Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Neath Port Talbot County Borough
Bwrdeistref Sirol Castell-nedd Port Talbot

City and County of Swansea
Dinas a Sir Abertawe

Welsh Assembly Government

FABIAN WAY CORRIDOR TRANSPORT ASSESSMENT: MAIN REPORT

January 2010 Revision A

Welsh Assembly Government

Fabian Way Corridor

Transport Assessment

REV A

Welsh Assembly Government

Fabian Way Corridor

Transport Assessment

January 2010

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1 Introduction

1.1 Background

Arup has been commissioned on behalf of the Welsh Assembly Government (WAG) to undertake a strategic assessment of the transportation options for the A483 Fabian Way corridor.

The corridor is scheduled to experience significant development in the next 25 years, generating increased travel demand. It is important that a balanced transport strategy is developed to support the sustainable development of the corridor and to facilitate wider economic regeneration in the surrounding catchment area. The Study has the following aims:

- to review the outputs of previous studies and assessments within the Study area;
- to assess the opportunities and constraints on the corridor;
- to identify appropriate transport options to enhance the movement of people and freight throughout the corridor;
- to present a robust, comprehensive and sustainable strategy for the corridor, including determining the potential funding streams; and
- to ensure full engagement with all Stakeholders.

1.2 Purpose of Report

This Report presents the development and assessment of transport options identified and tested to provide a solution to the anticipated problems likely to occur during development of the Fabian Way corridor. The Study has been undertaken based on the principles of the Welsh Transport Planning and Appraisal Guidance (WelTAG)[1], and this Report comprises the WelTAG Planning Stage and Stage 1 Technical Report for the Fabian Way corridor. The outcome of this Report will be a transport strategy composed of a series of measures to be implemented over the next 25 years.

The approach aims to ensure that all modes of transport are appraised against both the Study Objectives and sustainability criteria (Welsh Impact Areas of the economy, environment and social) taken from the Wales Transport Strategy[2]. This includes measuring each option's performance regarding deliverability, risk (how they are managed and mitigated), and the degree of support from Stakeholders during the consultation process.

In addition to this main Report there are (bound separately):

- a Technical Appendices Report; and
- a Summary Report.

1.3 Study Area

The Study area is shown on Figures 1.1 and 1.2. It covers the strategic route into eastern Swansea, namely the A483 Fabian Way. The area includes a number of key employment sites, existing and proposed residential areas, environmental sensitive areas and important infrastructure networks.

The Study area is within both the boundaries of Neath Port Talbot County Borough (NPT) and the City and County of Swansea (CCS).

This Study focuses on access to Swansea City Centre as the key destination to the west of the Study area. It is recognised that there are a range of alternative destinations for journeys from and through the Fabian Way corridor, but detailed consideration of these are beyond the scope of this Study. Further work is recommended as part of the proposed development

of the Fabian Way corridor to consider trips to destinations throughout the wider Swansea area, taking into account the impact of other studies currently being undertaken and any proposed policies for City Centre management.

1.4 Study Management

The Study was managed by a Client Steering Group which included representatives of WAG, NPT and CCS. A copy of the Study Brief is included in Appendix A of the Technical Appendices Report. The Minutes of Client Steering Group meetings are included in Appendix B of the Technical Appendices Report.

1.5 Structure of Report

The structure of this report is as follows:

- section 2 provides an overview of the Study approach;
- section 3 outlines the policy context at a national, regional and local level;
- section 4 reviews the existing conditions within the site area;
- section 5 summarises the proposals for developing the corridor over the next 25 years;
- section 6 identifies the problems and opportunities that the Study is addressing and discusses the Study Objectives;
- section 7 develops possible solutions and sifts them;
- section 8 appraises the packaged options and assesses the traffic impact;
- section 9 provides an overview of the preferred strategy;
- section 10 is concerned with the implementation of the preferred strategy including funding mechanisms and programme; and
- section 11 concludes the document, drawing together its findings and recommendations.

2 Study Approach

2.1 Introduction

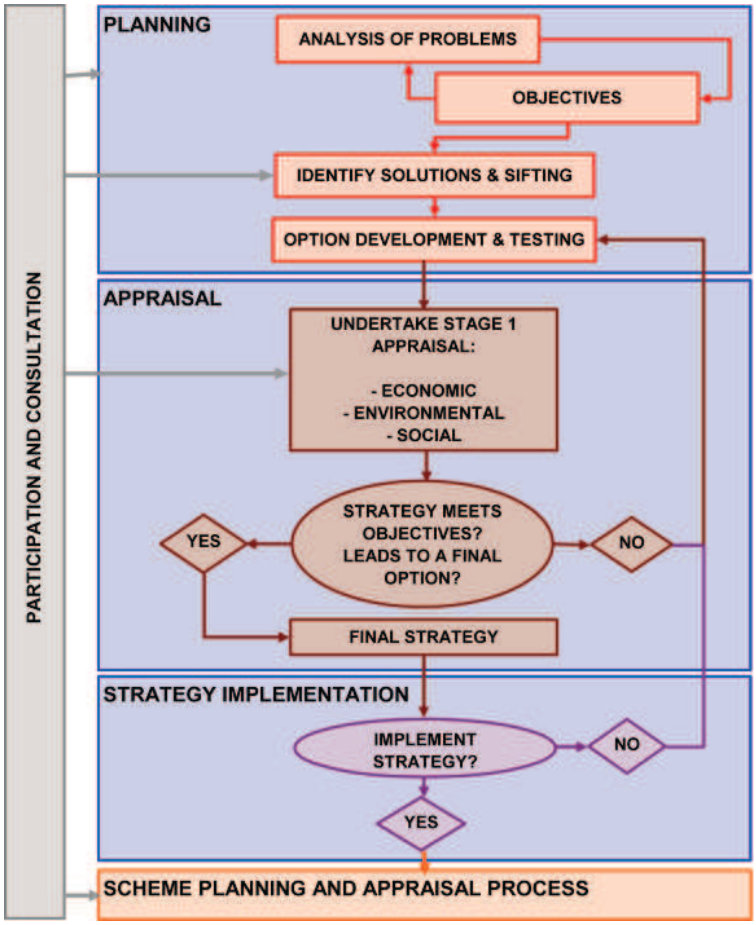
The methodology for this Study was set out in detail in the Inception Report dated 11 November 2008 included in Appendix C of the Technical Appendices Report. Throughout the Study and particularly during the appraisal process, the Study team followed the principles and advice set out in WelTAG.

WelTAG has been developed by WAG with the intention that is applied to all transport strategies, plans and schemes being promoted or requiring funding from WAG. In order to compete for public sector funding, proposals need to demonstrate that they:

- make a positive contribution to the objectives for transport and hence the wider policy objectives for Wales;
- provide a good value for money;
- provide overall economic, social and environmental benefits to society; and
- maximise benefits and minimise impacts.

The new guidance adopts a two-stage approach to appraisal. Stage 1 is concerned with screening and testing the options before more detailed analysis in Stage 2. It should be noted that only Stage 1 is applicable for strategies such as this Study. Figure 2.1 shows the three main steps of the WelTAG process for a strategy: planning, appraisal and strategy implementation.

Figure 2.1: The Structure of WelTAG at a Strategy Level



The methodology for the Study is based on the above diagram. The three main steps are noted below and explained in more detail in the following sections.

1. **Planning** - which included the following:
    - undertaking a corridor review to build up a picture of the existing situation and understanding the problems and opportunities with the input of the relevant Stakeholders;
    - setting the transport planning objectives;
    - developing and sifting options to mitigate against the existing and potential future problems identified within the corridor;
2. **Appraisal** – to compare options and select a preferred strategy; and
3. **Implementation** – to develop a plan to ensure the preferred strategy can be implemented.

2.2 Planning Stage

2.2.1 Corridor Review

The key to understanding the possible future situation along the corridor is a detailed and accurate knowledge of the existing situation. This has been built up from a variety of sources, including desk-based research, site visits and discussion with key Stakeholders. It covers the following key elements:

- policy review;
- population, social demographics and travel patterns;
- transport and utility networks; and
- the natural and built environment.

The information obtained has been summarised as a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis.

2.2.2 Problems, Opportunities and Objectives

The corridor review exercise provided a detailed understanding of problems and opportunities within the Study area. However, a major source of information on existing and possible future transportation challenges has been obtained from those who know the corridor well.

Dialogue was established from the outset with the many Stakeholders who have an interest in the future development of the Fabian Way corridor, including local authorities, transport operators and possible developers. A series of two Workshops was used as a platform to identify the key problems and opportunities in the area and to develop and agree the key transport planning objectives of the Study.

2.2.3 Option Development and Sifting

The Study team considered all possible transport options that might have a role to play in satisfying the Study Objectives. This included land use, infrastructure, management, information provision and pricing measures. Potential options were not limited to conventional or obvious solutions: the team adopted a lateral thinking approach and nothing was rejected initially. The advantages and disadvantages of each potential measure were recorded on proformas.

The scope of the options identification and development process was broadened by holding sessions with the Client Steering Group and key Stakeholders. The aim was to link transport and land use in a mutually supportive way to provide travel and lifestyle choices that add up to more sustainable combinations of movement and development. This means not only building transport infrastructure to support projected urban development in the corridor, but taking account of the land use implications of the transport plan.

The planning stage of WelTAG involved a proactive process of Stakeholder engagement to generate a picture of the transport conditions within the Study area, identifying both existing and potential future problems and opportunities. These activities have been described in the sections above, and culminated in the production of an initial long list of options to be sifted. Options included both 'hard' and 'soft' measures. Hard measures include infrastructure, service improvements or the introduction of new systems. Soft measures include other possible interventions such as ticketing, passenger/driver information or awareness campaigns.

The first sift was undertaken on the basis of whether an option is considered appropriate to the Study and whether it might potentially contribute to meeting the Objectives. The options that passed through this initial sifting process were further assessed against other considerations such as Stakeholder acceptability, risks to implementation and influence on transport movements within the corridor. This further sifting resulted in a number of options being recommended to be taken forward for grouping into four themed Strategy Packages.

2.3 Appraisal Stage

This stage of the Study involved appraisal of the four Packages in order to identify the Preferred Strategy.

The appraisal focused on how well each Package addressed the Study Objectives and supported the Welsh Impact Areas of the economy, environment and society. The appraisal was both qualitative and quantitative in nature. Consideration was given to the engineering feasibility of any major works, cost estimates and impact on third party or development land. The appraisal process also considered a number of additional key areas, in particular:

- Public acceptability;
- Stakeholder acceptability;
- Financial affordability and funding;
- Technical and operational feasibility; and
- Risk.

During this phase a high level transport model was also developed. This was subsequently used for the assessment and appraisal of the various packages.

The acceptability of a Package can only be demonstrated through participation; therefore a second Stakeholder Workshop was organised to obtain feedback from the same key Stakeholders that attended the initial Workshop. Views were also sought from the local community, via presentations to local businesses and a community newsletter.

The results of the appraisal process facilitated development of the Preferred Strategy, which was subsequently appraised.

2.4 Implementation Stage

This stage of the Study was concerned with the development of an implementation plan for the Preferred Strategy. An implementation plan was formulated in conjunction with the Client Steering Group and the project Stakeholders and includes details of scheme costs, funding and phasing.

2.5 Consultation and Participation

Consultation and participation were an integral part of the whole Study process, and involved the following:

- Client Steering Group meetings;
- Two Stakeholder Workshops;
- Meetings and liaison with individual Stakeholders; and
- Production and issue of a Community Newsletter.

3 Policy Background

3.1 Introduction

This chapter provides a review of relevant national, regional and local policy documents which will have an influence on the future development of the Fabian Way Corridor.

3.2 National

3.2.1 Planning Policy Wales[3]

Planning Policy Wales (PPW), published in March 2002, sets the context for sustainable land use planning for WAG. Chapter 8 (Transport) of PPW affirms that the Assembly Government's Transport Framework will be linked to the Wales Spatial Plan[4] and provide the context for Local Transport Plans.

One Objective of the Plan is to achieve sustainable accessibility and to:

"Extend choice in transport and secure accessibility in a way which supports sustainable development by encouraging the establishment of an integrated transport system which is safe, efficient, clean and fair."

This document promotes new development in locations accessible to public transport, walking and cycling. In particular WAG sets out its aim within PPW to achieve the doubling of the cycle network in Wales by 2012.

PPW also provides guidance on levels of car parking provision, which is considered to be a major influence on the choice of means of transport and the pattern of development. It sets out that local authorities should ensure that new developments provide lower levels of parking than have generally been achieved in the past. Minimum parking standards are no longer appropriate.

PPW states that when determining a planning application for development that has transport implications, local planning authorities should take into account the following issues:

- *the impacts of the proposed development on travel demand;*
- *the level and nature of public transport provision;*
- *accessibility by a range of different transport modes;*
- *the willingness of a developer to promote travel by public transport, walking or cycling, or to provide infrastructure or measures to manage traffic, to overcome transport objections to the proposed development (payment for such measures will not, however, justify granting planning permission to a development for which it would not otherwise be granted);*
- *the environmental impact of both transport infrastructure and the traffic generated; and*
- *the effects on the safety and convenience of other users of the transport network.*

3.2.2 Technical Advice Note 18[5]

Technical Advice Note 18 (TAN18) was published in March 2007 in support of PPW. The document sets out WAG's objectives on planning with regard to transport issues. TAN 18 acknowledges that:

"by guiding the location of new development, reducing the need to travel, and promoting transport choices which are less polluting, land-use planning can contribute to long term environmental improvement."

TAN 18 states that in order to meet sustainable development policy objectives, local authorities should be:

- *Promoting resource and travel efficient settlement pattern;*
- *Ensuring new development is located where there is, or will be, good access by public transport, walking and cycling thereby minimising the need for travel and fostering social inclusion; and*
- *Encouraging the location of development near other related uses to encourage multi-purpose trips.*

3.2.3 Wales Transport Strategy[2]

The Wales Transport Strategy: One Wales - Connecting the Nation was published in April 2008 and is a key document to developing an effective transport strategy for Wales. The document outlines how the transport policy approach is more responsive in its delivery of the WAG wider policy agenda, and has attempted to be flexible to reflect different regional circumstances.

The four main regions in Wales are each represented by one of four regional transport consortia which have been created through partnerships between neighbouring Local Authorities. The Study area falls across the CCS and NPT boundaries, both of which part of the South West Wales Integrated Transport Consortium known as SWWITCH.

The stated goal of the document is for Wales to promote sustainable transport networks that safeguard the environment while strengthening Wales' economic and social life. The transport strategy identifies a series of high-level outcomes and sets out the steps to their delivery, including:

- *achieving a more effective and efficient transport system;*
- *achieving greater use of the more sustainable and healthy forms of travel;*
- *minimising demands on the transport system; and*
- *reducing the impact of transport on greenhouse gas emissions.*

3.2.4 Wales Spatial Plan[4]

The 2008 update to the Wales Spatial Plan (WSP) was adopted in July 2008 and sets out the planning agenda at a spatial level. There are five guiding themes which set out the National Framework. The key themes are based on:

- *Building sustainable communities;*
- *Promoting a sustainable economy;*
- *Valuing our environment;*
- *Achieving sustainable accessibility; and*
- *Respecting distinctiveness.*

The WSP highlights the need to plan regions around strong integrated transport systems, and that new developments should be highly accessible by public transport. It suggests that brownfield sites should be scoped for reuse.

The Fabian Way corridor falls within the Swansea Bay waterfront and western valleys area identified in the WSP. The key priorities for this region are given as:

- *Improving accessibility. This includes improved telecommunication links as well as developing transport connections between the key settlements;*
- *Developing a cutting edge knowledge economy;*
- *Reducing economic inactivity and developing an integrated skills strategy;*

- *Implementing the Waterfront Masterplan to maximise opportunities along the stunning coastline;*
- *Developing a strong leisure and activity based tourism industry; and*
- *Ensuring that environmental protection and enhancement are fully integrated*.

The WSP emphasises the need for both internal and external sustainable transport links for the area, stating that:

"It is vital that the urban settlements and the waterfront are well connected by a range of sustainable transport options so people can move easily between where they live, work and access key services."

3.2.5 Walking and Cycling Action Plan for Wales 2009-2013[6]

WAG presented a Walking and Cycling Action Plan for Wales in December 2008. This document sets out WAG's aim to maximise the opportunities afforded by walking and cycling and to reduce car use, particularly for short journeys. In addition, it identifies that the provision of walking and cycling facilities is an important element in creating equal opportunities. Its mission statement is:

"To encourage more people to walk and cycle more safely and more often"

The core objectives of the Plan are to:

- *Improve the health and well-being of the population through increased physical activity;*
- *Improve the local environment for walkers and cyclists;*
- *Encourage sustainable travel as a practical step in combating climate change;*
- *Increase levels of walking and cycling through promotion of facilities; and*
- *Ensure that walking and cycling are prioritised in cross-cutting policies, guidance and funding.*

The Plan contains a range of actions aimed at delivering these objectives grouped under the following four themes:

A. Changing Behaviour – Walking and cycling to make an increasing contribution towards climate change targets and raising levels of physical activity.

B. Sustainable Travel encouraged via better Walking and Cycling Infrastructure – To create safe, attractive and convenient infrastructure for pedestrian and cycle travel.

C. Policy Objectives – Ensure that walking and cycling are included in cross-cutting policies, guidance and funding.

D. Evaluation – To enable the Welsh Assembly Government and delivery partners to track progress in delivering the actions of this Plan and intended outcomes.

3.2.6 Wales: A Vibrant Economy (WAVE)[7]

WAG's Strategic Framework for Economic Development, Wales: A Vibrant Economy (WAVE) was published in November 2005. It sets out the national economic development agenda with the following vision:

"…a vibrant Welsh economy delivering strong and sustainable economic growth by providing opportunities for all."

A key action for achieving the priorities of the vision is to invest in transport networks.

WAVE identifies the Greater Swansea Bay Area as having potential for extracting more economic benefits from urban agglomeration, citing the regeneration around SA1 and Llandarcy Urban Village as important factors. Urban agglomeration is difficult to achieve, but

investment in transport will help to bring communities together and create broader and more competitive markets.

3.2.7 Other Relevant National Policy Documentation

In addition to the national policy documents reviewed above, the following will have a wider influence on the Fabian Way transport strategy rather than a direct impact:

- Wales Freight Strategy[8];
- Rail Forward Programme 2008[9];
- Reprioritisation of the Trunk Road Forward Programme 2008[10]; and
- Network Rail's Route Utilisation Strategies (none complete for Wales to date).

3.3 Regional

3.3.1 Draft Regional Transport Plan[11]

SWWITCH has been developing a Regional Transport Plan (RTP) in line with government policy. The provisional RTP was submitted to WAG in December 2008 and the final report will be published by the end of September 2009.

SWWITCH has worked with a range of Stakeholders to examine a variety of options that could potentially deliver RTP objectives. The RTP explains that no single option would be appropriate across such a diverse region as South West Wales, and advocates a 'mix and match' approach to transport.

The provisional RTP lists the following objectives:

- *To improve access for all to a wide range of services and facilities including employment and business, education and training, health care, tourism and leisure activities;*
- *To improve the sustainability of transport by improving the range and quality of, and awareness about, transport options, including those which improve health and well being;*
- *To improve the efficiency and reliability of the movement of people and freight within and beyond South West Wales to support the regional economy;*
- *To improve integration between policies, service provision and modes of transport in South West Wales;*
- *To implement measures which make a positive contribution to improving air quality and reducing the adverse impact of transport on health and climate change, including reducing carbon emissions;*
- *To implement measures which help to reduce the negative impact of transport across the region on the natural and built environment including biodiversity; and*
- *To improve road safety and personal security in South West Wales.*

The long term strategy set out in the RTP for the Swansea urban area emphasises improved public transport and walking and cycling facilities, including Bus Rapid Transit. In relation to the Fabian Way site area, the RTP states that:

"New development sites and corridors, such as Fabian Way will be planned so that they can be effectively served by public transport and walking and cycling facilities."

The RTP includes an aspiration for the A483 Fabian Way to be trunked, although this is not specified as part of 2002 Trunk Road Forward Programme[10].

Accessibility analysis undertaken in developing the RTP concluded that Swansea has the best connectivity in the region.

3.4 Local

3.4.1 Neath Port Talbot County Council Unitary Development Plan[12]

The NPT UDP was adopted in March 2008 and is now the current development plan for the County area. The purpose of the UDP is to guide development, conservation and the use of land within the County Borough up to 2016.

One of the UDP's six strategies addresses transport issues. Its aims are to:

- *promote an integrated transport system which serves the needs of the County Borough's communities including the provision of new facilities, roads and paths and helps improve highway safety and reduce traffic congestion and pollution;*
- *promote measures to make the use of public transport, cycling and walking more attractive and reduce the need to depend on using the private car;*
- *ensure that new development is well located and designed to contribute to more sustainable patterns of development and movement; and*
- *protect facilities such as wharfs and railway lines which offer the potential for future use or re-use.*

Policy T12 promotes improvement, extension and protection of the existing footway and cycleway network. Policy T8 refers to the Southern Access Road that will link Jersey Marine with Llandarcy, proposed as part of the Coed Darcy Urban Village development.

3.4.2 Neath Port Talbot County Borough Council Local Transport Plan[13]

The LTP set out NPT's transport strategy for the five years up to 2005. It will be superseded by the RTP once this document is adopted.

The LTP recognises the need to reduce car dependency, whilst accepting the value of car availability and use. The main focus is on developing viable alternatives to the car, including measures to encourage more walking and cycling. Its strategy aims to:

- *improve the health of its citizens and especially children;*
- *promote social inclusion;*
- *reduce accidents on our highways;*
- *promote safer routes to schools;*
- *improve the environment;*
- *reduce pollution, congestion and consumption of fossil fuels;*
- *improve mobility and accessibility;*
- *recognise the particular difficulties experienced by disabled and elderly persons;*
- *reduce the speed of traffic;*
- *increase education and awareness in the community on green transport issues;*
- *promote travel plans;*
- *assist in the transporting of freight and reduce its impact;*
- *change land uses and re-vitalise our town centres; and*
- *attract inward investment and job creation.*

No specific measures were identified which may impact on the corridor.

3.4.3 Neath Port Talbot Community Plan[14]

NPT published its second Community Plan in June 2005 to present the vision for Neath Port Talbot in 2015. Transport is one of the themes of the Plan. The transport vision is to:

"…have a transport system that is more accessible, enables businesses to operate efficiently, is convenient, safe and sustainable."

Specific measures include:

- developing a Travel Plan for the Coed Darcy Urban Village;
- improving passenger facilities at bus stops with some real-time information; and
- increasing the length of cycleway within the County Borough.

None of the listed measures are area-specific.

3.4.4 City and County of Swansea Unitary Development Plan[15]

The CCS Unitary Development Plan (UDP) was adopted in November 2008. It sets out policies for future development for the period up to 2016. One of the five goals of the UDP is to:

"Maximise access opportunities for all by the most appropriate modes of transport to, from and within the area"

This leads into an aspiration to develop an integrated transport system for Swansea and the wider South West Wales region. The objectives of this integrated transport system are:

- *To support development at accessible and safe locations;*
- *To reduce the need to travel and reduce reliance on the private car;*
- *To improve safety and reduce the adverse environmental impacts of transport;*
- *To make the most efficient use of existing transport infrastructure;*
- *To ensure that Swansea's transportation system can support the City's continuing role as the regional centre for South West Wales;*
- *To promote improvements to the transportation system which will meet the existing and future access needs of businesses, residents and investors;*
- *To conserve and enhance the historic and cultural environment;*
- *To avoid significant adverse environmental impacts from new development; and*
- *To promote cycling and walking and the provision of high quality public transport.*

Policy AS5 seeks to encourage walking and cycling as an attractive alternative to the private car. Policy AS9 proposes enhancements to rail services including improved facilities for rail users and freight. Policy AS7 states that CCS will seek implementation of bus priority measures on the main transport corridors and dedicated bus routes from Park and Ride sites to the City Centre. The A483 Fabian Way is identified as a key corridor for bus priority measures.

The spatial strategy within the UDP sets out a vision for the regeneration of Swansea Waterfront, an area which includes the western part of the Fabian Way corridor. The UDP states that:

"The extensive area of brownfield land on the eastern approach to the city, south of Fabian Way and east of SA1 Swansea Waterfront, offers considerable regeneration opportunities. … Redevelopment of these areas has the potential to create a major mixed use destination, in order to:

- *Enhance linkages between a number of sites and locations along the Fabian Way corridor;*
- *Build upon the success of SA1 Swansea Waterfront;*
- *Provide opportunities for potential new tourism, leisure, and commercial developments in a range of settings; and*
- *Contribute to the creation of a strong sustainable transport corridor."*

The spatial strategy map identifies potential employment, sport and leisure and new housing sites within the Study area.

3.4.5 City and County of Swansea Local Transport Plan[16]

The Local Transport Plan (LTP) for CCS dates back to 2000. It will ultimately be superseded by the RTP. The transport objectives of the LTP are:

- *To promote public awareness of transport issues;*
- *To make the best use of existing transport facilities;*
- *To improve accessibility for all;*
- *To improve safety;*
- *To assist economic growth and development;*
- *To reduce the adverse environmental impact of transport;*
- *To encourage a more environmentally sustainable transport system;*
- *To encourage healthier forms of transport;*
- *To reduce reliance on the private car by promoting attractive alternatives, and by careful location of new development; and*
- *To ensure best value for money from investment in transport.*

The LTP also incorporates walking and cycling strategies for Swansea aimed at encouraging these modes.

In relation to the Fabian Way corridor, the LTP proposes strengthening Baldwins Bridge and mentions the problem of traffic congestion on the A483 Tawe Bridges.

3.4.6 Swansea 2020: Swansea's Economic Regeneration Strategy[17]

CCS published Swansea 2020: Swansea's Economic Regeneration Strategy in 2005 as a new strategic framework to support economic regeneration in the city and county of Swansea over the subsequent 15 years.

One of the Strategy's four cross-cutting themes focuses on the need for an efficient, integrated transport network to support Swansea's future economic growth. It states that:

"Investment in transport infrastructure and accessibility improvements will ensure that the provision of serviced sites and premises is properly planned. This will assist with productivity gains through time savings and improved reliability, and facilitate access to jobs and improved retention of staff."

The Strategy cites the flagship development of SA1 as an example of modern, high quality office and industrial property that is crucial to attracting new investors.

3.4.7 Fabian Way: Improving Swansea's Eastern Gateway[18]

CCS published Supplementary Planning Guidance for the Fabian Way corridor in 1998. The aim of this document was to identify a series of environmental measures to improve and redevelop the route. It includes an action plan with a four-year time frame. Many of the

proposals have now been implemented or superseded, but the principles of environmental enhancement remain relevant to this Study.

3.4.8 Parking Guidelines

The current adopted guidance on parking standards in CCS is the South Wales Parking Guidelines 1993[19]. These standards are generally regarded as providing a generous level of parking.

NPT is currently considering the CSS Wales Parking Standards[20] for adoption. They seek to provide a consistent approach to the provision of parking across Wales. The CSS Parking Standards use a system of zones. There are six zone levels where 1 represents a city centre and 6 a rural hamlet. The document also includes cycle parking standards.

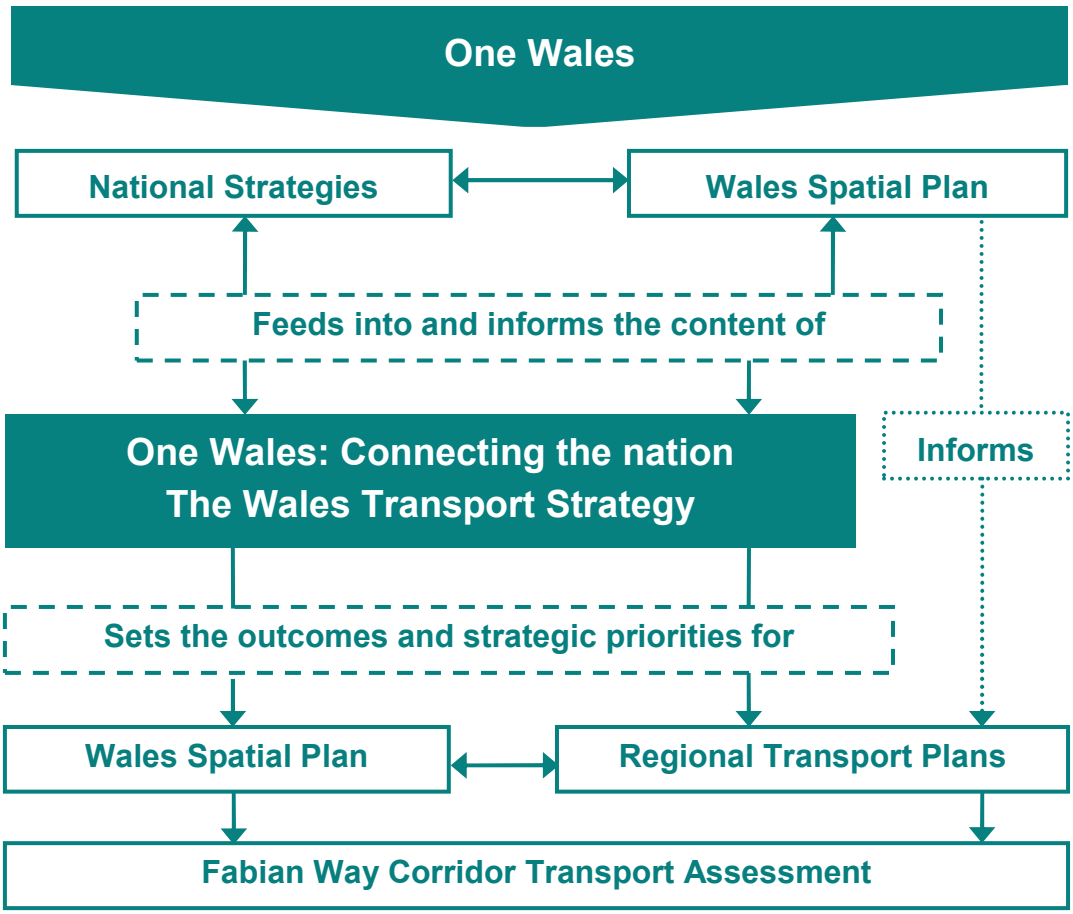
3.5 Other Studies

Several other studies are ongoing within the Fabian Way area at present. Atkins is undertaking a Strategic Parking Study within the city of Swansea on behalf of CCS and WAG. Hyder is undertaking a series of studies within the corridor relating to flood risk, utilities and ecology.

3.6 Summary

Figure 3.1 below shows how the transport strategy for the Fabian Way corridor will fit with the key national, regional and local policies reviewed in this section.

Figure 3.1: Summary of Policy Context



4 The Corridor Today

4.1 Introduction

A detailed and accurate knowledge of the existing situation is vital to understanding potential future scenarios. Information regarding the corridor today has been gathered from a variety of sources, including published data, first hand observation and discussions with key Stakeholders.

4.2 Study Area

The Study area is located to the east of Swansea City Centre. It is an east-west corridor approximately 7km long by 1.5km wide centred on the A483 Fabian Way. Figures 1.1 and 1.2 show the regional and local context of the Study area on Ordnance Survey map backgrounds. Figure 4.1 gives an aerial view of the site while Photograph 4.1 in the Photographs section of this Report offers a panoramic photo view.

Fabian Way is a key radial route into Swansea from the east, providing a link to the M4. It runs parallel to the coast and forms an eastern gateway to the City Centre. The Tennant Canal and a single track freight railway line follow the route of Fabian Way to the north. There are three Sites of Special Scientific Interest (SSSI) in the vicinity of the site area. Current land use either side of Fabian Way includes residential, industrial and commercial.

The Study area spans two local authorities, NPT and CCS. Its eastern boundary is the M4, while its western edge is defined by the Afon Tawe. The site extends as far as the Tennant Canal to the north and to the sea coast in the south.

4.3 Social

WAG aims to ensure that all demographic groups, particularly under-represented groups, can take advantage of transport services. It is therefore important that this transport proposal considers the needs of the communities within the Study area.

There are three wards within the Study area. Castle and St. Thomas form part of the Unitary Authority of Swansea and Coedffranc West forms part of the Unitary Authority of Neath Port Talbot (as shown on Figure 4.2).

Information has primarily been obtained from 2001 Census Data, the 2008 Welsh Index of Multiple Deprivation (WIMD) and where possible the Office of National Statistics (ONS) mid-year estimates.

4.3.1 Population

The total population for all of the three wards was 20,372 at the time of the 2001 Census. Castle was the most populated ward with 11,933 people, St Thomas was the second largest with 6,373 and Coedffranc West was the least populated with 2,066 inhabitants.

The ONS mid-year population estimates from 2007 show that the total population in Swansea was 228,100 people and the total population in Neath Port Talbot was 137,400.

Swansea has a higher population density (people per hectare) than Neath Port Talbot indicating more built up land use. St Thomas has the highest population density of the three wards within the Study area, while Coedffranc West has the lowest. It should be noted that there is no population density data available for Castle ward.

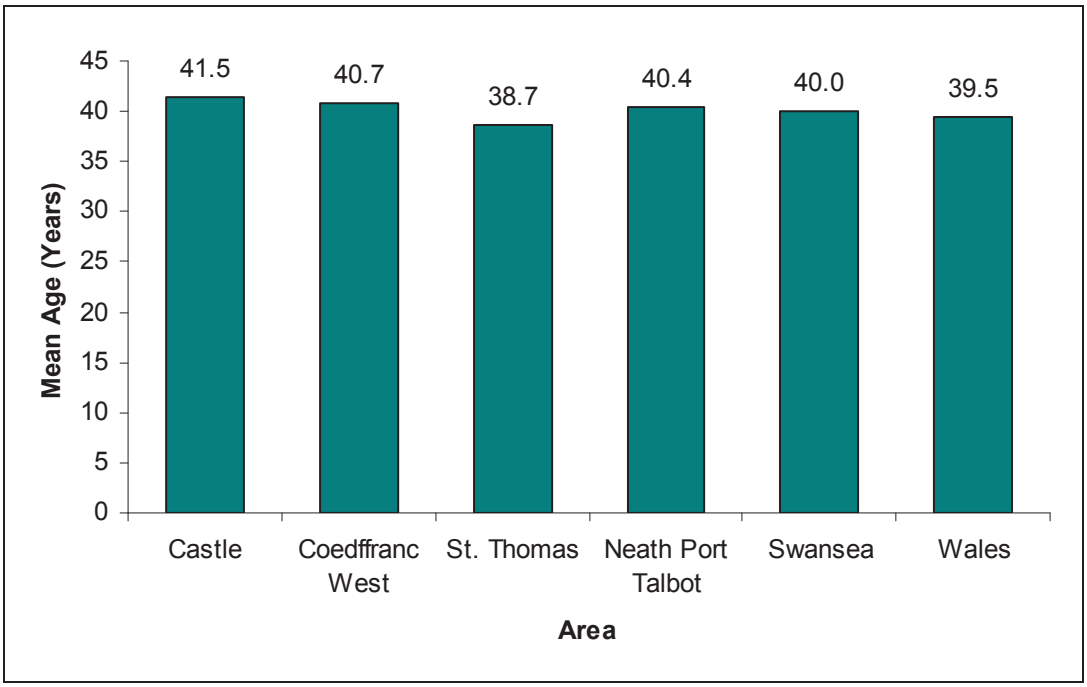
4.3.2 Demographics

Age Structure

The mean average age of people living in Swansea and Neath Port Talbot is similar to that of Wales as a whole. Castle has the highest average age of the three wards within the

Study area, while St. Thomas has the lowest average age. Figure 4.3 shows the mean age of the studied populations.

Figure 4.3: Graph to show Mean Age of Population within Site Area



Gender

The population of Swansea and Neath Port Talbot from 2001 Census Data is 48% male and 52% female. The more recent 2007 statistics from ONS mid-year population estimates show the population of both Swansea and Neath Port Talbot is 49% male and 51% female. These statistics mirrors the Welsh national average. Table 4.1 below shows the gender split between the three wards.

Table 4.1: Gender of Population within the Study Area

Ward	*Male*	*Female*
Castle	51%	49%
St Thomas	49%	51%
Coedffranc West	48 %	52%

Economic Activity and Social Grading

Economic activity has been obtained from 2001 Census Data (data set UV28). Swansea has a slightly higher percentage of residents who are economically active compared to Neath Port Talbot, although both areas have lower levels of economic activity than the Welsh national average. Table 4.2 below shows the economic activity for the three wards within the Study area. It can be seen that Coedffranc West is the ward within the Study area with the highest percentage of economic activity.

Table 4.2: Economic Activity and Social Grading within the Study Area

Ward	*Percentage Economic Activity*	*Higher and intermediate managerial / administrative / professional work*
Castle	51%	14%
St Thomas	57%	9%
Coedffranc West	63%	16%

Social grading classifications of the wards have been obtained from 2001 Census Data (data set UV50). This data allows researchers to make some extrapolations about likely household income, assuming that earnings are linked to professional skill bases. Castle and St Thomas have a lower percentage of people with higher and intermediate managerial / administrative / professional work compared to Swansea and Wales as a whole. Coedffranc West has a slightly higher percentage of people working in this type of position compared to Neath Port Talbot, although the proportion is lower than Wales as a whole.

Although the 2001 Census Data provides a useful indicator of the demographic context, it should be noted that the economic climate in the UK has deteriorated since 2001, with job losses felt in Wales.

Welsh Index of Multiple Deprivation (WIMD)

The WIMD represents the level of deprivation of an area. Deprivation is measured by considering the following domains at different levels of significance:

- income;
- employment;
- health deprivation and disability;
- education, skills and training;
- housing; and
- geographical access to services.

Wales has been divided into 1,896 areas, each having roughly the same number of people. These areas are known as Super Output Areas (LSOAs). This is a standard way of dividing up England and Wales for demographic comparison.

Deprivation scores have been calculated for each of these areas, with higher scores meaning more deprivation. Overall, Swansea and Neath Port Talbot rank above average in terms of levels of deprivation. There are 147 LSOAs in Swansea, of which 19 fell within the most deprived 10% LSOAs in Wales. There are 91 LSOAs in Neath Port Talbot, of which 17 fell within the most deprived 10% LSOAs in Wales. Table 4.3 below shows the scores and rankings of the three most deprived LSOAs in Swansea and Neath Port Talbot.

Table 4.3: WIMD Data for 3 Most Deprived LSOAs in Swansea and Neath Port Talbot

Authority	*LSOAs*	*Score*	*Rank out of 1,896 LSOAs in Wales*
Swansea	Townhill 1	74.3	6
	Castle 2	71.0	11
	Penderry 1	70.4	14
Neath Port Talbot	Cymmer 2	65.2	29
	Sandfields East 2	59.7	52
	Neath North 2	57.3	60

Ethnicity and Religion

Information regarding ethnicity and religion has been obtained from 2001 Census Data (data sets UV09 and KS07). Swansea, Neath Port Talbot and the three wards within the Study area all have a majority white ethnic population with Christian beliefs. Overall, the three wards reflect the pattern of ethnicity and religious belief of Wales as a whole. Table 4.4 below summarises the main ethnicity and religious beliefs within the area.

Table 4.4: Key Ethnicity and Religion within the Study Area

Ward	*Percentage of Residents of White Ethnicity*	*Percentage of Christian Residents*	*Percentage of Residents with No Religious Beliefs*
Castle	94%	64%	23%
St Thomas	99%	70%	21%
Coedffranc West	99%	75%	17%

Healthcare

Healthcare statistics have been obtained from 2001 Census Data (data set KS08). Residents within the Study area report slightly poorer health than the Welsh average. Table 4.5 below summarises the overall health of people living in Swansea, Neath Port Talbot and the three wards within the Study area. Coedffranc West has the highest percentage of people with general good health. Castle has the highest percentage of residents with poor health while Coedffranc West has the lowest.

Table 4.5: General Health within the Study Area

Area	*General Health: Good*	*General Health: Not Good*
Wales	65%	13%
Swansea	65%	13%
Neath Port Talbot	60%	16%
Coedffranc West	63%	12%
St Thomas	61%	17%
Castle	57%	19%

Nationally 42% of male adults and 46% of female adults reported eating more than five portions of fruit and vegetables the previous day. Slightly more people ate more than five portions in Swansea, while a slightly lower proportion ate more than five portions in Neath Port Talbot.

Education and Qualifications

Information regarding education and qualifications has been obtained from 2001 Census Data (data set KS13). Table 4.6 below shows the number of people living in Neath Port Talbot and Swansea between the working ages of 16 and 74 who have no qualifications and the proportion that have attained level 4 or level 5 qualifications. A level 4 qualification is equivalent to foundation and first degrees and equivalent national diplomas and certificates, and is targeted at technical and professional jobs and/or managers.

There is a significant difference in the level of education and qualifications between Swansea and Neath Port Talbot. The percentage of people in Swansea with level 4 or 5 qualifications is higher than the Welsh national average. Conversely, the proportion of people in Neath Port Talbot with level 4 or 5 qualifications is below the national average. St

Thomas is the ward with the lowest education and qualification statistics within the Study area.

Table 4.6: Education and Qualifications within the Study Area

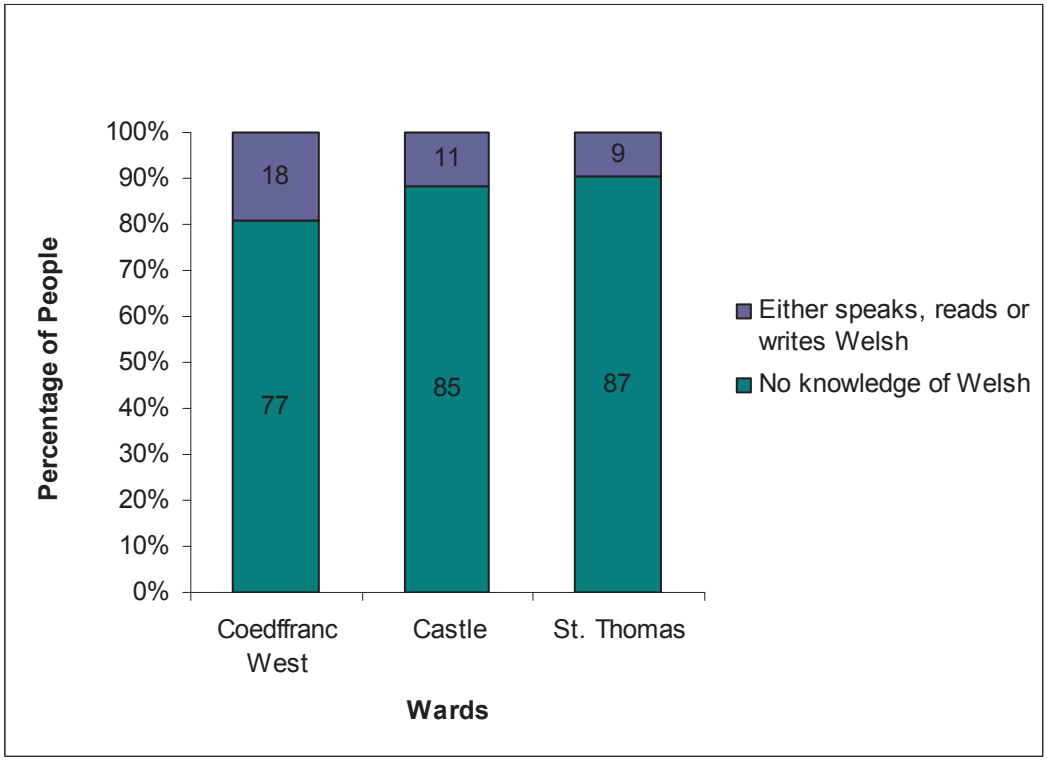
Area	*Age 16 to 74 with no qualifications*	*Age 16 to 74 with level 4 or 5 qualifications*
Wales	33%	17%
Neath Port Talbot	39%	13%
Swansea	31%	19%
Coedffranc West	32%	13%
St Thomas	46%	7%
Castle	35%	18%

Use of Welsh Language

It is useful to identify the number of residents with Welsh language skills to assess bi-lingual practices within the Study area. 2001 Census Data (data set UV84) shows the percentage of people aged 3 years and over who understand spoken Welsh and can either speak, read or write Welsh. The data shows that 24% of the population of Wales have Welsh language skills. The proportion of people who can understand, speak, read or write Welsh is lower than the national average in both Swansea and Neath Port Talbot.

The percentage of people with Welsh language skills in the three wards of the Study area is shown in the graph in Figure 4.4 below.

Figure 4.4: Graph of Welsh Language Understanding within the Study Area



4.3.3 Travel Patterns

Method of Travel

Information regarding method of travel has been obtained from 2001 Census Data (data set UV39). The mode of travel used by employees to access their place of work may be influenced by the availability of public transport, financial viability of owning a car, and the location of jobs in relation to housing.

A lower proportion of people work at home in the three wards within the Study area compared to Wales as a whole. Coedffranc West has a higher rate of car users and a lower rate of pedestrians and cyclists than the national average. Castle and St Thomas have a lower percentage of inhabitants who walk or cycle to work in comparison to the national average, and a corresponding higher rate of car or van use.

Travel to Work

Origin-Destination statistics from 2001 Census Data show that 31% of the population of St Thomas and 48% of residents of Castle work in central Swansea, the main work destination. A fifth of the population of Coedffranc West travel to Birchgrove / Llansamlet for work purposes.

Car Availability

Car availability data obtained from 2001 Census Data shows that over half of households in Castle have no access to a car or van. Coedffranc West has the highest rate of car availability of the three wards within the Study area, with only one fifth of households having no access to a car or van. One third of households in Coedffranc West have access to two or more cars or vans, compared to just 9% in Castle. The community of St Thomas falls between the other two wards in terms of car availability, with 41% of households having no access to a car or van and 46% of households with one car or van available. The pie charts in Figures 4.5, 4.6 and 4.7 below show levels of car ownership for all three wards.

Figure 4.5: Graph to show Car Ownership in Castle

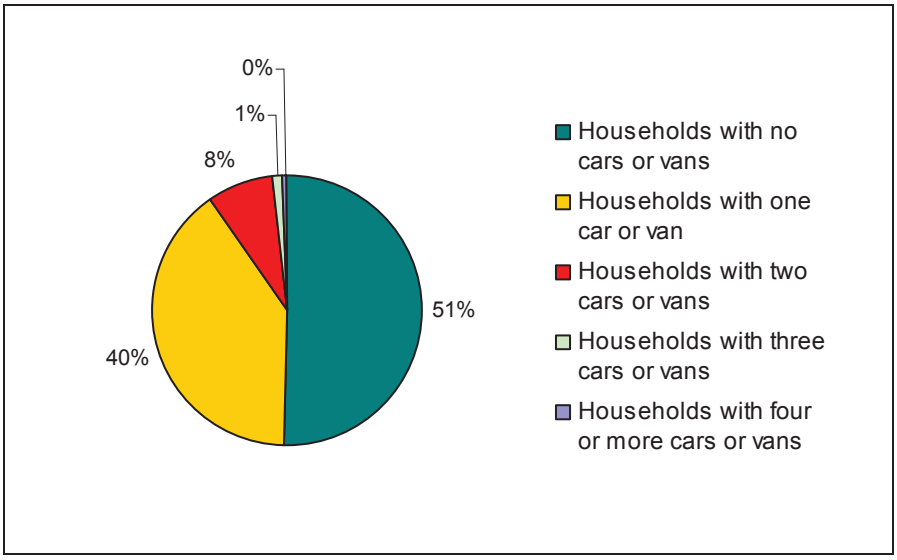


Figure 4.6: Graph to show Car Ownership in Coedffranc West

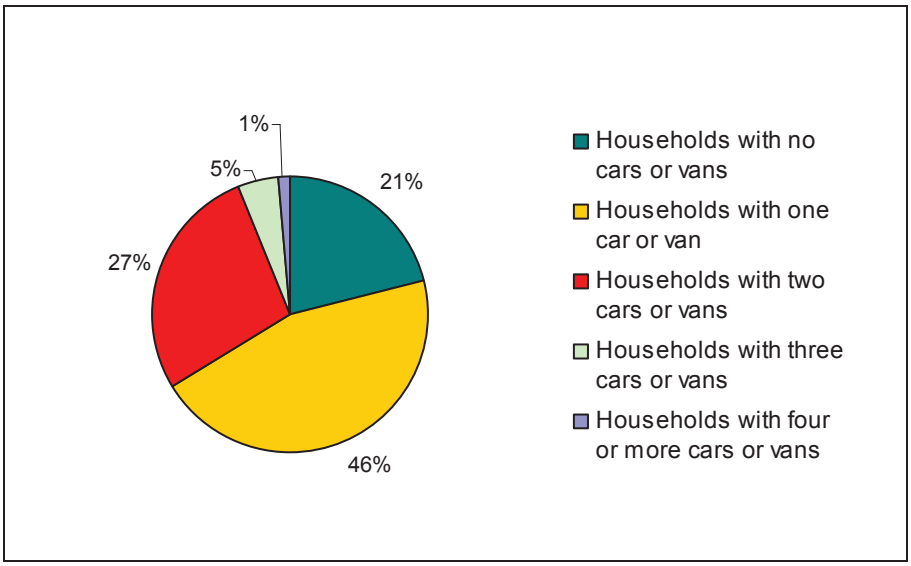
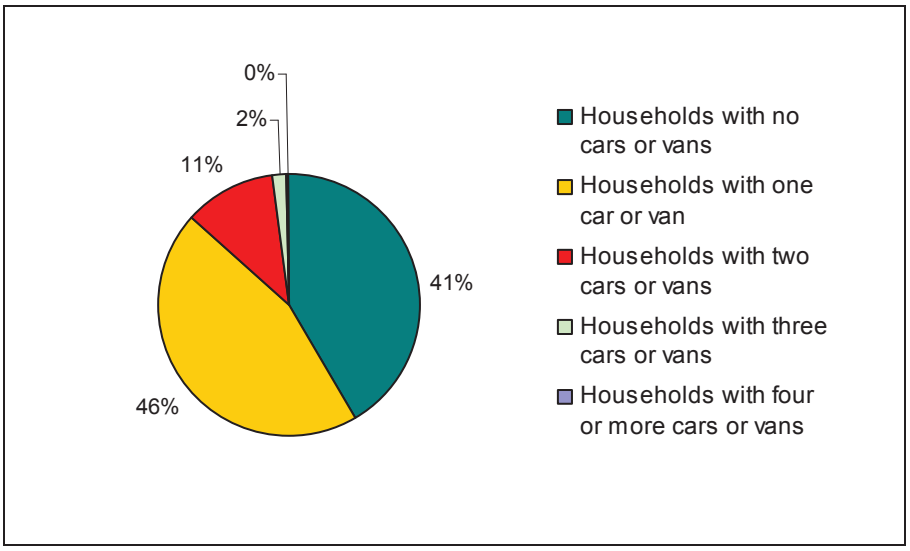


Figure 4.7: Graph to show Car Ownership in St. Thomas



4.3.4 Summary

The table below summarises the social data obtained for the Study area.

Table 4.7: Summary of Social Data

Topic	*Summary*
Total Population	The total population of the Study area was 20,372 at the time of the 2001 Census. Over half live in the ward of Castle, while just 10% live in Coedffranc West.
Population Density	St Thomas has the highest population density within the Study area and Coedffranc West the lowest.
Age Structure	The average age of people living in Castle and Coedffranc West is slightly higher than the national average. The mean age of people living in St Thomas is slightly lower than the national average.
Gender	The population of the Study area is approximately half male and half female.
Economic Activity and Social Grading	Coedffranc West has the most economic activity and the highest percentage of residents with higher and intermediate managerial / administrative / professional work compared to the other wards in the Study area.
WIMD	The Swansea and Neath Port Talbot areas are both above average in terms of levels of deprivation.
Ethnicity and Religion	The Study area has a vast majority white ethnic population who mainly describe themselves as Christians.
Healthcare	General health within the Study area and Swansea and Neath Port Talbot is slightly poorer than the Welsh national average.
Education and Qualifications	The level of education and qualifications of Swansea residents is generally higher than the national average, but lower in Neath Port Talbot. St Thomas has the lowest education and qualification statistics within the Study area.
Welsh Language	The proportion of people who can understand, speak, read or write Welsh is lower than the national average within the Study area.
Method of Travel	Coedffranc West has a higher rate of car users and a lower rate of pedestrians and cyclists than the national average. Castle and St Thomas have higher rate of car or van use.
Car Availability	Over half of households in Castle have no access to a car or van. Coedffranc West has the highest rate of car availability of the three wards within the Study area.

4.4 Networks

4.4.1 Highway

The A483 Fabian Way runs on an east-west alignment across the Study area. It is dual carriageway with two lanes in each direction along its length. Fabian Way provides an eastern access to Swansea City Centre, linking the M4 motorway at junction 42 with the Tawe Bridges. The Study area includes the B4290 New Road that links Fabian Way with junction 43 of the M4, and the M4 itself between junctions 42 and 43. There are also various minor roads associated with the existing commercial, industrial and residential areas within the site area.

The existing highway facilities and accident data within the site area are shown graphically on Figure 4.8.

Junctions

There are five major junctions and several entrances to individual commercial or industrial plots accessed directly off Fabian Way.

The recently opened Jersey Marine roundabout links Fabian Way with the B4290 New Road. It has been expanded to include a lane for drivers entering the Amazon development to the north. The circulatory is segregated from the east to west straight ahead movement enabling vehicles travelling from the M4 towards Swansea to avoid entering the junction.

The Elba Crescent signalised priority junction allows vehicles to turn into and out of Elba Crescent and the former British Petroleum (BP) site from either direction on Fabian Way.

The Baldwins Bridge junction gives access to the former BP site and the community of Elba Crescent via slip roads. Vehicles can pull off and pass beneath Fabian Way along a series of local roads in either direction.

The Fabian Way Park and Ride signalised crossroads at Port Tennant has dedicated right turn lanes for traffic entering the Park and Ride site and Swansea Docks. Similarly, the SA1 gateway junction is a signalised crossroads with dedicated right turn lanes for vehicles entering the SA1 development or the Port Tennant residential area.

The two Tawe Bridges have signalised junctions at each bank. The bridges form a two-way gyratory system over the river with at least two lanes in each direction.

Trunking

Fabian Way is currently managed and maintained by the two local authorities, CCS and NPT. Proposals to trunk Fabian Way as far as the Swansea Docks access have been suggested but not agreed to date.

The RTP[11] includes an aspiration for the A483 Fabian Way to be trunked, although this is not specified as part of the 2002 Trunk Road Forward Programme[10].

Traffic Flows

All available traffic data has been obtained from NPT and CCS. This includes:

- Two weeks of unclassified count data by hour and direction from October 2008 from automatic traffic count (ATC) sites between the Port Tennant and SA1 junctions and at Burrows Road;
- 10-hour classified count by direction from July 2008 by number 24 Elba Crescent;
- 10-hour classified counts by direction from June 2007 along Fabian Way and on the M4 between junctions 42 and 43;

- 10-hour classified count by direction from April 2007 on the M4 between junctions 43 and 44;
- 10-hour classified count by hour and direction from August 2006 on the B4290 Llandarcy Village Road;
- 10-hour classified turning count from March 2008 at the Fabian Way Park and Ride junction at Port Tennant;
- 10-hour classified turning count from November 2006 at the Fabian Way Park and Ride junction at Port Tennant; and
- 10-hour turning count classifying vehicles as heavy goods vehicles (HGVs) or other traffic from May 2004 for the New Cut Road junction on the western bank of the Tawe beyond the Study area.

In addition a manual count of vehicles entering and exiting the Amazon development was undertaken on Thursday 20 November between 13.30 and 14.30 to cover the afternoon shift change. A high proportion of car sharing was observed, with few single occupancy vehicles.

All traffic count data is included in Appendix D of the Technical Appendices Report.

Traffic Composition

The proportion of HGVs varies throughout the Study area and according to the time of day. The 2007 classified count data along Fabian Way shows that HGVs account for 2.5% of total traffic during the evening peak hours and up to 16.5% of total traffic during daytime off-peak periods. The average proportion of HGVs recorded along Fabian Way by the 2008 counts is 8.9%.

Traffic Speeds

Fabian Way is subject to national speed limit from the M4 to the eastern approach to the Jersey Marine roundabout. The speed limit is 50mph from east of Jersey Marine to west of the Park and Ride junction, where it drops to 30mph on the approach to Swansea city centre.

Road Safety

Accident data for the Study area was obtained from CCS and NPT for the past 5 years. Records are contained in Appendix E of the Technical Appendices Report. Each accident is plotted graphically on Figure 4.8.

There are accident clusters centered on the key junctions. Qualitative analysis of accident types occurring in each cluster is given in Table 4.8 below. It should be noted that the fatal and serious accidents on the westbound approach to the Baldwins Bridge junction do not appear to be related to the standard of the road.

Table 4.8: Analysis of Accident Clusters from 2003 to 2008 Data

Cluster Number (ref Figure 4.8)	*Location*	*Number of Accidents and Severity*	*Causes taken from Records*
1	Junction east of Tawe Bridges	16 slight	Minor shunts in queuing traffic
2	SA1 junction	1 fatal 1 serious 12 slight	Turning collisions related to the traffic lights
3	Park and Ride junction	7 slight	Lane changes and turning collisions related to the traffic lights
4a	Jersey Marine roundabout	3 serious 22 slight	Collisions related to the slowing traffic at the roundabout, some speed related
5	M4 junction 42	2 serious 6 slight	Collisions related to lane changes
6	M4 / A483 Earlswood junction	1 serious 9 slight	Collisions related to slowing traffic at the junction
7	M4 junction 43	54 slight	Minor shunts in queuing traffic

It is worth noting that improvements to the Jersey Marine junction were completed in spring 2008. The majority of the accidents recorded in Table 4.8 occurred before the improvement works.

The highway alterations to Fabian Way as part of the SA1 development were constructed between October 2004 and December 2005. The SA1 junction opened in early 2007. Accident cluster 2 can therefore be split into three phases: accidents that occurred before, during and after the junction construction. These are shown in Table 4.9 below. It can be seen that the highway alterations constructed to facilitate access to the SA1 development had minimal impact on the accident record.

Table 4.9: Analysis of SA1 Accident Cluster from 2003 to 2008

Cluster Number (ref Figure 4.8)	*Location*	*No. Accidents and Severity*	*Causes taken from Records*
2a before construction	SA1 junction prior to start of construction	1 fatal 4 slight	Turning collisions related to the traffic lights
2b during construction	SA1 junction during construction	4 slight	Turning collisions related to the traffic lights
2c after completion	SA1 junction after completion	1 serious 4 slight	Turning collisions related to the traffic lights

Intelligent Transport Systems

Intelligent Transport Systems (ITS) assist operators in providing an efficient, reliable and safe transport network. They complement fixed route signing and allow deployment of temporary measures at a strategic or local level. These measures can influence traveller's behaviour, deliver policy objectives or to manage planned or unplanned incidents on the network.

There are Variable Message Signs (VMS) on Fabian Way for vehicles travelling eastbound towards junction 42 of the M4. VMS are also present on the B4290 approach to junction 43 of the M4. Both sets of VMS form part of the Motorway Communication System (Traffic Wales). They were installed in the mid 1990s primarily to warn of closures and restrictions on the M4 and A48 Briton Ferry Bridges.

The three signalised junctions on Fabian Way are connected via a Split Cycle Offset Optimisation Technique (SCOOT). SCOOT is a tool designed specifically for urban areas to manage the flows on a particular section of network. All signals in an area are linked to provide optimum flows.

The signals at junction 43 of the M4 are controlled via a Microprocessor Optimised Vehicle Actuation (MOVA) system. MOVA is an optimization system similar to SCOOT but is designed to work on isolated junctions.

Parking

There are various existing car parks within the Study area for use by patrons and employees only. These include the Tower Hotel and Swansea Bay Golf Club on the B4290 north of the Jersey Marine roundabout, the Amazon development; and the Village and Ibis Hotels near the docks.

Parking in the SA1 development is controlled by one private company. There are two permit holder car parks and two pay and display car parks within the development. Permit holder parking is generally occupied by employees working at SA1 during the week, but is quieter at weekends. All parking areas are staffed and secure with wardens, wheel clamping control, lighting and CCTV monitoring. The cost of parking in SA1 all day is currently £4. At present around 15% of the planned parking spaces are unavailable as they are being used by construction vehicles. Further parking will be created as the development progresses.

There is on-street parking within the communities of Port Tennant, St Thomas and Elba Crescent that has traditionally been used as residential parking. Drivers were observed using the on-street parking in these communities to access the SA1 development without incurring parking charges. This is likely to cause friction with local residents.

4.4.2 Rail

The existing rail facilities within the Study area are shown graphically on Figure 4.9.

Passenger Rail

There are no passenger rail interchanges within the Study area. Swansea High Street is the nearest major station, less than 1km northwest of the Tawe Bridges. It has a taxi rank, a 41-space National Car Parks (NCP) controlled car park, cycle storage and bus links. It is staffed on a full time basis and has seating, toilets, a payphone and CCTV but no refreshment facilities. Swansea station is served by both Arriva Trains Wales and First Great Western.

Arriva Trains Wales operate an hourly service from Milford Haven to Manchester Piccadilly via Swansea, Cardiff, Shrewsbury and Crewe. There are four trains a day on the Heart of Wales line that links Swansea and Llanelli to the intermediate stations across mid Wales to Shrewsbury. First Great Western also operates an hourly service to London Paddington via Cardiff.

Briton Ferry station lies approximately 2.5km to the east of the M4 junction 42. It is served by the two-hourly West Wales to Cardiff service operated by Arriva Trains Wales. It is a small station with few facilities and little or no transport links.

Rail Freight

There is an existing freight line to the north of Fabian Way that runs east-west along the corridor. It is a 4 mile long single track line from Jersey Marine Junction South to Swansea Docks.

The Swansea Burrows sidings lie between the freight line and Fabian Way to the north of Baldwins Bridge. There is an array of 10 sidings plus reception lines. All trains to and from Swansea Docks have a reliance on the Swansea Burrows sidings for loco-release (enabling wagons to be left in the sidings for a period of time) and as a run-round function (to enable a locomotive to change which end of the train it is attached to).

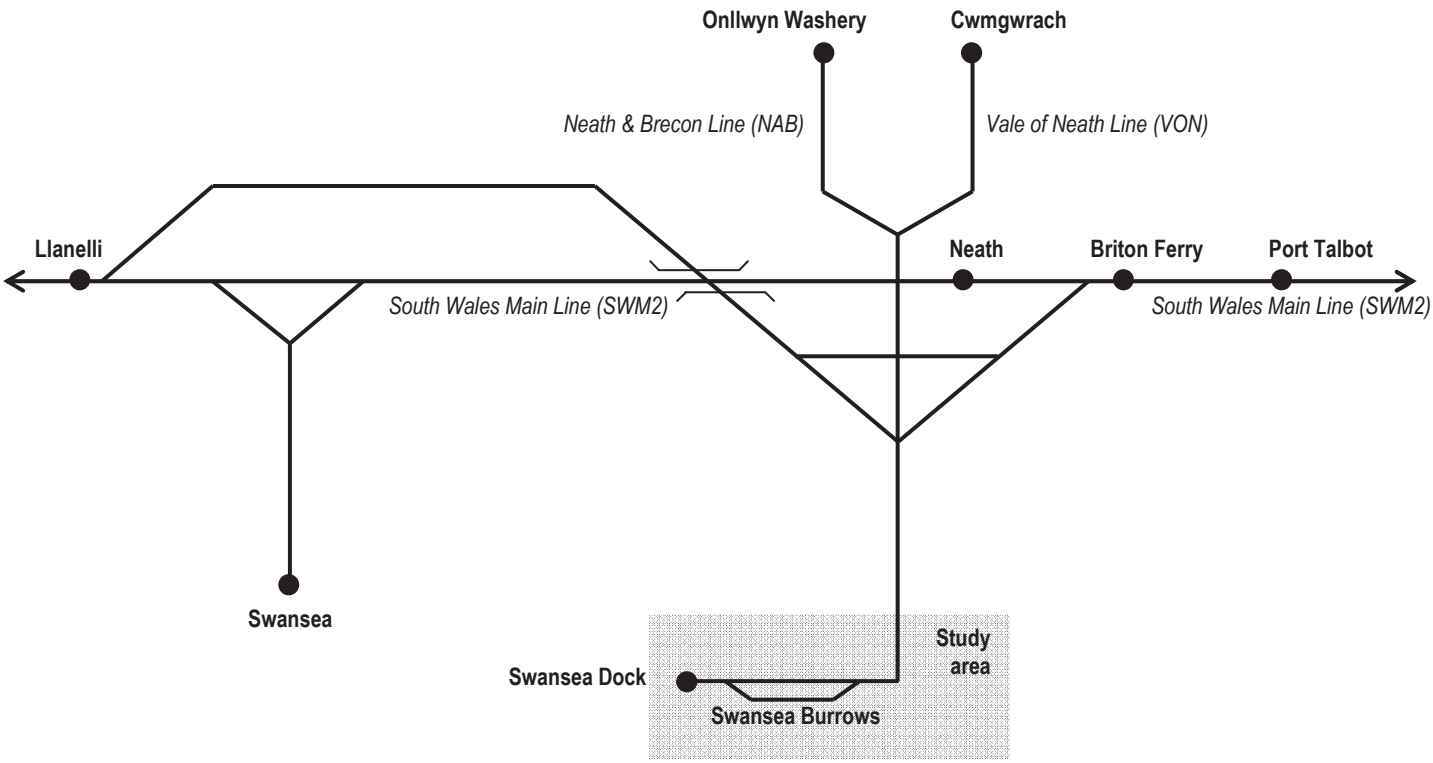
Historically, the rail layouts in this area were more extensive, with several routes in and around the docks. Trains can currently travel to Swansea Docks from either:

- the Onllwyn Washery and Distribution Centre, 18 miles north along the Neath and Brecon Branch Line (NAB);
- the Cwmgwrach coal mine workings, 15 miles north along the Vale of Neath Branch Line (VON); or
- the South Wales Main Line (SWM2) linking Briton Ferry, Port Talbot and stations to the east with Llanelli, Pembroke, Milford Haven, Fishguard and stations to the west.

There are four train paths per day each way on the Neath and Brecon Branch Line and two train paths per day in each direction on the Vale of Neath Branch Line in the current timetable. At present these paths are not being fully utilised. The number of train paths per day on the South Wales Main Line is uncertain.

Figure 4.10 below shows the existing railway lines in the area schematically.

Figure 4.10: Schematic Plan of Railway Lines



4.4.3 Bus

The existing bus facilities within the site area are shown graphically on Figure 4.9.

Routes and Headways

Several bus services run in both directions along the A483 Fabian Way and through the SA1 development. The network coverage of these services is quite wide, with many of the nearby urban conurbations easily accessible. Most of the services are hourly and are operated by First Cymru. Table 4.10 below gives a summary of key destinations, frequencies and average journey times.

Table 4.10: Buses serving the Study Area

Service	*Key Destination*	*Frequency*	*Average journey time to key destination (mins)*	*First and Last Bus Monday to Friday*	*Weekend Services*	*Operator*
156	D' Arcy Business Centre / Neath bus station	Hourly	17 / 37	0810 / 1659	Hourly	First Cymru
155	D' Arcy Business Centre / Neath bus station	7 services daily	15 / 35	1015 / 1805	Two hourly	First Cymru
157	Neath bus station	Hourly	36	0830 / 1825	Hourly	First Cymru
X5, X75	Neath bus station	Hourly	22	0800 / 1755	Hourly	First Cymru
224	Porthcawl	Hourly	85	0815/ 1735	Hourly	First Cymru
X1	Port Talbot / Bridgend	Hourly	32 / 72	0720 / 1830	Hourly	First Cymru
X3	Port Talbot / Maesteg	Hourly	25 / 55	0740 / 2350	Hourly	First Cymru
44	Grenfell Park	Hourly	22	0750 / 1810	Hourly	First Cymru
66	Port Talbot	Hourly	43	0900 / 1600	Hourly	Hoggans

Note: Journey times are from Swansea City Centre to key destination.

Bus Stops and Infrastructure

There are 27 operational bus stops within the Study area, as shown on Figure 4.9. These have been classified according to facilities available into the following categories:

1) Good quality – shelter, timetable and lighting (9 stops)
2) Standard – shelter, timetable or lighting (9 stops)
3) Poled stops – no shelter (9 stops)

Most bus stops have raised kerbs, although none have real time information. An example of each type of bus stop is shown on Photographs 4.2 to 4.4 in the Photographs section of this Report.

There is a dedicated westbound bus lane linking the existing Park and Ride site to the Tawe Bridges. It incorporates a car-free bridge across Fabian Way with short sections of segregated busway at either side before running alongside the Fabian Way main line. Photographs 4.5 and 4.6 in the Photographs section of this Report show the bus lane and the bridge.

There is an existing bus gate giving one way access to buses only to the east of Baldwins Bridge. Photograph 4.7 in the Photographs section of this Report shows the bus gate.

Patronage

Patronage data for all services operated by First Group along Fabian Way over a typical four week period is summarised in Table 4.11. Over half of bus journeys along Fabian Way are made in westbound direction towards Swansea. 13% of bus passengers travelling along the Fabian Way corridor start their journey within the Study area.

Table 4.11: Bus Patronage Data for Fabian Way Services from First Group

Action	*Eastbound from Swansea*	*Westbound to Swansea*	*Total*
Passengers travelling along Fabian Way	17,632 (47%)	19,669 (53%)	37,301 (100%)
Passengers boarding on Fabian Way			4,800 (13%)
Passengers alighting along Fabian Way*			1,071* (3%)*

*The alighting figure is likely to be higher than shown as First do not record alighting of concessionary pass holders. First Group estimates that concessionary pass holders comprise approximately 45% of the total number of passengers.

PlusBus is a through-ticketing system that allows train passengers to travel by bus at the beginning or end of their journey using the same ticket. The aim of this scheme is to encourage use of public transport. The level of usage is unknown in the Swansea or Neath Port Talbot area.

Park and Ride

The Fabian Way Park and Ride site lies to the north of the A483 opposite the access to Swansea Docks. The 550-space car park opens between 06.45 and 19.30 Monday to Saturday, as well as Sundays in the five weeks prior to Christmas. Low floor buses operated by First Group every 12 to 15 minutes provide a link to the City Centre with an average journey time of 10 minutes. Westbound buses use the recently opened car-free bridge and a dedicated bus lane adjacent to the SA1 development as far as the Tawe Bridges.

The parking area has an enclosed waiting area with seating, toilets, information point and vending machines, and has received the Secured Car Park Award. There is a £2 charge per car which includes all day parking and return bus travel for up to four people. Alternatively, users can purchase a book of Park and Ride vouchers which entitles them to 12 days parking and bus travel for £20. Patronage of the Fabian Way Park and Ride increased from 86,407 passengers in 2005 to 111,878 passengers in 2006[21]. Photograph 4.8 in the Photographs section of this Report shows the main terminal building at the Park and Ride site.

CCS currently operates two further Park and Ride sites on other key corridors into the city, and is seeking funding from WAG for a fourth.

Swansea Metro

Swansea Metro is a £14m Bus Rapid Transit (BRT) system being developed by CCS in partnership with First Group. Its aim is to improve the public transport network in Swansea and become the travel mode of choice for local journeys. The first route runs from Morriston through the City Centre to Singleton in the east. It does not pass through the Fabian Way corridor, but stops at the central bus and rail stations in Swansea allowing links to services along Fabian Way.

The Swansea Metro consists of bespoke Streetcar vehicles with priority over other traffic, including sections of dedicated busway to avoid congestion hotspots to ensure journey time reliability. The vehicles are rubber tyred and run on a normal road surface. Improved waiting facilities with real-time information have been provided at stops.

The infrastructure works have been funded through WAG's Transport Grant. The purchase and maintenance of the vehicles have been funded by First Cymru who will operate Swansea Metro as a commercial service without subsidy.

Coach

The nearest National Express coach stop is at Swansea bus station. Services between Swansea and Cardiff travel along Fabian Way.

Arriva Cymru operates the X40 Trawscambria service between Cardiff and Aberystwyth. There are two services a day from Swansea bus station in each direction. This is also likely to use Fabian Way as a route choice, although there are no stops within the Study area.

Taxi

Hackney-carriage type taxis are available from taxi ranks outside Swansea rail and bus stations. There are four private hire taxi operators within 5 minutes drive but none within the Study area itself.

4.4.4 Cycling and Walking

The existing network of cycleways, footpaths and facilities for pedestrians and cyclists within the Study area is shown graphically on Figure 4.11.

Cycling

The Celtic Trail, part of National Cycle Network (NCN) Route 4, runs 84 miles from the Severn Bridge to Swansea via Chepstow, Newport, Pontypridd and Port Talbot. There are two branches within the Study area. The main route runs generally to the south of Fabian Way along an off-road combined footpath / cycleway. There is an on-road section between the Elba Crescent junction and the western side of Baldwins Bridge. The recently modified Jersey Marine roundabout is well-signed but cyclists have to dismount to cross the junction. There is an underpass near the motorway slips.

There is a secondary, incomplete branch of the Celtic Trail that follows the Tennant Canal to the north of Fabian Way. This off-road route is missing a section on the western approach to the Jersey Marine roundabout. Sustrans has an aspiration to complete this additional section to link the branch route along the canal to the main NCN 4 route along Fabian Way at the Jersey Marine roundabout.

Route signing of the Celtic Trail along Fabian Way is generally clear, although there is no information regarding distance to key destinations. The route varies between combined use for pedestrians and cyclists and segregated for cycling only.

Cyclists can use the recently opened car-free bridge over Fabian Way near to the Park and Ride site. This bridge is for use by westbound Park and Ride buses, pedestrians and cyclists only.

The Sail Bridge is a pedestrian and cycle bridge that links the SA1 development with the City Centre. The Celtic Trail does not cross the Afon Tawe using the Sail Bridge as it follows the Fabian Way main line. However, there is an additional cycle route linking the Sail Bridge with the vehicular crossings to the north on both sides of the river, extending further north to Hafod.

Walking

There are footways along both sides of Fabian Way for much of its length. The recently modified Jersey Marine roundabout incorporates a shared cycleway / footpath with signalised crossings to the north.

There are signalised at-grade pedestrian crossings of Fabian Way at the Park and Ride junction, the SA1 junction and immediately east of the Tawe Bridges. There are also three bridge crossing points over Fabian Way. Two bridge crossings are dedicated pedestrian footbridges linking the community of Port Tennant north of Fabian Way to the settlements on the south side. Neither footbridge incorporates ramped access.

The newly completed car-free bridge used by westbound Park and Ride buses provides a smooth gradient shared path link between the SA1 development and the residential community of Port Tennant. The SA1 development has been designed to facilitate movement by non-car users. It includes raised highway crossings and footpaths.

There is an existing footpath along the Tennant Canal, but sections of the route are narrow and overgrown. Sustrans is keen for this route to be improved to provide a shared path link between SA1 and Jersey Marine without accessing Fabian Way itself.

4.4.5 Water-based Links

There are two canals and the Swansea docks within the Study area. The extent and condition of these water-based features can be seen Figure 4.12.

Canals

The canals in this area were built between 1818 and 1928 as a system for transporting coal from the Swansea and Neath valleys to the coast, until the railways took over in the early twentieth century. The Glan-y-Wern Canal was one of the earliest sections of canal to be built. It serviced the small mines on the ridges surrounding Crymlyn Bog.

The Tennant Canal is 12 km long and runs from its junction with the Neath Canal at Aberdulais, through Neath town to Crymlyn Bog. It currently terminates at the western end of the bog near Swansea Docks, on the north side of Fabian Way. Much of the Tennant Canal is managed by a private company as an industrial water supply. The managed length includes the section running below the M4 viaduct westwards through Jersey Marine village as far as its junction with the Glan-y-Wern canal.

The following canal sections are extant but in an abandoned condition:

- the full extent of the Glan-y-Wern Canal from its junction with the Tennant Canal northwards into Crymlyn Bog;
- the Tennant Canal west of the Glan-y-Wern Canal; and
- the short spur of the Tennant Canal at Jersey Marine that provides access to the tidal reaches of the River Neath.

There have been proposals for the integrated restoration of the waterway network in the Swansea and Neath valleys since at least the 1980s. A network of the Swansea, Neath and Tennant Canals, linked by a navigable section of the Afon Tawe, could provide more than 30 miles of cruising inland waterway that would be attractive to the national tourism market. This network is of a scale equivalent to the successfully restored Brecon and Abergavenny Canal. The area also has a range of buildings and other features of interest in close proximity to canal network, including the Aberdulais Falls, Neath Abbey and the National Maritime Museum.

The Vale of Neath and Swansea Valley Integrated Waterway Partnership (IWP) commissioned consultant Atkins to examine the practicality and viability of restoring the Swansea, Neath and Tennant Canals to navigation. Atkins' 2002 report[22] recommended the IWP pursue a full scheme of restoration for all three canals. The main conclusions can be summarised as follows:

- The canal network is largely extant and the Afon Tawe already navigable upstream of Swansea Barrage and Marina. Restoration of the network would require the removal of obstacles from the surviving canal lengths and the creation of new links where the

original canal has been lost. This includes a link under Fabian Way at Port Tennant into the east end of the Prince of Wales dock, and a western access to the Afon Tawe;

- The estimated capital cost of the scheme would be almost £55m at 2002 prices;
- Planning and traffic impacts of the scheme were not assessed;
- Ecological impacts and constraints, particularly in relation to Crymlyn Bog, would need to be carefully considered and addressed, but need not be insurmountable obstacles to the scheme;
- The economic benefits of the scheme were calculated at £4.2m per annum to the local economy;
- The potential benefits related to water-based recreation (canal hire, private boats, trip and restaurant boats, canoeing and angling); land based recreation activities (walking, cycling, sightseeing etc); development opportunities associated with the restoration; and expenditure on construction and maintenance of the canal, boats and other facilities associated with the use of the canal; and
- Both the full scheme and a partial restoration (involving only the Neath and Tennant Canals) would give positive cost benefits.

The integrated restoration of this network remains a long-term aspiration for the IWP. This is reflected in development plan policies safeguarding the waterway routes from proposed developments. Swansea's SA1 development retains land reserved for access into the Prince of Wales Dock, both from the east and into the Afon Tawe to the west.

A recently published report by Hyder Consulting and Bridge Economics[23] on behalf of NPT, CCS and WAG assesses the economic return that might be achieved through the restoration of the Neath and Tennant Canals.

The full scheme considered would provide a fully navigable route from Glynneath in the Neath Valley, down to the Prince of Wales Dock, Swansea (on the Tennant Canal) and to Briton Ferry (on the Neath Canal). The appraisal considered the impact of restoring individual sections of each canal, through examining the full scheme restoration option and several 'partial scheme' options.

Although the report concluded that the economic benefits of a full restoration of the Neath and Tennant Canals is not proven, several partial restoration schemes appear favourable. Hyder is continuing with Stage 2 of their commission to develop a costed proposal for further stages of work. This will culminate in a phased programme of works, including the environmental, engineering and ecological works required to progress the project towards implementation.

Stage 2 of Hyder's commission will be based on a partial restoration option that includes the Neath Canal from Abergarwed south to the Giant's Grave at Briton Ferry and the restoration of the Tennant Canal from its junction with the Neath Canal at Aberdulais westward to Port Tennant north of Fabian Way.

To the west, the current economic benefits of developing the Swansea Canal and Afon Tawe links (within the SA1 development) are uncertain. Any benefits are likely to be depressed by the already extensive availability of waterfront development area within Swansea, together with the high capital costs and potentially complex engineering solutions required to create some of the links. These factors have influenced the current situation such that there are no active proposals for the restoration of the waterway network within the Swansea part of the Study area.

Port

Swansea Docks is an active port operated by Associated British Ports (ABP). It handles freight cargo including containers, dry bulks, minerals and ores, forest products, steel and other metals and other general cargo. It is also equipped to accept passenger cruises visiting the Bay and Gower areas. A passenger ferry to Cork operated until 2006.

The main vehicular entrance on Langdon Road has a 24-hour security gate. Access to this entry is via the Park and Ride junction at Port Tennant on Fabian Way. A second access to the east provides a link via Baldwins Bridge, but the security gate is only manned from 6am to 6pm. Swansea Docks also utilises the existing railway line for movement of freight.

4.4.6 Utilities

All major services are present within the Fabian Way corridor. Information regarding utility locations has been taken from plans provided by the utility companies and from Hyder Consulting Ltd, who are currently undertaking a strategic assessment of existing services along Fabian Way.

Existing infrastructure within the site area is shown graphically on Figure 4.13.

Water

Water pipes are present along the majority of Fabian Way in both the northern and southern verges, footways and central reservation. Water mains cross the carriageway in eight locations. Some of the infrastructure is old, dating back to circa 1860. There are also several high pressure water mains.

Sewerage

Combined sewers run along much of Fabian Way. The construction varies from old brick sewers measuring 686mm by 457mm in cross section to more modern 450mm diameter vitrified clay pipes. There are many connecting branches from both private and public drains which are carrying foul, surface water and combined flows.

The Swansea Waste Water Treatment Works is located mid way along Fabian Way to the south of the carriageway. It is served by rising mains from the two local pumping stations at Langdon Road and Fabian Way. Sewers from the residential areas of St Thomas and Port Tennant drain to Langdon Road Pumping Station, while sewers from the western end of Fabian Way drain to the Fabian Way Pumping Station.

A section of private culverted watercourse has been identified along the southern verge of Fabian Way in the St Thomas area. The local authorities do not hold any records of its ownership or purpose.

Gas

The Llandarcy to Aberavon high pressure gas main crosses Fabian Way to the west of the Jersey Marine roundabout. There are also medium and low pressure gas mains along the verges of Fabian Way, with approximately six carriageway crossings

Electricity

There are high voltage overhead cables running in an east-west direction near the northern boundary of the Study area.

Fabian Way also has an extensive network of high and low voltage electricity underground cables running along and across the highway. There are two 33kV / 11kV sub stations within the site area. The Swansea Waterfront sub station is located to the south of Fabian Way towards Langdon Road and the Jersey Marine sub station is located to the north of the former Visteon site.

There are also four smaller sub stations: Bevans Row and Ashlands Changing Room are located in the Port Tennant / Docks area, while Elba Crescent and Crymlyn Burrows are west of the Amazon site.

Telecommunications

There is an underground British Telecoms (BT) fibre optic cable that runs along the southern side of Fabian Way from Jersey Marine roundabout into Swansea City Centre.

4.5 Environment

4.5.1 Natural

Biodiversity designations and features are shown graphically on Figure 4.14.

Crymlyn Bog/Cors Crymlyn and Pant-Y-Sais Fen[24]

Crymlyn Bog and Pant-y-Sais Fen occupy most of the northern fringe of the Study area between Port Tennant and Llandarcy. The site is almost 300 hectares in area and is covered by the following designations:

- Crymlyn Bog/Cors Crymlyn Special Area of Conservation (SAC)
- Crymlyn Bog National Nature Reserve (NNR)
- Crymlyn Bog Wetland of International Importance (Ramsar site)
- Cors Crymlyn/Crymlyn Bog Site of Special Scientific Interest (SSSI)
- Pant-y-Sais SSSI
- Pant-y-Sais Local Nature Reserve

Each designation boundary reflects the same core area, but they differ due to designation history, location of interest features and/or land ownership. To a large degree, the two SSSIs underlay all the other designations, i.e. the whole site is notified as SSSI.

Adverse effects from development on SSSIs and international designations are strongly deterred by both national and local planning policies. Public bodies have a duty under the Countryside and Rights of Way Act 2000 to “conserve and enhance” SSSIs.

Almost all of the special features of Crymlyn Bog are dependent on water supply quality and quantity in maintaining their condition. Habitat management, including grazing and cutting of emergent grassland/scrub is also important. Public access is limited, occurring mostly at Pant-y-Sais. The proposed Southern Access Road to the Coed Darcy development will cross the SAC along the line of an existing pipeline bridge.

Crymlyn Burrows[25]

This 243.5 hectare SSSI lies between the southern edge of Fabian Way and the mouth of the River Neath. It comprises salt marsh and sand dune, interfacing with intertidal habitats. It is one of the last remaining sections of the Swansea Bay Coastline that has not been substantially modified by industrial development. A range of scarce plants and invertebrates are associated with the habitats present on site.

The special interest features are principally reliant on the natural coastal processes in Swansea Bay. Fabian Way itself and the development to north restrict these processes, and rising sea levels present a threat as habitats become increasingly squeezed between the hinterland and the sea.

Low-key, informal recreational use of the site appears to be compatible with maintaining the site features. Illegitimate vehicle access and off-road motorbiking have caused localised damage. Adverse effects from development on SSSIs are strongly deterred by both national and local planning policies. Public bodies have a duty under the Countryside and Rights of Way Act 2000 to “conserve and enhance” SSSIs.

Adverse effects on the SSSI include both direct encroachments and indirect effects such as increased recreational use. Flood defence and coastal protection measures would also

need to consider their interference with the natural coastal processes. A number of active and disused pipelines cross the site. Removal of disused pipelines may present opportunities for habitat enhancement or public access/walking/cycling route improvements if compatible with maintaining the site features.

Earlswood Road Cutting and Ferryboat Inn Quarries[26]

This SSSI is located on the eastern edge of the Study area and is intimately related to junction 43 of the M4 and the slip roads on and off the A483. It consists of two separate areas of geological interest, with two identified special features:

- Exceptional exposures of one of the most complete sections through the Carboniferous Rhondda Beds in South Wales, revealed by the creation of the M4 motorway and Earlswood Road Cutting; and
- Well-displayed river channel structures in the Ferryboat Inn Quarries.

The features on this site are only likely to be affected by the Strategy if it were to propose layout/design changes to the existing M4 carriageway and/or slip roads.

Red Jacket Fen Wildlife Trust Reserve

This is an area of open water, lowland fen and wet woodland purchased by the Wildlife Trust for South and West Wales in 2004. It is divided from Pant-y-Sais by the embankment of disused sidings and a mineral railway.

4.5.2 Built

Cultural heritage, archaeology and environmental quality features are shown graphically on Figure 4.15.

Land Use

Historically the Fabian Way corridor was heavily industrial in nature. To the south of the A483, land use includes the former British Petroleum (BP) tank farm, the Swansea Wastewater Treatment Works and the Swansea docks. The SA1 development has transformed much of the northern part of the docks into a mixed use area with office space, leisure and retail units. This development is ongoing at present. There is also an emerging residential community within SA1.

To the north of Fabian Way, there are the established residential communities of Port Tennant, St Thomas, Elba Crescent and Jersey Marine. There are also former and existing industrial uses around the former Visteon manufacturing site, including Linamar and the Neath Port Talbot (Recycling) Ltd Material Recovery and Energy Centre (MREC). Amazon has just opened a new distribution centre accessed from the Jersey Marine roundabout on Fabian Way.

The Study brief included details of some of the major land uses within the site area at present. These are shown in Table 4.12 below.

Table 4.12: Existing Land Use Areas taken from Study Brief

Site	Floorspace	Land Use
A. Amazon	80,000m²	B8
B. Visteon (RT Properties)	80.000m²	B1/B2/B8
C. Gracelands Investments	30,000m²	B1/B2/B8

Cultural Heritage and Archaeology

There are no Registered Landscapes, Parklands of Historic Interest or Scheduled Ancient Monuments (SAM) within the Study area. Two cairn features to the south of Gelli Bwch

Farm and St Margaret's Chapel near the Coed Darcy Southern Access Road have SAM status but are located just outside of the Study area.

There are no designated conservation areas within the Study area. The nearest and most relevant Conservation Area appears to be Llandarcy Worker's Village, a planned village built in the 1920s for the refinery workers.

Hafod Air Quality Management Area (AQMA)

This AQMA includes an extensive area of Swansea city in the lower Tawe valley, but only covers a small part of the west of the Study area. The AQMA was declared in 2001 under the Environment Act 1995 because of elevated levels of nitrogen dioxide. The Action Plan[27] includes a traffic management programme to improve traffic flows and reduce pollution. There is an extensive ongoing air quality monitoring programme. Although the AQMA is peripheral to the Study area, traffic entering from the east into Swansea is likely to contribute to the problems in the City Centre. The Fabian Way Park and Ride scheme is seen to be a key measure to reduce traffic congestion.

Historical/Existing Landfill

The Tir John waste disposal area was closed to new disposals in 2006. The adopted UDP for CCS[15] indicates that this area is to form part of the Swansea Urban Woodland. This planning policy (HC20) also includes extensive areas of Kilvey Hill between Port Tennant and Bon-y-Maen/Winsh Wen. It comprises forest, recreational areas, wetland and heath land. The policy describes the "restoration of the former Crymlyn Bog waste disposal area (Tir John) as a landscaped sports/recreation area" as part of the further development of this project. It is therefore assumed that there are no future plans for waste disposal at the Tir John site.

Contaminated land

Historically the Study area was extensively industrial, so there is clearly potential for contaminated land to be an issue for the design and implementation of any proposed measures. However, no data is available on any significant areas of contaminated land. It is considered unlikely that there is a strategic issue concerning land contamination to be assessed as part of this transport strategy.

Flooding

Flood risk maps published by the Environment Agency (EA) show the eastern part of Fabian Way on the flood boundary for a 1 in 200 year tidal event[28] (see Figure 4.13). The level of Fabian Way is built up, so the carriageway itself is not at risk of flooding. The areas to the north of Fabian Way around Crymlyn Bog and Jersey Marine are also indicated as being within the flood boundary.

The Development Advice Maps contained within Technical Advice Note 15 (TAN15)[29] generally agree with the EA maps, but also indicate the western end of Fabian Way as being an area known to have been flooded in the past.

Potential Hazards

The adopted UDP for CCS[15] indicates a hazardous installation consultation zone (EV41) which encompasses much of the western half of Fabian Way. Its source is the BP Chemicals plant on Queens Dock. The policy states that:

"Development of land in the vicinity of existing hazardous installations will not be permitted if there would be significant risk to life or health."

In addition, Swansea was heavily bombed during the Second World War and had its steel industry and docks targeted. Fabian Way lies within this area and further consideration of the presence of unexploded bombs should be undertaken prior to development.

4.6 Summary

The information gathered during the corridor review exercise has been assessed with a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. Tables 4.13 to 4.16 in the Tables section of this Report summarise the strengths and weaknesses of the existing corridor and any opportunities and threats to its future development for each key criteria under the headings of the Welsh Impact Areas of society, economy and environment.

5 Corridor Development Proposals

5.1 Introduction

WAG, NPT and CCS have aspirations to maximise the potential of the Fabian Way corridor from an economic, environmental and social perspective. The area has been identified as a sub-regional focus for economic growth and there are several major regeneration schemes ongoing at present and proposed for the future. The Client Steering Group identified a number of development proposals that should be considered as part of this Study, details of which are summarised below.

5.2 Land Use Proposals

5.2.1 Ongoing and Committed Developments

Details of committed developments with planning consent can be obtained from the relevant plans and specific Transport Assessments.

SA1 Swansea Waterfront Development

The SA1 development is a regeneration project currently being delivered by WAG. It covers an area of more than 40 hectares and surrounds the Prince of Wales dock, which will become a new marina. Nearly 350,000m² of development has been completed with a further 350,000m² under construction, contracts exchanged or under offer. As of September 2008, £150m of private sector funding has been committed to the scheme, with a further £400m to be achieved[30].

The development includes office space, residential apartments and hotel, restaurant and leisure uses. In addition there is a Dental Referral Centre from which Parkway Clinic and Neath Teeth Orthodontics are operating and the Swansea Apostolic Church. The development operates an initiative to source goods, services and employees locally.

The SA1 development has a Travel Plan[31] with objectives and targets aiming to reduce private car use and promote alternative modes. The 2007 annual monitoring report[32] showed that the proportion of single occupancy car trips to SA1 decreased by 19% between 2004 and 2007. The proportion of people walking, cycling, car sharing and using public transport to access the SA1 development has increased accordingly.

Coed Darcy

Coed Darcy Urban Village is a proposed development of 4,000 homes with employment areas and open space over 1,300 acres. The site is brownfield, being formerly occupied by a BP oil refinery. The masterplan for the site[33] identifies a dense urban pattern of integrated residential and employment uses supported by a full range of community facilities. The development aspires to be a live-work community, offering the opportunity for residents to work within the same development.

The Transport Assessment for Coed Darcy[34] proposes a number of measures to support the development. These include a new road linking Coed Darcy Urban Village with Fabian Way called the Southern Access Road. The primary aim of this route is to provide bus priority to support frequent and reliable bus services to Swansea and Neath. At the southern end of the Southern Access Road link a bus-only access will allow buses to bypass the Baldwins Bridge junction, providing a journey time advantage over private cars.

A public transport interchange is proposed for centre of the development and a network of pedestrian and cycle linkages will provide improved access to Llansamlet and Swansea as well as connecting the development to Llandarcy and Skewen. Relatively low parking standards and a Community Travel Plan aim to encourage residents to travel by alternative modes.

5.2.2 Potential Future Developments

Often few details are available for proposed developments that have not yet entered the planning system. An understanding of the aspirational development proposals along the corridor was obtained from the Study Brief and through a series of meetings with key developers and landowners.

The indicative floor space requirements for the Fabian Way corridor over next 10 years provided as Appendix 2 to the Study Brief are reproduced in Table 5.1 below. A Development Framework Plan was also provided as Appendix 1 to the Study Brief.

Table 5.1: Anticipated Land Use Areas over next 10 years taken from Study Brief

Site	Floorspace	Land Use
A. Amazon Gateway Sites	35,000m²	B1
C. Gracelands Investments	36 dwellings	C3
D. Swansea University second campus	2,500 student units / 50,000m² campus	C2
E. North of Southern Access bus link	20,000m²	B1/B2/B8

Swansea University

Swansea University is looking to expand both in terms of student numbers and space. It has identified the former BP tank farm site to the south of Fabian Way as suitable location for a second campus.

Arup met with representatives of the University and its consultants on three occasions to discuss the development proposals for the second campus. Both the University and its consultants also attended both Stakeholder Workshops. The following intentions were identified in relation to the proposed second campus:

- the existing Singleton Park campus would be retained, with the two campuses referred to as the Park and the Bay campuses;
- specific schools and/or departments will be relocated to the Bay campus, as well as the 1,700 students currently living at Hendrefoelan;
- decisions regarding whether facilities such as the Sports Hall and Students' Union would be split between the two campuses or kept on one campus have yet to be taken;
- the University is keen to involve private companies in the development to create a seamless working and learning environment. Residential, retail and leisure uses will be provided within the site to serve both students and workers;
- the Bay campus will be a continuous operation throughout the year, with conferencing facilities during University holidays;
- the phasing of the development has yet to be determined but dates being discussed by range from 2011 to 2015; and
- highway access from Fabian Way will initially be provided via the existing signalised Elba Crescent junction. A second access may be required as the development progresses. The University has expressed interest in provision of a second dedicated access directly onto Fabian Way between Elba Crescent and Baldwins Bridge. Once the site is fully occupied, it is anticipated that there may be an additional access from Baldwins Bridge, if the campus extends into adjacent land to the west in future.

However, the University's proposals have not yet reached the level of detail required to establish parameters for use in this Study. In the absence of more detailed information, the University's consultants agreed that the demand assumptions given in Table 5.2 below were reasonable.

Table 5.2: Demand Assumptions related to the Swansea University Bay Campus

Assumption	Source
4000 residential students	WAG
2000 non-residential students	WAG
1000 staff	Based on existing Swansea University staff-student ratio
50% students travel in peak hours	Estimate
75% staff travel in peak hours	Estimate
10% residential students transfer to/from main campus in peak hours	Estimate

Swansea Docks

ABP owns a significant amount of land around the docks area. Although much of the land bordering Fabian Way and the Prince of Wales dock is now part of the SA1 development, ABP has aspirations to further develop its site. ABP are currently considering a masterplan for the Port of Swansea to guide its development until 2030.

Arup met with representatives of ABP to discuss the future of the docks. ABP also attended both Stakeholder Workshops. The following developments within the docks area were identified as anticipated to occur within the next 25 years:

- manufacturing and logistical developments are planned for the eastern part of the docks, including a biomass fired combined heat and power plant and a brick manufacturing and distribution plant;
- the dry dock by Queens Dock is likely to remain active for recycling facilities;
- a development of 5-6 wind turbines is being considered for the breakwater by Queens Dock; and
- potential office development for ABP's use to the east of the site.

ABP operate a clear separation between dock traffic and public vehicles primarily due to a security issues. In addition the existing road access is poor and currently operates as a one-way system.

Material Recovery and Energy Centre (MREC)

Neath Port Talbot (Recycling) Ltd has operated the MREC a waste treatment plant since 2003. The plant processes and recycles municipal waste in a sustainable manner. It currently receives household waste from the Bridgend and Neath Port Talbot areas. One of the end-products is a refuse-derived fuel which could be used in cement kilns as an alternative to fossil fuels.

At present both the incoming waste and the end product are transported by road. There is scope to increase the scale of works at the Crymlyn Burrows site in the future, which could impact negatively on the local road network within the Study area. However, the plant could be served by its own railhead as it lies adjacent to the existing freight railway line. Neath Port Talbot (Recycling) Ltd is currently considering the viability of the rail option, as success depends on desired delivery locations for the end product. Further detail regarding potential opportunities for rail use is given in section 7.2.3 of this Report.

5.3 Summary

Table 5.3 in the Tables section of this Report gives a summary of all the land uses that exist or are proposed over the next 25 years within the Fabian Way corridor. This table should be read in conjunction with Figure 5.1. The use classes referred to are taken from the Town & Country Planning (Use Classes) Order as amended.

The development plot areas for SA1 were taken from the SA1 Swansea Waterfront Area Schedules, Rev B, Third Issue, 14.10.08[35].The land use areas for the Amazon development and the adjacent plots accessed from Amazon Way are taken from the Junction Capacity Assessment undertaken for the Jersey Marine junction[36]. The development areas for the Coed Darcy Urban Village are taken from the Coed Darcy Transport Assessment[34]. All other plot areas are estimated from the Development Framework Plan provided as Appendix 2 to the Study Brief.

A transport strategy for the corridor is critical to support the regeneration proposals if all the development described above is implemented.

6 Problems, Opportunities and Objectives

6.1 Introduction

Further information on existing and possible future transportation challenges has been sought from those who know the corridor well.

The many Stakeholders who have an interest in the future development of the Fabian Way corridor include local authorities, transport operators and developers. A series of two Stakeholder Workshops were held to enable participation in formulating the transport strategy. The first Workshop encouraged Stakeholders to identify the key problems and opportunities in the area and to develop and agree the key objectives of the Study.

In addition to Stakeholder participation, views on the existing corridor and its potential future development were sought from the existing communities within the site area. A community newsletter was produced and circulated to local residents to provide information about the Study and request input regarding problems and opportunities.

WelTAG emphasises the importance of deriving solutions from identified problems, rather than proposing transport measures that may change the situation but not address the key issues. WelTAG considers Stakeholder participation as fundamental to the problem identification process.

6.2 Stakeholder Participation

6.2.1 Composition of the Stakeholder Group

A series of 34 organisations were invited to become part of the Stakeholder group for this Study. The organisations were selected on the basis of their involvement in the corridor today and/or in its future development. Further details regarding the Stakeholder Group are included in Appendix F of the Technical Appendices Report.

6.2.2 First Stakeholder Workshop

The first Stakeholder Workshop was held on Thursday 4th December 2008 at WAG's offices at Penllergaer Business Park, Swansea. The main purpose of this Workshop was to identify the characteristics of the existing corridor and discuss Objectives and possible options for the future.

Participants were divided into three focus groups corresponding to the Welsh Impact Areas of Social, Environmental and Economic. During the first break out session, participants were asked to identify and discuss problems and opportunities within the Study area based on their own experience.

The second break out session built on the problem identification stage by asking participants to discuss a vision and possible Objectives for the corridor, and any potential options for its future development.

A complete record of the first Stakeholder Workshop is contained within Appendix G of the Technical Appendices Report.

6.3 Community Consultation

6.3.1 Community Newsletter

Arup produced a community newsletter in conjunction with WAG to explain the purpose of the Study to residents of the Fabian Way corridor. It provided a brief background to the Study and summarised the activities that had been undertaken to date. The newsletter asked residents to provide comments relating to community-based problems and suggestions. A copy of the newsletter is contained in Appendix I of the Technical Appendices Report.

WAG discussed the newsletters with the relevant Councillors before being hand delivered to every house within the site area. Responses were collected at four drop-in boxes in key locations within the communities or posted directly to Arup. A total of 53 replies were received, representing approximately a 2% response rate. A summary of the responses to the community newsletter is included in Appendix J of the Technical Appendices Report.

6.3.2 SA1 Travel Forum

The SA1 Travel Forum is a WAG initiative to facilitate discussion and action on travel issues related to the SA1 site and business community. Arup presented an introduction to the Fabian Way Corridor Study to the SA1 Travel Forum on 11 March 2009. The aim of this session was to include local businesses in the community consultation exercise. The presentation was followed by a question and answer session and then formal feedback from the members. A copy of the feedback received from the SA1 Travel Forum is included in Appendix K of the Technical Appendices Report.

6.4 Problems and Opportunities

A thorough appreciation of the key transport-related problems and opportunities with the Study area was vital in formulating appropriate transport solutions. The process of gaining this understanding involved a number of activities, including:

- reviewing the statutory and other relevant documents;
- understanding the existing social, transport and environmental conditions on the corridor;
- assessing the proposed land-use planning aspirations for the corridor; and
- consulting with key stakeholders and the community.

Based on the above, Table 6.1 summarises the problems and Table 6.2 gives the opportunities that have been identified for the corridor.

Table 6.1: Problems

Ref	*Title*
P1	Congestion near Tawe Bridges
P2	Baldwins Bridge: poor junction arrangement, existing structure requires heavy maintenance
P3	Park and Ride too close to City Centre
P4	Lack of eastern gateway to Swansea
P5	Negative local perception of transport
P6	Fabian Way forms a barrier between areas to the north and south
P7	Social exclusion
P8	Lack of continuous cycle facilities
P9	Lack of linkages between green areas
P10	Pollution from traffic
P11	Flood risk
P12	Land contamination
P13	Insufficient capacity of existing utilities

Table 6.2: Opportunities

Ref	*Description*
O1	Provide additional Park and Ride site further east along Fabian Way
O2	Improve connectivity between north and south of Fabian Way
O3	Add passenger capability to existing freight line north of Fabian Way
O4	Implement and promote more sustainable modes of transport
O5	Improve access to coastline and designated sites of environmental interest
O6	Exploit Swansea Docks and Tennant Canal for water-based tourism and leisure, and to enhance biodiversity
O7	Complete National Cycle Network Route 4 along Fabian Way

6.5 Study Objectives

The Study Objectives have been derived with direct reference to the problems and opportunities identified during the corridor review and stakeholder/community participation process. The Objectives have been developed to comply with the principles of WelTAG, so are distinct from and do not presuppose particular options. WelTAG also specifies that, where possible, Objectives should be **S**pecific, **M**easurable, **A**ttainable, **R**elevant and **T**imed (SMART).

The objectives were refined to conform as far as possible to SMART principles. However, meaningful quantification of several of the Objectives is difficult without pre-empting or precluding the outcome. Nonetheless, it is still possible to appraise options against these objectives by considering whether the option would move towards or away from the desired direction of change.

As part of the refinement process, two additional objectives were added to more directly address particular issues raised by the Client Steering Group and Stakeholders.

The Study Objectives to be taken forward to the options testing stage are given in Table 6.3.

Table 6.3: Study Objectives

Ref	**Objective**
1	To maintain or improve the reliability and predictability of journey times on the corridor for business, commuting and freight
2	To reduce congestion and delay at the Tawe Bridges
3	To actively promote ultra-low carbon alternatives such as walking and cycling and low carbon alternatives such as public transport options in order to double the modal share for alternative modes of travel along the length of the corridor
4	To increase public transport capacity along the corridor
5	To improve the journey experience of transport users along the corridor by defining a clear gateway into Swansea
6	To improve connectivity and accessibility between communities and developments north and south of Fabian Way
7	To protect, enhance and improve access to green space within the Study area, particularly Crymlyn Bog and Crymlyn Burrows
8	To minimise the adverse impacts on air quality for local residents arising from transport

6.6 Summary

As advised by WelTAG the objectives for this Study have been developed to address the problems, and then options will be developed to assist in achieving the objectives. A matrix approach has been taken to demonstrate the fit of the objectives with the problems, as shown on the Table 6.4 in the Tables section of this Report.

150 yds
CV07 XZZ
X574 CWN
CV54 ZFM

7 Option Development and Sifting

7.1 Introduction

The approach adopted for this Study is that all possible transport interventions that could improve travel conditions along the corridor should be considered.

WelTAG (paragraph 4.5.1) notes that: *"Once the problems and opportunities are clear and the objectives have been formulated and agreed with stakeholders, it is necessary to identify possible solutions which will be developed into proposals for appraisal. This is, effectively, an initial coarse sifting process of putting together a long list of possible solutions (which will then be developed and refined to become proposals), considering all possible modes."*

On this basis, in order to define the number of options for detailed testing a three step process was undertaken:

- Developing Options – a long list of possible solutions has been developed through evaluation of existing conditions and consultation with the Client Steering Group, Stakeholders and the Community;
- Sifting Options – a three stage sifting process was undertaken on the long list of options. This included compatibility with Study Objectives, Stakeholder acceptability and option exclusivity; and
- Packaging Options – the results of the sifting process enabled packages of measures to be assembled for the more detailed appraisal stage.

7.2 Developing Options

7.2.1 Overview

An initial long list of 100 transport options was generated by considering all possibilities within the corridor by each key mode. At this stage, options were treated as stand-alone measures rather than sections of larger schemes composed of several interrelated options. The list includes land use measures, infrastructure measures, management measures, information provision and pricing measures.

Each option was given a unique reference. The first letter of the reference represents the option's primary mode, as follows:

H – Highways
B – Public transport
W – Walking, cycling and bridleway
R – Rail
C – Canal
S – Smarter Choices
ITS – ITS

Mutually incompatible options are allocated the same number but include a small case letter after the number. For example, *H3a – Allow general traffic to use Park and Ride bridge over Fabian Way (one-way only)* cannot be combined with *H3b – Allow general traffic to use Park and Ride bridge over Fabian Way (two-way shuttle working)*.

Further information regarding each option is available in Appendix L of the Technical Appendices Report. Graphical representations of each option are shown in Figures 7.1 to 7.4.

7.2.2 Highway Options

A long list of highway improvement options have been developed for the corridor, including:

- junction improvements;
- capacity enhancements;
- new links and bridges;
- new public transport priority routes; and
- traffic management measures.

The details of these are included in Table 7.1 in the Tables section of this Report.

The configuration of the main junctions will inform the overall package of highway improvements along the corridor. It is therefore useful to consider possible options for each key junction in isolation before considering how these individual elements might fit together. In addition, there are a number of options for reconfiguration along the length of Fabian Way with can be considered separately. Table 7.1 details the highway options by junction and along the main line. The table should be read in conjunction with the graphical representation of the options given in Figure 7.1.

7.2.3 Rail Options

The rail options focus on the best use of the existing single track freight line. Passenger train capability on this line could allow access to the new SA1 development and proposed University campus by rail from the east. However, trains cannot currently be routed from Swansea Docks directly to Swansea or Neath stations unless they travel to either Llanelli or Briton Ferry to change direction. This would be an awkward arrangement that could prove to be unworkable. It is also likely that additional infrastructure such as passing loops or lengths of double track may be necessary to enable this route to work efficiently. Nonetheless, it should be reasonable to assume that at least an hourly passenger service could be incorporated into the timetable for the route. Table 7.1 in the Tables section of this Report describes the rail options in more detail.

Initial discussions with existing and potential Stakeholders indicated a strong aspiration to continue to use the line for rail freight to support future industrial growth in the area. It appears there is scope to increase use of the existing line with a series of proposed developments.

- **Network Rail** is aware of the potential for seven additional trains per day each way carrying coal and/or aggregate from the works at Cwmgwrach to Swansea docks. There is also the potential for one additional service per day in each direction for biomass importation to the docks.
- **DB Schenker**, the freight operating company (formerly EWS), sees a potential for up to two additional trains per day to Swansea Docks.
- **Neath Port Talbot (Recycling) Ltd** is considering utilising rail freight as part of its Material Recovery & Energy Centre (MREC) business in the future. Initially, there would be a requirement for one or two trains per week, but this could increase significantly if successful. The MREC could be served by its own railhead as it is adjacent to the railway line.
- **ABP** (Association of British Ports) confirmed that potential schemes involving quarried aggregate, biomass power station(s) and coal moves are under discussion. ABP anticipates a large increase in coal export in the near future.

7.2.4 Public Transport Options

The provision of attractive public transport services with suitable capacity will offer people realistic alternatives when accessing the proposed developments in the Fabian Way area. They can also reduce congestion by enabling drivers to switch mode. The majority of the options detailed in Table 7.1 in the Tables section of this Report are bus-based, as both Swansea and Neath Port Talbot operate successful bus networks at present. Figure 7.2 provides a schematic representation of the options.

First Cymru Buses Ltd is supportive of the majority of the bus priority options proposed, particularly a new bus only bridge across the Tawe. However, First feel there is little demand for interchange between buses on the corridor at present, so a quality bus hub would have limited impact on modal shift.

First is interested in providing a high frequency bus service between Baldwins Bridge and the City Centre. This service could be operated as the 'son' of Swansea Metro or any form of high-grade buses. Real-time information will be available at seven or eight key service stops in the Swansea area as part of the Swansea Metro scheme. First would look to provide two or three further real information points along Fabian Way.

7.2.5 Walking and Cycling Options

Promoting and facilitating active modes of transport is essential to the sustainable development of the area. Benefits include an improvement in general health and fitness, a reduction in pollution and carbon emissions and a way to help tackle congestion. Footpaths should be accessible to as many people as possible, including wheelchair and pram users.

The options detailed in Table 7.1 in the Tables section of this Report have been put together in consultation with Sustrans Cymru, Ramblers Cymru, Wheelrights, the British Horse Society and local authorities. The options are shown graphically on Figures 7.3 and 7.4.

7.2.6 Canal Options

The part of the Tennant Canal within the Study area is integral to a wider waterway network in the Neath and Swansea valleys. Options for restoration of this wider network have been already been considered in some detail and include some very recent and continuing studies. Options proposed for the Fabian Way Study need to reflect this context and recognise that any practicable restoration of canal within the Study area is most likely to be taken forward through a project over a much wider extent of the waterway network. Table 7.1 in the Tables section of this Report details the options formulated for development of the canal.

It is worth noting that Glan-y-Wern Canal is unsuitable for development due to likely adverse effects on Crymlyn Bog SSSI. It would not offer a through route and has no destination/origin feature. Restoration of the Tennant Canal – River Neath spur at Jersey Marine would only be accessible to craft insured for estuary conditions. A water taxi, water bus or water-based freight service along the canal would be limited by speed restrictions (likely to be limited to 4mph) and could not compete with other modes on parallel routes.

7.2.7 Intelligent Transport Systems Options

Table 7.1 describes the ITS options identified for the Study area. It is worth noting that several ITS options have already been covered under other modes, such as bus priority measures and tidal flow systems.

7.2.8 Smarter Travel Choices Options

Smarter choices options focus on demand management and information provision, primarily to encourage modal shift away from the private car. Table 7.1 in the Tables section of this Report describes the smarter choices options proposed for the Fabian Way corridor.

7.3 Sifting Options

7.3.1 First Sift

The first sift considered whether each option on the long list would assist in achieving the Study Objectives and national policy Objectives, taken to be the outcomes of the Wales Transport Strategy (WTS)[2].

A proforma was completed for each option giving the following information:

- Description;
- Advantages and disadvantages;
- Fit with the Study Objectives;
- Fit with the WTS outcomes;
- Fit with other options; and
- Recommendations regarding further development of the option.

The completed proformas are contained within the Appendix L of the Technical Appendices Report. The options shown in Table 7.2 were discounted during the first sift.

Table 7.2: Options Discounted during the First Sift

Ref	*Option Description*
H1a	Do minimum at the Tawe Bridges
H2	New bridge for general traffic to south of existing Tawe Bridges
H3a	Allow general traffic to use Park and Ride bridge over Fabian Way (one way only)
H3b	Allow general traffic to use Park and Ride bridge over Fabian Way (two way shuttle working)
H4a	Do minimum at Baldwins Bridge
H6a	Convert one lane of existing two lanes on Fabian Way to a bus lane
H6b	Convert one lane of existing two lanes on Fabian Way to a high occupancy vehicle lane
H7a	Widen to dual 3 lane
H8	Remove central reservation to create fifth lane to allow tidal flow operation
B1	Do minimum regarding bus options
W1	Do minimum regarding walking, cycling and bridleway options
R1	Do minimum regarding rail options
C1	Do minimum regarding canal options
ITS1	Do minimum
ITS4	Variable speed limit depending on traffic conditions
S1	Do minimum regarding smarter choices options

7.3.2 Second Sift

The second sift considered Stakeholder acceptability of each option accepted during the first sift, including the opinions of the Client Steering Group, community, transport providers, landowners and developers. It also looked at risks to implementation or deliverability of the options, and the significance of the option's impact on transportation within the Study area.

A proforma was completed for each option giving the following information:

- Description;
- Stakeholder acceptability;
- Risks to implementation;

- Influence on transport movements within the corridor; and
- Recommendations regarding further development of the option.

The completed proformas are contained within Appendix M of the Technical Appendices Report. The options shown in Table 7.3 were discounted during the second sift.

Table 7.3: Options Discounted during the Second Sift

Ref	*Option Description*
H4b	Amend slips at Baldwins Bridge, maintaining existing bridge structure
H4e	Close Baldwins Bridge as a junction, maintaining existing bridge structure
H12	Fabian Way in a tunnel near University campus
H13	Fabian Way in a tunnel between existing communities and SA1
B9b	New light rail service between University and City Centre
B10b	New light rail service between Coed Darcy and City Centre
B11a	New shuttle service between SA1 and City Centre
B11b	New light rail service between SA1 and City Centre
B12b	New light rail service between University, Science Park Clusters, SA1 and City Centre
B13b	Transport hub providing high quality interchange point at existing Park and Ride site
B13c	Transport hub providing high quality interchange point at new Park and Ride site
B17a	Personal rapid transit loop within Fabian Way developments
B17b	Personal rapid transit loop linking Swansea City Centre and Neath, through Fabian Way developments
W5b	New on-road cycle route through SA1 south of Prince of Wales Dock linking to Sail Bridge
W8	New pedestrian and cycle route linking SA1 and the University
W13	Moving walks network to link University and Science Park Clusters transport hub
R3	Convert rail to passenger line
R5	Abandon existing rail line and re-use corridor for other transport purposes
C2	Full integrated waterway restoration, including link into SA1 marina and the Afon Tawe
C3	Full restoration of the Neath and Tennant Canals, including link into SA1 marina at the Prince of Wales Dock
C4	Partial Restoration of Neath and Tennant Canals, not including link into SA1 marina at the Prince of Wales Dock
ITS5	Tolling / congestion charging

7.3.3 Third Sift

The third sift concentrated on selecting a preferred choice between similar options. There were only eight sets of options to which the third sift applied. The decisions were based on additional consultation with the relevant third parties and a comparative assessment of the factors considered during the first and second sifts for each opposing option. The results of this assessment are shown in Table 7.4 below.

Table 7.4: Third Sift of Options

Ref	*Opposing Options*	*Choice and Reasoning*
H4c or H4d	The type of new junction at Baldwins Bridge	The choice of junction at Baldwins Bridge is dependent on the primary purpose of the corridor. A new grade-separated junction would support a high-speed link for traffic to access Swansea City Centre, as it provides an improved local alignment to Fabian Way and maintains a high level of capacity for through traffic. Conversely, an at-grade solution would reduce the visual severance caused by the elevated section, act as a speed enforcement measure, and provide more opportunity for pedestrian and cycle crossing facilities. Both options will therefore be taken forward for packaging.
H7b, H7c or H7d	A new dedicated busway or a widening of Fabian Way to incorporate a bus or high occupancy vehicle lane	These options are conflicting, and thus only one can be taken forward into packaging. The provision of a segregated busway to the north of Fabian Way was selected as it provides the highest level of bus priority over the corridor whilst simplifying the bus priority links to the wider highway network, allowing continuous dedicated bus facilities from Baldwins Bridge to the Tawe Bridges.
B4a or B4b	The location of a new/additional Park and Ride site	A new / additional Park and Ride site on vacant land north of Amazon development was chosen in preference to a new / additional Park and Ride site on or adjacent to the University site as it is further from the City Centre and located on the same side of Fabian Way as eastbound traffic.
B8 or B9a	A new bus route between the City Centre and the University or an extension of the existing Bright Orange Bus (BOB) student bus service	It was decided to extend the existing dedicated student bus services 82 and 82A (Bright Orange Bus (BOB)) to link the proposed University campus to the existing campus via the City Centre rather than provide a new regular bus service. This is primarily because the existing BOB service is well-patronised and it allows separation of student and main line use.
W2a, W2b or W2c	New off-road walking and cycling route from Celtic Trail NCN Route 4 along either the route of the canal or the railway line	Extending the shared route alongside the canal was considered preferable to providing a new shared route adjacent to the railway line. The canal options offer direct access from Jersey Marine village and are likely to provide a more pleasant environment for users. The two options for the shared route along the canal will both be recommended for implementation, although the shorter route will be prioritised in an earlier phase.
W5a or W5b	New off-road walking and cycling route east from Jersey Marine, via either the golf course or Crymlyn Burrows	These options are Wales Coastal Path proposals. Despite passing through private land, the golf course option was considered preferable to the Crymlyn Burrows option. This is primarily because the route across Crymlyn Burrows is tidal, putting users at risk and creating difficulties in constructing a suitable path.
W9a or W9b	Limit of extension of on-road cycleway on the B4290 north of Jersey Marine	The shorter route terminating at the picnic site was considered more appropriate than the longer route to the M4, as it is more likely to be used a leisure route. Users travelling between Jersey Marine and the M4 would be able to utilise the on-road route through the Llandarcy settlement.
R2 or R4	Use of existing railway line: freight or combined freight and passenger	Stakeholders have expressed a desire to maintain the freight capacity of the existing line. However, in the future the Fabian Way developments may benefit from a passenger rail service with links to the east. The combined freight and passenger line option will be held as an aspiration for later phases of the development.

The options shown in Table 7.5 were discounted during the third sift.

Table 7.5: Options Discounted during the Third Sift

Ref	*Option Description*
H7b	Widen to dual 3 lane and convert one lane to a bus lane
H7c	Widen to dual 3 lane and convert one lane to a high occupancy vehicle (HOV) lane
B4b	New / additional Park and Ride site within University development
B9a	New bus routes between University and City Centre
W2c	New footway / cycleway route along existing railway from proposed NCN Route 4 to the M4
W4a	New off-road pedestrian and cycle route from Jersey Marine junction with Fabian Way through Crymlyn Burrows
W9b	Extend on-road cycleway on the B4290 north of Jersey Marine roundabout on Fabian Way through Jersey Marine village as far as the M4.

7.4 Packaging Options

The options described as likely to have a significant influence on transportation movements within the corridor during the second sift were used as starting points for each package. Several of the significant options were considered vital for inclusion within each package as they directly address the Study Objectives. These include:

- H1b – Capacity improvements at the Tawe Bridges
- B4a – New / additional Park and Ride site north of Amazon development
- B13a – Transport hub providing high quality interchange point adjacent to / within University site
- W15 – New smooth gradient pedestrian and cycle bridge linking the SA1 development to the communities north of Fabian Way

Groups of mutually supportive options were formed around the remaining significant options to generate themes. These themed groups include:

a. Segregated two-way bus route between existing Park and Ride site and proposed new/additional Park and Ride site north of the Amazon development. Additional bus-only bridge utilising the existing piers south of the main bridges and two-way shuttle working across existing Park and Ride bridge.

b. Public transport services routed along the Fabian Way main line between existing Park and Ride site and proposed new/additional Park and Ride site north of the Amazon development.

c. New grade-separated junctions at both Jersey Marine and Baldwins Bridge with a parallel development access road and reduced accesses directly onto Fabian Way.

d. Reduce the speed limit along Fabian Way to 30mph beyond Jersey Marine. Replace Baldwins Bridge with an at-grade junction and retain the existing layout of the Jersey Marine junction.

Each Package features either themed option group a. or b., and either themed option group c. or d. The remaining combinations are mutually incompatible. This led to the generation of four Packages of measures to be appraised:

1. **Fabian Way as a Community Corridor with On-Line Public Transport**
2. **Fabian Way as a Community Corridor with Segregated Public Transport**
3. **Fabian Way as a Strategic Transport Link with On-Line Public Transport**
4. **Fabian Way as a Strategic Transport Link with Segregated Public Transport**

Options described as likely to have a positive minor or negligible influence on transportation movements within the corridor during the second sift were included within each relevant Package as complementary measures.

7.5 Summary

The measures included within each Package are shown graphically on Figure 7.5 to 7.8. The significant infrastructure measures within each Package are shown on Figures 7.9 to 7.12 and summarised in Tables 7.6 to 7.11.

Table 7.6: Package 1 – Community Corridor with On-Line Public Transport

Ref	*Option Description*
H9	Reduce speed limit to 30mph from Jersey Marine
H5a	Do minimum at Jersey Marine junction with Fabian Way
H4d	New at-grade junction at Baldwins Bridge
B15b	Two-way bus-only access north of Baldwins Bridge between Port Tennant and rail sidings
W16	New at-grade pedestrian / cycle crossing between SA1 junction and existing footbridge

Table 7.7: Package 2 – Community Corridor with Segregated Public Transport

Ref	*Option Description*
H9	Reduce speed limit to 30mph from Jersey Marine
H4d	New at-grade junction at Baldwins Bridge
H5b	New grade-separated junction at Jersey Marine junction with Fabian Way
H7d	Segregated busway north of Fabian Way
B2	New bus-only bridge to south of existing Tawe Bridges (this will assist constructing capacity improvements then provide significant bus priority)
B3b	Operate two-way shuttle working across existing Park and Ride bridge
B15b	Two-way bus-only access north of Baldwins Bridge between Port Tennant and rail sidings
W14	New cycleway over new bus-only bridge to the south of the existing Tawe Bridges
W16	New at-grade pedestrian / cycle crossing between SA1 junction and existing footbridge

Table 7.8: Package 3 – Strategic Transport Link with On-Line Public Transport

Ref	*Option Description*
H4c	New grade-separated junction at Baldwins Bridge
H5b	New grade-separated junction at Jersey Marine junction with Fabian Way
H10	Parallel development access road
H11	Remove or reduce development accesses onto Fabian Way

Table 7.9: Package 4 – Strategic Transport Link with Segregated Public Transport

Ref	*Option Description*
H4c	New grade-separated junction at Baldwins Bridge
H5b	New grade-separated junction at Jersey Marine junction with Fabian Way
H10	Parallel development access road
H11	Remove or reduce development accesses onto Fabian Way
H7d	Segregated busway north of Fabian Way
B2	New bus-only bridge to south of existing Tawe Bridges (this will assist constructing capacity improvements then provide significant bus priority)
B3b	Operate two way shuttle working for buses across Park and Ride bridge
B15	Two-way bus-only access north of Baldwins Bridge between Port Tennant and rail sidings
W14	New cycleway over new bus-only bridge to the south of the existing Tawe Bridges

Table 7.10: Other Significant Measures Common to all Packages

Ref	*Option Description*
H1b	Capacity improvements at the Tawe Bridges
B4a	New / additional Park and Ride site north of Amazon development
B13a	Transport hub providing high quality interchange point adjacent to / within University site
W15	New smooth gradient pedestrian and cycle bridge linking the SA1 development to the communities north of Fabian Way
B5	Divert/extend existing bus services 155 and 156 to cover Coed Darcy urban village
B8	Extend bus services 82 and 82A (Bright Orange Bus (BOB)) linking existing University campus to the City Centre
B12a	New shuttle service between University, Science Park Clusters, SA1 and City Centre (potentially extension of Swansea Metro)
W3a	New on-road cycle route linking Coed Darcy urban village and Fabian Way along proposed Southern Access Road
W10	Extend on-road cycleway north of Jersey Marine roundabout on Fabian Way along the minor unclassified road through Jersey Marine village as far as Llandarcy
W11	Extend footway and cycleway east along Amazon Road
W17	Upgrade existing footbridge west of Park and Ride junction
R2	Maximise use of existing railway as a freight line
C5	Protect the route of the canal restoration proposals
S5	All new developments to conform to site-wide Travel Plan, managed and monitored by an overall Travel Plan Coordinator

Table 7.11: Complementary Measures Common to all Packages

Ref	*Option Description*
B3a	Expand existing Park and Ride site
B4c	Convert existing Park and Ride site to Park and Walk site serving SA1 (potential interim measure)
B6	Divert existing bus service 31/32/33 (Swansea -Birchgrove) to cover SA1
B7	Divert existing regional bus services to include Fabian Way developments
B10a	New bus routes between Coed Darcy and City Centre
B14	Bus priority measures for University and Science Park Cluster junctions on Fabian Way
B16a	Improved bus stops: better facilities such as seating and lighting
B16b	Improved bus stops: digital real-time passenger information
W2a	Extend canal shared route (footway, cycleway and bridle path) from Celtic Trail NCN Route 4 to Jersey Marine (earlier phase)
W2b	Extend canal shared route (footway, cycleway and bridle path) from Celtic Trail NCN Route 4 to the M4 (later phase)
W3b	New off-road pedestrian and cycle route linking Coed Darcy urban village and Fabian Way along the eastern side of Crymlyn Bog
W3c	New off-road pedestrian and cycle route linking Coed Darcy urban village and Port Tennant along the western side of Crymlyn Bog
W4b	New off-road pedestrian and cycle route from Jersey Marine village through the golf course
W5a	New on-road cycle route through SA1 north of the Prince of Wales Dock linking to the Sail Bridge
W6	New pedestrian and cycle route through University site
W7	Provide continuous pedestrian and cycle facilities along both sides of Fabian Way
W9a	Extend on-road cycleway on the B4290 north of Jersey Marine roundabout on Fabian Way through Jersey Marine village as far as the picnic site
W12	Bridle path link from canal shared route to Pant-y-Sais stables
W18	New on-road cycle route through the residential area of Port Tennant and St Thomas
R4	Combined passenger / freight line (longer term aspiration)
ITS2	Variable message signs to show traffic conditions and support Park and Ride
ITS3	Signal optimisation
S2	Controlled parking zones for on-street parking with residential parking scheme
S3	Limit parking spaces provided in new developments, employer levy per parking space
S4	Priority spaces for car pooling in public car parks
S6	Residential Travel Plan for communities to the north of Fabian Way, managed and monitored by an overall Travel Plan Coordinator
S7	Travel information website showing real-time public transport information, traffic conditions and any issues with pedestrian or cycle links
S8	Smart Card ticketing system throughout the corridor.

The complementary measures are shown graphically on Figure 7.13.

Table 7.12 in the Tables section of this Report summarises the outcome of the sifting exercise for each option. The final column shows the Package(s) into which the option falls if is has not been discounted previously during the sifting process. The letter ‘c’ indicates the option will be incorporated into all Packages as a complementary measure.

In summary, the results of the planning stage process enabled four themed packages of options to be assembled for more detailed appraisal, which is discussed in the following sections of this Report.

8 Package Appraisal

8.1 Introduction

The Package appraisal process has been based on WelTAG guidelines and includes the following elements:

- assessment against the Welsh Impact Areas of the economy, environment and society;
- assessment of Package impact on travel conditions along the corridor, including capacity, journey times and modal split;
- assessment of how well the Packages perform against the Study Objectives; and
- evaluation against other criteria including public and stakeholder acceptability, technical and operational feasibility, financial affordability, deliverability and risk.

The results of the appraisal process are recorded in Appraisal Summary Tables (ASTs), based on WelTAG guidelines. The standard AST template has been modified for the Fabian Way Transport Assessment to include consideration of specific transport criteria.

The following sections describe each appraisal criteria, how it has been assessed for this strategy and the anticipated impact on each Package of options compared to the Reference Case.

It is worth noting that WelTAG states that: *"appraisal of area-wide strategies is generally a qualitative process undertaken at a broad level because of the conceptual nature of the measures in the strategy and the lack of modelling tools capable of quantifying the various impacts of a number of interacting measures."*

8.2 Reference Case

A Reference Case was established to provide a benchmark against which the performance of the four Packages could be compared.

The Reference Case is defined as the existing situation plus those changes to the transport system that are committed regardless of whether any measures considered in this Study are introduced. On this basis it was agreed with the Client Steering Group that the Reference Case should include ongoing maintenance of the existing facilities and infrastructure within the Study area and transport interventions associated with committed schemes. The Coed Darcy Urban Village is a major committed development with 4,000 homes planned on a former brownfield site to the north of the Study area.

A number of transport measures were proposed to support the development as part of the Coed Darcy Transport Assessment[34], including a new road link to Fabian Way called the Southern Access Road. At the southern end of the Southern Access Road link a bus-only access is planned to allow buses to bypass the Baldwins Bridge junction, providing a journey time advantage over private cars. The buses would travel along the proposed development access road that runs parallel to Fabian Way between the Jersey Marine and Baldwin Bridge junctions, an extension of Ffordd Amazon.

The measures included in the Reference Case are shown graphically in Figure 8.1.

A number of the measures included in the options development process as part of this Study have also been proposed in association with the Coed Darcy development. The Reference Case takes into account these measures, as listed in Table 8.1 below.

Table 8.1: Measures included in Reference Case

Ref	*Option Description*
H10	Parallel development access road (Ffordd Amazon)
B15	Two-way bus-only access north of Baldwins Bridge between Port Tennant and rail sidings
B5	Divert/extend existing bus services 155 and 156 to cover Coed Darcy urban village
B10a	New bus routes between Coed Darcy and City Centre
W3a	New on-road cycle route linking Coed Darcy urban village and Fabian Way along proposed Southern Access Road
W11	Extend footway and cycleway east along Amazon Road
S8	Smart Card ticketing system throughout the corridor

It is worth noting that Packages 3 and 4 include enhancement to the parallel development access road and potential relocation of the bus gate.

8.3 Transport Modelling Methodology

8.3.1 Overview

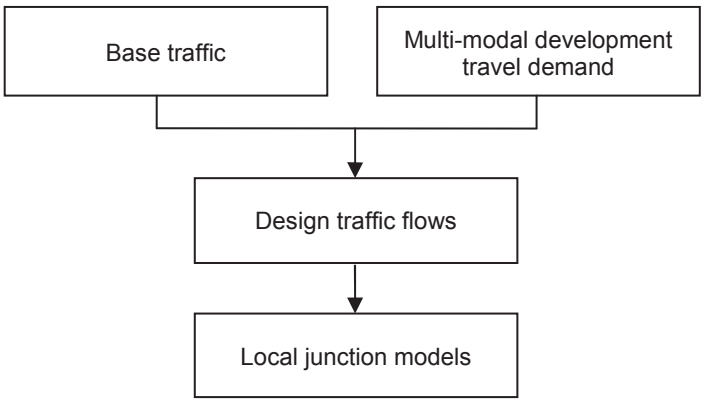
In order to appraise the transportation implications of various Packages on a consistent basis it was necessary to develop a bespoke transport model to derive future travel demand along the corridor. This model was then used to assess the future travel conditions along the corridor, including:

- link and junction capacity analysis;
- journey time assessments; and
- modal split.

The paragraphs below provide an outline summary of the modelling process. Further details are provided in Appendix N of the Technical Appendices Report.

A two-stage modelling process was used to provide inputs into the appraisal process. This is shown in Figure 8.2 below.

Figure 8.2: Summary of Modelling Methodology



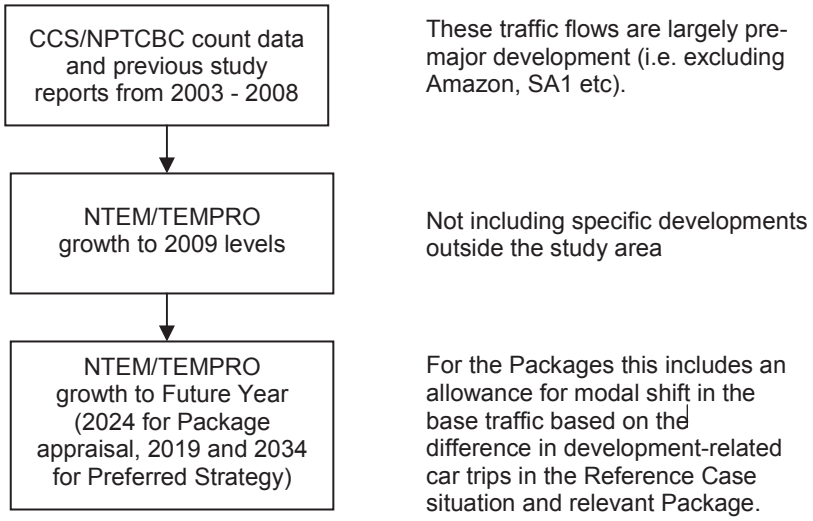
8.3.2 Model Demand

Future Year Base Travel Demand

The future year vehicular traffic levels, excluding further development along the Fabian Way corridor, have been estimated using existing traffic information from a variety of sources and applying suitable growth factors to bring these up to 2009 levels, with further growth applied to provide future assessment years. This process is summarised in Figure 8.3 below.

It is worth noting that the morning peak period represents 08.00 to 09.00 on a typical weekday, while the evening peak period represents 17.00 to 18.00.

Figure 8.3: Future Year Base Traffic

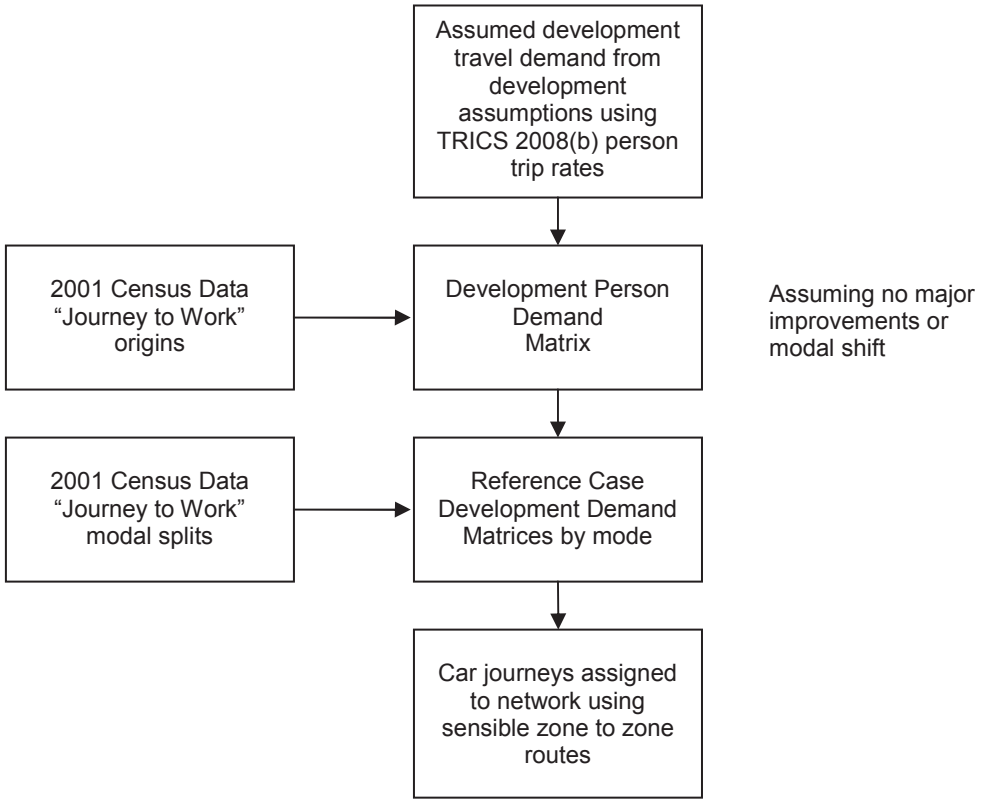


Reference Case Travel Demand

The total travel demand for the proposed developments has been estimated in terms of all mode person trips. The developments along the corridor have been grouped into 6 internal zones, with the journey origins and destinations outside the Study area grouped into 17 external zones. The Journey to Work information from the 2001 Census has been used as the basis for the geographic spread and modal split of the development related journeys in the Reference Case situation.

This process is summarised in Figure 8.4 below.

Figure 8.4: Reference Case Development Travel Demand

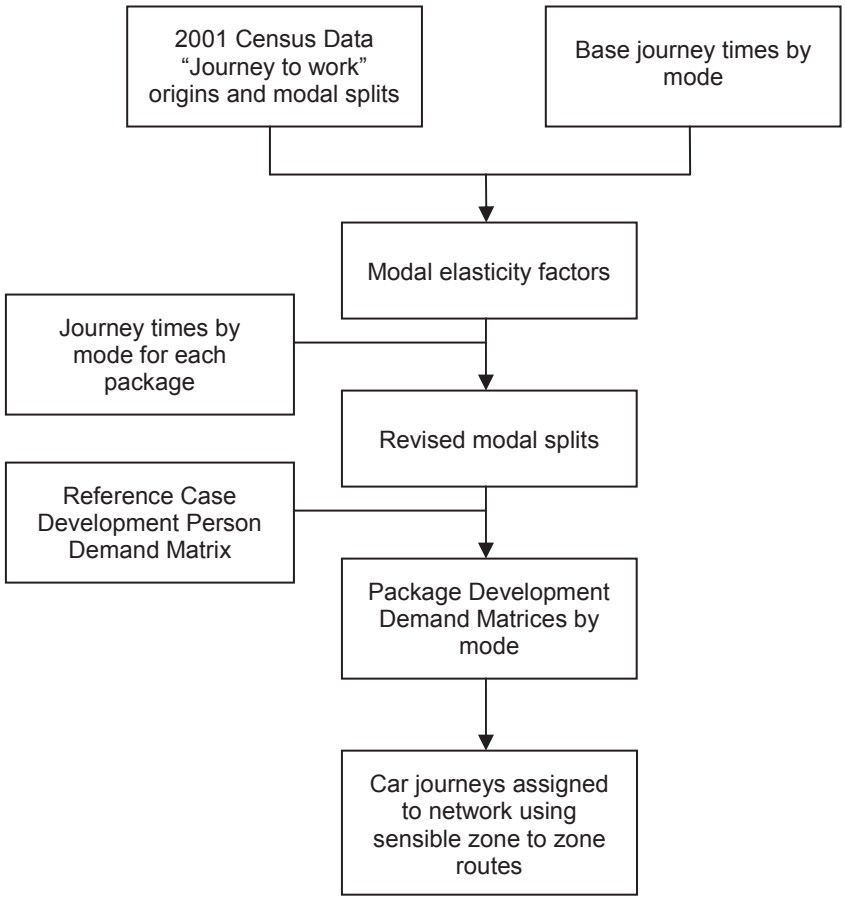


Package-Specific Development Travel Demand

The modal shift associated with the various improvements included in each Package has been estimated by comparing the journey times by each travel mode from each of the external zones to the modal splits recorded in the 2001 Census to produce modal elasticity factors. By reviewing the revised journey times for each mode, for each zone, and for each Package, revised modal splits for each Package can be determined.

This process is summarised in Figure 8.5.

Figure 8.5: Package-Specific Development Travel Demand

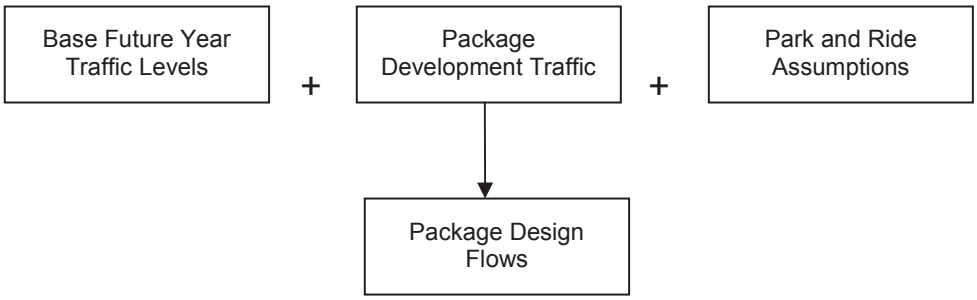


Package Design Flows

The design flows used to assess each Package are the sum of the Future Year Base Traffic and Base or Package-specific development traffic, along with assumptions regarding the future usage of the proposed Park and Ride site.

This process is summarised in Figure 8.6.

Figure 8.6: Summary



8.3.3 Capacity Assessment

The above process resulted in future year peak hour traffic flows along Fabian Way for the Reference Case and the four Packages. The six key junctions along Fabian Way were then assessed using a variety of models to determine their future year capacity, namely:

- Jersey Marine junction: comparison to 2008 Arup study results;
- Elba Crescent / proposed University access: new LinSig model;
- Baldwins Bridge junction: new LinSig model;
- Langdon Road / Park and Ride junction: new LinSig model;
- SA1 main access: new LinSig model;
- Tawe Bridges: comparison to 2003 Faber Maunsell study results.

Further details are provided in Appendix N.

8.4 Appraisal Against Welsh Impact Areas

8.4.1 Introduction

This section of the appraisal process assesses the performance of the Packages against the Welsh Impact Areas as set out in WelTAG.

8.4.2 Economic

Transport Economic Efficiency

Transport Economic Efficiency (TEE) measures the impact of a transport proposal on the economic efficiency of the transport system, with reference to the costs and benefits incurred by users and operators of the transport system and those providing funding. In Stage 1, the appraisal of the Fabian Way Corridor has been undertaken with reference to capital and operating costs, vehicle operating costs, travel time savings and reliability, based on currently available evidence.

Capital and Operating Costs

The capital and recurring costs of each Package is summarised below in Table 8.2. Further details are given in section 8.7.5 of this Report.

Table 8.2: Summary of Capital and Operating costs (2009 £m Net of Reference Case)

Package	*Capital Cost*	*Recurring / year*
1	£16.1m – £20.1m	£2.41m
2	£44.1m – £57.1m	£2.46m
3	£38.2m – £51.7m	£2.35m
4	£46.4m – £63.9m	£2.39m

Operating costs are similar for each option, ranging from £2.35m (Package 3) to £2.46m (Package 2) per annum. Package 1 is the lowest cost option for capital investment.

Travel Time Savings

Travel time savings typically make up the largest proportion of transport benefits. The time costs for transport users are based on the 'willingness to pay' for lower travel times. Different users value their time differently. In Stage 1, the magnitude of travel time savings for each of the Packages is based on the travel time for a typical journey from Neath to Swansea by each key mode. Table 8.3 below shows that the strategic transport link options (Packages 3 and 4) would provide the most significant travel time benefits for car users. The introduction of a community corridor (Packages 1 and 2) would increase travel times slightly

for a trip between Neath and Swansea. Travel times for bus travel and for cyclists would fall most significantly under Packages 2 and 4.

Table 8.3: Travel Time from Neath to Swansea by Mode (Minutes)

Mode	*Reference Case*	*Package 1*	*Package 2*	*Package 3*	*Package 4*
Car	33	34	34	31	31
Train	44	44	44	44	44
Bus	43	42	36	41	36
Cycle	71	68	66	69	66
Walk	n/a	n/a	n/a	n/a	n/a

Reliability

Transport users value the reliability of transport infrastructure as well as the average speed of travel. Business users and freight vehicles particularly value the ability to plan journeys effectively. Typically, reliability is measured in terms of the variability of travel times. The capacity of transport links provides a useful indication of the likely severity of congestion and delays for road users.

Link capacity for travel in one direction in the morning peak is shown in Table 8.4 below. In the Reference Case, two of the six links assessed are more than 100% capacity. All Packages reduce the flow to capacity ratio along Fabian Way. Each link in Package 2 is under capacity in this example.

Table 8.4: Link Capacity (Percentage Capacity, AM flows, eastbound)

Link	*Reference Case*	*Package 1*	*Package 2*	*Package 3*	*Package 4*
SA1 to P&R	120%	102%	97%	106%	101%
P&R to Baldwins Bridge	106%	101%	96%	103%	98%
Baldwins Bridge to Elba Crescent	87%	84%	80%	69%	66%
Elba Crescent to Jersey Marine	79%	67%	64%	57%	55%
Jersey Marine to J42	47%	40%	38%	42%	40%
Amazon Link	67%	57%	54%	18%	17%

A qualitative assessment of congestion issues has been undertaken. Table 8.5 shows that congestion is heavy at peak times in the Reference Case. All Packages reduce the severity of congestion.

Table 8.5: Congestion

Reference Case	*Package 1*	*Package 2*	*Package 3*	*Package 4*
Free flow plus heavy congestion during peaks	Free flow plus medium to heavy congestion during peaks	Free flow plus medium congestion during peaks	Free flow plus medium congestion during peaks	Free flow plus medium congestion during peaks

Vehicle Operating Costs

Vehicle operating costs are the costs incurred by transport users related to fuel and other operating costs such as maintenance, tyres and depreciation. Calculating changes in vehicle operating costs can be complex and depends on a range of factors, such as the speed travelled. However, a good proxy for operating costs is the kilometres travelled by vehicles before and after a transport improvement.

Table 8.6 shows the total vehicle kilometres (veh-km) travelled as new car trips associated with new developments within the Study area in the morning and evening peaks in the Reference Case scenario compared to the four Packages. Each Package results in a reduction in vehicle kilometres travelled of at least 11% against the Reference Case and would therefore be expected to reduce operating costs. The benefits are most significant for Package 2 although the differences between each Package are relatively slight.

Table 8.6: Vehicle Kilometres Travelled

Time Period	*Reference Case*	*Package 1*	*Package 2*	*Package 3*	*Package 4*
Morning peak	88303	75118	71362	77935	74179
Evening peak	86665	74180	70471	76961	73252
Morning peak	100%	85%	81%	88%	84%
Evening peak	100%	86%	81%	89%	85%

Summary

At this stage it is not possible to determine which of the Packages is most efficient, that is delivers the greatest benefits relative to costs. The strategic transport corridor options (Packages 3 and 4) are expected to result in the most significant transport cost savings. Package 1 is the lowest cost option but performs less effectively than each of the other packages. Table 8.7 below summarises the results of the TEE assessment.

Table 8.7: Stage 1 TEE Summary Table – Ranking of Packages

Aspect	Package 1	Package 2	Package 3	Package 4
Vehicle operating costs	3	1	4	2
Travel time savings	=4	=4	=1	=1
Reliability benefits	4	1	3	2
Scheme costs (1 is least costly, 4 is most costly)	1	3	2	4

(1 is most beneficial, 4 is least beneficial, =1 is joint most beneficial)

Economic Activity and Location Impacts

Economic Activity and Location Impacts (EALI) assesses the impacts of a transport scheme on the local, regional and/or Welsh economy.

The EALI assessment considers impacts on the economy beyond the transport sector to understand how changes in accessibility could result in economic performance or altered patterns of economic activity. Wider economic considerations are important for the Fabian Way corridor, given the current and expected development adjacent to the corridor and the importance of the route as a gateway to the City of Swansea.

At Stage 1, the EALI should assess the links between the proposed transport improvement and impacts on employment and Gross Domestic Product (GDP). Three relevant impacts are discussed below.

Employment Land and Expected Developments

Fabian Way provides access to a number of significant employment sites. Notably, Amazon is thought to support approximately 1,200 jobs in addition to seasonal employment. As noted there are a number of ongoing and potential new developments along the corridor which could have significant economic impacts if realised, including residential development (SA1, Coed Darcy), office development (Swansea University, Swansea Docks), and manufacturing and warehouse development (Swansea Docks).

The quality of the transport corridor could have implications for future take up of development land and occupancy of currently undeveloped sites. Industrial and warehousing operations particularly value the speed and reliability of the road network for the movement of goods. Therefore, the creation of a strategic corridor with reduced travel times and improved capacity would be expected to have positive impacts on adjacent industrial and warehouse development.

Reliability is also likely to be a concern for occupiers of office space, particularly in regard to peak time commuter access. However, for office and residential development, the quality of the public realm is also likely to be very important and therefore the creation of a community corridor and the quality of public transport will be critical.

Perceptions of Access to Swansea City Centre

Swansea lacks a clear gateway from the east. The creation of an improved corridor in combination with public transport and Park and Ride improvements could impact on perceptions of Swansea and the ease of access to the City Centre. This would increase footfall and associated trade. This is of particular relevance given the future retail-led development for the Quadrant/St Davids area of the city.

Labour Market Impacts

Access to a suitably qualified labour force is an important determinant of economic performance. Transport improvements can enable people to take up new employment opportunities and contribute to a conducive business environment. Improving public transport along the Fabian Way corridor, in addition to improving the reliability of road traffic will support this objective.

8.4.3 Environmental Appraisal Criteria

Noise

Noise nuisance from transport sources can adversely affect the quality of life for local communities. Transport proposals may generate additional noise during both construction and operation. Only operational noise impacts have been considered as construction effects are temporary and unlikely to influence the overall decision-making process.

Noise from transport is measured in dB(A) and it is generally accepted standard that changes in noise levels more than 3 dB(A) are regarded as significant. Noise is expressed as a logarithm function of flow and speed. A change in noise levels of 3 dB(A) would only be achieved by a halving or doubling of the total traffic flow. Although the options do make improvements in terms of reduction traffic flows, none of these are regarded as significant.

In terms of traffic noise, all of the Packages are considered to have slight beneficial effects.

Local Air Quality

Exhaust emissions from transport sources disperse in the air, affecting local air quality. Above certain levels, these can affect human health, sensitive habitats and the urban environment through the soiling of materials and buildings/structures. The key local pollutants arising from transport are small particulates (PM_{10}) and nitrogen dioxide (NO_2).

Significant detailed assessment would be required to undertake a useful quantitative calculation of emissions. A qualitative assessment of the likely impact on air quality of each Package has therefore been undertaken.

In broad terms, the performance of each Package in relation to emissions of NO_2 and PM_{10} will be a function of the reduction in the total veh-km travelled on the network compared to the Reference Case.

The western part of the Study area abuts the Hafod Air Quality Management Area (AQMA). The AQMA was declared because of the predicted failure of achieving the required air quality objectives for nitrogen dioxide. The failure is believed to be principally traffic-related and so the AQMA Action Plan includes the following measures:

- **Promotion and Provision of Alternatives** – travel plans; safer routes to schools; improved walking and cycling facilities; Park and Ride provision; enhancement of bus and rail stations; and improved internet access to information.
- **Managing The Road Network** – enforcement of bus only lanes; improved bus provision; bus corridor enhancement; bus priority routes; intelligent traffic signals; traffic management at pollution 'hot spots'; removal of existing Neath Road traffic management schemes; and improvements at Quay Parade Bridges.
- **Emission Management** – roadside testing; promote/pilot alternative vehicles/fuels; encourage the use of natural gas for diesel heavy goods vehicles; and City Centre car park charging schemes.

The AQMA is peripheral to the Study area, but traffic entering Swansea from the east is likely to contribute to the problems in the City Centre. The most recent progress report[16] on the AQMA indicated that nitrogen dioxide objective levels continued to be exceeded, with monitoring indicating the possibility of the annual mean objective being exceeded outside of the AQMA within the Sketty, Llansamlet, Morriston, Fforestfach and St Thomas areas.

It is difficult to make a useful prediction about whether the air quality issue within the Study area is likely to continue in the long-term. Whilst emissions per vehicle may be reduced through technological improvements, these would be countered by increases in traffic levels and congestion. Air quality has therefore been considered in the context of:

- the predicted changes in veh-km compared to the Reference Case; and
- how the measures in each Package would contribute to the actions required by the current AQMA Action Plan.

All the packages perform better than the Reference Case, reducing veh-km by between 11 and 19%. All Packages can therefore be described as having slight beneficial effects as they are likely to reduce daily emissions to some degree.

Packages 2 and 4 contribute most measures that align with those of the AQMA Action Pan. Packages 1 and 3 appear to contribute the fewest measures that would implement the AQMA Action Plan.

Greenhouse Gas Emissions

The performance of each package in relation to greenhouse gas emissions will be a function of the reduction in the total veh-km travelled on the network compared to the Reference Case. The proportion of non-car trips is also a possible indicator, as it implies modal shift to more sustainable transport options.

The European Union objective for car emissions is a target of 120g/km CO_2 by 2012. This figure has been used to calculate daily emissions from the network. For the Reference Case, daily emissions from the network would be 2,100kg CO_2.

All the Packages perform well against this baseline, reducing veh-km by between 11 and 19%. Package 2 offers the greatest reduction in CO_2 emissions with 19%, equating to 400kg CO_2. Packages 1 and 4 are broadly comparable, with reductions in vehicle-km of 14-16%. Package 3 is predicted to offer the least reduction in emissions.

All Packages can therefore be described as having moderate beneficial effects.

Landscape and Townscape

There are no landscape (e.g. Areas of Outstanding National Beauty (AONB), National Park) or townscape (e.g. conservation areas) designations that could be adversely affected by any of the Package options.

Packages 2, 3, and 4 include a new grade-separated junction on Fabian Way at Jersey Marine. The raised slip roads on the south side may provide vehicle travellers with near views of the sand dune habitat at Crymlyn Burrows.

All of the options provide at least some opportunity for public realm improvements that would enhance the townscape. Although none are explicit in providing for these, it is reasonable to assume that some enhancements would occur. For this reason, all of the Packages are considered to have slight beneficial effects.

Biodiversity

The Countryside and Rights of Way Act 2000 places a duty on all public bodies to “conserve and enhance” Sites of Special Scientific Interest in the exercise of their powers. Sites of international importance such as Crymlyn Bog have the highest degree of statutory protection, which directs plans and projects to avoid significant effects to their habitats and species of special interest.

Packages 2 and 4 include a segregated bus way north of Fabian Way utilising an extant (but disused) rail corridor in close proximity to Crymlyn Bog, a site of international importance for its wetland habitats and species. The measure is unlikely to have direct effects on Crymlyn Bog, but if implemented would also need to avoid any indirect effects; these are most likely to arise from construction impacts or effects on water quality within the site.

Packages 2, 3, and 4 include a new grade-separated junction on Fabian Way at Jersey Marine. The slip roads for the new junction are likely to directly encroach into the northern boundary of Crymlyn Burrows SSSI. This site is of special interest for its sand dune and salt marsh habitats, as well as several associated rare plants and invertebrates. Populations of one of these plants are known to occur close to the northern boundary. Further study would be required to fully assess the effects on the SSSI, but it is likely that there would be secondary effects in terms of habitat degradation, increased visitor pressures and cumulative effects from other development around the SSSI. It is not certain that all of these effects could be addressed through mitigation measures. However, design and construction of a new junction would present an opportunity for improvements in water quality from enhanced treatment of the road run-off that currently discharges into the SSSI.

Packages 2, 3, and 4 are considered to have moderate adverse effects on biodiversity because of the potential effects on the Crymlyn Burrows SSSI.

Heritage

There are no historic landscapes or registered parks and gardens within the Study area. There are a small number of Scheduled Ancient Monuments and listed buildings. However, none of the Packages are likely to affect the features or settings of these designations. The impact of all the Packages on the historic environment is therefore neutral.

Water Environment

All Packages take into account proposals and aspirations for the restoration of the Tennant Canal by protecting the route.

Packages 2 and 4 include construction of a new bus-only bridge to south of existing Tawe Bridges. This may have effects arising from construction and the issue of a further structure across the river. However, the scale of such effects is likely to be small and should be addressed through appropriate mitigation measures. These effects are best described as minor adverse.

Packages 1 and 3 do not interfere with any watercourses and are unlikely to create significant water quality issues and are therefore regarded to have neutral effects.

Soils

Most of the Study area comprises urban or other built development; vacant land is typically brownfield and previously developed. Soils on undeveloped land are mainly deep peat (Crymlyn Bog) or free-draining sand dune soils (Crymlyn Burrows), with some areas of poor quality shallow acid soils on Kilvey Hill and the slopes above Jersey Marine.

There are known sites affected by historical land contamination and historical landfill sites. Tir John landfill site stopped receiving waste in 2006.

None of the Packages contain measures that are likely to affect agricultural soils (of any grade). None of the measures are anticipated to interfere with (or provide opportunities for remediation of) contaminated land or landfill sites. The impact of all the Packages on the soil environment is therefore neutral.

8.4.4 Societal Appraisal Criteria

WelTAG states that the social impact of transport proposals is often difficult to quantify and there is a lack of an established approached to appraisal of societal criteria. However, social perspectives such as quality of life and health are often key elements of any transport proposal.

Transport Safety

Increasing the safety of the transport system in Wales is a key priority. It tends to be linked to a reduced risk of transport related accidents. Within the Fabian Way corridor, existing traffic accident clusters have been identified at the key junctions of the Tawe Bridges, the SA1 Gateway, the Park and Ride junction at Port Tennant and Jersey Marine.

It is worth noting that improvements to the Jersey Marine junction were completed in spring 2008. The majority of the accidents identified at Jersey Marine occurred prior to the completion of the improvements works, so it is assumed that the accident rate at Jersey Marine has now decreased.

There is no data available regarding off-road accidents involving non-motorised users.

WelTAG emphasises that clear separation between vulnerable road users such as cyclists and pedestrians from motorised traffic may reduce the risk of personal injury accidents, but may also incur negative permeability and social inclusion impacts. In fact, WelTAG states that there is evidence that increased activity by vulnerable road users increases their safety.

Packages 1 and 2 focus on the creation of a community corridor along Fabian Way, with a reduced speed limit west of the Jersey Marine junction. Pedestrians and cyclists would have more interaction with traffic with a new at-grade junction at Baldwins Bridge and new at-grade crossing near SA1. However, the severity of traffic accidents is likely to be reduced due to lower traffic speeds. Pedestrian activity generated by bus routes will be relocated away from Fabian Way towards the segregated busway with Package 2, reducing potential conflict.

The strategic transport link proposed as part of Packages 3 and 4 would increase separation between traffic and vulnerable road users with a parallel development access road and grade-separated junctions. Pedestrian activity along the route is likely to decrease, particularly with Package 4 where public transport is segregated.

The Reference Case would generate greater traffic flows which may increase the number of accidents.

Personal Security

WelTAG defines personal security as risk or perceived risk of attack or robbery. It can influence travel behaviour and mode choice, and is of particular importance to vulnerable users.

All four Packages under consideration include expansion of both the walking and cycling and bus networks to serve the proposed developments. In addition, all four Packages feature measures to improve waiting facilities at bus stops and interchanges and to enhance key pedestrian and cycle facilities by providing lighting and information.

Well-used routes that are overlooked by occupied buildings offer informal surveillance, therefore an increased proportion of non-car users will generally improve personal security. Packages 2 and 4 feature a dedicated off-line public transport route that should encourage drivers away from their cars; thereby increasing the proportion of walkers and cyclists along the corridor. The Reference Case would not offer any change from the existing situation.

Permeability

Permeability relates to the ease of movement within an area by non-motorised users. It includes consideration of physical obstructions to movement such as railway lines, and capacity to reach key services.

Fabian Way forms a significant barrier between communities and developments to the north and south. The severance issue was raised at an early stage in this Study by the Stakeholders and the local community. It is directly addressed by Study Objective 6. All four Packages attempt to improve north-south permeability across the site by increasing the number of pedestrian and cycle crossings.

It is important that new developments have both internal and external links by alternative modes to key destinations. All four Packages under consideration include the expansion of both the walking and cycling and bus networks to serve the proposed developments, including providing access to key services.

Packages 1 and 2 prioritise the needs of the existing and potential communities along the corridor, rather than traffic flows along the main line. Packages 1 and 2 therefore offer more opportunities to cross Fabian Way compared to Packages 3 and 4. The Reference Case would not offer any change from the existing situation.

Physical Fitness

WelTAG states that health is a key priority within Wales. Walking, cycling and travelling on horseback can offer health benefits through increased physical activity. It is well established that there is a strong link between poverty and poor health. The Swansea and Neath Port Talbot areas are both above average in terms of levels of deprivation. Nonetheless, expanding and improving facilities for active travel should encourage physical activity.

All four Packages under consideration include expansion of the existing walking and cycling networks to serve the proposed developments and enhancement of key pedestrian and cycle facilities. Short journeys on foot or by cycle may be more attractive than the private car with all four Packages due to the potential increase in traffic and therefore congestion associated with the proposed new developments. The Reference Case would not offer any change from the existing situation.

Social Inclusion

Lack of suitable transport can be factor in social exclusion. WelTAG defines social inclusion as the degree to which members of society are able to lead a full life. For the purposes of

this appraisal, it is considered to be synonymous with accessibility, or the ease with which people can access key services.

Within the Study area, over half the residents of the Castle ward (more than 5,000 people) do not have access to a car or van. It is therefore important that journeys to key services are achievable using alternative forms of transport. Public transport offers access to services that are too distant for walking or cycling journeys.

All four Packages under consideration include expansion of both the walking and cycling and bus networks to serve the proposed developments. In addition, all four Packages feature measures to improve waiting facilities at bus stops and interchanges. Packages 2 and 4 offer an enhanced bus service with a segregated busway in comparison to Packages 1 and 3. Trips between the Fabian Way communities and developments to Swansea City Centre will be faster and more reliable using the segregated busway than services following the main line. The Reference Case would not offer any change from the existing situation.

Equality, Diversity and Human Rights

WelTAG states that WAG is committed to ensuring that all demographic groups can take advantage of transport services. The Fabian Way site area has a majority white ethnic population with mainly Christian beliefs. The age structure and gender split of residents of the Study area is similar to the national average.

None of the four Packages or the Reference Case will have either a positive or negative discriminatory impact on any individual equality impact group.

8.5 Appraisal Against Transport Criteria

8.5.1 Introduction

This section describes the resulting impacts of future travel conditions along the corridor. The results of this assessment are based on output from the transport model developed for this Study and include the following criteria:

- junction capacity;
- link capacity;
- journey time; and
- modal split.

8.5.2 Junction Capacity

The capacity of an urban highway network is typically limited by the capacity of its junctions rather than by the capacity of the highway links between them. The key junctions along Fabian Way were assessed to compare their flow to capacity ratio within each Package. These key junctions are (from east to west):

- Jersey Marine junction;
- Elba Crescent / proposed University access;
- Baldwins Bridge;
- Langdon Road / Park and Ride;
- the SA1 main access; and
- the Tawe Bridges.

The Jersey Marine junction and Tawe Bridges capacity improvements were assessed by reviewing previous studies and comparing the proposed traffic flows against the cases presented in the reports. The remaining junctions were assessed using LinSig models.

This assessment shows that all junctions would be over capacity in the Reference Case, resulting in large queues and significant delays during the peak hours.

In comparison with the Reference Case, the modal shift associated with public transport improvements within each of the four proposed Packages would reduce traffic levels. There would be improvements in the flow to capacity ratios on all junctions, with two exceptions. The proposed at-grade signal controlled junction at Baldwins Bridge would be over capacity in the evening peak for Package 1 and approaching capacity for Package 2. The development access road connection at Baldwins Bridge in Packages 3 and 4 relieves traffic through the Elba Crescent / proposed University access and Jersey Marine junctions.

Further details are provided in Appendix N of the Technical Appendices Report.

8.5.3 Link Capacity

Advice on the link capacity of highways is set out in TA 79/99 in the Design Manual for Roads and Bridges (DMRB)[37]. This guidance sets out the maximum hourly vehicle capacity for various types of urban road. The classification of Fabian Way falls into two road types:

- from junction 42 of the M4 to Langdon Road / Park and Ride junction is classified as UAP1: a high standard single/dual carriageway road carrying predominantly through traffic with limited access; and
- from Landon Road / Park and Ride junction to the Tawe Bridges is classified as UAP2: a good standard single/dual carriageway road with frontage access and more than two side roads per kilometre.

It should be noted that both sections of Fabian Way have 7.3m wide carriageways.

Under Packages 1 and 2, Fabian Way would be reclassified from Baldwins Bridge to Landon Road / Park and Ride junction from UAP1 to UAP2, with a corresponding reduction in link capacity.

The link capacities along the corridor were assessed for the four Packages and the Reference Case for the morning and evening peak hours. The section of Fabian Way from the Tawe Bridges to Langdon Road / Park and Ride junction would be nearing or over capacity in an eastbound direction in the morning peak and in a westbound direction in the evening peak in all scenarios. This section of Fabian Way would be around 20% over capacity in the Reference Case. It would be slightly over capacity for Packages 1 and 3, approaching capacity for Package 2 and at capacity for Package 4 as a result of the improvements to transport efficiency proposed as part of each Package.

The section of Fabian Way from Langdon Road / Park and Ride junction to Baldwins Bridge would be over capacity in the Reference Case, slightly over capacity for Packages 1 and 3 and approaching capacity for Packages 2 and 4.

The remaining sections of Fabian Way would be largely within capacity for all cases considered, though the Reference Case would approach capacity in a number of isolated areas.

In addition, the recently constructed Ffordd Amazon would be over capacity in an eastbound direction in the evening peak hour due to the traffic associated with the Coed Darcy Urban Village, proposed developments north of Fabian Way and the new Park and Ride site. It is likely that this link would require widening to increase capacity as far as the junction with the proposed Coed Darcy Southern Access Road.

Further details are provided in Appendix N of the Technical Appendices Report.

8.5.4 Journey Time by Private Transport

Maintaining or improving journey times by all modes is a key objective of this Study. However, reducing journey time by private car is likely to discourage transport users from switching to more sustainable modes. It is important to strike a balance between facilitating journeys by private car and encouraging alternative modes.

The journey times for cars along the corridor have been estimated for each of the Packages. Generally, the reduced speed limits proposed in Packages 1 and 2 increase the journey time compared to the Reference Case, while the junction improvements associated with Packages 3 and 4 decrease journey times.

While reducing journey time by private car would discourage users to switch to more sustainable modes, it is important not to overly disadvantage the majority share of transport users of the corridor.

Table 8.8 shows a comparison of journey times in the Reference Case and under each Package for a typical trip by car from Neath to Swansea City Centre.

Table 8.8: Journey Times by Car from Neath to Swansea City Centre

Package	*Approximate Journey Time (mins)*	*Level of Congestion during the Peak Hours*
Reference Case	33	heavy
Package 1	34	medium to heavy
Package 2	34	medium
Package 3	31	medium
Package 4	31	medium

8.5.5 Journey Time by Public Transport

Reducing journey time by public transport is a key driver to encourage modal shift away from the private car.

Bus journeys will be improved under each of the four Packages through increased frequency of existing services, provision of new services and improved interchange between services. The inclusion of a segregated busway in Packages 2 and 4 will provide a high speed uninterrupted link from the Baldwins Bridge area to beyond the Tawe Bridges, significantly reducing journey time and increasing reliability.

Table 8.9 shows a comparison of the journey times in the Reference Case and under each Package for a typical trip by bus from Neath to Swansea City Centre. It can be seen that provision of the segregated busway offers a significant reduction in journey time.

Table 8.9: Journey Times by Bus from Neath to Swansea City Centre

Package	*Approximate Journey Time (mins)*
Reference Case	43
Package 1	42
Package 2	36
Package 3	41
Package 4	36

None of the proposed improvements will affect journey time by rail.

8.5.6 Modal Split

Several of the Study Objectives could be achieved by reducing vehicle traffic and promoting more sustainable travel modes. The proportion of trips by each mode is therefore important.

The choice of travel mode has been estimated for the Reference Case and each of the four Packages based on modal split information from 2001 Census Data. Travel recorded as 'Journey to Work' is split into six categories:

- Car (Driver);
- Car (Passenger);
- Train;
- Bus;
- Cycle; and
- Walk.

The Reference Case assumes the modal split remains largely as recorded in the Census, and as such travel associated with the proposed developments has been split according to these proportions.

Elasticity factors were calculated from the 2001 Census Data such that changes in the journey times by mode influence the relative attractiveness of each mode. Modal splits for each Package have been estimated by considering the zone to zone journey times for each mode in combination with the elasticity factors.

The proportion of trips made by train, bus, cycling or walking during the peak hours in the Reference Case is 15%. This proportion is estimated to increase to 17% under Package 3, up to 20% under Package 1, up to 21% under Package 4 and up to 24%under Package 2.

8.6 Appraisal Against Study Objectives

8.6.1 Introduction

A key aspect of WelTAG requires the Packages to be appraised against the Objectives developed for the Study, in order to ensure the Packages are related to the problems identified in the Study area. The paragraphs below describe this process.

8.6.2 Refinement of Objectives

Feedback from the second Stakeholder Workshop identified that the wording of several of the Study Objectives needed to be refined to ensure clarity of the intended meaning. Stakeholders felt that Objective 1 should include a reference to journey time duration as well as reliability and predictability. Objective 5 has been amended to remove the reference to journey experience in order to focus attention on the need to define a gateway.

The Study Objectives have thus been refined as shown in Table 8.10 below.

Each Study Objective is broadly related to the appraisal criteria covered previously as part of the Welsh Impact Areas.

Objectives 1 and 2 will be double weighted in the appraisal process to reflect their greater significance in comparison to the other Objectives.

Table 8.10: Refined Study Objectives

Ref	Objective
1	To maintain or improve the duration, reliability and predictability of journey times on the corridor for business, commuting and freight
2	To reduce congestion and delay at the Tawe Bridges
3	To actively promote ultra-low carbon alternatives such as walking and cycling and low carbon alternatives such as public transport options in order to double the modal share for alternative modes of travel along the length of the corridor
4	To increase public transport capacity along the corridor
5	To define a clear gateway into Swansea from the east for transport users along the corridor
6	To improve connectivity and accessibility between communities and developments north and south of Fabian Way
7	To protect, enhance and improve access to green space within the Study area, particularly Crymlyn Bog and Crymlyn Burrows
8	To minimise the adverse impacts on air quality for local residents arising from transport

8.6.3 Study Objectives 1 and 2

The capacity analysis has demonstrated that all four Packages would reduce journey times compared to the Reference Case. All four Packages include improvements at the Tawe Bridges junctions to increase capacity. Package 4 would offer the most improvement due to upgraded junction infrastructure along the main line and the removal of development traffic and public transport. However, Package 2 would generate the least delay and congestion at the Tawe Bridges. Whilst vehicles could travel faster along Fabian Way with Package 4, traffic flows would slow down at the Tawe Bridges junction. Traffic would be more spread out with Package 2 due to the lower speed limit, so the queues at the Tawe Bridges would be reduced.

All Packages also offer enhanced public transport options to encourage drivers away from their cars. The proposed segregated busway in Packages 2 and 4 will enable bus movements to be independent of traffic conditions on the Fabian Way main line. Public transport trips should therefore be more reliable with more predictable journey times. The advantages of the segregated busway should attract drivers away from their cars, thereby reducing vehicle flows along Fabian Way.

8.6.4 Study Objectives 3 and 4

All four Packages under consideration include expansion of both the walking and cycling and bus networks to serve the proposed developments. In addition, all four Packages feature measures to improve waiting facilities at bus stops and interchanges and to enhance key pedestrian and cycle facilities by providing lighting and information. Packages 2 and 4 feature the segregated busway which should provide improved reliability and predictability of services.

8.6.5 Study Objective 5

With regard to Objective 5, it is difficult to manufacture a clear gateway into a city. Traditionally, transport users become aware that they are entering a city environment when the surrounding land use becomes visibly urban. As the Fabian Way corridor is developed, this will start to occur naturally. However, Packages 1 and 2 proposed a reduction in speed limit from Jersey Marine and an increased number of at-grade pedestrian and cycle crossing points. Slower speeds and more traffic signals should increase drivers' awareness that they are entering the city of Swansea.

In addition, all Packages include a new / additional Park and Ride site north of the Amazon Distribution Centre. This would be indicated with variable message and static signing at Jersey Marine to encourage drivers to use the Park and Ride service. The presence of a well-signed Park and Ride facility should ensure drivers are aware that they are approaching the city. All Packages also feature a new smooth gradient pedestrian and cycle bridge over Fabian Way near the SA1 development. This could be used as an iconic gateway feature that defines the entry to the City Centre from the east.

8.6.6 Study Objective 6

Connectivity and accessibility is directly addressed as part of the assessment of permeability under the social section of the Welsh Impact Areas. Severance issues between the communities and developments to the north and south of Fabian Way can be improved by increasing the number of crossing points along key desire lines. Packages 1 and 2 include more crossing points as at-grade signalised pedestrian and cycle crossings are easier to accommodate on-road with slower vehicle speeds.

8.6.7 Study Objective 7

All four Packages include expansion of the existing walking and cycling network. Various new routes are proposed to link access to and through the Crymlyn Bog area, opening up the periphery of the SSSI site to walkers and cyclists. None of the individual measures under consideration in any of the Packages should have a direct adverse impact on the green spaces with the Study area, other than constructing a grade separated junction at Jersey Marine as part of Packages 2, 3 and 4. The slip roads would encroach slightly into the northern section of the Crymlyn Burrows SSSI. The northern part is not the most significant area within the site, but rather acts as a buffer zone protecting the key intertidal zone.

8.6.8 Study Objective 8

This Study Objective is intimately related to the air quality criteria described and assessed under the environmental Welsh Impact Area.

8.7 Other Appraisal Criteria

8.7.1 Introduction

This part of the appraisal process focuses on the following elements:

- Public Acceptability;
- Stakeholder Acceptability;
- Technical and Operational Feasibility;
- Financial Affordability and Deliverability; and
- Risks.

8.7.2 Public Acceptability

Community Newsletter

The problems and opportunities raised in the responses to the community newsletter have been incorporated into the options development process. Whilst direct feedback on the four proposed Packages has not been obtained from the community, the responses to the newsletter give an indication of the likely acceptability.

Parking was raised as a key issue. All four Packages include parking controls and a residential parking scheme.

Congestion along Fabian Way was another priority raised by respondents. All four Packages aim to address potential future congestion by a combination of infrastructure improvements to increase capacity and modal shift to alternative modes of transport to the

private car. Packages 3 and 4 would provide the greatest reduction in congestion by prioritising highway access. However, Packages 3 and 4 also incorporate the fewest carriageway crossings of Fabian Way in order to maintain constant vehicle flows.

Lack of safe access to the SA1 development was also raised by the community as an issue. Packages 1 and 2 offer more crossing points but increased congestion due to lower speed limits and more at-grade junctions and crossings.

SA1 Travel Forum

The SA1 Travel Forum did not identify a preferred Package from the four proposals, as members felt that the details and method of delivering the significant infrastructure measures would be more important than the choice of Package. Nonetheless, the Forum considered that all four Packages seem capable of fully addressing the key issues raised.

8.7.3 Stakeholder Acceptability

The second Stakeholder Workshop was held on Thursday 26th February 2009 at WAG's offices at Penllergaer Business Park, Swansea. The aim of this event was to obtain feedback from the Stakeholders on the Packages of transportation measures proposed. Participants were divided into four focus groups broadly corresponding to their interests: Economy; Environment and Community; Development; and Freight and Public Transport.

Fit of Packages with the Study Objectives and WTS Outcomes

During the first break out session, participants were asked to discuss and assess how well each proposed Package of measures addresses the Study Objectives and the Wales Transport Strategy outcomes. Groups were asked to rank each Package using a six-point scale as follows:

++ Package would substantially meet the Study Objectives

+ Package would help to meet the Study Objective

o Package is unlikely to have any impact on meeting the Study Objective

- Package could compromise the delivery of the Study Objective

- - Package would seriously compromise the delivery of the Study Objective

? Effect of the Package is uncertain

The results of each Group's discussions were recorded on pre-printed forms. The combined scores for each Package give an indication of how well each Group felt each Package met the Study Objectives and fitted with the Wales Transport Strategy outcomes.

Numerical scores were assigned with 2 points for each **++**, 1 point for each **+**, zero points for a score of **o**, -1 points for each **-** and -2 points for each **- -**.

It should be noted that although some of the Study Objectives may be considered more important that the others, for the purposes of this exercise no weightings have been applied.

Table 8.11 below summarises how each Group scored each Package in terms of fit with the Study Objectives. Packages 2 and 4 were considered to meet the Study Objectives most positively.

Table 8.11 Package Fit with Study Objectives

Group	*Highest Scoring Package*	*Second Highest Scoring Package*	*Third Highest Scoring Package*	*Lowest Scoring Package*
Economy	4	2	3	1
Environment and Community	4	2	3	1
Development	2	4	1	3
Public Transport and Freight	2	4	1	3

Table 8.12 below summarises how each Group scored each Package in terms of fit with the Wales Transport Strategy outcomes. It is more difficult to provide a summary of each Group's scores for this element due to the high number of question marks allocated. Nonetheless, Package 2 scored highest overall across all the Stakeholders present.

Table 8.12 Package Fit with Wales Transport Strategy Outcomes

Group	*Highest Scoring Package*	*Second Highest Scoring Package*	*Lowest Scoring Package*
Economy	3 and 4	n/a	1 and 2
Environment and Community	Not scored		
Development	2	4	1 and 3
Public Transport and Freight	2	1 and 4	3

Omissions

Participants were also asked to consider any omissions from the Packages. The following omissions were identified by the participants during the session:

- Link to Swansea High Street railway station;
- Grade-separated junction serving the proposed University campus;
- Access to green spaces;
- Extend dedicated bus route to Park and Ride; and
- Highway access to Burrows Sidings.

It also became clear that the wording on several of the Study Objectives needs to be amended to ensure clarity (see section 8.6.2 of this report for more details).

Significance of Measures

The second break out session considered the significance of the measures within each Package, relevant to each Group's theme and individual interests. Groups were asked to rank each measure within each Package according to its importance, with 1 as the most significant. The results of this exercise will be assessed as part of the implementation strategy in section 11 of this report.

A complete record of the second Stakeholder Workshop is contained within Appendix B.

8.7.4 Technical and Operational Feasibility

Infrastructure

All four Packages include improvements to the Tawe Bridges. Significant physical alterations would be complicated to construct whilst maintaining through traffic, although the new bus only bridge south of the existing bridge using the historic piers proposed as part of the segregated busway in Packages 2 and 4 would be helpful for temporary traffic diversions.

All Packages also include a new smooth gradient pedestrian and cycle bridge over Fabian Way near the SA1 development. There is limited land available in this area, and although a site with favourable levels has been identified, the construction works for this bridge would be restricted by space.

The proposed grade-separated junction at Jersey Marine in Packages 2, 3 and 4 would also be very restricted by space. It is likely that traffic would have to be temporarily diverted onto a new section of carriageway to the north of the proposed elevated section. The works would be restricted to the south by the Crymlyn Burrows SSSI site.

The proposed alterations to the Baldwins Bridge junction in all four Packages are more likely to be able to be accommodated by constructing the new bridge or junction off-line to the east of the existing bridge.

East of the existing Park and Ride site, the segregated busway featured in Packages 2 and 4 would follow Wern Fawr Road then the route of a disused spur of the freight railway line. It would cross the Tennant Canal and the live railway line via a new bridge, then cut across the disused southern section of Swansea Burrows Sidings before joining Amazon Way at a bus gate. The entirety of this route can be constructed off-line, however, it takes land currently owned by Network Rail and let to DB Schenker on a long term lease. Both parties have been consulted and are happy in principle to relinquish the required land as it is currently disused.

Diversion of existing utilities may be necessary to achieve some or all of these infrastructure improvements. Services diversions can be costly and time consuming.

Management

The statutory authorities have confirmed that it is difficult to enforce the current 50mph speed limit west of Jersey Marine. Enforcing a lower speed limit would be even more difficult, probably necessitating fixed speed cameras at regular intervals along Fabian Way.

Limits on parking spaces for new developments could be implemented during the planning process using directions and objectives in a site-wide Travel Plan.

8.7.5 Financial Affordability and Deliverability

The capital and recurring costs of each of the measures has been identified in broad terms using a range of available information. The aim of the costing exercise was to establish the order of magnitude of costs sufficient for input to the appraisal process. Some costs are more firmly established than others.

The capital cost estimates cover the costs of the civil and engineering works associated with the measure. In most cases it was not possible to include the cost of land acquisition. For some items, principally the major junction improvements, cost ranges have been identified to cover unknown details such as ground conditions and services diversions. In addition no costs have been assigned for mitigation measures that may be required to address the environmental consequences of the measures.

The recurring cost of each of the measures comprises three main items:

- operating and maintenance cost of additional bus services;

- maintenance cost of the new infrastructure; and
- operating costs of the measure, such as staffing, advertising, fuel, vehicle leasing etc.

It should be noted that the recurring costs exclude any additional revenues generated.

The Package costs are detailed in Table 8.13 in the Tables section of this Report, with the complementary measures provided separately in Table 8.14 in the Tables section of this Report. The costs for each Package are summarised in Table 8.15 below. All costs are based on 2009 prices and are not discounted. The costs given are net of and additional to the costs associated with the Reference Case.

It must be emphasised that, at this stage, the costs are only approximate; therefore should only be use for comparison purposes to allow a basic decision on the preferred strategy to be made.

Package 4 has the highest capital cost, due to the extensive junction modifications and segregated busway. Package 2 has the second highest capital cost as there are less significant junction modifications due to the reduced speed limit. Package 1 has the lowest capital cost, primarily because it does not include converting the Jersey Marine junction to grade-separated solution. This measure has the highest associated capital cost of £20m to £25m.

First Cymru Buses Ltd has indicated support for the new and amended existing bus routes proposed as part of all four Packages. Any services that First do not believe could be run commercially in the first instance would have to be subsidised.

Table 8.15: Summary of Package Costs (2009 - £m - Net of Reference Case)

Package	*Minimum Capital*	*Maximum Capital*	*Recurring / year*
1	16.1	20.1	2.41
2	44.1	57.1	2.46
3	38.2	51.7	2.35
4	46.4	63.9	2.39

Table 8.15 shows that Package 4 is the most expensive and Package 1 is the least expensive. The capital costs are the key driver in the overall scheme costs, with the recurring costs similar for all Packages.

8.7.6 Risks

Infrastructure

There are always risks associated with significant alterations or additions to existing infrastructure. Key risks include the cost of any services diversions and unforeseen ground conditions. Packages 2, 3 and 4 are most susceptible to this type of risk as they involve significant junction modifications and the construction of a new segregated busway.

Third Party Involvement

All Packages involve use of additional land to accommodate transport interventions. The landowner may not be keen to sell or allow access through their site. Packages 2 and 4 utilise land owned by Network Rail and currently operated by DB Schenker. Packages 2 and 4 also include land take within the SA1 development.

Lack of Use

There are operational risks that facilities or services provided will not be well-patronised, and as such will not be value for money or self-sufficient in the long term. The proposed new/additional Park and Ride site and the amendments to the existing site will only be

considered a success if First can operate the bus service on a commercial basis once established. Similarly, new or amended bus services need to attract users to guarantee their success and longevity.

The success of improvements to the walking and cycling network will also be judged depending on the level of use on completion.

The bus, pedestrian and cycle proposals included in each Package have been designed to suit anticipated desire lines and journeys associated with the development aspiration of the corridor.

8.8 Appraisal Summary Tables

8.8.1 Reference Case

The Reference Case includes ongoing maintenance of the existing facilities and infrastructure within the Study area and transport interventions associated with the committed development of 4,000 homes at Coed Darcy.

The measures included in the Reference Case are listed in section 8.2 of this report and shown graphically on Figure 8.1.

Table 8.16 in the Tables section of this Report gives the results of the appraisal process in the format of a WelTAG Appraisal Summary Table.

8.8.2 Appraisal of Package 1

Package 1 considers Fabian Way as a community corridor. The aim would be to increase pedestrian activity with reduced speed limits and at-grade junctions and crossing points. Multiple development accesses would be permitted directly onto Fabian Way. Public transport services would be routed along the Fabian Way main line between the existing Park and Ride site and the proposed new/additional Park and Ride site north of the Amazon development.

The measures included in each Package for the purposes of the appraisal process is listed in section 7.5 of this report and shown graphically on Figures 7.5 and 7.9.

Table 8.17 in the Tables section of this Report gives the results of the appraisal process in the format of a WelTAG Appraisal Summary Table. Package 1 would reduce link capacity and journey times by car compared to the Reference Case due to the lower speed limit. However, it would provide significant environmental and social improvements, particularly in terms of permeability, encouraging alternative modes and creating a gateway into Swansea.

8.8.3 Appraisal of Package 2

Package 2 also considers Fabian Way as a community corridor. The aim would be to increase pedestrian activity with reduced speed limits and at-grade junctions and crossing points. Multiple development accesses would be permitted directly onto Fabian Way.

A segregated two-way bus route would be provided between the existing Park and Ride site and the proposed new/additional Park and Ride site north of the Amazon development, with two-way shuttle working across existing Park and Ride bridge and an additional bus-only bridge over the Tawe utilising the existing piers south of the main bridges.

The measures included in each Package for the purposes of the appraisal process is listed in section 7.5 of this report and shown graphically on Figures 7.6 and 7.10.

Table 8.18 in the Tables section of this Report gives the results of the appraisal process in the format of a WelTAG Appraisal Summary Table. Package 2 would reduce journey time by car compared to the Reference Case due to the lower speed limit. It would offer significant improvements in public transport with large beneficial impacts on modal split. Package 2 also offers the advantages of increased permeability, connectivity and creation of a gateway into Swansea.

8.8.4 Appraisal of Package 3

Package 3 considers Fabian Way as a strategic transport link into east Swansea from the M4. New grade-separated junctions at both Jersey Marine and Baldwins Bridge would increase vehicular capacity. Development accesses would be provided from a new road parallel to Fabian Way, so the number of direct accesses onto Fabian Way could be reduced.

Public transport services would be routed along the Fabian Way main line between the existing Park and Ride site and the proposed new/additional Park and Ride site north of the Amazon development.

The measures included in each Package for the purposes of the appraisal process is listed in section 7.5 of this report and shown graphically on Figures 7.7 and 7.11.

Table 8.19 in the Tables section of this Report gives the results of the appraisal process in the format of a WelTAG Appraisal Summary Table. Package 3 would provide a betterment in terms of transport along the corridor compared to the Reference Case. It offers slight improvement in social and environmental aspects.

8.8.5 Appraisal of Package 4

Package 4 also considers Fabian Way as a strategic transport link into east Swansea from the M4. New grade-separated junctions at both Jersey Marine and Baldwins Bridge would increase vehicular capacity. Development accesses would be provided from a new road parallel to Fabian Way, so the number of direct accesses onto Fabian Way could be reduced.

A segregated two-way bus route would be provided between the existing Park and Ride site and the proposed new/additional Park and Ride site north of the Amazon development, with two-way shuttle working across existing Park and Ride bridge and an additional bus-only bridge over the Tawe utilising the existing piers south of the main bridges.

The measures included in each Package for the purposes of the appraisal process is listed in section 7.5 of this report and shown graphically on Figures 7.8 and 7.12.

Table 8.20 in the Tables section of this Report gives the results of the appraisal process in the format of a WelTAG Appraisal Summary Table. Package 4 would improve transport movement along the corridor compared to the Reference Case, with significant modal split due to the segregated busway. It would have a positive impact on social aspects along the corridor, and a slight improvement in terms of the environment.

8.9 Summary

Table 8.21 in the Tables section of this Report gives a comparison of the results of the appraisal process for each Package.

The significance ratings for each appraisal criteria were converted into numerical scores by applying the following system:

Rating	*Score*
Large beneficial	+3
Moderate beneficial	+2
Slight beneficial	+1
Neutral	0
Slight adverse	-1
Moderate adverse	-2
Large adverse	-3

Table 8.22 below summarises the numerical scores derived from the appraisal process for each Package by category of criteria. It is worth noting that Study Objectives 1 and 2 are double weighted compared to other appraisal criteria to reflect their relative importance.

Table 8.22: Summary of Appraisal Scores for Different Packages

Appraisal Criteria	**Reference Case**	**Package 1**	**Package 2**	**Package 3**	**Package 4**
Economy	0	3	3	4	4
Environment	-4	4	3	3	3
Society	-1	5	8	5	8
Transport	-3	-1	6	4	9
Study Objectives	-4	13	18	12	16
TOTAL	**-12**	**24**	**38**	**28**	**40**

It can be seen that the appraisal process has shown that Package 4 performs best against the Welsh Impact Areas and the Study Objectives.

9 Preferred Strategy

9.1 Introduction

The Preferred Strategy Package 5 is a hybrid of Packages 2 and 4. It was created following the outcome of the appraisal process with the intention of providing a compromise between the community benefits of Package 2 with the transport efficiency of Package 4.

The Preferred Strategy Package 5 includes all the significant and complementary measures common to all Packages listed in section 7.5. It also includes the following options:

- Amendment to B15 – Two-way bus-only access west of proposed connection to Southern Access Road, rather than north of Baldwins Bridge
- Amendment to H9 – Reduce speed limit to 40mph west of Jersey Marine
- H4c – New grade-separated junction at Baldwins Bridge
- H5a – Do minimum at Jersey Marine junction with Fabian Way
- H10 and H11 – Parallel development access road with removed/reduced development accesses onto Fabian Way
- H7d – Segregated busway north of Fabian Way
- B2 and W14 – New bus-only bridge with cycleway to south of existing Tawe Bridges
- B3b – Operate two way shuttle working for buses across Park and Ride bridge

The following sections give an overview of the Preferred Strategy by mode. A schematic representation of all the measures within the Preferred Strategy Package 5 is shown in Figure 9.1. The significant infrastructure measures included in the Preferred Strategy are shown on Figure 9.2.

9.2 Highway Strategy

The Preferred Highway Strategy provides enhancement to key junctions and a reduction in speed limit. The outline layout of the proposed highway infrastructure is shown on Figure 9.2.

Capacity improvements will be implemented at the Tawe Bridges (Option H1b) with MOVA installed to maximise efficiency. This measure may require partial closure of two or more accesses onto the existing bridge junctions, and may complicate future proposals such as the Morfa Road scheme.

The Baldwins Bridge junction will be improved to a grade-separated junction (Option H4c), but the Jersey Marine junction will remain as existing for the next 25 years. The Jersey Marine junction has recently been upgraded to accommodate traffic from the Amazon Distribution Centre, and would be very expensive to convert to a grade-separated solution due to limited land availability and the close proximity of the Crymlyn Burrows SSSI. However, upgrading the Jersey Marine junction to grade-separated (Option H5b) will be included as a long term aspiration for the area.

The initial phase of the University second campus development will be accessed via the existing Elba Crescent signalised junction. A further new signalised access between Elba Crescent and Baldwins Bridge is planned to increase vehicular access in later stages. It is anticipated that once fully occupied, there may be an additional access point to the University's second campus from the new grade-separated junction at Baldwins Bridge, if the campus expands into adjacent land to the west in the future.

Ffordd Amazon is a partially constructed road allowing access to development plots north of Fabian Way. This road was proposed as part of the transport interventions associated with the Coed Darcy Urban Village. The Reference Case includes a bus-gate north of Baldwins Bridge allowing buses to follow a more direct route from Coed Darcy to Swansea City Centre compared to private cars that must travel via Jersey Marine.

The Preferred Strategy includes a two-way bus-gate on Ffordd Amazon to the west of the proposed entrance to the new / additional Park and Ride site (amendment to Option B15). General traffic will be able to access developments to the north of Fabian Way from either the Jersey Marine or Baldwins Bridge junctions, but will not be able to use Ffordd Amazon as a through route. Buses will be able to travel from Coed Darcy Urban Village to Baldwins Bridge via Ffordd Amazon, offering a reduced journey times and visible priority over the private car.

The Preferred Highway Strategy includes a reduction in the speed limit from 50mph to 40mph along the central part of the Fabian Way corridor. The inclusion of this measure in the Preferred Strategy reflects the aspiration to develop Fabian Way into a community corridor, a concept that has received overwhelming support from key Stakeholders. Whilst it is recognised that reducing the speed limit will incur travel time disbenefits to motorists, there are a number of benefits from this reduction, including:

- Safety – lower speeds should improve the safety record of Fabian Way with a reduction in the severity of accidents.
- Environment – noise and air pollution would be reduced for the surrounding residential areas.
- Travel Choice – walking and cycling would become more attractive without the intimidation of fast-moving traffic.
- Cost – more compact junction arrangements could be achieved with a lower design speed, making pedestrian and cycle crossing points easier to incorporate resulting in capital cost savings.

In addition, it should be noted that Fabian Way does not meet current design standards for a 50mph speed limit; therefore any amendment or improvement works undertaken on the highway would have to be completed to current design standards, which would be less onerous for a lower speed limit. It is also likely that average vehicle speeds will automatically become slower once the traffic signals associated with the University access points and the pedestrian crossing at the bus hub are implemented, as traffic streams will stop and start rather than flow continuously. As Fabian Way becomes more densely developed, the perceived eastern boundary of the City of Swansea will move further from the River Tawe – so changes in land use will contribute to creating an ‘urban’ feel to the corridor and an eastern gateway to Swansea further from the city centre. The new urban feel will be enhanced by slower moving vehicles..

9.3 Rail Strategy

The Preferred Rail Strategy seeks to maximise the use of the existing railway as a freight line (Option R2). This will be achieved primarily through securing freight subsidy grants. A longer term aspiration would be to create a combined passenger and freight line to maintain the rail freight facility but add a passenger connection to the east (Option R4).

9.4 Public Transport Strategy

The Preferred Public Transport Strategy focuses on enhancing and expanding the existing bus network and Park and Ride facilities. The proposed restructure of the bus network is shown in Figure 9.3.

The opportunity to expand the existing Park and Ride site into vacant land to the west of the existing parking area will be considered (Option B3a). Part of the expanded area could be converted to a Park and Walk site serving the SA1 development (Option B4c) or a Park and Cycle serving other parts of Swansea. SA1 employees could park all day at the Park and Walk site and access SA1 across the bus bridge used by the Park and Ride buses. It is recommended that a new Park and Ride site be constructed to the north of the Amazon

Distribution Centre (Option B4a). This site could be operated in addition to the existing facility, at least until it becomes established. The conversion of the current Park and Ride site into a Park and Walk/Cycle could then be considered.

A high-quality transport hub will be located on Fabian Way adjacent to the University's second campus access junction (Option B13a). The hub will be linked by a dedicated footway and cycleway to bus stops on Elba Crescent and will incorporate an at-grade pedestrian crossing of Fabian Way. Students, staff and visitors will be able to access the University directly via regional services from Cardiff, Neath, Bridgend and other eastern areas. In addition the Bright Orange Bus (BOB) services 82 and 82A that link the existing University campus to the City Centre will be extended to the second campus. A new shuttle bus service between the University, developments to the north of Fabian Way, SA1 and the City Centre will be established, potentially as an extension to Swansea Metro.

Bus links to Coed Darcy Urban Village will be improved by a combination of new services and the diversion / extension of services 155 and 156. The existing communities north of Fabian Way will be linked to the SA1 development via the diversion of existing bus services 31/32/33. Bus stops will be improved to provide better facilities such as seating, lighting and digital real-time passenger information.

Bus priority measures will be provided at signalised junctions between key development accesses (including the University) and Fabian Way. Junction approaches will be widened to create an additional bus-only lane to enable buses to bypass any queuing traffic.

9.5 Walking and Cycling Strategy

The Preferred Walking and Cycling Strategy aims to encourage walking and cycling through improvements to the existing network and facilities, with particular emphasis on crossing points along Fabian Way.

A new smooth gradient pedestrian and cycle bridge to link the SA1 development with the communities to the north of Fabian Way will be constructed (Option W15). This bridge will loop diagonally across the carriageway to join existing off-road routes to the north and south. It would provide a safe crossing suitable for all non-motorised users, and offers an opportunity to provide an iconic structure to indicate the entry to Swansea City Centre. The existing footbridge to the west of the Park and Ride junction will also be upgraded (Option W17), although ramped access my not be feasible due to space constraints.

Various walking and cycling proposals are aimed at users of particular developments. The Coed Darcy Urban Village development will benefit from improved walking and cycling links including new shared off-road cycle routes along the proposed Southern Access Road and on-road links along the existing minor unclassified road north of Jersey Marine (Options W3a and W10). The on-road cycleway on the B4290 will be extended through Jersey Marine village as far as the picnic site (Option W9a). In addition, a new on-road cycle route will be installed through the residential area of Port Tennant and St Thomas (Option W18).

Dedicated cycle routes will be constructed through the University site (Option W6) and through the SA1 development (Option W5a). The route through SA1 will be to the north of the Prince of Wales Dock and will provide a link to the Sail Bridge. The existing footway and cycleway along Ffordd Amazon will be extended as far as Baldwins Bridge (Option W11). Continuous pedestrian and cycle facilities will be provided along both sides of Fabian Way (Option W7).

The Strategy also includes proposals to enhance and extend the network of pedestrian and cycle routes used for leisure purposes to improve access to green space within the Study area. New off-road footway and cycle routes will be provided to allow users to circumnavigate Crymlyn Bog (Options W3b and W3c) and to head east from Jersey Marine through the golf course as part of the Wales Coastal Path proposal (Option W4b).

The existing shared route (footway, cycleway and bridle path) along the Tennant Canal will be extended from Celtic Trail NCN Route 4 in two phases. The initial phase will link the route to Jersey Marine village (Option W2a), while the second phase will extend the route to the M4 (Option W2b). A bridle path link will also be provided from the canal shared route to the Pant-y-Sais stables (Option W12).

9.6 Canal Strategy

WAG is funding a separate Study to consider the benefits of integrated restoration of the waterway network in the Swansea and Neath valleys. The Preferred Canal Strategy for the Fabian Way Corridor Transport is therefore to protect the route of the canal restoration proposals (Option C5) by not proposing alternative uses for the land.

9.7 Intelligent Transport Systems Strategy

The Preferred ITS Strategy supports the Strategies proposed for other modes. Variable message signs will be installed to show traffic conditions and support Park and Ride (Option ITS2) and traffic signals within the site area will be optimised to increase efficiency (Option ITS3).

9.8 Demand Management Strategy

The Preferred Demand Management Strategy incorporates various 'soft' measures to encourage use of alternative modes of travel and thus reduce traffic levels. It also focuses on resolving existing parking conflicts by introducing a controlled parking zone across the Study area (Option S2). All on-street and public parking will be subject to the same pricing structure and restrictions. A residential parking scheme will be developed for the local communities of St Thomas, Port Tennant, Elba Crescent, Jersey Marine and the emerging community within SA1.

Parking spaces associated with all new developments will be restricted to levels proposed in the CSS Wales Parking Standards[15] (Option S3). Priority spaces will be designated for car sharing in public car parks (Option S4).

All new developments will have to conform to a site-wide Travel Plan, building on the work already undertaken by the SA1 Travel Forum (Option S5). This will be complemented by a residential Travel Plan for the existing residential communities. Both Plans will be managed and monitored by an overall Travel Plan Coordinator.

Use of alternative modes will also be encouraged by provision of real-time public transport information, traffic conditions and any issues with pedestrian or cycle links via a dedicated travel information website. Smart card ticketing will also be introduced throughout the corridor to ensure travel by public transport is particularly easy for regular users.

Targets will be applied to all new developments to increase the modal share of pedestrians, cyclists and bus users. The targets will incorporate an additional 20% improvement on top of the anticipated response in modal shift to the transport interventions implemented as part of the Preferred Strategy. The targets are set as person trips rather than vehicle trips to more accurately reflect movement to and from the site.

Table 9.1 below summarises the anticipated response in mode shift to the Preferred Strategy and the proposed targets compared to the Reference Case scenario. The proposed target modal splits offer a 12% improvement on the Reference Case situation. It is worth noting that the proportion of person trips made by train is not likely to be affected by the Preferred Strategy as no changes will be made to the passenger rail connections within the corridor.

Table 9.1: Anticipated and Target Modal Splits (Person Trips)

Mode	*Reference Case*	*Anticipated Response to Preferred Strategy*	*Proposed Target*
Car	85%	77%	73%
Train	3%	3%	3%
Bus	5%	9%	11%
Cycle	3%	5%	6%
Walk	4%	6%	7%

9.9 Appraisal of Preferred Strategy

9.9.1 Economic Appraisal Criteria

Transport Economic Efficiency

The capital cost of implementing Package 5 is estimated to be between £27m and £39.5m. Package 5 is the second lowest capital investment option. The operating costs for Package 5 are comparable to the other Packages at £2.44m per year.

It must be emphasised that, at this stage, the costs are only approximate; all costs are based on 2009 prices and are not discounted. The costs given are net of and additional to the costs associated with the Reference Case.

The magnitude of travel time savings for each Package is based on the travel time for a typical journey from Neath to Swansea by each key mode. Table 9.2 below shows that Package 5 would slightly reduce travel time by car compared to the Reference Case, but travel times by bus and cycle would fall most significantly under Packages 2, 4 and 5.

Table 9.2: Travel Time from Neath to Swansea by Mode (Minutes)

Mode	*Reference Case*	*Package 1*	*Package 2*	*Package 3*	*Package 4*	*Package 5*
Car	33	34	34	31	31	32
Train	44	44	44	44	44	44
Bus	43	42	36	41	36	36
Cycle	71	68	66	69	66	66
Walk	n/a	n/a	n/a	n/a	n/a	n/a

Reliability is typically measured in terms of the variability of travel times. The capacity of transport links provides a useful indication of the likely severity of congestion and delays for road users. Link capacity for travel in one direction in the morning peak is shown in Table 9.3 below. Each link in Package 5 is under capacity, offering a significant improvement on the Reference Case.

Table 9.3: Link Capacity (Percentage Capacity, AM flows, eastbound)

Link	*Reference Case*	*Package 1*	*Package 2*	*Package 3*	*Package 4*	*Package 5*
SA1 to P&R	120%	102%	97%	106%	101%	98%
P&R to Baldwins Bridge	106%	101%	96%	103%	98%	98%
Baldwins Bridge to Elba Crescent	87%	84%	80%	69%	66%	62%
Elba Crescent to Jersey Marine	79%	67%	64%	57%	55%	55%
Jersey Marine to J42	47%	40%	38%	42%	40%	39%
Amazon Link	67%	57%	54%	18%	17%	52%

A qualitative assessment of congestion shows that Package 5 reduces congestion to a similar level as Packages 2, 3 and 4 compared to the Reference Case.

Table 9.4: Congestion

Reference Case	*Package 1*	*Package 2*	*Package 3*	*Package 4*	*Package 5*
Free flow plus heavy congestion during peaks	Free flow plus medium to heavy congestion during peaks	Free flow plus medium congestion during peaks	Free flow plus medium congestion during peaks	Free flow plus medium congestion during peaks	Free flow plus medium congestion during peaks

Vehicle kilometres travelled before and after a transport improvement is a good proxy for operating costs. Table 9.5 shows the total vehicle kilometres travelled in the morning and evening peaks within the Study area in the Reference Case compared to the five Packages. The reduction in vehicle kilometres travelled is greatest for Packages 2 and 5, although the differences between each Package are relatively slight.

Table 9.5: Vehicle Kilometres Travelled

Time Period	*Reference Case*	*Package 1*	*Package 2*	*Package 3*	*Package 4*	*Package 5*
Morning peak	88,303	75,118	71,362	77,935	74,179	72,301
Evening peak	86,665	74,180	70,471	76,961	73,252	71,398
Morning peak	100%	85%	81%	88%	84%	82%
Evening peak	100%	86%	81%	89%	85%	82%

At this stage it is not possible to determine which of the options is most efficient, that is delivers the greatest benefits relative to costs. Table 9.6 shows that if each of the benefits (vehicle operating costs, travel time savings and reliability benefits) is weighted equally, Package 5 is ranked highest for delivering transport benefits.

Table 9.6: Stage 1 TEE Summary Table – Ranking of Packages

Aspect	*Package 1*	*Package 2*	*Package 3*	*Package 4*	*Package 5*
Vehicle operating costs	4	1	5	3	2
Travel time savings	=4	=4	=1	=1	3
Reliability benefits	5	2	4	3	1
Scheme costs (1 is least costly, 5 is most costly)	1	4	3	5	2

(1 is most beneficial, 5 is least beneficial, =1 is joint most beneficial)

Economic Activity and Location Impacts

Reduced travel times and improved capacity along the Fabian Way corridor would be expected to have positive impacts on adjacent industrial and warehouse development. Reliability is likely to be a concern for occupiers of office space, particularly in regard to peak time commuter access. However, for office and residential development, the quality of the public realm is also likely to be very important and therefore the community aspects of the corridor and the quality of public transport.

Transport improvements can enable people to take up new employment opportunities and contribute to a conducive business environment. Improving public transport along the Fabian Way corridor and improving the reliability of road traffic will support this objective. Package 5 offers a compromise between enhancing the local environment for employees and residents yet maintaining reduced journey times and increased reliability for car journeys.

9.9.2 Environmental Appraisal Criteria

In terms of air quality, Package 5 performs better than the Reference Case and contributes most measures that align with those of the AQMA Action Plan. Package 5 also performs better than Packages 1, 3 and 4 with regard to greenhouse gas emissions. The modal shift encouraged by the measures featured in the Package gives an estimated 18% reduction in greenhouse gas emissions, equating to 370kg CO_2.

Package 5 is considered to be equable to the other Packages in terms of traffic noise and impact on agricultural soils and contaminated land. It would not adversely affect any landscape or townscape designations, but does provide opportunity for public realm improvements. It does not impact on the features of settings of any historic landscapes or registered parks and gardens within the Study area.

The segregated bus way north of Fabian Way is unlikely to have direct effects on Crymlyn Bog SSSI, but if implemented would also need to avoid any indirect effects such as impacts from construction activities or effects on water quality within the site. The preferred strategy (Package 5) avoids these impacts on Crymlyn Burrows SSSI by utilising the existing junction arrangement. However, the parallel development access road already has recognised minor adverse affect on areas of Wet Woodland (a Biodiversity Action Plan habitat). The access road is likely to decrease the area of this habitat and fragment/isolate the areas that remain.

Construction of a new bus-only bridge to south of existing Tawe Bridges may have a negative impact on water quality. However, the scale of any effects is likely to be small and should be addressed through appropriate mitigation measures. Package 5 also takes into account proposals and aspirations for the restoration of the Tennant Canal by protecting the route.

9.9.3 Societal Appraisal Criteria

The reduced speed limit west of the Jersey Marine junction is likely to reduce the severity of traffic accidents and pedestrian activity generated by bus routes will be relocated away from Fabian Way towards the segregated busway, reducing potential conflict. The level of separation between traffic and vulnerable road users will vary with a combination of at-grade and grade-separated junctions and a parallel development access road.

Well-used pedestrian and cycle routes offer informal surveillance therefore an increased proportion of non-car users will generally improve personal security. Package 5 features a dedicated off-line public transport route that should encourage drivers away from their cars, thereby increasing the proportion of walkers and cyclists.

Package 5 addresses north-south permeability across Fabian Way by increasing the number of pedestrian and cycle crossings, although Packages 1 and 2 offer a greater number of crossing points.

In terms of physical fitness, Package 5 is comparable to the other four Packages. The segregated busway will improve social inclusion by increasing accessibility for local residents. Package 5 will have neither a positive or negative discriminatory impact on any individual equality impact group.

9.9.4 Transport Appraisal Criteria

Package 5 would enable improvements in the flow to capacity ratios on all junctions along the corridor, primarily due to a reduction in traffic caused by modal shift associated with public transport improvements. The development access road connection at Baldwins Bridge relieves traffic through the Elba Crescent / proposed University access and Jersey Marine junctions.

Fabian Way would be reclassified from Baldwins Bridge to Landon Road / Park and Ride junction from UAP1 to UAP2, with a corresponding reduction in link capacity, as part of Package 5.

The section of Fabian Way from the Tawe Bridges to Baldwins Bridge would be approaching capacity in an eastbound direction in the morning peak and in a westbound direction in the evening peak under Package 5. The remaining sections of Fabian Way are within capacity.

In addition, the recently constructed Ffordd Amazon would be over capacity in an eastbound direction in the evening peak hour due to the traffic associated with the Coed Darcy Urban Village, proposed developments north of Fabian Way and the new Park and Ride site. It is likely that this link would require widening to increase capacity as far as the junction with the proposed Coed Darcy Southern Access Road.

Table 9.7 below shows the journey time for a typical trip by car and by bus from Neath to Swansea City Centre along the Fabian Way corridor for each of the Packages. Package 5 offers shorter journey times by car compared to the Reference Case and Packages 1 and 2, but is slower than Packages 3 and 4 due to the reduced speed limit. The journey time by bus is the same for Packages 2, 4 and 5 as the segregated busway is unaffected by traffic conditions on the Fabian Way main line.

The proportion of trips made by train, bus, cycling or walking during the peak hours is assumed to increase to 23% under Package 5 compared to the Reference Case of 15%. This is a significant increase, comparing favourably with the estimated modal splits for the other Packages.

Table 9.7: Journey Times by Car from Neath to Swansea City Centre

Package	*Approximate Journey Time by Car (mins)*	*Level of Congestion during the Peak Hours*	*Approximate Journey Time by Bus (mins)*
Reference Case	33	heavy	43
Package 1	34	medium to heavy	42
Package 2	34	medium	36
Package 3	31	medium	41
Package 4	31	medium	36
Package 5	32	medium	36

9.9.5 Other Appraisal Criteria

Study Objectives

Package 5 would reduce journey times compared to the Reference Case, but does not perform as well as Packages 3 and 4 due to the reduced speed limit. Junction capacity would be increased with improvements at the Tawe Bridges and replacement of Baldwins Bridge with a new grade-separated solution. Development traffic would largely be removed from Fabian Way onto the parallel access road, while traffic levels would be reduced due to the segregated busway.

The proposed segregated busway in Package 5 will enable bus movements to be independent of traffic conditions on the Fabian Way main line. Public transport trips should therefore be more reliable with more predictable journey times. The advantages of the segregated busway should attract drivers away from their cars, thereby reducing vehicle flows along Fabian Way.

Package 5 includes expansion of both the walking and cycling and bus networks to serve the proposed developments, with a segregated busway which should provide improved reliability and predictability of services. In addition, Package 5 features measures to improve waiting facilities at bus stops and interchanges and to enhance key pedestrian and cycle facilities by providing lighting and information.

The proposed reduction in speed limit from Jersey Marine should help to increase drivers' awareness that they are entering the City of Swansea. Package 5 also includes a new / additional Park and Ride site north of the Amazon Distribution Centre. This would be indicated with variable message and static signing at Jersey Marine to encourage drivers to use the Park and Ride service. The presence of a well-signed Park and Ride facility should ensure drivers are aware that they are approaching the city. The new smooth gradient pedestrian and cycle bridge over Fabian Way near the SA1 development could be used as an iconic gateway feature that defines the entry to the City Centre from the east.

Package 5 does not include any alteration to the existing junction at Jersey Marine, thereby protecting Crymlyn Burrows SSSI compared to Packages 2, 3 and 4.

Public acceptability

Package 5 addresses the key issues raised by both the responses to the community newsletter and the SA1 Travel Forum by offering a compromise between the improved connectivity of the community corridor and the reduced congestion associated with the strategic transport link concept. All five Packages include parking controls and a residential parking scheme.

Acceptability to other stakeholders

Package 5 was created as a hybrid of Packages 2 and 4 following positive feedback about aspects of each of these Packages from the second Stakeholder Workshop. Concerns were

raised regarding the potential negative impact on the City Centre of reducing the speed limit along Fabian Way to 30mph. Package 5 involves a more easily enforceable speed limit reduction and junction improvements to provide community benefits whilst maintaining Fabian Way's function as a key route into Swansea.

Technical and operational feasibility

Capacity improvements at the Tawe Bridges may be difficult to construct whilst maintaining through traffic, particularly if the junctions are converted into a gyratory system. The proposed alterations to the Baldwins Bridge junction are more likely to be able to be accommodated by constructing the new bridge off-line to the west of the existing bridge. Construction works for the new smooth gradient pedestrian and cycle bridge over Fabian Way near the SA1 development would be restricted by space.

East of the existing Park and Ride site, the segregated busway would follow Wern Fawr Road then the route of a disused spur of the freight railway line. It would cross the Tennant Canal and the live railway line via a new bridge, then cut across the disused southern section of Swansea Burrows Sidings before joining Amazon Way at a bus gate. The entirety of this route can be constructed off-line, however, it takes land currently owned by Network Rail and let to DB Schenker on a long term lease. Both parties have been consulted and are happy in principle to relinquish the required land as it is currently disused.

Diversion of existing utilities may be necessary to achieve some or all of these infrastructure improvements. Services diversions can be costly and time consuming.

The statutory authorities have confirmed that it is difficult to enforce the current 50mph speed limit west of Jersey Marine. Enforcing a lower speed limit would be even more difficult, probably necessitating fixed speed cameras at regular intervals along Fabian Way.

Limits on parking spaces for new developments could be implemented during the planning process using directions and Objectives in a site-wide Travel Plan.

Financial affordability and deliverability

The capital and recurring costs of each of the measures has been identified in broad terms in section 8.7.5 of this report. The aim of the costing exercise was to establish the order of magnitude of costs sufficient for input to the appraisal process. Some costs are more firmly established than others.

The costs for each Package are summarised in Table 9.8 below. All costs are based on 2009 prices and are not discounted. The costs given are net of and additional to the costs associated with the Reference Case.

Table 9.8: Summary of Package Costs (2009 - £m - Net of Reference Case)

Package	*Minimum Capital*	*Maximum Capital*	*Recurring / year*
1	16.1	20.1	2.41
2	44.1	57.1	2.46
3	38.2	51.7	2.35
4	46.4	63.9	2.39
5	27.0	39.5	2.44

Package 5 involves the second least capital investment, primarily because it does not include converting the Jersey Marine junction to grade-separated solution. This measure has the highest associated capital cost at £20m to £25m.The recurring costs associated with Package 5 are similar to the other Packages.

Risks

The significant junction modifications and new segregated busway within Package 5 include inherent risks such as the cost of services diversions, unforeseen ground conditions and land acquisition.

There are operational risks that facilities or services provided will not be well-patronised, and as such will not be value for money or self-sufficient in the long term. The proposed new/additional Park and Ride site and the amendments to the existing site will only be considered a success if First can operate the bus service on a commercial basis once established. Similarly, new or amended bus services need to attract users to guarantee their success and longevity. New developments should be given public transport patronage targets with a requirement to provide financial support if the targets are not met.

The success of improvements to the walking and cycling network will also be judged depending on the level of use on completion. The bus, pedestrian and cycle proposals included in each Package have been designed to suit anticipated desire lines and journeys associated with the development aspiration of the corridor.

9.10 Summary

Table 9.9 in the Tables section of this Report gives the results of the appraisal process in the format of a WelTAG Appraisal Summary Table. Table 9.10 in the Tables section of this Report gives a comparison of the results of the appraisal process for each Package.

Table 9.11 below summarises the numerical scores derived from the appraisal process for each Package by category of criteria. It is worth noting that Study Objectives 1 and 2 are double weighted compared to other appraisal criteria to reflect their relative importance.

Table 9.11: Summary of Appraisal Scores for Different Packages

Appraisal Criteria	Do Minimum	Package 1	Package 2	Package 3	Package 4	Package 5
Economy	0	3	3	4	4	4
Environment	-4	4	3	3	3	4
Society	-1	5	8	5	8	8
Transport	-3	-1	6	4	9	8
Study Objectives	-4	13	18	12	16	18
TOTAL	**-12**	**24**	**38**	**28**	**40**	**42**

Table 9.11 demonstrates that Package 5 performs best overall against the appraisal process. Package 5 has the joint highest score for all three Welsh Impact Areas and the Study Objectives. Package 4 scores higher than Package 5 in terms of transport criteria, but this reflects the more wider-ranging benefits of Package 5 compared to Package 4.

Implementation Stage

10 Implementation

10.1 Introduction

The challenge in the delivery of the Fabian Way Preferred Strategy is to develop an implementation plan that takes into consideration:

- the requirements of key regeneration proposals in the area and, in particular, the need to deliver some regeneration projects early;
- the actual time taken to deliver large-scale transport infrastructure measures;
- the availability of funding and affordability of the measure;
- the inter-relationships between Strategy measures;
- the roles and responsibilities of the key Stakeholders; and
- the need for investment based on assessment indicators.

The implementation of the various Strategy measures has to be phased. As time passes, so circumstances may change and new techniques may become available. There is thus a need to monitor conditions, to review the appropriateness of the measures within the Strategy from time to time and, if necessary, to update and revise the Strategy. While the process of establishing a Strategy is largely sequential, there may be revisions to and developments of the Strategy as implementation progresses. Flexibility is also required due to the uncertainty of the form amount of future development.

Implementation of transport strategies requires action on a number of fronts, spread over a number of years and involving a range of agencies. The Fabian Way Corridor Preferred Strategy does not rely solely on Transport Wales for its implementation.

There should be relatively few obstacles to the implementation of the ‘soft’ measures and initiatives to encourage walking and cycling, subject to funding being available. Travel Plans will require co-operation from residents and major employers within the Study area, although it is encouraging that the SA1 development has already established a Travel Forum with participation from key local businesses and the community.

Planning permissions are usually required for new transport infrastructure. Highway modifications and the segregated busway would commence with initial design then proceed to consultation/participation with the public and individuals or bodies directly affected by the proposals. The highway authority would then resolve to seek planning permission. Assuming that any objections to these proposals could not be resolved, the schemes would be taken to public enquiry. Clearly there is some risk that planning permission would not be granted. However this implementation plan assumes that the necessary approvals can be obtained and gives realistic timescales for delivery.

10.2 Roles and Responsibilities

Implementing the strategy will be the responsibility of the agencies represented on the Client Steering Group, namely:

- Welsh Assembly Government;
- Neath Port Talbot County Borough Council; and
- City and County of Swansea.

Although individual measures within the Strategy may involve other parties, particularly the public transport/regeneration projects, these organisations will drive the improvements forward.

NPT and CCS are the local highway authorities and therefore responsible for all public highways within the Study area, other than the motorway network.

First are responsible for most of public transport services and liaise with the local authorities to ensure the provision of necessary services and to enhance existing services. However, as public transport issues need to be considered over a larger geographical area than covered by individual authorities, regional public transport boards have been established. NPT and CCS are currently part of SWWITCH, which was formed in 1998. It consists of two other local authorities and is dedicated to improving transport facilities and conditions within its boundaries.

In order to coordinate transport development in Wales, WAG has requested that all local authorities in Wales produce a Local Transport Plan (LTP). These plans cover a five year period and, building on work already done in identifying transport priorities, set out ways in which integrated transport will be delivered at the local level. As discussed in this Report, NPT's and CCS's current transport strategy is set out in their LTPs. These plans cover the five year period between 2011 and 2016 in NPT and 2000 to 2005 in CCS and include the authorities' proposals for both capital and revenue expenditure on transport.

In addition to these LTPs, SWWITCH has produced a draft Regional Transport Plan which sets out transport priorities within the region over the next 5 years.

As well as coordinating these local and regional plans, WAG has statutory powers and responsibility for the maintenance and improvement of the trunk road and motorway network in Wales.

The Railways Act 2005 transferred most of the functions of the Strategic Rail Authority to the Secretary of State for Transport in the UK Government. The Act made provision for the National Assembly for Wales to be a joint signatory with the Secretary of State for Transport to the Wales and Borders Franchise for train services operating within Wales.

Under the Government of Wales Act, powers are conferred upon the Welsh Ministers. Under the Act the Assembly Government is able to:

- develop and fund infrastructure enhancement schemes;
- develop new rail passenger services;
- invest in improving the journey experience for rail users; and
- fund rail freight improvement schemes through Freight Facility Grant (FFG).

Partnership working in developing this Preferred Strategy and early inclusion of the key measures in both authorities' Local Transport Plan and the wider Regional Transport Plan are seen as essential to progress design work, secure funding and swift delivery. As a way forward, it is recommended that a Transport Review Panel be established to plan, monitor and coordinate the implementation of the Preferred Strategy. This should include representatives from the following organisations:

- Welsh Assembly Government;
- Neath Port Talbot County Borough Council;
- City and County of Swansea;
- SWWITCH; and
- Public transport operators.

10.3 Programme

The implementation of the Preferred Strategy will be staged over a 25 year period. A provisional programme has been formulated by considering both transport need and implementation constraints. Transport need has been assessed using anticipated timescales for the development aspiration for the corridor and feedback regarding Stakeholder priorities. It has been assumed that in addition to the Strategy, schemes included in the Reference Case, including Coed Darcy, the Southern Access Road and Ffordd Amazon 2, will be taken forward in the next five years.

10.3.1 Links to Development Aspiration

The realisation of specific developments will be a key driver in the implementation of various significant measures.

The occupation of the Swansea University second campus will generate large numbers of person-trips to and from the site. Bus services and walking and cycling routes linking the second campus to the City Centre and the Park campus should be in place once the site is fully operational to assist students, staff and visitors in making smarter transport choices to avoid creating a dependence on the private car and the resulting congestion.

The proposed grade-separated junction at Baldwins Bridge has been included in the Preferred Strategy primarily to facilitate vehicular access to the development areas to the east of the junction. The junction improvements should therefore be completed at the same time as the surrounding sites.

Similarly, bus services and walking and cycling routes serving the Coed Darcy Urban Village development need to be in place once there is a significant resident population to encourage modal shift away from the private car and to avoid congestion issues.

Likely timings for the development aspiration for the Study area are given in Table 10.1 in the Tables section of this Report. This table should be read in conjunction with Figure 5.1.

10.3.2 Stakeholder Priorities

The second break out session at the Stakeholder Workshop held on Thursday 26th February 2009 aimed to identify measures that Stakeholders felt should be prioritised within each of the Packages.

Participants were asked to discuss the significance of the measures within each Package, relevant to each Group's theme and individual interests. Groups were asked to rank each measure within each Package according to its importance, with 1 as the most significant.

The most significant measures in each Package were determined by adding up all the rankings for each measure from all Groups. The three measures with the lowest score in each Package were taken to be the top three most significant measures within that Package. These are given below:

Package 1: Community Corridor with On-Line Public Transport

1. Capacity improvements at the Tawe Bridges, such as converting to a gyratory
2. New/additional Park and Ride site north of Amazon development
3. Improve/increase pedestrian and cycle bridges linking SA1 to the communities north of Fabian Way

Package 2: Community Corridor with Segregated Public Transport

1. New bus-only bridge to south of existing Tawe Bridges
2. Capacity improvements at the Tawe Bridges, such as converting to a gyratory
3. Segregated busway north of Fabian Way with two-way working across existing Park and Ride bridge

Package 3: Strategic Transport Link with On-Line Public Transport

1. Capacity improvements at the Tawe Bridges, such as converting to a gyratory
2. New grade-separated junction at Baldwins Bridge
3. New/additional Park and Ride site north of Amazon development

Package 4: Strategic Transport Link with Segregated Public Transport

1. New bus-only bridge to south of existing Tawe Bridges
2. Capacity improvements at the Tawe Bridges, such as converting to a gyratory
3. Segregated busway north of Fabian Way with two-way working across existing Park and Ride bridge

Capacity improvements at the Tawe Bridges, such as converting to a gyratory system, appears in the top three most significant measures in each Package.

The most significant measure in Packages 2 and 4 was the proposed bus-only bridge across the Afon Tawe utilising the disused piers south of the existing bridges. The third most significant measure in Packages 2 and 4 was the segregated busway north of Fabian Way. Packages 1 and 3 do not include either the new bus-only bridge or the segregated busway.

A complete record of the second Stakeholder Workshop is contained within Appendix H.

10.3.3 Summary

The proposed Programme is presented in Table 10.2 in the Tables section of this Report. This gives a provisional programme for implementation of the Preferred Strategy over the next 25 years and includes the delivery agency, order of magnitude costs and potential funding sources.

The first phase of the major infrastructure works (short term: 2010 – 2014) focuses on the bus-only bridge across the Tawe and the segregated busway with the proposed bus gate and quality bus hub, in order to provide a viable alternative option to drivers switching mode.

The second phase (medium term: 2015 – 2019) concentrates on capacity improvements at the Tawe Bridges and the existing Park and Ride site. The Tawe Bridges are a significant source of concern for many transport users and were highlighted as a key priority in the second Stakeholder Workshop.

The final phase (long term: 2020 – 2029) completes the infrastructure investment with improvements to the eastern half of the Study area to support the University and business park developments in this area. Key infrastructure provision includes the new junction at Baldwins Bridge with tie-ins to Ffordd Amazon and the new Park and Ride site.

The programme also includes two measures considered to be longer-term aspirations:

- H5b – New grade-separated junction at Jersey Marine junction with Fabian Way
- R4 – Combined passenger / freight railway line

These measures have not been costed as they are not part of the Preferred Strategy.

10.4 Funding

The estimated capital cost of the Preferred Strategy is between £27m and £39.5m, with an annual recurring cost of £2.44m. A breakdown of costs by measure is provided in section 9.9.5 of this Report.

Table 10.2 in the Tables section of this Report shows that by phasing the implementation of measures within the Preferred Strategy, the capital cost of delivering the Strategy is spread across a 25 year period. The capital cost of implementation over each period is predicted to range from £4.7m to £17.6m (based on 2009 prices).

There are currently three potential sources of funding for the transport improvement schemes:

- Welsh Assembly Government;
- Private Sector Funding; and
- Partnership Funding.

Welsh Assembly Government

WAG is a major source of funding (through Transport Grant and regional development) which has calls placed on it by all local authorities in Wales.

Transport Grant (TG) is designed to assist local authorities in Wales to implement the WAG's integrated transport policy. Historically, in order for a measure to be eligible for TG funding the measure had to be included in local authorities Local Transport Plan (LTP). LTPs covered a five-year period (between July 2000 and June 2006) and included the authorities' proposals for both capital and revenue expenditure on transport. Annually, local authorities were invited to submit bids for TG.

This system is now in the process of changing. Local authorities will submit bids for TG through their regional transport consortium. The SWWITCH members vote for schemes they would like to see progressed. As a Fabian Way bid would have the support of two of the four local authorities covered by SWWITCH, it is likely to receive higher priority than some other schemes.

Under this year's allocation of Transport Grants, road schemes will receive more than £63million, sustainable transport packages £21m and £10million has been awarded for walking and cycling projects. CCS has been allocated nearly £6m to improve public transport, including development of the Quadrant bus station. The ongoing development of the all Wales Travel Card will get £2m. Every local authority in Wales has also received some of the £8.134 million awarded for Safe Routes in Communities projects.

WAG also operates a Principal Road Grant under Section 272 of the Highways Act. WAG allocates funding to local authorities to construct and improve roads for which they are responsible where WAG is satisfied that the cost involved should not fall to the local authority. Schemes where this power is used are rare but include the construction or improvement of the roads which it is intended to trunk on completion, as well as improvements to local authority roads which relieve pressure on trunk roads.

In summary, most of the measures identified in the Transport Strategy should be eligible for WAG funding support; therefore the early inclusion of the key measures in SWWITCH's Regional Transport Plan are essential.

Private Sector

Although it is acknowledged that the public sector will need to provide funding support for the key elements of the recommended strategy, financial contributions from developers will also be necessary to help mitigate the transportation impacts of additional development. This will be required to ensure that high levels of accessibility to development sites by all modes are provided. It is therefore recommended that developers, through planning conditions (e.g. Section 106 agreements), will be required to contribute to both the wider transport strategy as well as site-specific measures. The high level transport model, which has been developed for this Study, could be used to calculate the level of financial contribution that would be equitable for each development site. This 'roof tax' could be based on:

- the level of public transport service within a five minute walk from the site; and
- the size of the development.

It is important that such a payment system is equably applied in a transparent manner across the entire Study area. This could be ensured by both local authorities adopting the Preferred Strategy as Supplementary Planning Guidance or similar.

Partnership Scheme

Enhancement to the bus network can be developed through Quality Bus Partnerships or Contracts. These involve partnerships between service providers (the bus operators) and the infrastructure providers (local and national government).

Summary

It is likely that a mix of funding mechanisms from a variety of different sources will be used to finance the Preferred Strategy. TG and other WAG funding applications can be supported by direct developer contributions in the form of a 'roof tax'. Obtaining priority for the Fabian Way Strategy within SWWITCH is key to achieving public sector funding.

11 The Way Forward

11.1 Conclusions

It seems certain that the Fabian Way corridor will be further developed in the future in order to help Swansea to consolidate its position as a prominent regional centre. Fabian Way will become a destination in its own right, with employment, residential and leisure uses planned. To support this development, it is essential that transport links are strengthened and real choices provided for travellers meeting their individual and family needs. The Fabian Way Corridor Transport Strategy gives a sound basis on which to plan the necessary transport provision for the next 25 years.

The Fabian Way Corridor Transport Strategy will make a major contribution towards meeting local, regional and national transport policy objectives. It consists of cost-effective, affordable, safe and environmentally acceptable measures to reduce the impact of current and future travel demand within the Fabian Way area.

The Strategy will provide real alternatives to car use, and places particular emphasis on planning and designing for pedestrians and cyclists. However, it is recognised that use of the private car will continue to be vitally important for many people who live in, work in, visit or travel through the corridor. The Strategy therefore includes initiatives to address the most pressing traffic problems such as congestion at junctions.

Many elements of the Strategy are mutually reinforcing, for example improving public transport and developing a progressive parking policy. A piecemeal approach to implementation will therefore reduce the effectiveness of the Strategy. It is vital that the Strategy is treated as a coherent whole.

The total investment proposed to implement the Strategy is some £27m to £39.5m over the next 25 years, of which £11.2m to £15.2m is earmarked for schemes to be implemented in the next five years. The funding will need to be secured through a combination of WAG, local authority and private sector investment maximising the added value of transport measures to the corridor regeneration process. In summary the Preferred Strategy is important in providing a framework within which transport can support the wider aims regeneration, environmental and quality of life within the corridor. The Strategy will deliver a number of benefits, including:

- a more accessible transport system – better conditions for walking and cycling and reduced severance in local communities and more frequent public transport services;
- an improved environment – reduced traffic emissions, high quality public realm in development areas and sensitive design of transport infrastructure to minimise impacts;
- an integrated transport network – an enhanced and more joined-up public transport system with better information and more effective interchange with existing transport hubs which will provide travel choice and reduce the need to use the private car;
- a more efficient and safer transport network – through making better use of transport infrastructure, tackling corridor congestion and ensuring public transport priority where it is needed;
- a more robust transport system – that meets the need of the economy by providing additional transport capacity to cater for growth, and facilitating regeneration and new development; and
- a more sustainable transport system – that encourages travel behavioural changes and allows people to consider means of travel other than the private car.

11.2 The Next Steps

The Fabian Way Corridor Transport Strategy should be considered in the context of other initiatives that WAG and the local authorities have taken to plan for future transport improvements and secure suitable funding. It is recommended that that following activities are undertaken:

- Agree the findings of this Report;
- Set up a meeting with SWWITCH to agree the principles of the Preferred Strategy;
- Consider incorporation of the Preferred Strategy as Supplementary Planning Guidance or similar;
- Coordinate the Preferred Strategy with the University and other major developments such as Coed Darcy Urban Village and SA1;
- Commission a detailed study of the Tawe Bridges; and
- Set up a monitoring group.

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