brief summary of the cost and duration estimation tolerances and the discrete risks are outlined below.

Cost Estimating Tolerances

The baseline costs represent the most-likely estimate of scheme costs based on current knowledge and expertise. Factors have been applied to these baseline costs (and also to the activity duration) to represent the combined effect of a number of uncertainties relating to cost estimation such as further detailed design; detailed investigations of ground conditions and major structures; and competitive tendering etc.

Within each section of the construction work, costs were summarised into five sub-categories including main civil works, statutory undertakers, environmental mitigation, stop and ticketing infrastructure; and other ITS systems such as traffic signals. Main works, which represent over three-quarters of all costs across all sections, were estimated to be as low as 80% of the baseline costs and as high as 120 to 150%, depending on the development stage of individual sections.

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Utility service diversions, although representing a small portion of the construction costs, have much wider tolerance ranges, from 70-130% to 20-200% due to lack of detailed information at the time of the QRA assessment. In all cases, the baseline costs are regarded as being the most likely value.

Duration Estimating Tolerances

Similar to the uncertainty on capital costs, there are also unknown / known factors that could affect the delivery of the work, such as ground conditions, weather and the contractor's methodology. The biggest uncertainty is related to when DfT approves Programme Entry and whether or not this will be impacted upon by the forthcoming General Election.

Discrete Risks

These are possible events that have been identified as having a chance of occurring and of impacting the project programme and/or cost to some degree. An initial set of risks were identified in a risk workshop on 21st December 2009 and reviewed and agreed at a second workshop on 4th February 2010. The risk register is identified in the detailed QRA Report attached at **Appendix 4.C**. Overall, 20 discrete risks were included and included in the risk model. Nearly all of the identified risks are judged to cause potential cost increase, and half are judged to have a potential impact on the programme schedule. Four would delay the project before a contract could be signed. The remaining risks would delay the construction programme.

6.3.2 Findings of QRA

6.3.2.1 Cost Results (excluding inflation)

Figure 6.1 below shows the cost results predicted by the risk model. The dotted vertical line represents the baseline estimate on construction costs. The risk curve indicates the possible range of outcomes against confidence levels, and predicts that the project baseline cost has a confidence level of 20%. The addition of a £12million risk allowance, excluding inflation, increases the confidence level to 80%.



Figure 6.1 – Project Outturn Costs: Cumulative Distribution (excluding inflation)

In comparison with other projects at this stage of development these are very low predictions for levels of risk allowance required, and suggest that the baseline estimate is well founded. These



values are all at current prices (Q4 2009). The possible effects of inflation are discussed in the following section.

6.3.2.2 Cost Results (including inflation)

Once funding has been granted the Authorities will carry the risk for actual construction cost inflation.

Prior to the recent recession, construction inflation was above RPI, driven by high demand and global increases in commodity prices, including oil, steel and cement. Input prices then flattened and a fall in tender prices was predicted to reflect reduced demand. Public sector infrastructure projects are insulated to some extent from demand changes in the private sector, and at some point a recovery in the global economy will stimulate commodity prices. Construction costs are then likely to recover their upward trend, but there is plenty of scope for wider variation, bearing in mind that construction prices are historically much more volatile than background inflation. This uncertainty has been modelled using the input ranges shown in Table 6.2.

Range	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Low	-1.00%	1.00%	1.79%	1.79%	1.79%	1.79%	1.79%	1.79%
Medium	2.79%	2.79%	2.79%	2.79%	2.79%	2.79%	2.79%	2.79%
High	5.79%	5.79%	8.79%	8.79%	8.79%	8.79%	8.79%	8.79%

Table 6.2 – Modelled	Construction	Industry	Inflation
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The rationale is an assumption that the current forecast for general inflation of 2.79% provides a central estimate throughout the entire project period. Initially, a tolerance of +/-3% is assumed for the first two years. Then in anticipating the effects of economical recovery, a tolerance of -1% and +6% is applied in any one full year from 2012/13.

The results obtained for the total project cost using these inputs is shown in Figure 6.2 below. Here, the thinner black S-curve is the un-inflated risk result shown in Figure 6.1 previously, and the thicker red S-curve is the result with inflation applied in accordance with Table 6.2 above.







With the identified uncertainties and risks, the risk model predicts that a total project budget of \pounds 187m would have a 50% chance of being adequate. To achieve a confidence level of 80% the budget would need to be increased to £195.3m. Table 6.3 shows the required risk allowance at selected confidence levels.

The risk values shown in Table 6.3 include all the inflation adjustments necessary to convert from baseline (un-inflated) costs to an outturn cost estimate at a specified confidence level. Given that inflation allowances had already been incorporated into the non-risk adjusted outturn cost estimates, the actual risk budget reported in Table 6.1 (£23.7million) represents the additional budget required to reach an estimated outturn cost of £195.3million.

Confidence Levels	Outturn costs (£m)	Risk values (£m)	% over baseline
Baseline (un-inflated)	£147.2m	-	-
20%	£177.7m	£30.5m	21%
50%	50% £186.7m £39.5m		27%
80%	£195.3m	£48.1m	33%
Maximum	£221.1m	£73.9m	50%
Mean	£186.6m	£39.4m	27%

Table 6.3 – Outturn Project Costs Predictions

6.3.3 Treatment of Inflation

Inflation assumptions used in calculating the outturn costs and undertaking the economic appraisal have been adjusted to take account of the current economic climate. The inflation rates are in line with the recommendations contained with the DfT's WebTAG unit 3.5.9 "Treatment and Estimation of Scheme Costs" (January 2010 In Draft version). The key inflation recommendation within this guidance is that construction costs are unlikely to increase above the general rate of inflation (approximately 2.7%) until at least 2014. This represents a significant change from the previous version of WebTAG Unit 3.5.9, which recommended a construction inflation rate of between 5% and 7% per annum.

The following annual inflation rates have been used for the NFH Package:

- General industry-wide inflation: 2.7%;
- Construction inflation to 2014 (including capital renewal): 2.7%;
- Construction inflation beyond 2014 (including capital renewal): 6%;
- Preparatory, supervision and land cost inflation: 2.7%; and
- Operating and maintenance cost inflation: 2.7%.

The QRA assessment (see previous sections) takes account of the possibility of higher or lower than forecast inflation rates, ranging from 1.79% to 8.79%. The inflation range within the QRA is based on previous discussions with DfT in preparing the Programme Entry MSBC for the Ashton Vale to Temple Meads / Bristol City Centre Rapid Transit scheme.

6.4 Preparatory Costs

Preparatory costs have been prepared on the basis of known costs for existing arrangements, estimates from the Project Managers on likely costs and benchmarking with other major schemes to understand the relative level of investment in scheme development.



DfT guidance states that "provided that the scheme passes through the necessary approval stages the Department will normally contribute 50% of the eligible preparatory costs incurred between Programme Entry and Full Approval".

Eligible costs include:

- Detailed design and procurement;
- Preparation of the business case for submission of Conditional and Full Approval; and
- The additional costs incurred in the preparation of PFI schemes (e.g. additional legal and financial advice).

Ineligible costs include:

- Early stage option appraisal and feasibility (pre-Programme Entry work);
- Publication of draft orders and the submission of and publicity for applications;
- The preparation of cases for, and attendance at, public inquiries; and
- Evaluation and monitoring of scheme implementation.

The total preparatory costs – including eligible and ineligible costs – are provided in Table 6.4 (in both current and outturn prices)

Scheme Element	Local Contribution (£million)	DfT Contribution (£million)	Total Preparatory Costs (£million)
Pre-Programme Entry Works	£1.091m	-	£1.091m
Preparation of MSBC for Conditional and Full Approval	£0.2m	£0.2m	£0.4m
Detailed Design and Assessment	£2.819m	£2.819m	£5.639m
Public Inquiries and Consultation	£4.344m	-	£4.344m
Procurement / Tendering	£0.525m	£0.525m	£1.050m
Evaluation / Monitoring	£1.050m	-	£1.050m
Total (current prices)	£10.029m	£3.545m	£13.574m
Eligible Costs (current prices)	£3.545m (50%)	£3.545 (50%)	£7.090m
Ineligible Costs (current prices)	£6.484m	-	£6.484m
Eligible Costs (outturn prices	£3.719m (50%)	£3.719m (50%)	£7.438m
Ineligible Costs (outturn prices)	£6.906m	-	£6.906m
Total (outturn prices)	£10.625m	£3.719m	£14.344m

Table 6.4 – Preparatory Costs (Current / Outturn Prices)

6.5 Total Quantified Cost Estimate

DfT guidance states that "provided that the scheme passes through the necessary approval stages the Department will normally contribute a maximum of 90% of the total cost of the scheme



(including preparatory costs), also known as the Quantified Cost Estimate (QCE), as estimated at Programme Entry. The maximum 90% of the QCE is inclusive of the Department's 50% contribution to Preparatory Costs". However, at present, South West Council requires local authorities to provide a 12% local contribution to major schemes in the region.

The breakdown of the Quantified Cost Estimate (total capital and preparatory costs) is provided in Table 6.5.

Cost Element	Local	Contributi outturn p	on (£millio prices)	on – DfT Contribution £million – outturn prices)			Total
	Ineligible Costs	Eligible costs	Total	%	Total	%	
Preparatory costs	£6.906m	£3.719m	£10.625m	74%	£3.719m	26%	£14.344m
Capital costs	-	£13.758m	£13.758m	8%	£167.179m	92%	£180.937m
Total QCE	-	-	£24.383m	12.5%	£170.898m	87.5%	£195.281m
Total QCE (excluding 2009/10 pre- Programme Entry preparatory costs)	-	-	£23.292m	12%	£170.898m	88%	£194.190m

Table 6.5 – Total Quantified Cost Estimate (Outturn Prices)

Notes: Preparatory costs from Table 6.4; Capital costs from Table 6.1.

6.6 Financial Sustainability, Maintenance & Operating Costs

6.6.1 Maintenance and Operating Costs

A detailed breakdown of the scheme maintenance and operating costs are included in **Appendix 6.A**. Similarly to the capital costs, the maintenance and operating costs have been based on widespread experience of similar schemes, as well as knowledge-exchange from other promoters / operators of similar rapid transit schemes.

The annual maintenance costs for the scheme (net increase) are estimated at £301k p.a. (2009 prices). These costs, which will be borne by the local authorities, will cover the following:

- Ongoing highway maintenance, allowing for grass cutting, drain cleaning, fencing repairs, street light bulb replacement and line repainting (£40k p.a.);
- Park and ride site maintenance as above (£150k p.a. of which £100k is for the M32 park and ride site);
- ITS maintenance (£55k p.a.);
- Rapid transit stop maintenance, covering shelters and RTPI (£20k p.a.); and
- Increased power (electricity) costs (£36k p.a.).

Additional to the annual maintenance costs, capital renewal of guided busway infrastructure, resurfacing of extra highway space and full replacement of ITS / traffic signal equipment and ticketing infrastructure is estimated to amount to £37,486k (2009 prices) over the 60 year appraisal period. These costs will also be borne by the local authorities.



The annual operating costs for the scheme are estimated at £1,968k p.a. (2009 prices). These have been calculated and included in the appraisal of the scheme and comprise:

- Net increase in bus vehicle operating costs incurred as a result of the introduction of the new rapid transit services as well as operating costs saved as a result of likely changes to existing bus services (£862k p.a.);
- Operating costs incurred as a result of the operation of the three park and ride sites, including:
 - general operating costs, allowing for staff and utility bills (£600k p.a.);
 - site security (including CCTV) operating costs (£150k p.a.); and
 - ongoing National Non-Domestic rate payments to central government (£226k p.a.).
- Ongoing costs in relation to marketing and promotion of the rapid transit services (£100k p.a.); and
- Ongoing costs in relation to bus / rapid transit priority enforcement (£30k p.a.).

It is anticipated that the operating costs associated with the rapid transit services (and changes to existing bus services), will be borne by the private operator(s). The operating costs associated with the park and ride sites and the ongoing marketing, promotion and enforcement costs will be borne by the local authorities.

6.6.2 Financial Sustainability

A number of options for service procurement remain available to the Authorities at this stage with different implications for revenue attribution and risk ownership as set out in Section 5 (Commercial Case). These are to be explored further between Programme Entry and Conditional Approval to ensure that the most appropriate procurement method is chosen.

For the purposes of this Programme Entry MSBC, a number of assumptions about revenue and operating cost streams have been made to feed into this appraisal. In summary, these are:

- Vehicle investment costs and service operating costs are borne by the operator (see section 3.3.1.2) and revenue from the services will accrue to the operator:
 - The scheme costs for the provision of 28 new bespoke vehicles is equivalent to a gross cost of £6,875k in the opening year (current prices). Taking into account the likelihood of the rapid transit services replacing or leading to slight reductions in other competing conventional bus services, the net increase in vehicle investment costs in the opening year is estimated at £5,074k;
 - Subsequent fleet replacement costs are estimated as a net increase of £2,511k in 2009 prices for each entire fleet replacement over the 60 year appraisal period. It is assumed that after the initial fleet investment the entire fleet will then be replaced three times within the appraisal period. The estimated cost takes into account the likelihood of reduced fleet investment costs on competing conventional bus routes which may be reduced in frequency or withdrawn.
- The Authorities will bear the costs of annual maintenance and other general operating costs as outlined in section 6.6.1 above.

The Affordability and Financial Sustainability (AFS) tables in section 3.8.2 shows that the ongoing costs to the operator of the rapid transit services are comfortably offset by the revenues received with services being commercially viable.



6.6.3 Independent Financial Review

An independent review of the financial aspects of the modelling and appraisal work has been undertaken by PriceWaterhouseCoopers LLP (PwC). The independent review has:

- Considered the financial assumptions and data underpinning the current proposals;
- Highlighted any key risks and issues, particularly around the Benefit to Cost Ratio (BCR) or potential financial impacts for either Bristol City Council or South Gloucestershire Council; and
- Identified what further work might be necessary to assist in preparing the MSBC submission with a view to mitigating any of the identified risks.

In particular, the review has considered the following:

- Clarity on costs, in terms of capital and operational expenditure, sources of local contributions, and spend profile over time;
- Robustness of the BCR; and
- Assumptions around the impact on bus network operation and financing.

The actions arising from the main conclusions from the review were as follows:

- The scheme description includes an emphasis on the overall strategic benefits of the whole package;
- The spend profile has been adjusted to reflect local, preparation and DfT contributions within the regional RFA funding envelope, with both authorities committed to sharing preparation costs and underwriting local contributions;
- The Independent Cost Review has confirmed that the overall scheme costs are not overestimated;
- The authorities' consultants have incorporated a set of quality control processes to provide certainty around the BCR;
- Sensitivity tests post-submission will inform the prioritisation of the most appropriate option for service procurement and impacts on a range of potential fare levels; and
- Future discussions with the DfT will confirm if necessary further amendments to inflation assumptions.

6.7 Funding Sources

6.7.1 Funding Sources

6.7.1.1 Regional Funding Allocation

The South West Region has approved a £168.08million funding contribution to the NFH Package. A copy of the notification of support and funding allocation from the South West Councils is attached at **Appendix 2.D**.

6.7.1.2 Local Contributions

The NFH Package is a significant investment for the West of England Authorities, not only in terms of the benefits that it will deliver, but also as part of a programme of major schemes contained within the Joint Local Transport Plan.

Bristol City Council and South Gloucestershire Council have agreed to underwrite the 12% funding required for the local contribution, a total of £23.3million (excluding pre-Programme Entry



preparatory costs that have already been incurred). Agreement to underwrite the local contribution was endorsed by Bristol City Council Cabinet on 25th March 2010 and by South Gloucestershire Council Cabinet on 1st March 2010.

As the scheme development work continues, the opportunities for meeting this local contribution will be explored and agreed in due course. Possible sources of funding include significant regeneration schemes in South Bristol, city centre developments and housing schemes in the North Fringe as well as other possible future s.106 developer contributions (see next section).

6.7.1.3 Developer Contributions

There are a number of major developments, particularly along the route of the rapid transit scheme, which will benefit from the implementation of the NFH Package. Bristol City Council and South Gloucestershire Council are currently in discussions with a number of developers regarding the integration of the design of these developments with the NFH Package and associated s.106 developer contributions for infrastructure and/or services.

However, at this stage (Programme Entry) there are currently no fully finalised agreements with regards to potential developer contributions to the NFH Package.

6.7.2 Payment Profile

Table 6.6 and Table 6.7 show the payment profile, in outturn prices, for the risk-adjusted programme cash flows. This payment profile is in line with the current RFA2 allocations.

	Payment Profile (£million – outturn prices)					
Year	Preparatory Capital Costs Costs		Total			
2009/10	£1.091m*	-	£1.091m*			
2010/11	£3.922m	-	£3.922m			
2011/12	£6.480m	-	£6.480m			
2012/13	£1.565m	£8.905m	£10.470m			
2013/14	£0.028m	£22.237m	£22.265m			
2014/15	£0.228m	£59.474m	£59.702m			
2015/16	£0.235m	£61.211m	£61.446m			
2016/17	£0.362m	£29.11m	£29.472m			
2017/18	£0.433m	-	£0.433m			
Total	£14.344m	£180.937m	£195.281m			

 Table 6.6 – Payment Profile (Outturn Prices and Risk-Adjusted)

* 2009/10 preparatory costs (pre-Programme Entry), which have already been incurred, are not eligible for DfT reimbursement and do not count towards the Major Scheme 'local contribution'.



	Payment Profile Split (£million – outturn prices)					
Year	Year Local Contribution		DfT Contribution			
	Preparatory Costs	reparatory Costs Capital Costs		Capital Costs		
2010/11	£2.706m	-	£1.216m [†]	-		
2011/12	£4.471m	-	£2.009m [†]	-		
2012/13	£1.080m	£8.905m	£0.485m	-		
2013/14	£0.019m	£3.246m	£0.009m	£18.991m		
2014/15	£0.228m	£0.693m	-	£58.781m		
2015/16	£0.235m	-	-	£61.211m		
2016/17	£0.362m	£0.914m	-	£28.196m		
2017/18	£0.433m	-	-	-		
Sub-totals	£9.534m	£13.758m	£3.719m	£167.179m		
Total	£23.292m [‡] (12%)		£170.898	Sm (88%)		

Table 6.7 – Payment Profile Split (Outturn Prices and Risk-Adjusted)

[†] Preparatory costs which are eligible for DfT reimbursement in 2010/11 and 2011/12 will not be reimbursed until Conditional Approval Stage (2012/13).

[‡] Local contribution excludes 2009/10 pre-Programme Entry preparatory costs of £1.091m that have already been incurred.

6.7.3 Section 151 Officers Sign-Off

The Chief Finance Officers (Section 151 Officers) of the West of England Authorities meet regularly to discuss and manage issues in relation to the funding, risk and resources of the transport programme. In the case of the NFH Package, the Chief Finance Officers from Bristol City Council and South Gloucestershire Council are represented on Programme and Project Boards and have taken an active role in the scheme development, including provision of independent advisors to review the financial case for the scheme. The Programme Board, including the Section 151 Officers, has endorsed the submission of the MSBC.

The Section 151 Officers also provide advice to the recommendations made to Bristol City Council Cabinet and South Gloucestershire Council Cabinet. Submission of the MSBC was endorsed by Bristol City Council Cabinet on 25th March 2010 and by South Gloucestershire Council Cabinet on 1st March 2010.

A letter confirming that the Section 151 Officers have endorsed the submission of the MSBC submission is attached overleaf.







6.8 Summary

In summary, the Financial Case provides a detailed breakdown of the scheme costs; outlines our assumptions in relation to the treatment of risk and inflation; and provides an overview of the funding sources for the scheme as well as ongoing financial sustainability, maintenance and operating costs.

The main points to note are as follows:

- The total capital cost estimate is £195.3million in outturn prices these costs have been subject to an independent review;
- A full Quantified Risk Assessment has been undertaken and has provided for potential variation in cost, programme and inflation;
- The total preparatory cost estimate is £14.344million in outturn prices. This estimate is based on known costs for existing arrangements, estimates from the Project Managers on likely costs and benchmarking with other major schemes. The eligible cost element of this is £7.438million (in outturn prices);
- The local contribution is £24.4million (£23.2million excluding pre-Programme Entry preparatory costs which have already been incurred). This represents a 12% local contribution. This has been endorsed by Bristol City Council Cabinet and South Gloucestershire Council Cabinet; and
- The Section 151 Officers of Bristol City Council and South Gloucestershire Council meet regularly to discuss and manage issues in relation to the funding, risk and resources of the transport programme. In the case of the NFH Package, the Chief Finance Officers from Bristol City Council and South Gloucestershire Council are represented on Programme and Project Boards and have taken an active role in the scheme development, including provision of independent advisors to review the financial case for the scheme. The Programme Board, including the Section 151 Officers, has endorsed the submission of the MSBC, which was also subject to an independent financial review.



Appendix 1.A:

Scheme Drawings -

North Fringe Rapid Transit Route and Stoke Gifford Transport Link

Appendix 1.B:

Scheme Drawings -

East Fringe Rapid Transit Route

Appendix 1.C:

Scheme Drawings -

South Bristol Rapid Transit Route

Appendix 1.D:

Scheme Drawings –

M32 Corridor and Park and Ride

Appendix 1.E:

Scheme Drawings -

Bristol City Centre Improvement Works

Appendix 1.F:

Scheme Drawings -

Next Best Alternative Scheme

Appendix 1.G:

Scheme Drawings -

Lower Cost Alternative Scheme

Appendix 1.H:

Letter to DfT regarding transfer of GBBN proposals to NFH Package

Appendix 2.Ai:

Joint Local Transport Plan 2008 Progress Review



Appendix 2.Aii:

Joint Local Transport Plan Progress Report 2009



Options Assessment Report



Appendix 2.Ci:

Technology Review 2009 (Executive Summary)

Appendix 2.Cii:

Technology Review 2009 (Full Report)

Appendix 2.D:

Letter of Support from Regional Bodies
Appendix 3.A:

Appraisal Specification Report



Appendix 3.B: Traffic Survey Report

Appendix 3.C:

Public Transport Model Validation Report

Appendix 3.Di:

Highway Model Validation Report



Appendix 3.Dii:

Supplementary Report (General): Highway Validation



Appendix 3.Diii:

Supplementary Report (M32 Park & Ride Validation)



Demand Model Development Report



Appendix 3.F: Forecasting Report

Appendix 3.G:

Economic and Cost-Benefit Appraisal Report



Appendix 3.Hi: Environmental Report



Appendix 3.Hii:

Responses from Environmental Bodies



Appendix 3.I: NATA Worksheets



Appendix 4.A:

Project Programme



Appendix 4.B: Project Risk Register

Appendix 4.C:

Quantified Risk Assessment Report

Appendix 4.Di:

Public Consultation Feedback Report

Appendix 4.Dii:

Public Consultation Feedback Addendum Report



Letters of Support from Key Stakeholders

Appendix 6.Ai:

Detailed Cost Breakdown & Cost Assumptions

Appendix 6.Aii:

Detailed Breakdown & Assumptions for Rapid Transit Operating Costs

Appendix 6.B:

Independent Surveyor's Report