Vale of Glamorgan Council

A4226 Five Mile Lane

WelTAG Appraisal Planning Stage and Stage 1 Report

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1 Introduction

1.1 Purpose of this Report

In October 2010, the Vale of Glamorgan Council (VoG) commissioned Arup to record the development and assessment of highway safety improvements along the Five Mile Lane section of the A4226 in the form of a Welsh Transport Appraisal Guidance (WelTAG) Planning Stage and Stage 1 assessment. The results of this assessment will be used to inform the VoG Principal Road Grant Bid for 2012/13.

This WelTAG (Planning Stage and Stage 1) Report identifies and tests the transport options available to VoG in providing a solution to the traffic problems associated with the Five Mile Lane Route. The aim of the proposed scheme is to improve the highway standard of the A4226, in order to reduce the number of accidents, whilst improving access to key destinations including Cardiff Airport and Barry.

Each transport option has been screened and tested against both the Transport Planning Objectives (TPOs) developed for the study (as agreed with the Welsh Government (WG) in March 2010) and the sustainability criteria identified in WelTAG. This includes measuring each option's performance regarding deliverability, risk, and the degree of support from stakeholders during the consultation process.

1.2 Study Background

Cardiff Council and VoG have previously undertaken technical studies and entered into discussions with WG with regard to the Five Mile Lane highway improvements. However, this was in respect of the WG proposal to trunk the Culverhouse Cross –Sycamore Cross – Five Mile Lane – Waycock Cross – Cardiff Airport route.

The Five Mile Lane section of the A4226 is primarily oriented in a north-south direction. At its most northern point, the section commences at the Sycamore Cross junction with the A48. This gives access via the A48 to the A4232 (Ely Link) and the M4 (Junction 33) to the east, and to Cowbridge, Bridgend and the M4 (Junction 37) to the west. At its most southern point, Five Mile Lane joins the A4226 Port Road at the Waycock Cross roundabout. This gives access to Barry (east) and Penarth via the A4050 to the east, to central Barry via the B4266 to the south, and to Cardiff Airport via the continuation of the A4226 to the west.

The Five Mile Lane stretch of the A4226 has acquired a reputation for having a poor accident record in recent years. In order to address the safety issues on the road, the VoG has introduced a series of measures, including a 40 mph speed limit, static speed camera, re-surfacing, improved signage, lighting, and solar powered LED cats' eyes. However, the road still presents some safety issues as drivers have to negotiate a number of sharp bends, whilst it is too narrow for two large vehicles to pass in some places and has poor sight lines in various locations. Further improvements in safety may require major re-alignment of the road, including consideration of off-line options.

1.2.1 Previous Studies

Over the past twelve years, various environmental and technical studies have been undertaken and associated with improving access to both Five Mile Lane and the surrounding areas. These studies include:

- Full Scheme Environmental Statement - Airport Access Road Phase 1, Chris Blandford Associates (June 1998);
- Interchange Environmental Statement - Airport Access Road Phase 1, Chris Blandford Associates (June 1998);
- Cardiff Airport Access Road, Environmental Assessment Scoping Report, Ove Arup and Partners (August 2005);
- A4226 Five Mile Lane Improvements, Environmental Assessment Scoping Report, Soltys Brewster Consulting (January 2008);
- Five Mile Lane Stage 1 Environmental Assessment, Soltys Brewster Consulting (May 2008);
- WelTAG Appraisal Report Stage 1 - Cardiff International Airport and Culverhouse Cross Access Improvements, Ove Arup and Partners (May 2009);
- WelTAG Appraisal Report Stage 2 - Cardiff International Airport and Culverhouse Cross Access Improvements, Ove Arup and Partners (July 2009);
- Interim Scheme Assessment Report – A4226 Five Mile Lane, Soltys Brewster Consulting (February 2010); and
- Five Mile Lane Collision Study Report, Mott MacDonald (February 2011).

1.3 WelTAG

WelTAG was formally published by the WG in June 2008[1]. The WelTAG guidance states that WelTAG *"has been developed by the Welsh Assembly Government with the intention that it is applied to all transport strategies, plans and schemes being promoted or requiring funding from the Welsh Assembly Government".*

WelTAG has two primary purposes:

- to assist in the development of proposals enabling the most appropriate scheme to be identified and progressed – one that is focused on objectives, maximises the benefits and minimises negative impacts; and
- to allow the comparison of competing schemes on a like-for-like basis, so that decision-makers can make funding decisions.

[1] Welsh Transport Planning and Appraisal Guidance (WelTAG) June 2008

WelTAG aims to ensure that transport proposals contribute to the wider policy objectives for Wales. Three pillars of sustainability, known as the Welsh Impact Areas, underlie policy in Wales. These are:

- Economy: this reflects the importance of a strong and developing economy for Wales;
- Environment: this reflects both the legal requirements and desire to protect and enhance the condition of the built and natural environment; and
- Society: this reflects the desire to address issues of social exclusion and to promote social justice and a high quality of life for Welsh people.

Paragraph 2.2.3 of WelTAG sets out the structure of the WelTAG process, which comprises the following stages:

- A Planning Stage, which includes problem and opportunity identification, proposal rationale, objective setting, possible solution identification and sifting, option development and option testing;
- A two stage appraisal process, with Stage 1 largely comprising a qualitative assessment and Stage 2 comprising a more detailed quantitative assessment;
- A post-appraisal stage which involves on-going monitoring or performance and an evaluation/value for money assessment; and
- Participation, including public consultation, which occurs at several stages in the planning and appraisal process.

This report focuses on both the Planning Stage and Stage 1 parts of WelTAG.

1.4 Report Structure

The structure of this report is as follows:

- Chapter 2 outlines the methodology used in the appraisal;
- Chapter 3 sets out the national, regional and local planning policy context;
- Chapter 4 describes the existing conditions in the study area;
- Chapter 5 identifies the problems and Transport Planning Objectives;
- Chapter 6 outlines potential options to address the problems and objectives;
- Chapter 7 appraises the scheme options;
- Chapter 8 examines the impact of options on health; and
- Chapter 9 provides a summary and recommendations.

2 Methodology

2.1 Planning Stage

2.1.1 Introduction

The Planning Stage methodology has involved a review of the existing problems, analysis of new traffic data, stakeholder interviews, and a stakeholder workshop designed to develop and appraise each option against the Transport Planning Objectives and Sustainability Criteria ('Welsh Impact Areas').

2.1.2 Traffic Data

Traffic data has been gathered in order to:

- provide an additional evidence base for the review of existing problems as identified during the Planning Stage consultation;
- review the Transport Planning Objectives to ensure their continued relevance in light of the above, and where possible to make them more specific and measurable; and
- inform the development and likely effectiveness of transport options.

The following traffic data has been collated and analysed:

- accident data for the study area between 2005 and 2009;
- Roadside Interview Surveys (RSI): a 12-hour RSI was carried out between 07:00 and 19:00 on 6 March 2008 close to the Hawking Centre site, as part of the Cardiff International Airport and Culverhouse Cross Access Improvements Study. The interviews obtained information on trip origin and destination and journey purpose; and
- Journey Time Surveys: journey time surveys were undertaken between Cardiff Airport and M4 Junction 37 via the A4226 and A48 on weekdays in June 2007 as part of the Cardiff International Airport and Culverhouse Cross Access Improvements Study.

The analysis of these surveys is presented in Chapter 4.

2.1.3 Identification of the Existing Problems and Opportunities

A series of meetings has been held with key stakeholders and statutory consultees to identify existing issues. The outcomes of the consultations with respect to the existing situation were subsequently compiled and distilled into a number of problems (described in Chapter 5 of this report) so that it was clear what possible options were available to resolve the existing problems.

2.1.4 Transport Planning Objectives

WelTAG states that TPOs form a crucial early stage in the appraisal process, by allowing any proposal to be tested to see if it is likely to succeed in addressing the identified problems, or securing the identified opportunities, which underpin the whole proposal. TPOs should be framed so that:

- they focus on the ends rather than the means;
- they are specific about what is to be achieved;
- they relate directly to the identified problems and opportunities;
- their success can be tested in a consistent manner; and
- they are sufficiently detailed to enable the comparative assessment of different options.

TPOs were derived for this study with direct reference to existing identified issues, and with reference to the WelTAG principles e.g. ensuring that TPO are distinct from, and do not presuppose, particular options. The development of TPOs also had regard to key policies and objectives from the following relevant plans:

- One Wales;
- Wales Spatial Plan;
- Wales Transport Strategy;
- Trunk Road Forward Programme;
- Environment Strategy for Wales;
- Wales: A Vibrant Economy;
- South East Wales Economic Development Strategy;
- South East Wales Transport Alliance (SEWTA) Regional Transport Plan;
- Vale of Glamorgan Unitary Development Plan (UDP); and
- Vale of Glamorgan Local Transport Plan (LTP).

WelTAG requires TPOs to conform to the principles known as **SMART** (**S**pecific **M**easurable **A**ttainable **R**elevant **T**imed). This means, once TPOs have been established, it should be possible to specify as fully as possible what it is desirable for transport objectives to achieve in a particular area. With the TPOs and existing problems for the study defined, meaningful quantification of each objective can be assessed using the traffic data available.

2.2 Identification of Possible Options

WelTAG specifies that *"what should be avoided [in the identification of possible options] is simply 'dusting off' some existing project ideas and trying to make these fit the TPOs: an objective-driven approach is intended to encourage re-thinking old solutions and finding new ones, even to old problems."*

A number of studies have been commissioned by VoG and the WG in recent years to develop on-line and off-line road options as well as public transport options along the Five Mile Lane route. These have been considered as part of this study.

During the consultation process, consultees were invited to discuss their ideas about the need for and appropriateness of options to address the transport-related issues associated with the Five Mile Lane route. This was to allow new ideas to emerge alongside long-held aspirations for particular transport interventions.

The options identified for this study are reported in Chapter 6.

2.2.1 Stakeholder and Public Consultation

Stakeholder and public consultation has been sought through a series of events held between March and May 2010, details of which are provided below:

- an assessment of issues associated with the proposed Five Mile Lane highway safety improvements was carried out during a workshop held with statutory environmental bodies on **25 March 2010**. Attendees included representatives from: VoG, Countryside Council for Wales (CCW), Environment Agency Wales (EA), Glamorgan Gwent Archaeological Trust (GGAT), and Soltys Brewster;
- two informal Cabinet meetings were held on **10 and 11 May 2010**, where Members were apprised of the Five Mile Lane project and the proposed public participation process; and
- three public exhibitions were held at Bonvilston, Wenvoe and Barry on **18-20 May 2010** respectively. These events sought to collect views from the general public on the existing Five Mile Lane, to identify problems and to receive proposals for possible solutions to these. Responses were requested in the form of answers to a number of questions via a questionnaire[2]. A total of 354 questionnaire responses were received as part of the public consultation and of those 215 were completed by regular users of the Five Mile Lane, accounting for just over 60% of the sample.

The feedback from these consultations, identifying problems which need addressing along Five Mile Lane and suggesting improvements, has been incorporated into Chapter 5 (Problems and TPOs) and Chapter 6 (Possible Options).

2.3 Stage 1

2.3.1 Option Appraisal

The initial process of compiling and sifting transport options during the Planning Stage resulted in a number of possible options which were considered to have some potential to achieve the Transport Planning Objectives and to offer some prospect of being delivered.

[2] Questionnaires were available on the Vale of Glamorgan Council's website and were also published in local newspapers. The analysis of the public consultation process is published in the Soltys Brewster Consulting report 'Public Consultation Analysis (October 2010).

WelTAG recognises that proposals are often defined *"too narrowly and with inadequate reference to other inextricably linked elements which are fundamental to the execution of the proposal."* Consequently a process of refinement of the list of options was undertaken, with the grouping of mutually supportive options into 'packages' where appropriate.

The packages were tested against the five Transport Planning Objectives and the following key considerations identified in WelTAG:

- the fit of options with policies;
- public and stakeholder acceptability;
- technical and operational feasibility; and
- affordability.

To test each package's compatibility with the TPOs and other criteria, a five-point scale was used to assess its performance. Following the identification of feasible transport options from the Planning Stage (reviewed in Chapter 6), WelTAG Stage 1 required each individual option to be analysed both qualitatively and quantitatively against the TPOs.

The Stage 1 option development includes the provision of factual information to support the strengths of each option against each refined TPO and the sustainability criteria of the Welsh Impact Areas.

2.4 Outcome

To conclude this report, recommendations have been provided concerning which options should be taken forward to the Stage 2 Appraisal.

Chapter 9 provides a summary of the report and the recommendations to be taken forward.

3 Policy Context

3.1 Introduction

In order to link with existing and emerging initiatives, it is important to take account of established policies and objectives relevant to the transport issues on the A4226. The review covers national, regional and local policy context and includes the following:

- Planning Policy Wales: Edition 3 (July 2010);
- Wales Spatial Plan;
- National Transport Plan;
- Wales Transport Strategy: One Wales – Connecting the Nation Wales Transport Strategy;
- Technical Advice Note 18: Transport;
- Environment Strategy for Wales;
- SEWTA Regional Transport Plan; and
- Vale of Glamorgan Unitary Development Plan (UDP).

3.2 National Policy

3.2.1 Planning Policy Wales: Edition 4 (2011)

Planning Policy Wales (PPW) sets out the land use planning policies of the WG. It is supplemented by a series of Technical Advice Notes (TANs). PPW's objectives for transport include:

- improving accessibility by walking, cycling and public transport;
- supporting the provision of high quality public transport;
- supporting sustainable travel options in rural areas;
- supporting necessary infrastructure improvements; and
- ensuring that, as far as possible, transport infrastructure does not contribute to land take, urban sprawl or neighbourhood severance.

3.2.2 Wales Spatial Plan (July 2008)

The 2008 update to the Wales Spatial Plan (WSP) sets out the planning agenda at a spatial level. WSP identifies that improvements to strategic transport links and infrastructure have the potential to deliver safer and more reliable journey times on current networks.

3.2.3 National Transport Plan (March 2010)

The National Transport Plan (NTP) provides a basis for taking forward the delivery of the integrated transport strategy proposed with the Wales Transport Strategy. The NTP includes a number of aims that are intended to maximise the benefits associated with improving transport. A key intervention includes the aspiration to *"Maximise reliability, improve journey times and the safety of the road network."*

3.2.4 Wales Transport Strategy: One Wales – Connecting the Nation (April 2008)

In informing the strategic priorities of the NTP, the Wales Transport Strategy identifies a range of outcomes that should be achieved over the longer term. These include the need for improved connectivity and reliability across networks. The following key principles are identified as critical to the future transport policy agenda:

- 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.

3.2.5 Technical Advice Note 18: Transport (2007)

The Advice Note elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be adopted in new development. These include:

- promoting cycling and walking;
- supporting the provision of high quality, inclusive public transport; and
- ensuring that transport infrastructure and interchanges are designed and located to be safe, accessible and functional for all.

3.2.6 Environment Strategy for Wales

The WG published its Environment Strategy during 2006. The Strategy acknowledges a number of environmental pressures arising from transport within Wales. For example, road and rail transport emissions are cited as accounting for 13.5% of greenhouse gas emissions in Wales (in 2003). The Strategy commits to *"ensuring appropriate access, including managing the volume of people and the mode of access or transport in sensitive areas and ensuring that associated infrastructure minimises its impact on the environment"*.

3.3 Regional Policy

3.3.1 SEWTA Regional Transport Plan (March 2010)

The aim of the Regional Transport Plan is to improve regional transport in South East Wales and help deliver the social, economic and environmental objectives of the Wales Spatial Plan and the Wales Transport Strategy. The RTP vision is:

"A modern, accessible, integrated and sustainable transport system for South East Wales which increases opportunity, promotes prosperity for all and protects the environment; where walking, cycling, public transport, and sustainable freight provide real travel alternatives."

3.4 Local Policy

3.4.1 Vale of Glamorgan Unitary Development Plan (UDP)

The VoG UDP provides the strategic and detailed policy framework for the local authority area. In terms of local transportation policy, the UDP sets out that transport in the Vale of Glamorgan is dominated by several key issues, including:

- increasing the market accessibility of Barry as a location for development, and the need to facilitate movement to employment opportunities;
- strategic peak period commuter movements between the Vale and Cardiff;
- the importance of serving Cardiff Airport and associated developments;
- the development of facilities for travel by means other than the private car; and
- maintenance of accessibility.

4 Existing Conditions

4.1 Study Area

The A4226 route links the A48 with Cardiff Airport and Barry. It is a single carriageway route, running in a north-south direction and linking the A48 at the Sycamore Cross junction with the Waycock Cross junction on the A4226 Port Road. At this point it continues in either a westerly direction to the northern perimeter of Cardiff Airport, or in an easterly direction to Barry.

4.2 Transport

4.2.1 Introduction

Available data and information regarding traffic on the road network was compiled, drawing upon previous surveys, routine monitoring and Roadside Interviews undertaken on the route.

4.2.2 Accident Data

Accident data has been supplied by VoG for the A4226 and adjoining A48 stretches of road for the five-year period 2005-2009. The data has been analysed by Mott MacDonald, and the results reported in the Collision Study Report.[3]

The severity of an accident is classified as slight, serious or fatal according to the worst personal injury occurring in the accident. A fatal accident is where a person is killed on the public highway. A serious accident is where a person incurs a serious injury that results in hospital treatment and usually an overnight stay in hospital. A slight accident is where a person incurs a slight injury that may require medical treatment, but not usually an overnight stay in hospital.

There were 24 personal injury accidents along Five Mile Lane between 2005 and 2009, of which two were fatal accidents, four were serious accidents and 18 were slight accidents. These accidents resulted in a total of 34 casualties.

For the purpose of analysing the accident data, the route was divided into four sections:

1. Sycamore Cross Junction;
2. ‘Improved’ section of Five Mile Lane (Sycamore Cross to Blackland Farm) (1.4km);
3. ‘Unimproved section of Five Mile Lane (Blackland Farm to Waycock Cross) (5.4km); and
4. Waycock Cross Junction.

A summary of the personal injury accident data by section is given in Table 4.1. This shows that accidents have reduced in recent years, and this is considered to be attributable to the low-cost small scale engineering measures that have been implemented in recent years.

[3] Five Mile Lane: Collision Study Report, Mott MacDonald, February 2011

Table 4.1: Summary of Accidents by Year

Year	Section 1	Section 2	Section 3	Section 4	TOTAL
2005	1	1	5	2	**9**
2006	4	2	2	0	**8**
2007	1	0	1	0	**2**
2008	1	0	2	1	**4**
2009	1	0	0	0	**1**
TOTAL	**8**	**3**	**10**	**3**	**24**

Accidents are fairly well distributed along the whole length of the road, although the Sycamore Cross junction is a location at which accidents have been recorded more frequently. This junction is an at-grade staggered crossroads at which eight accidents were recorded between 2005 and 2009, two of them serious.

Along the length of Five Mile Lane there are numerous concealed farm entrances, two T-junctions and one crossroads, all with poor visibility. The high hedges, tight bends and changing elevation of the road mean that there are generally poor sight lines along Five Mile Lane. During winter months, ice can form in the hollows of the lane, creating a further hazard, while on some sections there are sharp drops at the side of the road.

Analysis of the accident data has shown that, excluding the terminal junctions at Waycock Cross and Sycamore Cross, Five Mile Lane has an accident rate that is below the national average rate for this class of road. The observed link accident rate per 100 million vehicle kilometres between 2005 and 2009 was 16, compared with the average national rate of 21 for a rural 'A' road[4].

Although only three accidents occurred on the 'improved' section 2, two of these were fatal accidents. One resulted from an overtaking manoeuvre while the other involved a motorcyclist losing control. Consequently, the killed and seriously injured (KSE) rate of 11 on Section 2 is considerably higher than the national average of 4.5. There were no other fatalities on the other sections, and the KSE rate on Section 3 was 3, below the national average.

4.3 Traffic

4.3.1 Roadside Interview Survey

A Roadside Interview Survey (RSI) was undertaken on the A4226 in the southbound direction on 6 March 2008. The survey took place just north of the Hawking Centre between 07:00 and 19:00.

A manual classified count was also carried out over the full 12 hour period, which recorded 3,226 vehicles travelling south, while 3,273 vehicles were recorded travelling in the northbound direction. Of these total vehicle flows, a total of 827 valid interviews were conducted over the day, providing a 26% sample rate.

[4] Table 26, Reported Road Casualties Great Britain: 2008 Annual Report

The majority of trips observed at the site were travelling to Barry or Cardiff Airport. Table 4.2 gives a breakdown of the trip origins for vehicles interviewed.

Table 4.2: Origin of Southbound Vehicles on Five Mile Lane

Location	Percentage of Vehicles
Bridgend	32%
Vale of Glamorgan	29%
North	17%
Cardiff	16%
East	6%
TOTAL	**100%**

The proportion of trips recorded for each journey purpose across the day is shown in Table 4.3. It can be seen that commuters account for nearly half of journeys, with trips associated with employer's business comprising over 10% and work related trips accounting for over a quarter of daily traffic interviewed.

Table 4.3: Journey Purpose of Southbound Vehicles on Five Mile Lane

Purpose	Percentage of Vehicles
Home-based Work (commuting)	45%
Employer's Business	16%
Education	2%
Shopping / Personal Business	16%
Other	21%
TOTAL	**100%**

The RSI shows that nearly half of the vehicles on the A4226 within the study area are commuters. This represents a significant proportion of drivers who could be targeted to reduce their car travel to work with 'soft' measures, such as employer Travel Plans.

4.3.2 Journey Time Surveys

A series of journey time surveys were undertaken in the study area on weekdays during June 2007. The route from Cardiff Airport to M4 Junction 37, via A4226 Five Mile Lane and the A48 was surveyed during the AM (07:00 to 10:00) and PM (16:00 to 19:00) peak periods. A total of six journeys were made in each direction during each peak period.

The results showed that:

- the average journey time northbound between Waycock Cross and Sycamore Cross was 6.5 minutes in the AM peak and 6.8 minutes in the PM;
- in the southbound direction, the average journey time between Sycamore Cross and Waycock Cross was 6.2 minutes in the AM peak and 6.4 minutes in the PM peak;

- journey times between Waycock Cross and Sycamore Cross were very consistent (generally ±1 minute of the overall route averages) for both directions and time periods; and
- the average journey times on the A4226 route between Waycock Cross and Sycamore Cross (approximately 6.8km in distance) give an average speed of about 64kph (40mph).

4.3.3 Public Transport

There are two bus services that currently use Five Mile Lane between Waycock Cross and Sycamore Cross:

- Service 322, Cardiff to Barry, via St George and Peterstone-super-Ely: 3-4 buses per day, Monday-Friday; and
- Hail-and-Ride Service V5, Cowbridge to Barry, via Pendoylan: 1 bus per day, Monday-Saturday.

Most bus routes serving Barry are focused on Cardiff (via the A4050) or the B4265 to the west. There is a poor service provision between Barry and Cowbridge, and in part this may be attributed to the poor highway standard, both in terms of carriageway width and road alignment, along Five Mile Lane, which forms the main connection between the towns.

4.3.4 Non Motorised Users

There are currently no footways present on the entire length of Five Mile Lane. While there are wide verges available on the northernmost section of the route south of Sycamore Cross, for the most part there are no verges available. As a result, for approximately three-quarters of the length of Five Mile Lane, conditions for cyclists, pedestrians and equestrians are very poor, owing to the narrow carriageway and lack of footways and verges.

4.4 Environmental Sensitivity

4.4.1 Introduction

The Soltys Brewster Consulting Environmental Assessment Stage 1 report (2008) sets out the key environmental issues relevant to the study area. The key issues are summarised below.

4.4.2 Areas of Environmental Value

The whole route corridor lies within a Special Landscape Area (SLA), whilst the Barry Woodland SSSI is of biological interest and is located within the study area. Many of the woodlands in the study area are classed as Ancient Semi Natural Woodlands (ASNW), Planted Ancient Woodland Site (PAWS), or Sites of Importance for Nature Conservation (SINCs) and are included within the provisional inventory of ancient woodlands for Glamorgan. In addition, one wildlife trust reserve, Coed Garnllwyd, is located within the study area at Llancarfan.

4.4.3 Ecology

In terms of wildlife, breeding (or displaying) skylarks are known to be present within surrounding arable fields, whilst displaying (not breeding) lapwings have been noted in the nearby vicinity of Northcliff. Overall, a range of wildlife has been identified within the study area, including:

- great-crested newt;
- dormouse *Muscardinus avellanarius;*
- otter *Lutra lutra;* and
- bats.

The site also has a large number of records of local and UK Biodiversity Action Plan (BAP) species including the brown hare *Lepus europaeus*, the harvest mouse *Micromys minutus* and a large number of lepidopteron (butterflies and moths) species.

Furthermore, the Environment Agency Wales' records show that there are a number of species present in the Waycock and Thaw river catchments that run through the study area.

4.4.4 Archaeology

The A4226 and A48 routes run through areas of archaeological value and thus route options must investigate the potential for a package of mitigation measures to address discovery.

4.5 Summary

The surveys undertaken together with data gathered from the VoG have provided a useful evidence base to develop the problems, TPOs, and transport options. The key points are as follows:

- the majority of traffic flow is travelling between Barry and the rest of the Vale or the Bridgend area;
- journey times are similar in both directions;
- vehicle users average 40mph speeds, in line with the imposed speed limit on the southern section; and
- a significant proportion of drivers are commuters, which increases the impact on local businesses in the event of accidents, congestion or delayed journey times.

5 Problems and Transport Planning Objectives

5.1 Introduction

Stakeholder consultation, as discussed in Section 2.4, was undertaken to discuss existing transport problems and/or opportunities along Five Mile Lane which could be addressed and/or realised (or assisted) by improvements in transport infrastructure or management, as perceived by the consultees.

The problems highlighted as part of this process were:

- P1 – Perceived poor safety record;
- P2 – Location within an environmentally and archaeologically sensitive area;
- P3 – Congestion and journey time reliability issues in the event of an accident, slow moving farm vehicle or poor weather conditions;
- P4 – Lack of provision for non-motorised users; and
- P5 – Road maintenance issues associated with the physical constraints of the highway.

The traffic data identified in Chapter 4 has been drawn upon to revisit the perceived transport problems and opportunities identified by consultees during the consultation process. By strengthening the evidence base and gauging the severity of the issues, a more detailed assessment of what the problems are and how the TPOs should be modified to solve these problems can be considered.

5.2 Review of Identified Problems

5.2.1 P1 – Perceived poor safety record

Summary
Analysis of the historic accident data has shown that the route has previously experienced accident rates significantly above the national average rates for the class of road, although this has improved in recent years following the introduction of minor safety improvements.

Evidence Base
Local Authority accident data shows that there have been 24 personal injury accidents between the years 2005 and 2009, following the completion of a series of safety improvements.

Review
Proposals will need to maintain the number of accidents at a level acceptable for the class of road.

5.2.2 P2 – Location within an environmentally and archaeologically sensitive area

Summary
Within the study area there are a number of protected species and environmentally valued areas, including ancient woodland. In addition, the presence of two rivers means that Flood Defence Consent will be required for any proposed bridge over the River Waycock.

Evidence Base
The Soltys Brewster Consulting Environmental Assessment Stage 1 report (2008) provides details of ecological and environmental surveys. The report identified that there are a total of 104 archaeological sites within the study area, including three Scheduled Monuments and four listed buildings. In addition, the A48 road adjoins the Five Mile Lane stretch of the A4226 and follows the line of the Roman Road. Actual alignment could be anywhere within the vicinity of the existing road and thus remains could exist along the route of the road.

Review
In order to mitigate the environmental and ecological issues identified, proposals need to demonstrate strong justification for any loss in environmentally valued land. In terms of ecological protection, surveys would be required in the season before planning application submission. Geophysical survey is advised to determine the presence and extent of remains associated with the Roman Road and the findings of this could influence route selection and alignment and should therefore be given high priority.

5.2.3 P3 – Congestion and journey time reliability issues in the event of an accident, slow moving farm vehicle or poor weather conditions

Summary
Five Mile Lane is narrow in parts and there are few safe opportunities for vehicles to overtake. The route becomes subject to delays in the event of an accident, whilst journey time reliability is affected by the use of the road by slow moving vehicles. The A4226 is vulnerable to flooding, fog and ice during poor weather conditions. This threatens the safety of users and causes potential users to use alternative routes during poor weather conditions.

Evidence Base
Consultation with key stakeholders has identified concerns over congestion and journey time reliability in the event of an accident or slow moving vehicles along the route. Results also identify public concerns over the safety of the route to vehicle users during poor periods of weather.

Review
Road widening along narrow stretches will facilitate the passing of slow vehicles and ease congestion in the event of an accident. In addition, improvements to road surfacing, lighting and drainage will help ease safety issues during poor weather conditions.

5.2.4 P4 – Lack of provision for non-motorised users

Summary
The existing route does not offer facilities for equestrians, pedestrians and cyclists.

Evidence Base
There are currently no pedestrian footways, designated cycle lanes or bridleways. The narrow and winding nature of the route makes it an unattractive travel option for non-motorised users. The absence of lighting along parts of the route further discourages non-motorised users due to perceived poor safety issues.

Review
Should the Council wish to encourage equestrians, pedestrians and cyclists to use the route, non-motorised user facilities will need to be introduced in order to raise safety levels and make the road a viable option as an alternative travel route.

5.2.5 P5 – Road maintenance issues

Summary
Due to the narrow and winding nature of the route, in the event of a requirement to close part of the road for maintenance, the disruption can cause significant delays and result in potential users seeking alternative routes until works have been completed.

Evidence Base
Key stakeholders state that maintenance works can be difficult to coordinate along the route due to the impact on road users. The use of temporary signage and traffic lights can cause severe traffic delays due to the narrow nature of the road.

Review
In order to reduce disruption and severe delays during maintenance works, the road will require widening in narrow sections to maintain traffic flow.

5.3 Review of Transport Planning Objectives

Based on a meeting held between VoG and WG on 12 March 2010, together with subsequent discussions with VoG, the following Transport Planning Objectives (TPOs) were agreed:

- TPO 1 – to improve safety for all users;
- TPO 2 – to make junction improvements;
- TPO 3 – to improve community connections;
- TPO 4 – to improve access, safety and security for pedestrians, cyclists and equestrians, thereby encouraging healthy options;
- TPO 5 – to facilitate better access to Barry as a Key Settlement and Strategic Regeneration Area;
- TPO 6 – to facilitate better access to St Athan as a Strategic Opportunity Area; and
- TPO 7 – to minimise impact on environmentally sensitive areas.

Table 5.1 shows how the TPOs address each problem identified in Section 5.1. The relationship between each TPO and each identified problem is denoted as follows:

++	Fulfilling the TPO in the row would directly and positively address the problem in the column.
+	Fulfilling the TPO in the row would be expected to indirectly and positively address the problem in the column.
?	Fulfilling the TPO in the row is likely to affect the problem in the column, but the nature of the effect would depend on the type of transport intervention and thus is not known at this stage.

The table demonstrates that each of the identified problems is directly addressed by at least one TPO.

Table 5.1: Transport Planning Objectives and Identified Problems

Problems / **Transport Planning Objectives**	**P1**	**P2**	**P3**	**P4**	**P5**
	Safety	*Environmentally sensitive area*	*Congestion and journey time reliability issue*	*Lack of provision for non-motorised users*	*Road maintenance issues*
TPO 1 – Safety improvements for all users	++	?	+	+	+
TPO 2 – Junction improvements	++	?	+	+	?
TPO 3 – Improved community connections	+	?	+	+	+
TPO 4 –Improved access, safety and security for pedestrians, cyclists and equestrians, thereby encouraging healthy options	++	?	+	++	?
TPO 5 – Access to Barry as a Key Settlement and Strategic Regeneration Area	+	?	++	?	+
TPO 6 –Access to St Athan as a Strategic Opportunity Area	+	?	++	?	+
TPO 7 – Minimise impact on environmentally sensitive areas	?	++	?	?	?

6 Possible Options

6.1 Introduction

WelTAG sets out the need for a *"process of putting together a long list of possible solutions (which will then be developed and refined to become proposals), considering all possible modes"*. The guidance is not specific about how this should be undertaken. However it is suggested that *"public consultation and other forms of participation can help considerably"*.

There are some longstanding aspirations for particular transport interventions in the area, and it is recognised that several options have previously been explored and may remain potentially viable options. However, to avoid simply 'dusting off' these existing project ideas (whilst recognising that they remain potentially viable options), stakeholders and members of the public were encouraged to discuss a range of different ideas for resolving the identified transport issues during the consultation events.

6.2 Consultation Response

Different options considered to have the potential to achieve the TPOs were prepared for review at the stakeholder and public consultation events by VoG. These options drew upon the suggestions of consultees and were supplemented by a published list of possible transport interventions for members of the public to comment on (covering all modes), including:

- improvement of visibility;
- pedestrian and cycling facilities;
- improved bus services;
- community transport;
- park and ride facilities;
- park and share facilities; and
- other options, including improvements to the carriageway width, horizontal and vertical alignments, and junction improvements.

Members of the public were asked to indicate which measures would help address the problems associated with Five Mile Lane. The key results, as presented in the questionnaire responses, are shown below:

- approximately three quarters of respondents stated that improving visibility would help reduce the problems present on Five Mile Lane; and
- approximately two thirds of respondents agreed that pedestrian and cycling facilities would help reduce the problems present on Five Mile Lane.

6.3 Identification of Possible Options

Following the public consultation exercise and previous stakeholder events, transport options which had been favoured and those which were considered viable transport option from previous technical studies were taken forward to be refined.

The following options were suggested for further consideration, taking into account the relationship between options and, in particular, relationships that the analysis indicated were necessary or supportive:

1. Construction of a dual carriageway between Sycamore Cross and Waycock Cross;
2. Construction of a wide single carriageway between Sycamore Cross and Waycock Cross;
3. Implementing junction improvements at Sycamore Cross and Waycock Cross;
4. Introducing and improving public transport services and walking/cycling facility provision;
5. Undertake minor works along the route to improve visibility; and
6. Do nothing.

6.4 Option Assessment

Options 1–6 have been tested against the seven TPOs identified in Section 5.2.

Consideration has also been given to the fit of options with public and stakeholder acceptability, their technical and operational feasibility, and their likely affordability. Compatibility with the TPOs and other criteria has been indicated as follows:

++	Option would substantially meet the TPO / would proactively progress several policies / would be highly acceptable, feasible or affordable.
+	Option would help meet the TPO / would progress one or more policies / is likely to be acceptable, feasible or affordable.
o	No or negligible relationship.
-	Option could compromise the delivery of the TPO / could compromise the delivery of one or more policies / is unlikely to be readily acceptable, feasible or affordable.
- -	Option would seriously compromise the delivery of the TPO / would be directly contrary to several policies / would not be at all acceptable, feasible or affordable.
?	Effect of the Option is uncertain.

In order to assess each possible option and take forward the most viable and effective option (or package of options) to address the identified problems and TPOs, evaluation tables have been prepared and are shown below.

Option	TPO1	TPO2	TPO3	TPO4	TPO5	TP06	TPO7	Acceptability	Feasibility
Option 1 – Construction of a dual carriageway between Sycamore Cross and Waycock Cross.	++	++	++	-	++	++	--	-	-
	Commentary A new dual carriageway would improve journey times and journey time reliability for through traffic and local traffic by providing a new through route with increased speed limit restrictions. A more direct straight route with a good road surface and lighting at key points would improve safety levels. A new dual carriageway would increase community severance and exposure to emissions for settlements severed by the existing A4226 road. A new dual carriageway would be likely to have significant adverse impacts on local environmentally, ecologically and archaeologically sensitive areas. With respect to feasibility, the delivery of a new dual carriageway is likely to be technically demanding , involving a substantial new road through an area of countryside including river crossings. Construction of a substantial new road would be very expensive.								
Option	TPO1	TPO2	TPO3	TPO4	TPO5	TPO6	TPO7	Acceptability	Feasibility
Option 2 – Construction of a wide single carriageway between Sycamore Cross and Waycock Cross	**	+	++	+	+	+	-	+	+
	Commentary A new wide single carriageway would improve journey times and journey time reliability for through traffic and local traffic by providing an improved route in terms of addressing existing physical constraint. The extent of journey time improvement will need to be quantified at the next stage taking into account the results of journey time surveys. A more direct straight route with a good road surface and lighting at key points would improve safety levels. There is the potential for new community severance and exposure to emissions depending on the route of the new single carriageway. A new wide single carriageway is likely to have significant impacts on the local environment but the extent to which will be determined by the length of any offline development of any proposed new route. There is substantial and long-standing local support for the improvement of the carriageway in terms of safety and journey time reliability. With respect to feasibility, the delivery of a new single carriageway is likely to be technically demanding but possible. Operational feasibility is likely to be good. Construction of a substantial new road would be expensive. There may be some potential to upgrade the existing road (as a package of both online and offline development).								

Option	TPO1	TPO2	TPO3	TPO4	TPO5	TPO6	TPO7	Acceptability	Feasibility
Option 3 – Implementing junction improvements at Sycamore Cross and Waycock Cross	+	++	o	o	+	+	?	+	+
	Commentary Junction improvements are likely to improve journey times and journey time reliability for traffic by reducing queuing times, especially at peak periods. The extent of journey time improvement will need to be quantified at the next stage taking into account traffic data on adjoining routes. Junction improvements are unlikely to have significant impacts on the local environment. With respect to feasibility, the delivery of new junction improvements is realistic. Operational feasibility is likely to be good. Construction associated with junction improvements would be a realistic alternative in terms of securing funding.								
Option	TPO1	TPO2	TPO3	TPO4	TPO5	TPO6	TPO7	Acceptability	Feasibility
Option 4 - Introducing and improving public transport services and walking/cycling facility provision	+	+	++	++	+	+	?	+	?
	Commentary Public transport and non motorised user facility improvements are likely to attract additional users, whilst improving safety conditions for current users. Such a measure is likely to reduce dependence on the car as a preferred mode of transport, although the extent to the impact will need to be quantified at the next stage taking into account potential surveys. Public transport and non motorised user facility improvements will require widening of the highway along existing narrow stretches of the Five Mile Lane. As such, the impact on the local environment will depend on the location of highway works. With respect to feasibility, the delivery of public transport and non motorised user facility improvements is realistic. Construction associated with facility provision and improvements would be an inexpensive option, although the requirement to widen the highway in sections of the route could be expensive.								

Option	TPO1	TPO2	TPO3	TPO4	TPO5	TPO6	TPO7	Acceptability	Feasibility
Option 5 – Undertake minor works along the route to improve visibility	+	--	-	-	-	-	++	**?**	++
	Commentary • Undertaking minor works along the route to improve visibility may include such measures as minor route realignment or removal of existing obstructing vegetation. • Undertaking minor works would improve existing visibility and safety conditions in the short to medium term. In the event of significant increased traffic as a result of potential future development in the local area, the traffic conditions are likely to be adversely affected. Increased road usage is likely to lead to more congestion, poorer journey time reliability, increased accident rates, and road maintenance issues in the long term. • Doing minimal works may be a feasible option in the short to medium term but may cause public concern should the safety of road users on the route deteriorate further. • Doing minimal works would involve limited cost. However, should road conditions worsen there may be a requirement to invest in road maintenance, causing both disruption to road users and increased cost.								
Option	TPO1	TPO2	TPO3	TPO4	TPO5	TPO6	TPO7	Acceptability	Feasibility
Option 6 – Do nothing	-	--	-	-	-	-	++	**?**	++
	Commentary • Doing nothing would maintain existing conditions in the short to medium term. In the event of increased traffic as a result of potential future development in the local area, the traffic conditions are likely to be adversely affected. Increased road usage is likely to lead to more congestion, poorer journey time reliability, increased accident rates, and road maintenance issues in the long term. • Doing nothing may be a feasible option in the short to medium term but may cause public concern should the safety of road users on the route deteriorate further. • Doing nothing would directly result in no expense. However, should road conditions worsen there may be a requirement to invest in road maintenance, causing both disruption to road users and increased cost.								

6.5 Sifting

Whilst the option assessment provides an overview of the relative merits of different transport interventions, the assessment system is not intended to provide an absolute indication of which options are 'better' than others, nor does it include any assessment of the options against the Wales Transport Strategy 'Impact Areas' (sustainability criteria). Rather, it is intended to identify which options appear to have the most potential to meet the transport planning objectives, whilst excluding options from further consideration if they are clearly not effective / deliverable / acceptable.

It is proposed to exclude the following options:

- Option 1 – Construction of a dual carriageway between Sycamore Cross and Waycock Cross; and
- Option 6 – Do nothing.

It is considered that constructing a dual carriageway between Sycamore Cross and Waycock Cross would lead to significant environmental and ecological damage, which would be unacceptable in terms of public support. In addition, the major works required would make the proposal's feasibility doubtful, and is likely to incur significant expense. Alternatively, to do nothing would not address any of the existing concerns associated with the route.

At this stage it is not considered that there is sufficient justification for excluding any of the other options. However, it is proposed to amalgamate Options 2 and 4 as a package of measures. In addition, Options 3 and 5 will be taken forward to the next WelTAG Stage 1 Assessment (as summarised in the table below).

Planning Stage Options	Stage 1 Options
1. Construction of a dual carriageway between Sycamore Cross and Waycock Cross; 2. Construction of a wide single carriageway between Sycamore Cross and Waycock Cross; 3. Implementing junction improvements at Sycamore Cross and Waycock Cross; 4. Introducing and improving public transport services and walking/cycling facility provision; 5. Undertake minor works along the route to improve visibility; and 6. Do nothing.	**1. Package 1:** • Construction of a wide single carriageway between Sycamore Cross and Waycock Cross; • Implement junction improvements at Sycamore Cross and Waycock Cross; and • Introduce and improve public transport services and walking/cycling facility provision. **2. Package 2:** • Implement junction improvements at Sycamore Cross and Waycock Cross; and • Undertake minor works along the route to improve visibility.

7 Option Development and Appraisal

7.1 Introduction

WelTAG states that for the development of Stage 1 options, the work should be "*sufficiently robust to be able to identify and differentiate the most promising options and provide sufficient information to complete summary Appraisal Summary Tables over the successive iterations*".

The Planning Stage transport options carried through to Stage 1 have been reviewed and refined against the TPOs. Further refinement of each option is discussed below following technical and environmental studies carried out to inform the Five Mile Lane highway safety improvements.

7.1.1 Package 1

Package 1 would provide a new wide single carriageway between Sycamore Cross and Waycock Cross that would positively address most of the TPOs. The package would also include the implementation of a junction improvement at Sycamore Cross, together with improvements in the provision of public transport and non-motorised user facilities. In order to deliver this package, a series of Route Options have been developed and are summarised below.

a) Red Route

The alignment of the Red Route is shown in Figure 7.1. This would commence just north of Blackland Farm, with an online widening of Five Mile Lane to a standard 7.3m carriageway. At the Whitton Lodge crossroads, the Dyffryn Lane to the east would be diverted southwards to create two T-junctions. The two junctions with Northcliffe and Moulton would be combined into a new four-arm roundabout just south of Grovelands.

To the south of this roundabout, the route would go offline to shorten the existing tortuous alignment past Sutton Farm. This offline section would be constructed as a wide single 10m carriageway, allowing for two northbound lanes uphill and one southbound lane downhill. The route would rejoin the existing alignment at the Hawking Centre, and would continue online as a wide single 10m carriageway to Waycock Cross, although on this section it would have one lane northbound downhill, and two lanes southbound uphill. The entry into Waycock Cross roundabout would therefore be widened, but otherwise this junction would remain unchanged.

The improvement proposed for the Sycamore Cross junction would involve the implementation of traffic signals, as outlined in the Collision Study Report produced by Mott MacDonald for the VoG in February 2011.

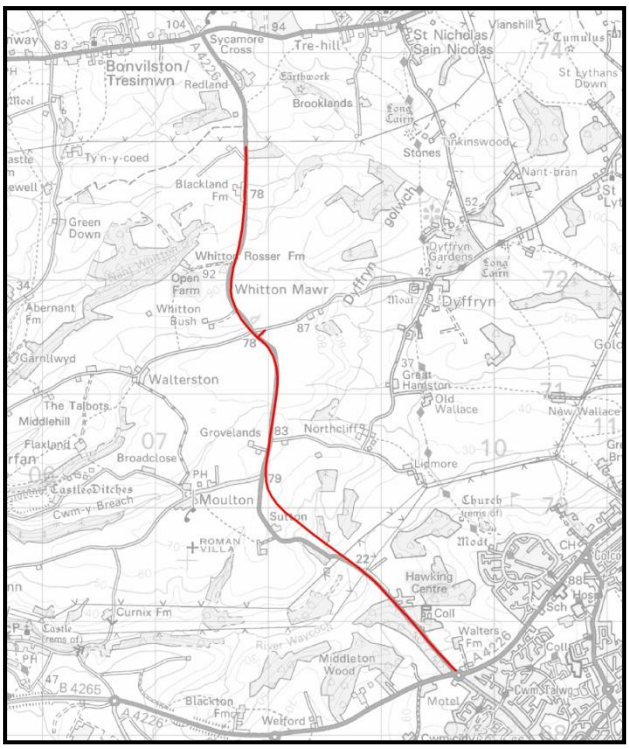

Figure 7.1: Red Route Alignment

b) Orange Route

Figure 7.2 shows the alignment of the Orange Route. This would commence at Blackland Farm, with a widening of the existing route to a standard 7.3m single carriageway.

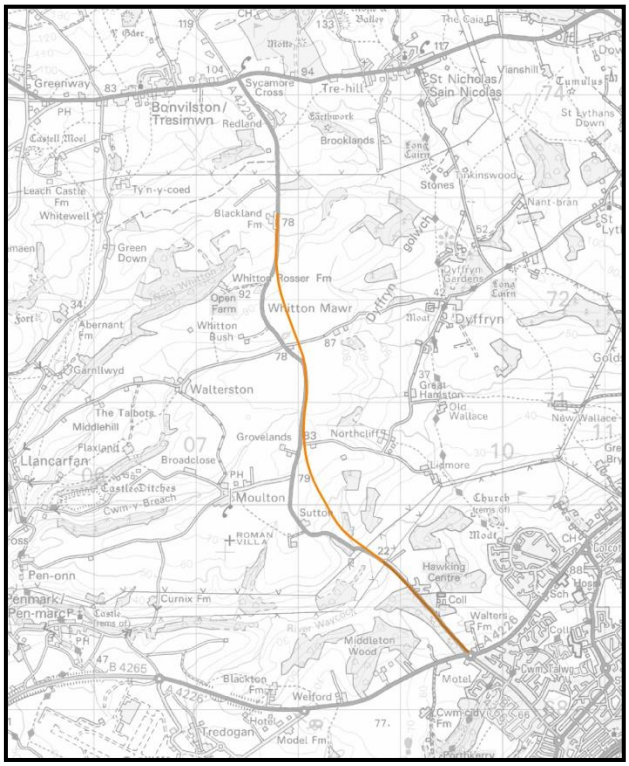

Figure 7.2: Orange Route Alignment

It would then go offline to follow a more direct route to rejoin the existing alignment to the south of Whitton Lodge, where a new four-arm roundabout would replace the existing crossroads Whitton Lodge. To the south of this junction, the existing alignment would be widened to a point just north of the Northcliff junction, where a new four-arm roundabout would serve both Northcliff and, via the existing A4226 alignment past Grovelands, Moulton.

From this point, as with the Red Route, the Orange Route would go offline to shorten the existing tortuous alignment past Sutton Farm. Again, this offline section would be constructed as a wide single 10m carriageway, allowing for two northbound lanes uphill and one southbound lane downhill. The route would rejoin the existing alignment at the Hawking Centre, from where it would follow the same alignment as the Red Route.

Traffic signals would be implemented at the Sycamore Cross junction, as described for the Red Route.

c) Green Route

The alignment of the Green Route is shown in Figure 7.3. This would be similar to the Orange Route, except that the new roundabout to replace the Whitton Lodge crossroads would be located to the north of the existing junction, and the side roads would be diverted accordingly.

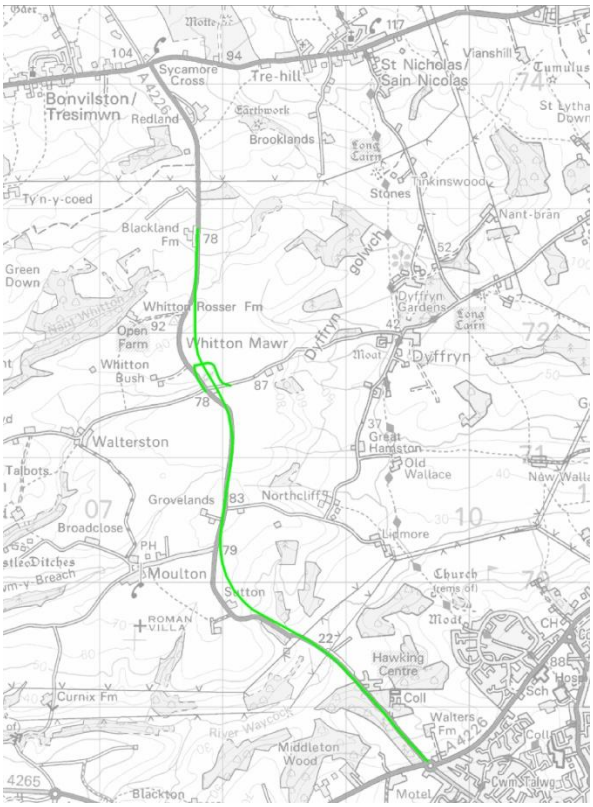

Figure 7.3: Green Route Alignment

The new Moulton / Northcliff roundabout would, as with the Red Route, are located to the south of Grovelands, and the offline section near Sutton Farm would be closer to the existing alignment. Like the Red and Orange Routes, the section from Moulton to Waycock Cross would be constructed as a wide single 10m carriageway, with two lanes uphill and one lane downhill.

d) Blue Route

Figure 7.4 shows the alignment of the Blue Route. This commences further north than the other routes, between Blackland Farm and Sycamore Cross, providing a standard 7.3m single carriageway online to a point just south of Blackland Farm where, like the other routes, it goes offline. A replacement junction for the Whitton Lodge would be formed by a new four-arm roundabout on the Dyffryn Lane alignment.

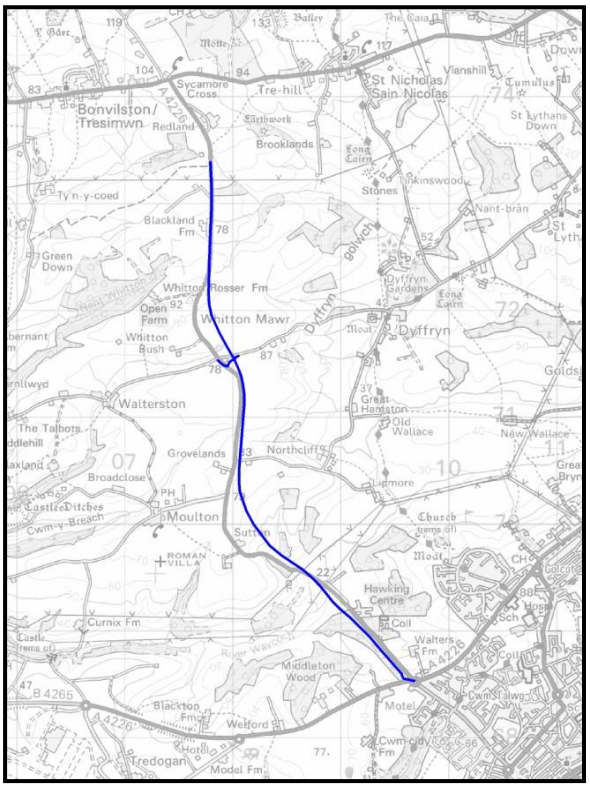

Figure 7.4: Blue Route Alignment

Unlike the other routes, there would not be a separate junction serving Moulton and Northcliff. Traffic from these side roads would follow the existing A4226 alignment northwards to feed onto the Blue Route at the new Whitton Lodge roundabout.

To the south of the Whitton Lodge roundabout, the route would be offline but close to the existing alignment. From a point just north of the Northcliff turn, where the route begins to descend into the valley, it would be constructed like the other routes as a wide 10m single carriageway, following an offline route to avoid the Sutton Farm section of the existing A4226.

Just north of the Hawking Centre, the Blue Route would cross the existing A4226 and form a new four-arm roundabout, linking to the existing A4226 both to the

north (past Sutton Farm to Moulton) and to the south (connecting to the Hawking Centre). The Blue Route would then continue parallel to the existing alignment but slightly to the west. This would feed into a new three-arm roundabout on the Port Road close to the existing Waycock Cross roundabout. The latter would also be converted to a three-arm roundabout, with a smaller and more conventional layout than the existing elongated island.

Traffic signals would be implemented at the Sycamore Cross junction, as described for the Red Route.

e) Purple Route

The Purple Route represents the alignments previously incorporated into the option testing process within the Cardiff International Airport and Culverhouse Cross Access Improvements Study. There were two route variations: an online alignment (Purple Route A) and an offline alignment (Purple Route B), both shown in Figure 7.5.

Purple Route A **Purple Route B**

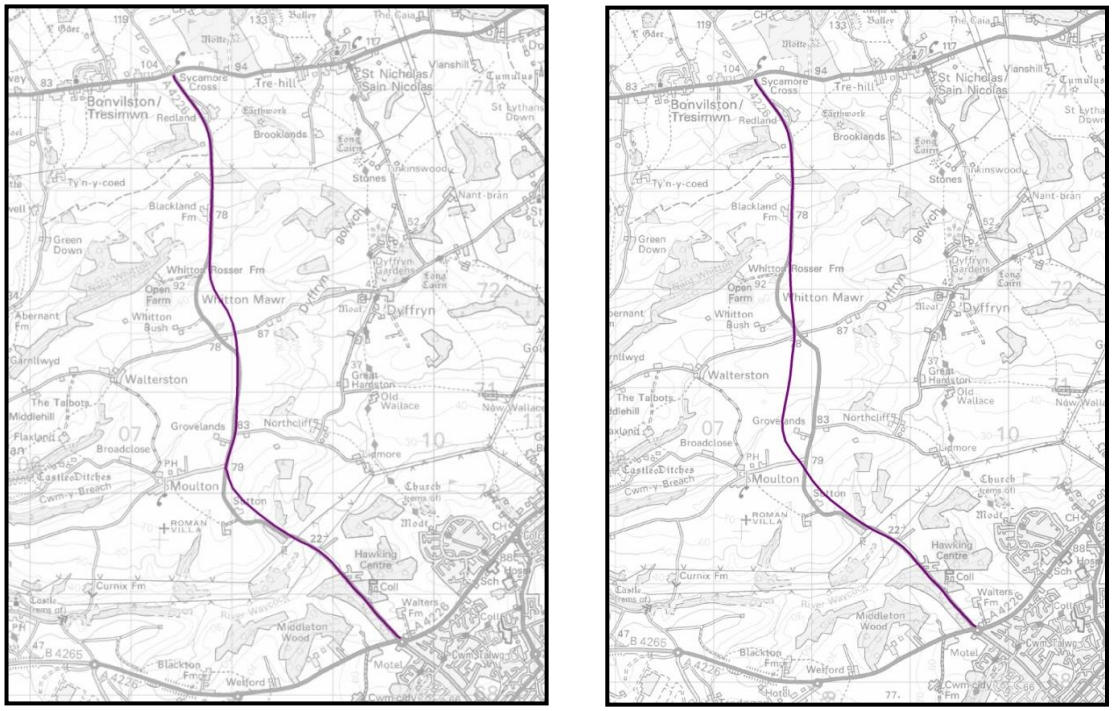

Figure 7.5: Purple Route Alignments

Purple Route A would extend the whole length of Five Mile Lane between Sycamore Cross and Waycock Cross, and would be constructed as a wide single 10m carriageway, with the exception of the southern section between the Hawking Centre and Waycock Cross, which would be a standard 7.3m single carriageway.

For the most part, the improvement would be online, apart from two offline sections, one between Blackland Farm and Whitton Lodge, and one between Moulton and the Hawking Centre. There would be a new roundabout at the Moulton junction, but there would be no junction at Whitton Lodge, and local

traffic would use the existing alignment to access the route at a new priority junction south of Blackland Farm.

Purple Route B extends over the same length, with identical sections at the northern and southern ends. The central section between Blackland Farm and the Moulton roundabout, however, would be more substantially offline. South of Blackland Farm, the wide single carriageway would divert to the east of the existing alignment before crossing it just north of the existing Whitton Lodge crossroads. It would then follow an alignment to the west of the existing road, to link in to the proposed Moulton roundabout close to the existing junction.

Traffic signals would be implemented at the Sycamore Cross junction, as described for the Red Route.

7.1.2 Package 2

Package 2 would comprise junction improvements at Sycamore Cross and Waycock Cross, together with proposals to improve forward visibility at key points along Five Mile Lane.

The improvement option for Sycamore Cross would comprise the conversion of the junction either to traffic signal operation as proposed in Mott MacDonald's Collision Study Report, or to a roundabout. The detail of this improvement is still to be determined.

The safety measures at Waycock Cross are as detailed in the Collision Study Report, and comprise:

- removal of vegetation on the Five Mile Lane approach;
- minor works to the traffic island on the eastern approach and introducing 'keep clear' markings to improve egress from the petrol station; and
- hatching to effectively widen the traffic island on the western approach and reduce the entry width for traffic.

The works on Five Mile Lane consist of vegetation clearance at defined locations to improve the forward visibility for drivers, together with additional 'concealed entrance' signs at one location.

This package would provide a feasible low-cost option that would address safety conditions in the short to medium term. However, this package may not address all of the TPOs in the longer term in the event of traffic growth.

7.2 Option Appraisal

7.2.1 Overview

WelTAG Stage 1 requires the principal outcomes for each package to be presented using Appraisal Summary Tables (ASTs) for comparison of their performances. This assists identification of packages that have the potential to be the best performing package, to take forward to the Stage 2 appraisal. ASTs extract the core economic, environmental and social impacts from each transport package, under the respective appraisal criteria.

As well as assessing how well a package performs against the TPOs and the Welsh Impact Areas, an evaluation of deliverability, risk and strength of local support must be carried out. The ASTs report this under five categories:

- Public Acceptability: likelihood of acceptance by the public.
- Acceptability to Other Stakeholders: likelihood of acceptance by stakeholders.
- Technical and Operational Feasibility: are there any barriers to the implementation and/or operation of the scheme?
- Affordability and Deliverability: can the costs be realistically funded and the proposal delivered?
- Risks: what are the risks associated with the transport option?

7.2.2 Results

This section contains the ASTs with additional information provided as appropriate. WelTAG advises that the analysis in Stage 1 should be qualitative for some or most criteria, be sufficiently robust to be able to identify and differentiate the most suitable options and to provide sufficient information to complete the ASTs of the options.

In order to inform the economic impacts reported in the ASTs, an outline cost-benefit appraisal has been undertaken. Further details of this appraisal are provided in **Appendix A**.

Following each impact appraisal for both Stages 1 and 2, WelTAG recommends that the significance of impact for each criterion is assessed using a seven point scale detailed in Paragraph 3.7.1 of the guidance. This scale includes the following assessment criteria:

Large beneficial	**Lb**
Moderate beneficial	**Mb**
Slight beneficial	**Sb**
Neutral	**N**
Slight adverse	**Sa**
Moderate adverse	**Ma**
Large adverse	**La**

Package 1(a) – Red Route		
Appraisal Criteria	**Assessment and Distribution**	**Significance**
Welsh Impact Areas		
Economic		
Transport Economic Efficiency	PVC=£11.48m, PVB £23.13m (including Safety PVB £4.15m), NPV £11.65m, BCR 2.02	Sb
EALI	Not assessed as part of Stage 1.	
Environment		
Noise	The route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Sb
Local Air Quality	Overall impacts are likely to be neutral. There will be some moderate positive effects on receptors where the carriageway is constructed at a greater distance than the current road alignment. Slight to moderate adverse effects will occur in locations where the proposed carriageway is within close proximity to receptors.	N
Greenhouse Gas Emissions	Impacts on greenhouse gas emissions are likely to be negligible.	N
Landscape and townscape	Slight adverse effect on landscape character and neutral effect on visual amenity.	Sa
Bio-diversity	Overall impact in the long term likely to be neutral for most of the route with appropriate mitigation. Large scale loss of road-side hedgerows in the short term.	Sa
Heritage	Potential for an offline section of the route to impact on the rich archaeological landscape that has been identified to be in close proximity to the A48.	N
Water environment	No direct interference through flood zones although Flood Defence Consent will be required for any proposed bridge over the River Waycock.	N
Soils	Some highway land available, but some element is offline, running through agricultural land. Construction works required for cuttings, widening and embankments.	Sa
Society		
Transport Safety	The route would improve traffic flow and would result in an improvement in safety for all road users.	Mb
Physical Fitness	Improvements to transport safety may encourage more pedestrian and cyclist trips.	Sb
Social Inclusion	Improvements to traffic flow and safety would improve the reliability and journey times of trips, whilst improving accessibility.	Sb
Transport Planning Objectives		
TPO 1	Traffic flow along the route would be improved in addition to road conditions, thus improving the safety of all road users.	Mb
TPO 2	Traffic signal improvement at Sycamore Cross. Whitton Lodge crossroads replaced by two priority junctions and new roundabout at Moulton, improving safety.	Sb
TPO 3	Improved journey times and accessibility would benefit local communities and reduce severance.	Sb
TPO 4	Improving safety for all road users including the potential provision of pedestrian and cycling facilities along the route as a package of measures would benefit non-motorised users.	Sb
TPO 5	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to Barry.	Sb
TPO 6	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to St Athan.	Sb
TPO 7	Mostly online route minimises impact on landscape.	N
Public acceptability: Public consultation exercise identified need for improvements to visibility and carriageway width. Consultation with the public on options being considered will be a requirement.		
Acceptability to other stakeholders: CCW, GGAT, & EAW were consulted on road improvements – further work required on environmental footprint will be required to satisfy stakeholders.		
Technical and operational feasibility: Very significant construction disruption with extensive online widening.		
Financial affordability and deliverability: To be completed in Stage 2		
Risks: To be completed in Stage 2		

Package 1(b) – Orange Route		
Appraisal Criteria	**Assessment and Distribution**	**Significance**
Welsh Impact Areas		
Economic		
Transport Economic Efficiency	PVC=£11.67m, PVB £27.78m (including Safety PVB £4.22m), NPV £16.10m, BCR 2.38.	Mb
EALI	Not assessed as part of Stage 1.	Not applicable
Environment		
Noise	The route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Sb
Local Air Quality	Overall impacts are likely to be neutral. There will be some moderate positive effects on receptors where the carriageway is constructed at a greater distance than the current road alignment. Slight to moderate adverse effects will occur in locations where the proposed carriageway is within close proximity to receptors.	N
Greenhouse Gas Emissions	Impacts on greenhouse gas emissions are likely to be negligible.	N
Landscape and townscape	Slight adverse effect on landscape character and neutral effect on visual amenity.	Sa
Bio-diversity	Overall impact in the long term likely to be neutral for most of the route with appropriate mitigation. Large scale loss of road-side hedgerows in the short term.	Sa
Heritage	Potential for offline section of route to impact on rich archaeological landscape that has been identified to be in close proximity to the A48.	N
Water environment	No direct interference through flood zones although Flood Defence Consent will be required for any proposed bridge over the River Waycock.	N
Soils	Some highway land available, but some element is offline, running through agricultural land. Construction works required for cuttings, widening and embankments.	Sa
Society		
Transport Safety	The route would improve traffic flow and would result in an improvement in safety for all road users.	Mb
Physical Fitness	Improvements to transport safety may encourage more pedestrian and cyclist trips.	Sb
Social Inclusion	Improvements to traffic flow and safety would improve the reliability and journey times of trips, whilst improving accessibility.	Sb
Transport Planning Objectives		
TPO 1	Traffic flow along the route would be improved in addition to road conditions, thus improving the safety of all road users.	Mb
TPO 2	Traffic signal improvement at Sycamore Cross. New roundabouts replace existing junctions at Whitton Lodge and Moulton, improving safety.	Sb
TPO 3	Improved journey times and accessibility would benefit local communities and reduce severance.	Sb
TPO 4	Improving safety for all road users including the potential provision of pedestrian and cycling facilities along the route as a package of measures would benefit non-motorised users.	Sb
TPO 5	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to Barry.	Sb
TPO 6	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to St Athan.	Sb
TPO 7	Slightly greater impact on landscape with offline sections than option 1(a), but still relatively low.	N
Public acceptability: Public consultation exercise identified need for improvements to visibility and carriageway width. Consultation with the public on options being considered will be a requirement.		
Acceptability to other stakeholders: CCW, GGAT, & EAW were consulted on road improvements – further work required on environmental footprint will be required to satisfy stakeholders.		
Technical and operational feasibility: Significant construction disruption with improvements to online sections.		
Financial affordability and deliverability: To be completed in Stage 2		
Risks: To be completed in Stage 2		

Package 1(c) – Green Route		
Appraisal Criteria	**Assessment and Distribution**	**Significance**
Welsh Impact Areas		
Economic		
Transport Economic Efficiency	PVC=£11.54m, PVB £20.48m (including Safety PVB £4.24m), NPV £8.94m, BCR 1.77.	Sb
EALI	Not assessed as part of Stage 1.	Not applicable
Environment		
Noise	The route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Sb
Local Air Quality	Overall impacts are likely to be neutral. There will be some moderate positive effects on receptors where the carriageway is constructed at a greater distance than the current road alignment. Slight to moderate adverse effects will occur in locations where the proposed carriageway is within close proximity to receptors.	N
Greenhouse Gas Emissions	Impacts on greenhouse gas emissions are likely to be negligible.	N
Landscape and townscape	Slight adverse effect on landscape character and neutral effect on visual amenity.	Sa
Bio-diversity	Overall impact in the long term likely to be neutral for most of the route with appropriate mitigation. Large scale loss of road-side hedgerows in the short term.	Sa
Heritage	Potential for an offline section of the route to impact on the rich archaeological landscape that has been identified to be in close proximity to the A48.	N
Water environment	No direct interference through flood zones although Flood Defence Consent will be required for any proposed bridge over the River Waycock.	N
Soils	Some highway land available, but some element is offline, running through agricultural land. Construction works required for cuttings, widening and embankments.	Sa
Society		
Transport Safety	The route would improve traffic flow and would result in an improvement in safety for all road users.	Ma
Physical Fitness	Improvements to transport safety may encourage more pedestrian and cyclist trips.	Sa
Social Inclusion	Improvements to traffic flow and safety would improve the reliability and journey times of trips, whilst improving accessibility.	Sa
Transport Planning Objectives		
TPO 1	Traffic flow along the route would be improved in addition to road conditions, thus improving the safety of all road users.	Mb
TPO 2	Traffic signal improvement at Sycamore Cross. New roundabouts replace existing junctions at Whitton Lodge and Moulton, improving safety.	Sb
TPO 3	Improved journey times and accessibility would benefit local communities and reduce severance.	Sb
TPO 4	Improving safety for all road users including the potential provision of pedestrian and cycling facilities along the route as a package of measures would benefit non-motorised users.	Sb
TPO 5	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to Barry.	Sb
TPO 6	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to St Athan.	Sb
TPO 7	Slightly greater impact on landscape with offline sections than option 1(a), but still relatively low.	Sa
Public acceptability: Public consultation exercise identified need for improvements to visibility and carriageway width. Consultation with the public on options being considered will be a requirement.		
Acceptability to other stakeholders: CCW, GGAT, & EAW were consulted on road improvements – further work required on environmental footprint will be required to satisfy stakeholders.		
Technical and operational feasibility: Significant construction disruption with improvements to online sections.		
Financial affordability and deliverability: To be completed in Stage 2		
Risks: To be completed in Stage 2.		

Package 1(d) – Blue Route		
Appraisal Criteria	**Assessment and Distribution**	**Significance**
Welsh Impact Areas		
Economic		
Transport Economic Efficiency	PVC=£12.46m, PVB £24.36m (including Safety PVB £3.10m), NPV £11.90m, BCR 1.96.	Sb
EALI	Not assessed as part of Stage 1.	Not applicable
Environment		
Noise	The route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Sb
Local Air Quality	Overall impacts are likely to be neutral. There will be some moderate positive effects on receptors where the carriageway is constructed at a greater distance than the current road alignment. Slight to moderate adverse effects will occur in locations where the proposed carriageway is within close proximity to receptors.	N
Greenhouse Gas Emissions	Impacts on greenhouse gas emissions are likely to be negligible.	N
Landscape and townscape	Moderate adverse effect on landscape character and neutral effect on visual amenity.	Ma
Bio-diversity	Overall impact in the long term likely to be neutral for most of the route with appropriate mitigation. Large scale loss of road-side hedgerows in the short term.	Sa
Heritage	Potential for an offline section of the route to impact on the rich archaeological landscape identified to be in close proximity to the A48.	N
Water environment	No direct interference through flood zones although Flood Defence Consent will be required for any proposed bridge over the River Waycock.	N
Soils	Some highway land available, but some element is offline, running through agricultural land. Construction works required for cuttings, widening and embankments.	Sa
Society		
Transport Safety	The route would improve traffic flow and would result in an improvement in safety for all road users.	Mb
Physical Fitness	Improvements to transport safety may encourage more pedestrian and cyclist trips.	Sb
Social Inclusion	Improvements to traffic flow and safety would improve the reliability and journey times of trips, whilst improving accessibility.	Sb
Transport Planning Objectives		
TPO 1	Traffic flow along the route would be improved in addition to road conditions, thus improving the safety of all road users.	Mb
TPO 2	Traffic signal improvement at Sycamore Cross. Waycock Cross roundabout replaced by two smaller 3-arm roundabouts, and a new roundabout replaces the existing junctions at Whitton Lodge and Moulton, all improving safety.	Sb
TPO 3	Improved journey times and accessibility would benefit local communities and reduce severance.	Sb
TPO 4	Improving safety for all road users including the potential provision of pedestrian and cycling facilities along the route as a package of measures would benefit non-motorised users.	Sb
TPO 5	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to Barry.	Sb
TPO 6	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to St Athan.	Sb
TPO 7	Greater landscape impact with offline alignment through woodland between the Hawking Centre and Waycock Cross.	Ma
Public acceptability: Public consultation exercise identified need for improvements to visibility and carriageway width. Consultation with the public on options being considered will be a requirement.		
Acceptability to other stakeholders: CCW, GGAT, & EAW were consulted on road improvements – further work required on environmental footprint will be required to satisfy stakeholders.		
Technical and operational feasibility: Lower construction disruption with more extensive offline improvements.		
Financial affordability and deliverability: To be completed in Stage 2		
Risks: To be completed in Stage 2		

Package 1(e) – Purple Route A		
Appraisal Criteria	**Assessment and Distribution**	**Significance**
Welsh Impact Areas		
Economic		
Transport Economic Efficiency	PVC=£10.75m, PVB £26.92m (including Safety PVB £5.93m), NPV £16.17m, BCR 2.50.	Mb
EALI	Not assessed as part of Stage 1.	Not applicable
Environment		
Noise	The route creates neutral or slight positive impacts following the installation of appropriate mitigation.	N
Local Air Quality	Overall impacts are likely to be neutral. There will be some moderate positive effects on receptors where the carriageway is constructed at a greater distance than the current road alignment. Slight to moderate adverse effects will occur in locations where the proposed carriageway is within close proximity to receptors.	N
Greenhouse Gas Emissions	Impacts on greenhouse gas emissions are likely to be negligible.	N
Landscape and townscape	Slight adverse effect on landscape character and neutral effect on visual amenity.	Sa
Bio-diversity	Overall impact in the long term likely to be neutral for most of the route with appropriate mitigation. Large scale loss of road-side hedgerows in the short term.	Sa
Heritage	Potential for an offline section of the route to impact on the rich archaeological landscape that has been identified to be in close proximity to the A48.	N
Water environment	No direct interference through flood zones although Flood Defence Consent will be required for any proposed bridge over the River Waycock.	N
Soils	Some highway land available, but some element is offline, running through agricultural land. Construction works required for cuttings, widening and embankments.	Sa
Society		
Transport Safety	The route would improve traffic flow and would result in an improvement in safety for all road users.	Mb
Physical Fitness	Improvements to transport safety may encourage more pedestrian and cyclist trips.	Sb
Social Inclusion	Improvements to traffic flow and safety would improve the reliability and journey times of trips, whilst improving accessibility.	Sb
Transport Planning Objectives		
TPO 1	Traffic flow along the route would be improved in addition to road conditions, thus improving the safety of all road users.	Mb
TPO 2	Traffic signal improvement at Sycamore Cross. New roundabout replaces the existing junctions at Moulton, improving safety.	Sb
TPO 3	Improved journey times and accessibility would benefit local communities and reduce severance.	Sb
TPO 4	Improving safety for all road users including the potential provision of pedestrian and cycling facilities along the route as a package of measures would benefit non-motorised users.	Sb
TPO 5	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to Barry.	Sb
TPO 6	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to St Athan.	Sb
TPO 7	Slightly greater impact on landscape with offline sections than option 1(a), but still relatively low.	Sa
Public acceptability: Public consultation exercise identified need for improvements to visibility and carriageway width. Consultation with the public on options being considered will be a requirement.		
Acceptability to other stakeholders: CCW, GGAT, & EAW were consulted on road improvements – further work required on environmental footprint will be required to satisfy stakeholders.		
Technical and operational feasibility: Significant construction disruption with improvements to online sections.		
Financial affordability and deliverability: To be completed in Stage 2		
Risks: To be completed in Stage 2.		

Package 1(e) – Purple Route B		
Appraisal Criteria	**Assessment and Distribution**	**Significance**
Welsh Impact Areas		
Economic		
Transport Economic Efficiency	PVC=£13.70m, PVB £25.39m (including Safety PVB £6.08m), NPV £11.69m, BCR 1.85.	Sb
EALI	Not assessed as part of Stage 1.	Not applicable.
Environment		
Noise	The route creates neutral or slight positive impacts following the installation of appropriate mitigation.	Sb
Local Air Quality	Overall impacts are likely to be neutral. There will be some moderate positive effects on receptors where the carriageway is constructed at a greater distance than the current road alignment. Slight to moderate adverse effects will occur in locations where the proposed carriageway is within close proximity to receptors.	N
Greenhouse Gas Emissions	Impacts on greenhouse gas emissions are likely to be negligible.	N
Landscape and townscape	Moderate adverse effect on landscape character and neutral effect on visual amenity.	Ma
Bio-diversity	Overall impact in the long term likely to be neutral for most of the route with appropriate mitigation. Large scale loss of road-side hedgerows in the short term.	Sa
Heritage	Potential for an offline section of the route to impact on the rich archaeological landscape that has been identified to be in close proximity to the A48.	N
Water environment	No direct interference through flood zones although Flood Defence Consent will be required for any proposed bridge over the River Waycock.	N
Soils	Some highway land available, but some element is offline, running through agricultural land. Construction works required for cuttings, widening and embankments.	Sa
Society		
Transport Safety	The route would improve traffic flow and would result in an improvement in safety for all road users.	Mb
Physical Fitness	Improvements to transport safety may encourage more pedestrian and cyclist trips.	Sb
Social Inclusion	Improvements to traffic flow and safety would improve the reliability and journey times of trips, whilst improving accessibility.	Sb
Transport Planning Objectives		
TPO 1	Traffic flow along the route would be improved in addition to road conditions, thus improving the safety of all road users.	Mb
TPO 2	Traffic signal improvement at Syacmore Cross. New roundabout replaces the existing junctions at Moulton, improving safety.	Sb
TPO 3	Improved journey times and accessibility would benefit local communities and reduce severance.	Sb
TPO 4	Improving safety for all road users including the potential provision of pedestrian and cycling facilities along the route as a package of measures would benefit non-motorised users.	Sb
TPO 5	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to Barry.	Sb
TPO 6	Improved journey times and accessibility along the route, together with Sycamore Cross improvement, would facilitate better access to St Athan.	Sb
TPO 7	Greater landscape impact with more extensive offline alignment between the Hawking Centre and Blackland Farm.	Ma
Public acceptability: Public consultation exercise identified need for improvements to visibility and carriageway width. Consultation with the public on options being considered will be a requirement.		
Acceptability to other stakeholders: CCW, GGAT, & EAW were consulted on road improvements – further work required on environmental footprint will be required to satisfy stakeholders.		
Technical and operational feasibility: Lower construction disruption with more extensive offline improvements.		
Financial affordability and deliverability: To be completed in Stage 2		
Risks: To be completed in Stage 2		

Package 2 –Junction improvements at Sycamore Cross and Waycock Cross; Minor works along Five Mile Lane to improve visibility		
Appraisal Criteria	**Assessment and Distribution**	**Significance**
Welsh Impact Areas		
Economic		
Transport Economic Efficiency	PVC=£0.61m, PVB=£2.83m (including Safety PVB -£0.74m), NPV £2.22m, BCR 4.65	Mb
EALI	Not assessed as part of Stage 1.	Not applicable
Environment		
Noise	No significant impact on noise.	N
Local Air Quality	Potentially more traffic along Five Mile Lane could create more emissions.	N
Greenhouse Gas Emissions	Negligible changes in greenhouse gas emissions.	N
Landscape and townscape	Negligible change to the landscape and townscape.	N
Bio-diversity	Measures to remove obstructing vegetation may potentially create negative impacts on biodiversity.	N
Heritage	Negligible change on study area heritage.	N
Water environment	Potential impact from increased traffic and non-management of the risks.	N
Soils	Contamination from continued run-off issues.	N
Society		
Transport Safety	Junction and visibility improvements would help improve traffic flow and would result in an improvement in safety for all road users.	Sb
Physical Fitness	As existing	N
Social Inclusion	Improvements to traffic flow and safety would improve the reliability and journey times of trips, whilst improving accessibility.	Sb
Transport Planning Objectives		
TPO 1	Safety levels may continue to deteriorate in the longer term with increasing traffic following initial improvements.	Sb
TPO 2	Traffic signal improvement at Sycamore Cross, minor works at Waycock Cross.	Sb
TPO 3	Medium to long term deterioration to journey time reliability and safety levels may adversely impact on local communities and increase community severance.	N
TPO 4	Continuing deteriorating in safety levels will not attract the use of the route by non –motorised users.	N
TPO 5	Improvement to Sycamore Cross junction will facilitate better access to Barry.	Sb
TPO 6	Improvement to Sycamore Cross junction will facilitate better access to St Athan.	Sb
TPO 7	Minor works may lead to negative landscape impacts.	Sa
Public acceptability: There is long-standing local aspiration for urgent action in response to the poor safety record of Five Mile Lane and perceived dangerous nature of the route for non-motorised users.		
Acceptability to other stakeholders: No record of stakeholder comments on do-nothing scenario to date.		
Technical and operational feasibility: No impact		
Financial affordability and deliverability: To be completed in Stage 2		
Risks: To be completed in Stage 2		

8 Health Impact Assessment

8.1 Introduction

As reported in the 'Improving Health and Reducing Inequalities' guide produced by the Welsh Assembly Government in 2004, Health Impact Assessments provide a *"systematic yet flexible framework that can be used to consider the wider effects of local and national policies or initiatives and how they, in turn, may affect people's health".* For the purposes of this report, a screening record summary has been provided to indicate the key social, economic and health impacts that could occur as a result of each transport package identified.

8.2 Basic Screening Record – Package 1 (new wide single carriageway package of measures)

8.2.1 Key Population Groups affected by the project

Vulnerable Groups

Primarily, the residents of Barry, Tredogan, Llancarfan, Penmark, Dyffryn, St Nicholas and Bonvilston are the population groups within the study area most likely to be affected by this package.

8.2.2 Summary of significant or moderate impacts

Individual Lifestyles

At present, road user safety, journey time reliability and traffic flow inconsistency along the A4226 in the event of slow moving vehicles, road maintenance works or traffic accidents are perceived to be problems in the area. As a result there is long-standing local support for transport interventions to solve these problems.

Introducing a wide single carriageway in addition to junction improvements and non motorised user facility provision to address these problems could have major beneficial impacts on individual lifestyles, particularly for residents along the A4226. However, residents in the study area may suffer from impacts on the local environment as a result of potential offline measures.

Social and Community Influences

The introduction of a wide single carriageway and associated works would create a more attractive route in terms of safety and journey time reliability for commuters and residents in the study area. From a social perspective it may increase the level of community/farm severance along the A4226, although the agricultural nature of the study area would limit the impact. The package of measures would reduce conflict between non motorised users and vehicles on the road network.

Living Conditions

Increasing the use of the road is not a Transport Planning Objective. It is not considered that the proposed measures would lead to an increase of traffic on local

roads and therefore there is likely to be minimal impact on residents along the A4226. However, improvements to public transport and non motorised user facilities may encourage more sustainable transport mode usage on the route and as a result vehicle emissions may be reduced along the corridor. The same assumptions can be made for noise and vibration impacts.

Economic Conditions

Improved journey time reliability and road safety would improve access for commuters to key nearby employment areas in the Vale of Glamorgan.

Access and Quality of Services

The increase in travel conditions along the A4226 would have a positive impact on access to healthcare and educational facilities in the wider Vale of Glamorgan area. The improvement in journey time reliability along the A4226 would benefit public transport and private vehicle movements. The provision of non-motorised user facilities may also encourage more people to travel by bicycle or on foot.

8.2.3 Recommendations

At this stage of the study the level of information concerning the health of those who would be affected by an improved route is not sufficient to enable a Health Impact Assessment to be undertaken.

8.3 Basic Screening Record – Package 2 (Junction improvements at Sycamore Cross and Waycock Cross; Minor works along Five Mile Lane to improve visibility)

8.3.1 Key Population Groups affected by the project

Vulnerable Groups

Primarily, the residents of Barry, Tredogan, Llancarfan, Penmark, Dyffryn, St Nicholas and Bonvilston are the population groups within the study area most likely to be affected by this package.

8.3.2 Summary of significant or moderate impacts

Individual Lifestyles

Individual lifestyles will be improved in the short term. In the long term, the road network may deteriorate and the levels of traffic may rise, having a negative impact on the local community.

Social and Community Influences

Access to facilities will deteriorate for private car users and public transport services in the longer term should traffic and road conditions deteriorate over time.

Living Conditions

At this stage of appraisal it is very difficult to determine whether there would be a major impact on living conditions in the study area.

Economic Conditions

Access to employment opportunities and local assets will slowly deteriorate should traffic increase on the junctions and along the route in the longer term.

Access and Quality of Services

Access to employment opportunities may slowly deteriorate for those who live outside of the study area should traffic increase on the junctions and along the route in the longer term.

8.3.3 Recommendations

At this stage of the study the level of information concerning the health of those who would be affected by Package 2 is not sufficient to warrant a Health Impact Assessment.

8.4 Summary

Following the Stage 1 Basic Screening Test for each Package, it is clear that there is insufficient information to carry out a Health Impact Assessment. For this study, the environmental aspects are extremely important in assessing the impacts of each option and will therefore require quantitative information. Once this data is available, it will be essential that another test is carried out in the WelTAG Stage 2 Appraisal.

9 Summary and Recommendations

9.1 Summary

This report has defined the transport options that are best suited to meeting the Transport Planning Objectives and Welsh Impact Areas for the Five Mile Lane section of the A4226.

Whilst the Stage 1 appraisal process has provided an overview of the relative merits of each transport package, it has only been used to select packages that merit further consideration at a Stage 2 Appraisal. It has not been used to provide an absolute indication of which options are better than others. A summary of the Packages is shown below:

Appraisal Criteria	Package						
	1a	1b	1c	1d	1e (A)	1e (B)	2
Welsh Impact Areas							
Economic							
Transport Economic Efficiency	Sb	Mb	Sb	Sb	Mb	Sb	Mb
EALI	Not applicable						
Environment							
Noise	Sb	Sb	Sb	Sb	N	Sb	N
Local Air Quality	N	N	N	N	N	N	N
Greenhouse Gas Emissions	N	N	N	N	N	N	N
Landscape and townscape	Sa	Sa	Sa	Ma	Sa	Ma	N
Bio-diversity	Sa	Sa	Sa	Sa	Sa	Sa	N
Heritage	N	N	N	N	N	N	N
Water environment	N	N	N	N	N	N	N
Soils	Sa	Sa	Sa	Sa	Sa	Sa	N
Society							
Transport Safety	Mb	Mb	Ma	Mb	Mb	Mb	Sb
Physical Fitness	Sb	Sb	Sa	Sb	Sb	Sb	N
Social Inclusion	Sb	Sb	Sa	Sb	Sb	Sb	Sb
Transport Planning Objectives							
TPO 1	Mb	Mb	Mb	Mb	Mb	Mb	Sb
TPO 2	Sb	Sb	Sb	Sb	Sb	Sb	Sb
TPO 3	Sb	Sb	Sb	Sb	Sb	Sb	N
TPO 4	Sb	Sb	Sb	Sb	Sb	Sb	N
TPO 5	Sb	Sb	Sb	Sb	Sb	Sb	Sb
TPO 6	Sb	Sb	Sb	Sb	Sb	Sb	Sb
TPO 7	N	N	Sa	Ma	Sa	Ma	Sa

Package 1 considered a number of measures including a new single carriageway between Sycamore Cross and Waycock Cross, a junction improvement at Sycamore Cross and public transport/non motorised user facility provision. The package was split into six route options and each performed relatively well against the TPOs and Welsh Impact Areas and would improve the transport network of the study area. They would also improve network resilience with the capacity to react to sudden change. Each route shared similar feasibility and cost projections. However, they would have a varied impact on the environment in terms of their online/offline development. Overall, options 1b and 1e(A) were selected as the preferred routes for Package 1 with reference to the TPOs and WelTAG evaluation criteria.

Package 2 considered the implementation of junction improvements at Sycamore Cross and Waycock Cross, together with minor works on Five Mile Lane to improve forward visibility along the route. Junction improvements would help improve traffic flow and would result in an improvement in safety for all road users at a minimal cost.

Having assessed its likely impacts, it was concluded that Package 2 is a viable short to medium term option. In the short term there would be a positive impact on existing journey times, community severance, safety, and network reliability but in the longer term, if traffic volumes continue to increase, there would be an associated gradual deterioration in relation to each of the transport related TPOs.

9.2 Recommendations

The following packages that have emerged as a result of the Stage 1 assessment are:

- Package 1: Wide single carriageway between Sycamore Cross and Waycock Cross - Option 1b (Orange Route);
- Package 1: Wide single carriageway between Sycamore Cross and Waycock Cross - Option 1e (Purple Route A); and
- Package 2, comprising:
  - Major junction improvement at Sycamore Cross (roundabout or signal control);
  - Minor improvement at Waycock Cross; and
  - Minor works along Five Mile Lane to improve visibility.

It is recommended that these options should be taken forward to a WelTAG Stage 2 Appraisal.

Appendix A

Cost-Benefit Appraisal

A1 Methodology

An outline cost-benefit appraisal was undertaken on each of the route options identified in Section 7.1.1, using traffic forecasts obtained from the traffic model developed as part of the Cardiff International Airport and Culverhouse Cross Access Improvements study.

The appraisal has been carried out using the Department for Transport's TUBA software, with a separate assessment of safety benefits undertaken using a spreadsheet analysis that uses accident rates for different road types as defined in the Design Manual for Roads and Bridges.

It should be noted that the appraisal has certain limitations:

1. At this stage, no detailed scheme costs have been produced for the different options. The costs for the route options used in the appraisal have been derived from those produced as part of the Cardiff International Airport and Culverhouse Cross Access Improvements study for the Purple Routes, with adjustments for the relative length of the individual schemes and the proportion of online and offline construction. Costs for the Package 2 measures, including the traffic signal improvement at Sycamore Cross, are taken directly from Mott MacDonald's Collision Study Report.

2. Scheme costs do not include an allowance for Optimism Bias or risk assessment, while it is assumed that indirect taxation is not applicable to the construction costs.

3. The appraisal does not include the assessment of benefits or disbenefits arising from scheme construction and maintenance.

4. Land costs are assumed to be 1.5% of the construction costs (the same assumption used in the Cardiff International Airport and Culverhouse Cross Access Improvements study).

It should also be noted that the traffic model developed for the Cardiff International Airport and Culverhouse Cross Access Improvements study was designed to appraise a larger scheme than those considered here. For an accurate assessment of the Five Mile Lane options, a model covering a reduced area and validated in accordance with current guidance may be more appropriate.

While a more detailed cost-benefit assessment will be required for a Stage 2 appraisal, this Stage 1 assessment provides a guide to the economic benefits that could be expected, and in particular enables the relative economic performance of the different options to be compared objectively.

A2 Cost-Benefit Results

Table A1: Summary of Economic Assessment Results

Package Option	PVB (£000)					PVC (£000)	NPV (£000)	BCR
	Time	Vehicle operating costs	Carbon	Accidents	Total			
1(a) Red	17001	1860	154	4115	23130	11477	11653	2.02
1(b) Orange	20492	2841	225	4216	27774	11672	16102	2.38
1(c) Green	14170	1919	154	4236	20479	11542	8937	1.77
1(d) Blue	20275	877	114	3097	24363	12461	11902	1.96
1(e) Purple 'A'	19497	1361	128	5935	26921	10749	16172	2.50
1(e) Purple 'B'	17451	1708	154	6082	25395	13704	11691	1.85
2	2508	995	68	-743	2828	608	2220	4.65

Note: All costs expressed in thousands of pounds at 2002 prices.

PVB = Present Value of Benefits

PVC = Present Value of Costs

NPV = Net Present Value (PVB-PVC)

BCR = Benefit Cost Ratio (PVB/PVC)