

A465 Blaenau'r Cymoedd
Adrannau 5 + 6: *Dowlais Top - Hirwaun*



A465 Heads of the Valleys
Sections 5 + 6: *Dowlais Top - Hirwaun*



Llywodraeth Cymru
Welsh Government

www.cymru.gov.uk

A465 Heads of the Valleys Sections 5 and 6: Dowlais Top to Hirwaun

Sustainable Development Report—July 2017



Contents

1.	Introduction	1
1.1	Purpose of the Report	1
1.2	Structure	1
1.3	Publication of the Sustainable Development Report	2
2.	Sustainable Development Policy in Wales	3
2.1	Background to Welsh Sustainable Development Policy	3
2.2	Well-being of Future Generations (Wales) Act 2015.....	3
2.3	Taking Wales Forward: The Welsh Government’s Well-being Objectives.....	6
3.	The Proposed Scheme and its Context	10
3.1	Location	10
3.2	Background	10
3.3	The Proposed Scheme.....	12
3.4	A465 Section 5 & 6 Context	13
4.	The Sustainable Development Principle in Decision Making	31
4.1	Identification of the Objectives of the Proposed Scheme.....	31
4.2	Evolution of Environmental Design Objectives	35
4.3	Collaboration and Involvement.....	36
4.4	Construction and post construction maintenance	43
4.5	Operation.....	44
5.	The Well-being Goals	45
5.1	A Prosperous Wales.....	45
5.2	A Resilient Wales	48
5.3	A Healthier Wales.....	52
5.4	A More Equal Wales.....	53
5.5	A Wales of Cohesive Communities	53
5.6	A Wales of Vibrant Culture and Thriving Welsh Language	56
5.7	A Globally Responsible Wales	58
6.	The Well-being Objectives	59
6.1	Create Conditions to Give Every Child the Best Start in Life	59
6.2	Improve Education Outcomes for All and Reduce the Gap in Outcomes for Different Groups	60
6.3	Help People Live Healthy and Independent Lives and Support a Healthy Workforce	61
6.4	Improve Prosperity for All Across Wales, Helping People into Employment and Sustaining Jobs	63
6.5	Create the Conditions for People to Learn and Use the Welsh Language with their Families, in their Communities and in the Workplace.....	66
6.6	Support the Transition to a Low Carbon and Climate Resilient Society	67
6.7	Connect Communities through Sustainable and Resilient Infrastructure.....	68
6.8	Support Safe, Cohesive and Resilient Communities	69
6.9	Improve Access to Secure, Safe, Efficient and Affordable Homes	71
6.10	Foster Conditions for Sustainable Economic Development and Employment, whilst Stimulating Innovation and Growth for a Modern Low Carbon Economy	71
6.11	Promote and Enhance the Culture and Heritage of Wales	72

6.12	Manage, Use and Enhance Wales' Natural Resources to Support Long-Term Wellbeing.....	73
6.13	Facilitate High Quality, Responsive and Better Integrated Public Services, to Those That Need Them Most; Enabling Citizens to be an Equal Partner	74
6.14	Position Wales as an Internationally Focussed, Ambitious Country Engaged and Connected to the Wider World.....	75
7.	Conclusions	77
8.	References	78

1. Introduction

1.1 Purpose of the Report

This document is the Sustainable Development Report for the dualling of the A465 Section 5 and 6, Dowlais Top to Hirwaun Project (the proposed scheme). This document reports the findings of a consideration of the proposed scheme against the Welsh Government's commitments to sustainable development within the context of the Well-being of Future Generation (Wales) Act 2015 (the Act).

This report is based on the framework set out in the Act and assesses how the proposed scheme aligns with the Well-being Goals set out in the Act and the Welsh Government's Well-being Objectives. The report also considers the extent to which the proposed scheme has been developed in accordance with the five ways of working.

The proposals for the Abergavenny to Hirwaun Dualling highway improvements scheme (the Project) promoted in the 1990s predate the Act. On this basis, early consultation and Project development were undertaken prior to the requirement to consider the Act's requirements relating to goals, objectives and five ways of working.

This report contributes to the evidence put forward by the Welsh Government in support of the proposed scheme. It will form part of the evidence that will inform the Welsh Ministers in arriving at a decision on whether to proceed with the proposed scheme having regard to their duty to carry out 'sustainable development'; and shows how the development of the proposed scheme aligns with the principles of sustainable development.

1.2 Structure

The structure of the report is based on the framework set out in the Act and supporting guidance documents. This framework includes seven Well-being Goals, five ways of working which are applicable to all public bodies, along with consideration of fourteen objectives that have been set by the Welsh Government in respect of its own strategies and projects. Table 1.1 sets out the structure of the report.

Table 1.1 : Structure of the Sustainable Development Report

Chapter	Topic	Description
Chapter 1	Introduction	This chapter introduces the Well-being of Future Generation (Wales) Act 2015 and the proposed scheme and explains the structure of the sustainability report.
Chapter 2	Sustainable Development Policy in Wales	An introduction to the Welsh Government's legislative and policy context in relation to sustainable development.
Chapter 3	The Proposed Scheme	This chapter provides an introduction to the proposed scheme and the area where it is situated.
Chapter 4	The Sustainable Development Principle	This chapter considers how the sustainable development principle has influenced the decision making process as the proposed scheme has evolved.
Chapter 5	The Well-being Goals	This chapter summarises how the proposed scheme aligns with the Well-being Goals.
Chapter 6	The Well-being Objectives	This chapter summaries how the proposed scheme aligns with the Welsh Government's Well-being Objectives.

Chapter	Topic	Description
Chapter 7	Conclusions	This chapter sets out the main findings and conclusions of the sustainability consideration and sets out how the proposed scheme will continue to contribute to the Well-being Goals and Objectives as it progresses through construction and operation.

1.3 Publication of the Sustainable Development Report

This Sustainability Report has been submitted alongside the draft Orders and an Environmental Statement for the proposed scheme. Statutory Orders are prepared by the Welsh Ministers and published in draft. The draft Orders for the proposed scheme are listed below:

- The Neath to Abergavenny Trunk Road (A465) (Abergavenny to Hirwaun Dualling and Slip Roads) and East of Abercynon to east of Dowlais Trunk Road (A4060), Cardiff to Glan Conwy Trunk Road (A470) (Connecting Roads) Order 1999, (Dowlais Top to Hirwaun) (Amendment) Order 201-
- The Neath to Abergavenny Trunk Road (A465) (Abergavenny to Hirwaun Dualling and Slip Roads) and East of Abercynon to east of Dowlais Trunk Road (A4060), Cardiff to Glan Conwy Trunk Road (A470) (Connecting Roads) Order 1999, (Dowlais Top to Hirwaun) (Side Roads) Order 201-

Copies of the Sustainable Development Report, Environmental Statement and draft Orders along with other supporting documents may be inspected free of charge during normal office hours during the objection period as set out in the Public Notice at the following premises:

Orders Branch
Transport
Network Management Division
Department of Economy and Infrastructure
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

Copies of the Sustainability Report, Environmental Statement, draft Orders and other supporting documents can be viewed and downloaded free of charge from the Welsh Government's website:

<http://gov.wales/topics/transport/roads/schemes/a465/section-5/?lang=en>.

2. Sustainable Development Policy in Wales

2.1 Background to Welsh Sustainable Development Policy

The Welsh Government adopted its first sustainable development scheme 'Learning to Live Differently' in 2000 (National Assembly for Wales, 2000), which was made under Section 121 of the Government of Wales Act 1998.

Subsequently, the Government of Wales Act 2006 set a legal duty on the Welsh Ministers to make a scheme ('the sustainable development scheme') setting out how they propose to promote sustainable development. This was published as 'One Wales: One Planet - The Sustainable Development Scheme of the Welsh Assembly Government' (Welsh Assembly Government, 2009a), which set out the Government's vision of a sustainable Wales and confirmed sustainable development as the central organising principle of the Welsh Assembly Government (now referred to as the Welsh Government).

In 'One Wales: One Planet', sustainable development is defined as "enhancing the economic, social and environmental well-being of people and communities, achieving a better quality of life for our own and future generations", and the "Vision of a Sustainable Wales" is one where Wales (Welsh Assembly Government, 2009:

- lives within its environmental limits, using only its fair share of the earth's resources so that our ecological footprint is reduced to the global average availability of resources, and we are resilient to the impacts of climate change;
- has healthy, biologically diverse and productive ecosystems that are managed sustainably;
- has a resilient and sustainable economy that is able to develop whilst stabilising, then reducing, its use of natural resources and reducing its contribution to climate change;
- has communities which are safe, sustainable and attractive places for people to live and work, where people have access to services, and enjoy good health; and
- is a fair, just and bilingual nation, in which citizens of all ages and backgrounds are empowered to determine their own lives, shape their communities and achieve their full potential".

In 2012, the Welsh Government issued a white paper called 'A Sustainable Wales - Better Choices for a Better Future' which was a forerunner of the Well-being of Future Generations (Wales) Act 2015 (Welsh Government, 2015a). It makes reference to the Welsh account of sustainable development as "*an emphasis on social, economic and environmental wellbeing for people and communities, embodying out values of fairness and social justice. We must also look to the longer term in the decisions we make now, to the lives of our children's children as well as current generations.*" The document sets out the proposal to introduce a new duty of the Welsh public service requiring that sustainable development be embedded within strategic decision making processes.

2.2 Well-being of Future Generations (Wales) Act 2015

In order to strengthen the sustainable development framework in Wales, a pilot National Conversation was launched in February 2014, to define the 'Wales We Want', led by the Commissioner for Sustainable Futures. The Wales We Want Report (Welsh Government and Sustain Wales, 2015), sets out seven foundations for the well-being of future generations. This resulted in the enactment of the Well-being of Future Generations (Wales) Act in May 2015 (Welsh Government, 2015a). The Act requires public bodies (including the Welsh Government) to carry out sustainable development. Section 2 of the Act defines this as:

"Sustainable development means the process of improving the economic, social environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals."

In the Act, any reference to a public body doing something “*in accordance with the sustainable development principle*” means that the body must act in a manner which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs¹.

The Act defines seven ‘well-being’ goals, as set out in Table 2.1.

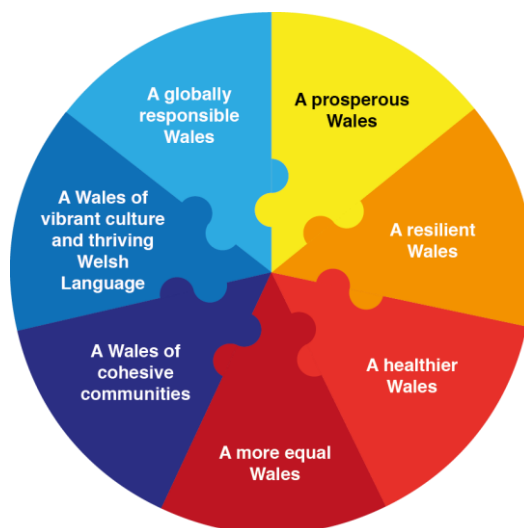


Table 2.1 : Well-being Goals






Well-being Goal	Description of goal
A prosperous Wales	An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work.
A resilient Wales	A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).
A healthier Wales	A society in which people’s physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood.
A more equal Wales	A society that enables people to fulfil their potential no matter what their background or circumstances (including their socio economic background and circumstances).
A Wales of cohesive communities	Attractive, viable, safe and well-connected communities.
A Wales of vibrant culture and thriving Welsh language	A society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation.
A globally responsible Wales	A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.

¹ Part 2 ‘Improved well-being’, section 5 ‘the sustainable development principle’, paragraph (1)

The Act requires public bodies in Wales to work towards achieving these Well-being Goals, in order for actions to align to the sustainable development principle.

The Act outlines five ways of working that public bodies need to think about to show that they have applied the sustainable development principle. Public bodies need to make sure that when making their decisions they take into account the impact they could have on people living their lives in Wales in the future. There are five things that public bodies need to think about to show that they have applied the sustainable development principle; these are set out in Table 2.2. Following these ways of working will help us work together better, avoid repeating past mistakes and tackle some of the long-term challenges we are facing.

Table 2.2 : Ways of Working

Ways of Working	
<p>Hirdymor  Long Term</p>	<p>The importance of balancing short-term needs with the need to safeguard the ability to also meet long-term needs.</p>
<p>Atal  Prevention</p>	<p>How acting to prevent problems occurring or getting worse may help public bodies meet their objectives.</p>
<p>Integreiddio  Integration</p>	<p>Considering how the public body's Well-being Objectives may impact upon each of the Well-being Goals, on their other objectives, or on the objectives of other public bodies.</p>
<p>Cydweithio  Collaboration</p>	<p>Acting in collaboration with any other person (of different parts of the body itself) that could help the body to meet its Well-being Objectives.</p>
<p>Cynnwys  Involvement</p>	<p>The importance of involving people with an interest in achieving the Well-being Goals, and ensuring that those people reflect the diversity of the area which the body serves.</p>

Each public body is now required under the Act to publish a set of Well-being Objectives, designed to maximise their contribution to achieving each of the Well-being Goals (see Chapter 5 below). The Well-being Goals will form the framework of these objectives, as well as indicators to be used to measure well-being.

2.3 Taking Wales Forward: The Welsh Government's Well-being Objectives

The duties on Welsh Ministers under section 3(2)(a) and 7 of the Act requires Well-being Objectives to be developed and published by public bodies, to help maximise the contribution of the Welsh Government (and other public bodies under the same duty) to the seven Well-being Goals outlined in the Act.

On 4 November 2016, the Welsh Government published its Well-being Objectives in *Taking Wales Forward*, which set out how the Welsh Government will use the Act to help deliver its programme for government and maximise its contribution to the seven overarching Well-being Goals that apply to public bodies in Wales (Welsh Government, 2016).

Taking Wales Forward is the Welsh Government's programme for the next five years (2016-2021). It sets out the Welsh Government's programme to drive improvement in the Welsh economy and public services, delivering a Wales which is:

- prosperous and secure;
- healthy and active;
- ambitious and learning; and
- united and connected.

The above four cross-cutting strategies aim to help the Welsh Government to deliver the promise of its Act. The Welsh Government has developed fourteen Well-being Objectives that have been designed to reflect the key priorities for improvement in the Welsh economy, society, environment and culture. They aim to form the foundation of the four cross-cutting strategies in *Taking Wales Forward* and to maximise the contribution the Welsh Government can make towards achieving the seven national Well-being Goals.

The fourteen Well-being Objectives are:

- create conditions to give every child the best start in life;
- improve education outcomes for all and reduce the gap in outcomes for different groups;
- help people live healthy and independent lives and support a healthy workforce;
- improve prosperity for all across Wales, helping people into employment and sustaining jobs;
- create the conditions for people to learn and use the Welsh language with their families, in their communities and in the workplace;
- support the transition to a low carbon and climate resilient society;
- connect communities through sustainable and resilient infrastructure;
- support safe, cohesive and resilient communities;
- improve access to secure, safe, efficient and affordable homes;
- foster conditions for sustainable economic development and employment, whilst stimulating innovation and growth for a modern low carbon economy;
- promote and enhance the culture and heritage of Wales;
- manage, use and enhance Wales' natural resources to support long-term wellbeing;
- facilitate high quality, responsive and better integrated public services, to those that need them most, enabling citizens to be an equal partner; and
- position Wales as an internationally focused, ambitious country engaged and connected to the wider world.

The Welsh Government has committed to ensuring there is an effective link between the goals, the government's programme, the strategies and delivery. The Well-being Objectives provide the bridge between *Taking Wales Forward* and its four cross-cutting strategies. Each Well-being Objective aims to address one or more of the Well-being Goals, and one or more of the four cross cutting strategies identified in *Taking Wales Forward*. Table 2.3 shows the links from the objectives, to the strategies and goals.

Table 2.3: Links between Well-being Objectives, Strategies and Goals

Well-being Objective	Links to Cross Cutting Strategies	Links to Well-being Goals
Create conditions to give every child the best start in life	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • Healthy and active • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A Wales of vibrant culture and thriving Welsh Language
Improve education outcomes for all and reduce the gap in outcomes for different groups	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A Wales of vibrant culture and thriving Welsh Language
Help people live healthy and independent lives and support a healthy workforce	<ul style="list-style-type: none"> • Prosperous and secure • Healthy and active 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A resilient Wales • A Wales of cohesive communities A healthier Wales
Improve prosperity for all across Wales, helping people into employment and sustaining jobs	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A resilient Wales • A Wales of cohesive communities • A globally responsible Wales
Create the conditions for people to learn and use the Welsh Language with their families, in their communities and in the workplace	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A globally responsible Wales • A Wales of cohesive communities • A Wales of vibrant culture and thriving Welsh Language

Well-being Objective	Links to Cross Cutting Strategies	Links to Well-being Goals
Support the transition to a low carbon and climate resilient society	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • Healthy and active • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A globally responsible Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales
Connect communities through sustainable and resilient infrastructure	<ul style="list-style-type: none"> • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A globally responsible Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A Wales of vibrant culture and thriving Welsh Language
Support, safe, cohesive and resilient communities	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • Healthy and active • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A Wales of vibrant culture and thriving Welsh Language
Improve access to secure, safe, efficient and affordable homes	<ul style="list-style-type: none"> • Prosperous and secure • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A globally responsible Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A Wales of vibrant culture and thriving Welsh Language
Foster conditions for sustainable economic development and employment, whilst stimulating innovation and growth for a modern low carbon economy	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A resilient Wales • A globally responsible Wales • A Wales of vibrant culture and thriving Welsh Language

Well-being Objective	Links to Cross Cutting Strategies	Links to Well-being Goals
Promote and enhance the culture and heritage of Wales	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A globally responsible Wales • A Wales of cohesive communities • A Wales of vibrant culture and thriving Welsh Language
Manage, use and enhance Wales' natural resources to support long-term wellbeing	<ul style="list-style-type: none"> • Prosperous and secure • Ambitious and learning • Healthy and active • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A globally responsible Wales
Facilitate high quality, responsive and better integrated public services, to those that need them most, enabling citizens to be an equal partner	<ul style="list-style-type: none"> • Ambitious and learning • Healthy and active • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A Wales of cohesive communities • A healthier Wales
Position Wales as an internationally focussed, ambitious country engaged and connected to the wider world	<ul style="list-style-type: none"> • Prosperous and secure • United and connected 	<ul style="list-style-type: none"> • A prosperous Wales • A more equal Wales • A globally responsible Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A Wales of vibrant culture and thriving Welsh Language

3. The Proposed Scheme and its Context

3.1 Location

The Heads of the Valleys region includes the communities in the north of the South Wales Valleys. The South Wales Valleys communities grew up around heavy industry in the 18th and 19th centuries but since the decline of the iron and coal industries in the 20th century, the remoteness of this area, both in terms of distance from larger employment and business centres and the quality of the road and rail links, has resulted in high levels of economic and social deprivation. While there are railway and road links north – south between the South Wales Valleys and Cardiff, east west links between valleys are generally poor. The primary link between the valleys is the A465.

The A465 links the Heads of the Valleys communities and is also a key strategic east west link between South West Wales and the English Midlands, and is part of the Trans–European Transport Network (TEN-T) across Europe.

The dualling of Sections 5 and 6 would complete the final link in providing a high standard dual carriageway road between Abergavenny and Neath, where the A465 joins the M4. It would also provide a high standard highway link between the English Midlands, and South West Wales, improving trans-European links to the West Wales ports serving Ireland in the longer term. Providing a completed dual carriageway for the entire length of the A465 trunk road between Abergavenny and Neath would deliver a high standard alternative route to the M4, improving the resilience of the South Wales trunk road network.

The proposed scheme is a section of the A465 which is approximately 17.7 km long between Dowlais Top and Hirwaun. The western section of the proposed scheme runs to the south of Hirwaun as an off-line route moving the road further from the village before joining the current alignment at Trewaun. The central part of the proposed scheme skirts the southern boundary, and is located partially within, the Brecon Beacons National Park (BBNP). Heading eastwards, it then passes through the village of Cefn Coed, to the north of Merthyr Tydfil. Continuing eastwards, it skirts the northern boundary of the Gurnos suburb of Merthyr Tydfil before approaching the villages of Pant and Dowlais Top. It passes through an undulating landscape with long stretches of steep inclines. The road crosses the Afon Cynon, Afon Taf Fawr, and Afon Taf Fechan gorges on bridge structures. In order to minimise the gradients the existing road is routed through cuttings at various locations.

The A470 trunk road, a key north-south link between Cardiff in south Wales and Glan Conwy in north Wales, crosses the A465 to the west of Cefn Coed.

3.2 Background

Within the Heads of the Valleys region, poor transport links are a long standing issue. The existing road was built in the 1960s to the design standards extant at the time. The current trunk road layout is predominately set out as a 2+1 road whereby there are two lanes in one direction (uphill) and one lane in the other (downhill). This road layout does not deliver the quality of service or safety standards required of a key strategic route at the start of the 21st century.

Plans to improve the A465 trunk road have been developed since the 1990s. In 1990, a regional traffic study identified the need to improve the capacity and safety of the road, with the ultimate goal of assisting economic regeneration of the area. It was proposed to improve the A465 trunk road between the Hardwick Roundabout at Abergavenny and the junction with the A4061 at Hirwaun, a distance of approximately 40 km (the 'Project').

The Project comprised the widening of the existing three lane carriageway to dual carriageway with grade separated junctions. The 40 km route was separated into the following six Sections:

- Section 1: Hardwick Roundabout, Abergavenny to Gilwern;
- Section 2: Gilwern to Brynmawr;
- Section 3: Brynmawr to Tredegar;
- Section 4: Tredegar to Dowlais Top;
- Section 5: Dowlais Top to A470 Junction; and
- Section 6: A470 Junction to Hirwaun Roundabout.

The proposed scheme would deliver Sections 5 and 6 of the Project.

The Line Order for the entire 40 km Project and Compulsory Purchase and Side Roads Orders for Sections 1 and 4 were taken through Public Local Inquiry in 1998. Section 1, Abergavenny to Gilwern, Section 3 Brynmawr to Tredegar and Section 4, Tredegar to Dowlais Top have been completed and are open to traffic. Construction of Section 2, Gilwern to Brynmawr, commenced in 2015 and is due to be completed in 2019.

A public consultation was held in 1994 providing interested parties and stakeholders with the opportunity to raise their views and be involved with the design process. A preferred route was announced in 1995. In 1997, Jacobs (at that time Babbie Group) carried out design development, with draft line order proposals and an Environmental Statement (ES) published for the entire 40 km length. The line order for the proposed scheme was taken through public inquiry in 1998. At the inquiry, concerns were raised regarding the need for grade separated junctions at some of the more sensitive locations along the proposed scheme, these concerns were taken into account by the Inspector who recommended that five of the proposed new junctions along the proposed scheme should be 'at grade'.

In the Secretary of State's decision letter approving the draft Orders (June 1999) and announcing the decision to proceed with the proposals, specific reference was made to the need to provide grade separated junctions at five locations along the Scheme, of relevance to the proposed scheme is the A470 junction. This was contrary to the Inspector's report which recommended that the Line Order be modified '*to substitute 'at-grade' junctions for the 'grade separated' junctions proposed at Glanbaiden, Brynmawr, Nant-y-Bwch, Rhymney Bridge and that with the A470².*

The decision letter went on to explain the Secretary of State's reasoning for this decision, which were threefold. They related to land-take, cost and safety. The decision letter stated:

36. The Secretary of State has considered the Inspector's recommendations both as to the overall effect and to the effect at each individual junction. He accepts that generally speaking the 'at-grade' alternative involves less land take and would be cheaper to construct, and at certain locations would involve less demolition and would be less intrusive from a landscape aspect. Against this, as pointed out by the Inspector, journey times would be increased, safety would be reduced, resulting in more accidents – albeit of a 'shunt' variety, and the desired effect of segregating local and through traffic would be lost. The overall result would be a scheme which would present less value for money in NPV terms, despite lower costs.

37. The construction of the junctions in two stages would prove even less economic. Additionally initial considerations suggest that the land take for an at-grade junction later upgraded to grade separated would be greater for them than for either option alone.

² Recommendation 1 Para 843 – Page 183

38. The Secretary of State believes that the balance of arguments rests with the published scheme. He cannot accept the argument that initially at-grade alternatives should be provided at the five locations suggested. He believes that the better value and greater traffic efficiency of the published scheme outweigh the slight landscape advantage of the at-grade options which in any case could be lost later when the at-grade junctions were upgraded at greater cost than if constructed as part of the initial scheme.

Therefore, the Secretary of State made the Line Order as drafted, which included a grade separated junction at the A470 junction within Sections 5 and 6 of the Abergavenny to Hirwaun Scheme.

To date, Sections 1, 3 and 4 have been completed and made dual carriageway, with Section 2 currently under construction and due for completion in 2019.

In 2015, Jacobs UK Limited was appointed to review the need for improvements to Sections 5 and 6. It was confirmed that improvements to these sections of the A465 were still required and design work commenced on these final sections of the Project. The design development work, 2015 to date, has taken into account changes to highway standards, environmental legislation and Welsh Government policy requirements.

A description of the proposed scheme is provided in the ES (Chapter 5: Proposed Scheme Description (Jacobs, 2017a)) and a summary is provided below.

3.3 The Proposed Scheme

The A465 Heads of the Valleys road is a key strategic route across South Wales, connecting the English Midlands with South West Wales and is also a major local route linking the communities across the north of the South Wales Valleys.

The proposed scheme involves improvements to Sections 5 and 6 which run between Hirwaun and Dowlais Top and include a major interchange with the A470 (Cardiff to Glan Conwy) trunk road at Merthyr Tydfil.

The Heads of the Valleys Highways Improvements Scheme, Section 5 and 6 (the proposed scheme) would extend from Hirwaun in the west to Dowlais Top in the east, passing to the north of Merthyr Tydfil. The length of the proposed scheme is approximately 17.7 km. The proposed scheme would be predominately an on-line improvement of the existing A465 trunk road. It would provide a 70 mph dual carriageway from Hirwaun to Dowlais. The highway cross section for the proposed A465 would take the form of a dual carriageway road with a concrete central reservation. A verge and stock proof fencing would be provided beyond the kerblines of the road with safety barriers installed where appropriate. Additional stock proof fencing would be provided around attenuation ponds and along cycleways and footpaths, as appropriate.

On account of natural gradients in the topography, the proposed scheme would be constructed on embankment or in cutting for most of its length. The design and construction of the proposed scheme would achieve an earthworks balance.

Six junctions would be provided within the proposed scheme, all of which would be grade separated roundabouts. The junctions would be located at Hirwaun, Croesbychan, Baverstock, A470, Prince Charles Hospital and Dowlais. A detailed description of the proposed scheme is provided in Chapter 5 of the ES (Jacobs, 2017a), published separately alongside this report.

3.4 A465 Section 5 & 6 Context

3.4.1 Traffic

Within Sections 5 and 6 the existing A465 contains a number of junctions. The majority of these are roundabouts but several T-junctions or staggered crossroads also form part of the road layout. Junctions are a key constraint in road design which introduces a greater risk of accidents. With the exception of the A470 junction, the primary traffic flow through the junctions is along the A465. As such, the trunk road traffic has to slow to take account of other traffic exiting or entering the junctions. Poor visibility in terms of gradients and bends in the road increase the accident risks associated with junctions, as vehicles entering the main carriageway may not be visible to on-coming traffic.

The large number of junctions can cause congestion build up as vehicles slow down and / or move lanes to allow vehicles onto the carriageway. A significant amount of congestion occurs at both the Dowlais Top and A470 roundabouts during peak-hour traffic. This often results in further congestion on the local road network that adjoins the trunk road.

The traffic modelling undertaken has concluded that over the longer term volumes of traffic will continue to increase over time. As this traffic increases so too does the need for the proposed scheme, due to the exacerbation of the existing road safety concerns related to the number of junctions and lack of provision for overtaking. The delays associated with the congestion at peak times at the roundabouts is expected to increase by up to seven minutes by 2037 should the proposed scheme not progress, and the degree of frustration experienced by drivers as a result of lack of overtaking opportunities would also increase.

The purpose of the proposed scheme is to reduce existing congestion and prevent additional congestion which would otherwise occur as a result of the anticipated increases in traffic flows.

3.4.2 Road safety

An accident report has been prepared for the proposed scheme that considers accidents on the A465 covering a five year period from 2011 to 2015. During this period there were six fatal, 11 serious and 99 slight accidents on the A465 between Hirwaun and Dowlais Top. The most common contributory factors in accidents were a failure to look properly, drivers being careless or reckless, drivers failing to judge another's path or speed, and a loss of control of the vehicle.

There are two main reasons why the proposed scheme would be expected to reduce the severity of accidents. The first is that the new central reservation and barrier separating traffic would reduce head-on collisions particularly when one car has lost control and has veered to the right. The second is that with the grade separation of junctions along the route and the expansion of the road to a dual carriageway in both directions there would be less slowing and stopping in the carriageway reducing the likelihood of some accidents.

In addition to a reduction in the number and severity of accidents that could be anticipated along this section of the A465, there would be a reduction in the congestion that would result should an accident occur. Presently, due to the road alignment of the current road, even relatively minor road accidents can lead to traffic congestion in both directions. With serious accidents it can be necessary to close both carriageways of the road due to the lack of a central reservation.

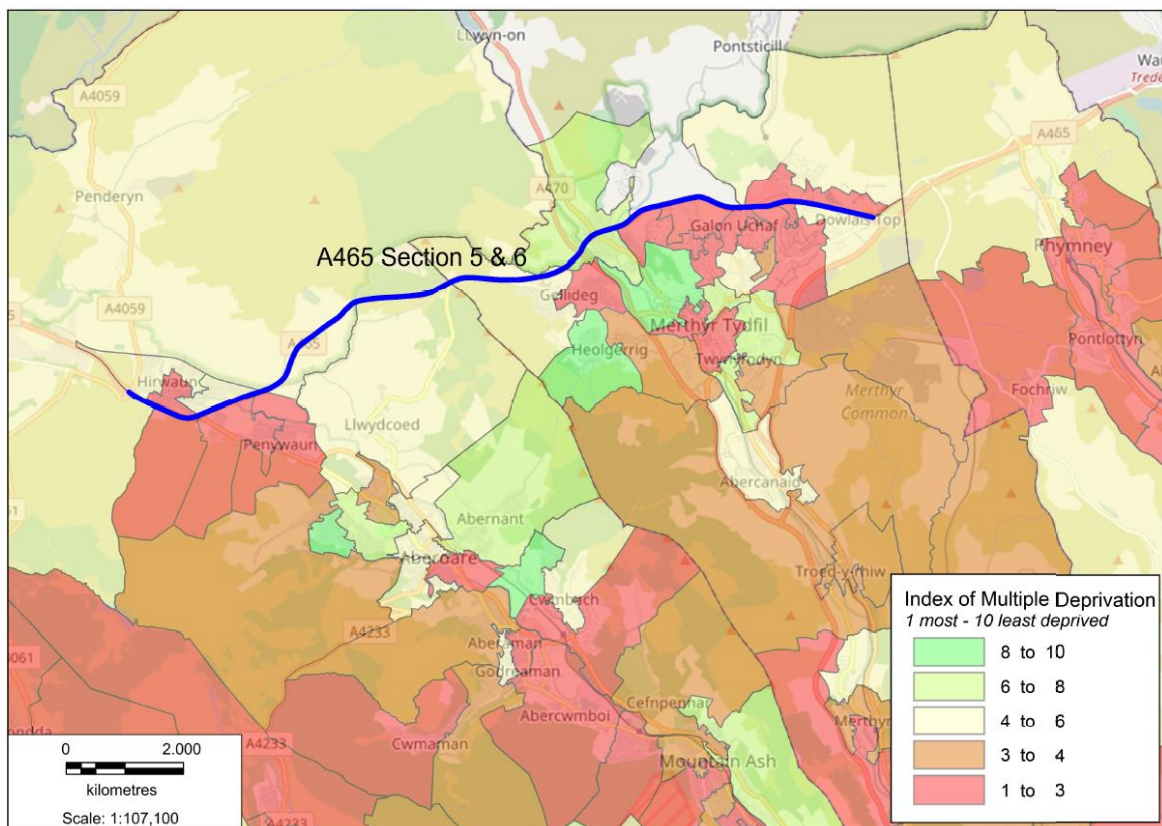
3.4.3 Economy

The Heads of the Valleys region includes communities in the north of the South Wales Valleys. The communities on the South Wales Valleys grew up around heavy industry in the 18th and 19th centuries. The Heads of the Valley corridor and the area it serves are facing considerable economic and social challenges that have arisen from the economic restructuring of the late 20th Century.

3.4.3.1 Deprivation

The decline of traditional economic sectors in the Valleys, including mining, steel and other heavy industries and the growth of the service sector based in larger cities has led to the loss of skilled and well paid jobs and as a result considerable levels of deprivation throughout the area. The Welsh Index of Multiple Deprivation (WIMD) is designed to identify small areas (lower super output areas (LSOAs)) that are the most deprived in the country. LSOAs have a mean population of 1,500 so spatially cover very small areas in urban areas and larger areas in rural low population areas. Plate 1 shows that the majority of LSOA districts in proximity to the scheme are within the lowest 40% on the WIMD. In fact, 22% of the communities in Merthyr Tydfil and 17% in the Rhondda Cynon Taf local authority areas are amongst the 10% most deprived communities in Wales.

Plate 1: Deprivation index

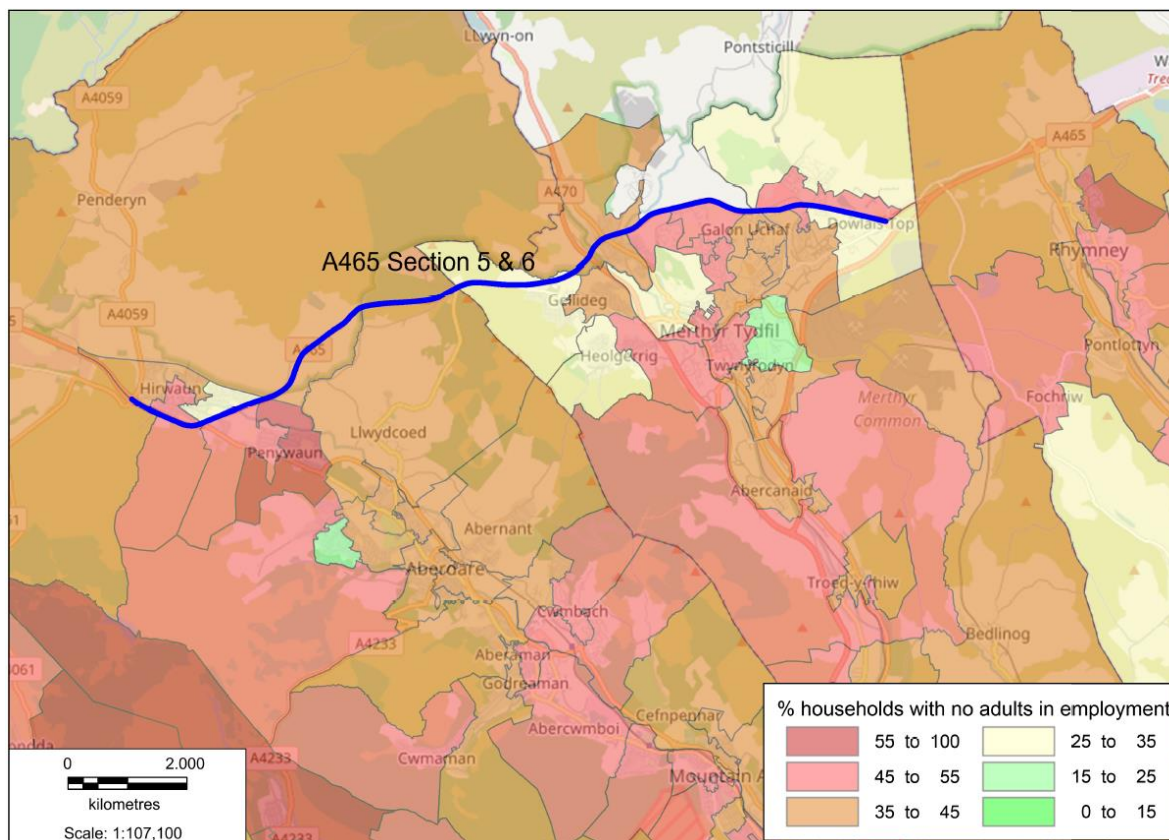


Source: Welsh Government, Welsh Index of Multiple Deprivation (WIMD) - Annual indicator data

3.4.3.1.1 Employment rates

The decline in primary and manufacturing sectors has had a particularly negative impact on the socio-economic conditions in the region and has resulted in very low employment rates. That is, the proportion of adults of working age who are in employment. The 2011 population census data shows that a high proportion of households contain non-working adults, reaching over 45% in the study corridor well above the UK average of 33% as shown in Plate 2.

Plate 2: Percentage of adults not in employment per household



Source: NOMIS/ONS

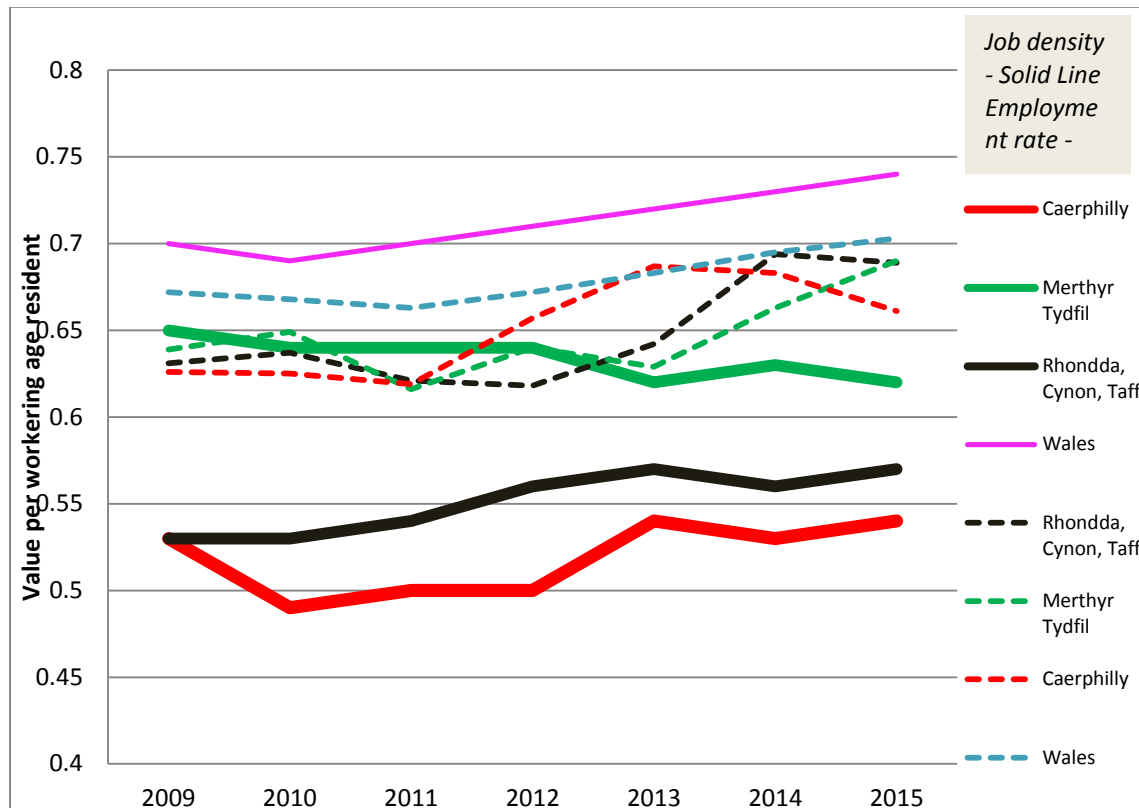
However, the number of jobs in Merthyr has steadily increased in recent years; primarily driven by increases in the public administration, education and health sectors. An increase in manufacturing, transport and communications and construction employment has also contributed to improved figures. In fact, the employment activity rate in Caerphilly is now higher than the average Welsh rate. This however is mainly driven by an increase in public sector employment, which in 2015, employed 29.1% of the workforce, well above the Welsh and UK averages of 26.7% and 22.1% respectively³. Along the immediate A465 corridor in the three local authority areas there are some 20,000 jobs of which some 8,000 are in public services such as health, education and administration highlighting the even greater importance of the public sector in this area. Around 3,500 jobs are in wholesale and retail activities, 2,500 in manufacturing, 1,200 in accommodation and catering and 1,000 in construction.

Job density is defined as the level of jobs per resident aged 16-64. So a job density of 1.0 means that there is one job for every resident aged 16-64. A high job density is an indicator of high levels of employment and inward commuting, while a low job density indicates lower levels of employment and potentially the need to commute out for work. As Plate 3 illustrates job density in the council areas covering the study area is relatively low, which indicates low level of employment opportunities and the need to travel out of the area to obtain employment.

Employment rates in the area are also well below the average level for Wales and the gap has widen in recent years reaching over 15 percentage points in the case of Caerphilly and not much better in Rhondda Cynon Taf.

³ NOMIS/ONS

Plate 3: Job density and employment rate

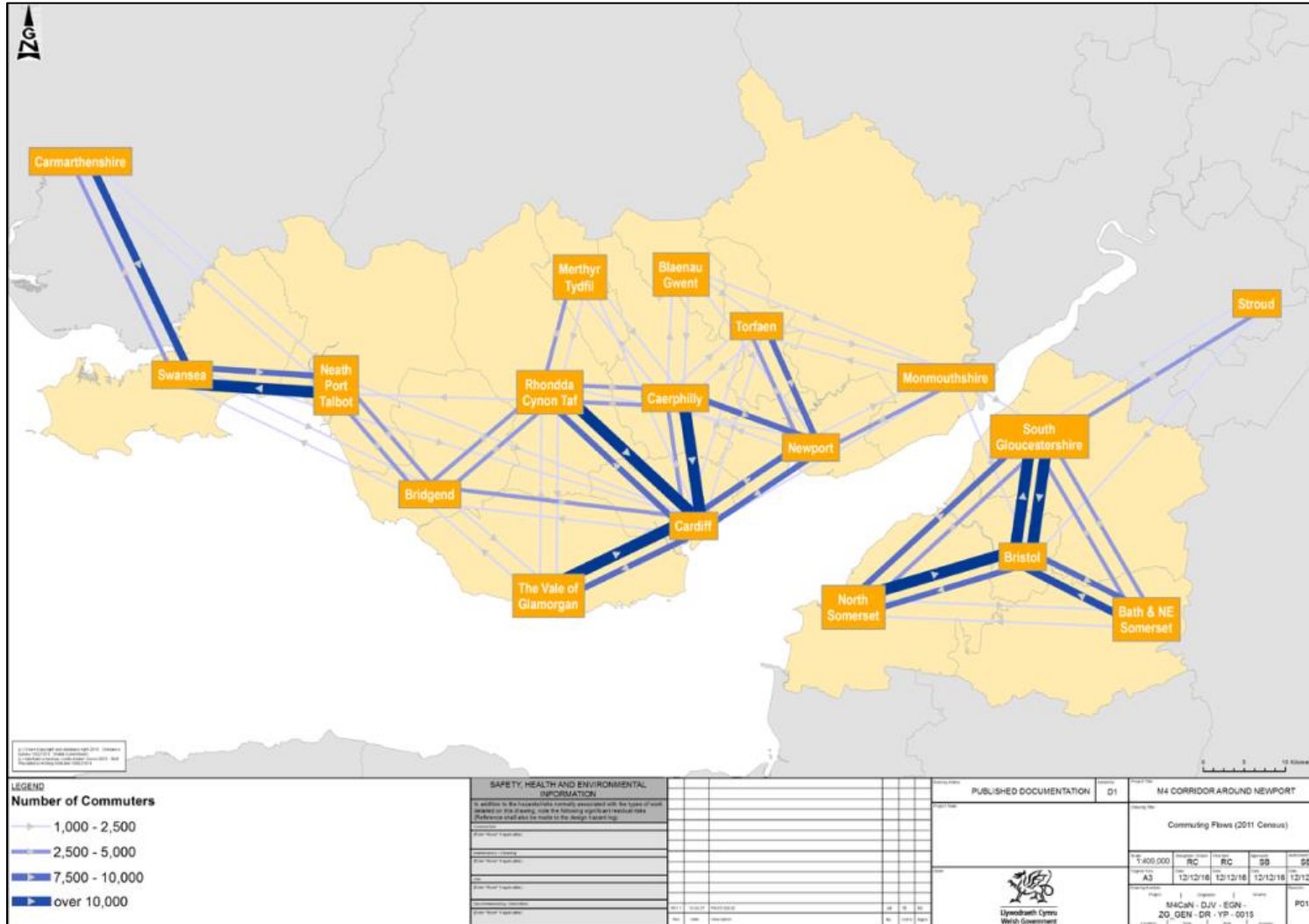


Source: NOMIS/ONS

The fact that job density in the area is significantly lower than the employment rate, suggests that a lot of workers commute to other areas like Cardiff or Swansea where the job density is relatively high. Plate 4 supports this assumption as it can be seen that a large proportion of commuters travel to Cardiff from the three council areas. However, most of these are travelling from the southern sections of these areas rather than the northern area along the A465 corridor.

Of the nearly 20,000 people who live along the A465 corridor, over 60% work in their own council area and nearly 80% work within the three council areas (i.e. Merthyr Tydfil, Caerphilly and Rhondda Cynon Taf) showing relatively high commutes between neighbouring valleys. Relatively few commute along the A465 to jobs in neighbouring areas east and west of the study area. As Plate 4 highlights there is a very high dependency on private transport to access employment which is a factor of the poor cross valley public transport links. As table 3.1 highlights there is a very high dependency on private transport to access employment which is a factor of the poor cross valley public transport links.

Plate 4: Commuter patterns



Source: Welsh Government, M4 Corridor around Newport Revised Wider Economic Impact Assessment

Table 3.1: Where those living along the corridor work by council area⁴

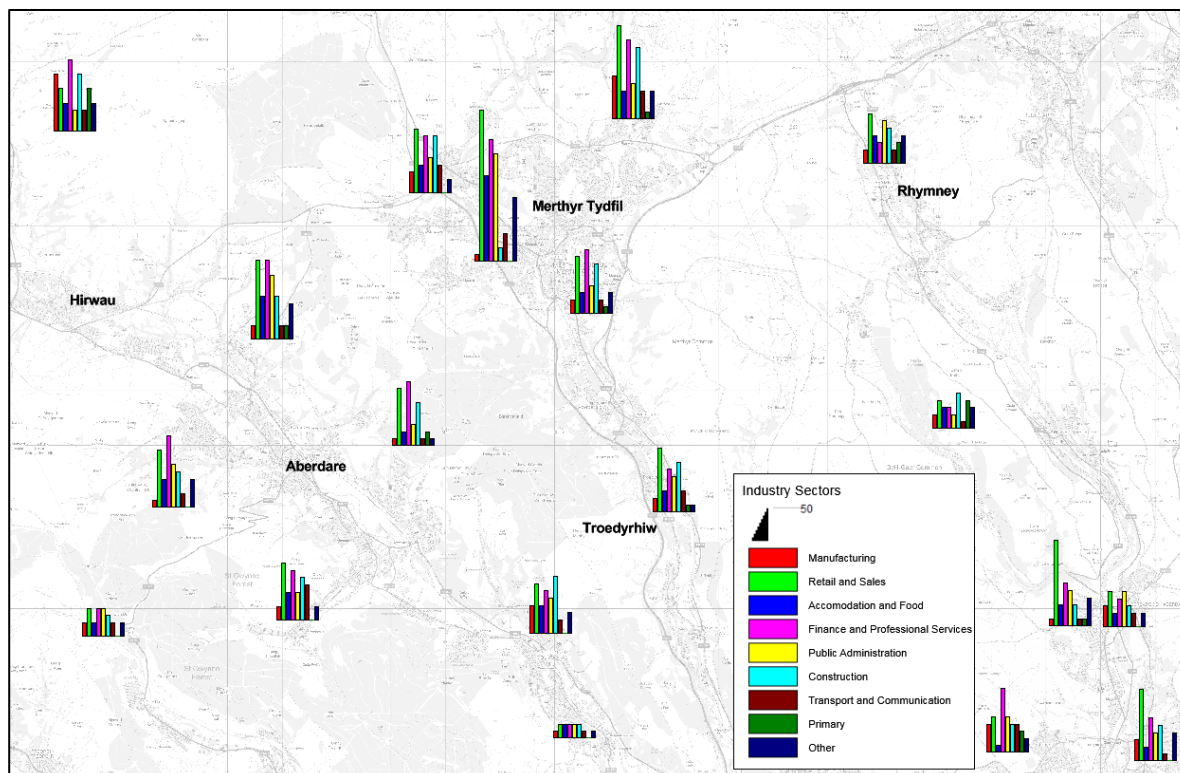
Local authority area	Numbers working by council area	Percentage commuting by car / van	Percentage who walk to work
Merthyr Tydfil	9,220	73%	15%
Rhondda Cynon Taf	4,000	81%	11%
Caerphilly	2,090	79%	13%
Cardiff	1,570	75%	
Blaenau Gwent	730	94%	
Newport	310	91%	
Neath Port Talbot	290	97%	
Powys	240	97%	
Bridgend	230	92%	
Swansea	210	92%	
Torfaen	170	97%	
Monmouthshire	150	96%	
The Vale of Glamorgan	140	90%	

Source: 2011 Population Census

3.4.3.2 Industries

Plate 5 shows that the primary sector, once a key sector of the region, now plays a minor role in most districts of the study area. The manufacturing industry, another historically important sector, has also declined to insignificance, in terms of employment numbers, in most regions. In urban areas the retail and financial and service sectors are a major part of the local economy.

Plate 5: Map of local industries

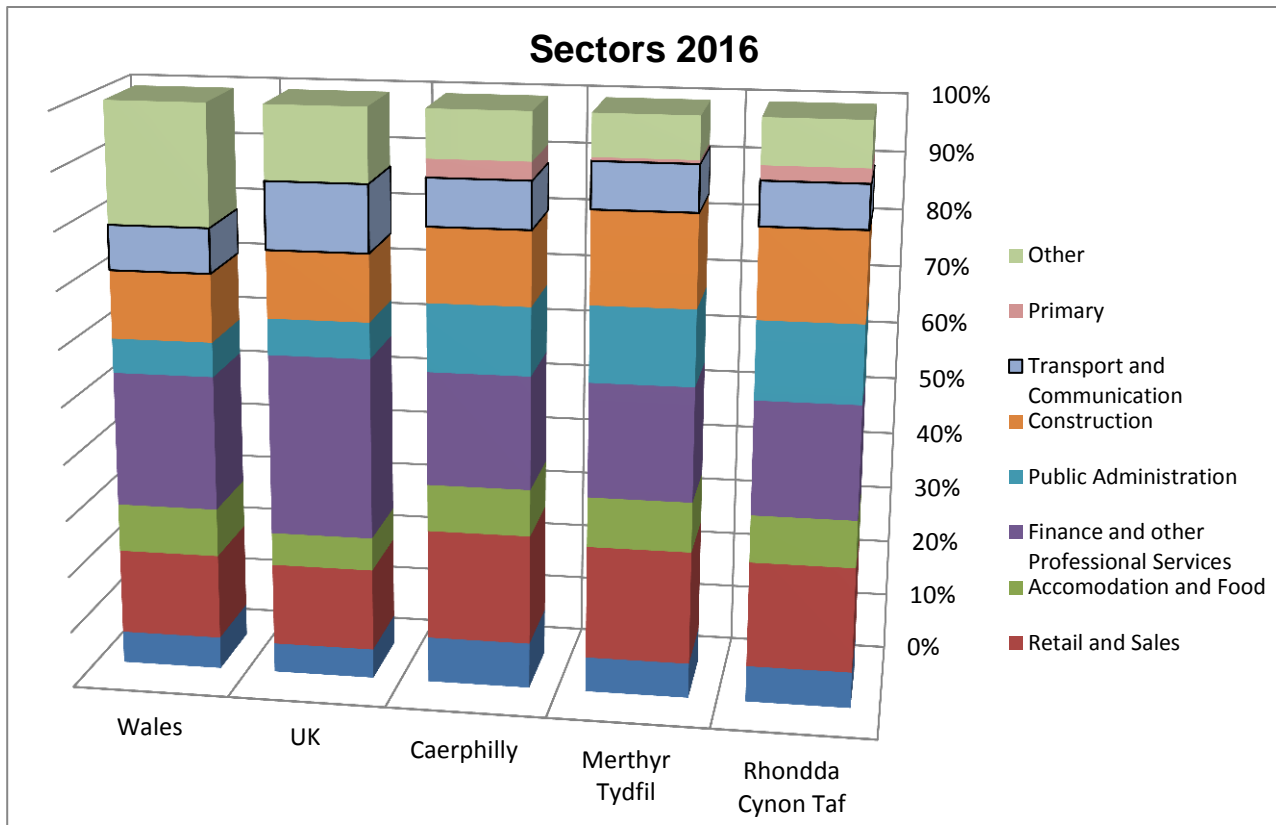


Source: NOMIS/ONS

⁴ Residents living in super output areas: Caerphilly 001, Merthyr Tydfil 002, 003, 004 & 008, Rhondda Cynon Taff 001 and 002.

The financial and professional service sectors are key economic sectors for the UK and Wales, accounting for 32% and 24% of all employers respectively. These sectors tend to be amongst the most productive sectors and hence contribute a disproportionately higher amount of national GDP per employee. In Rhondda Cynon Taf, Merthyr Tydfil and Caerphilly this sector is relatively small (around 20% of all employers) as can be seen in Plate 6, effectively leading to a lower level of local productivity. The public administration and the retail and sales sector are of higher significance in the local region.

Plate 6: Local sector composition by number of employers



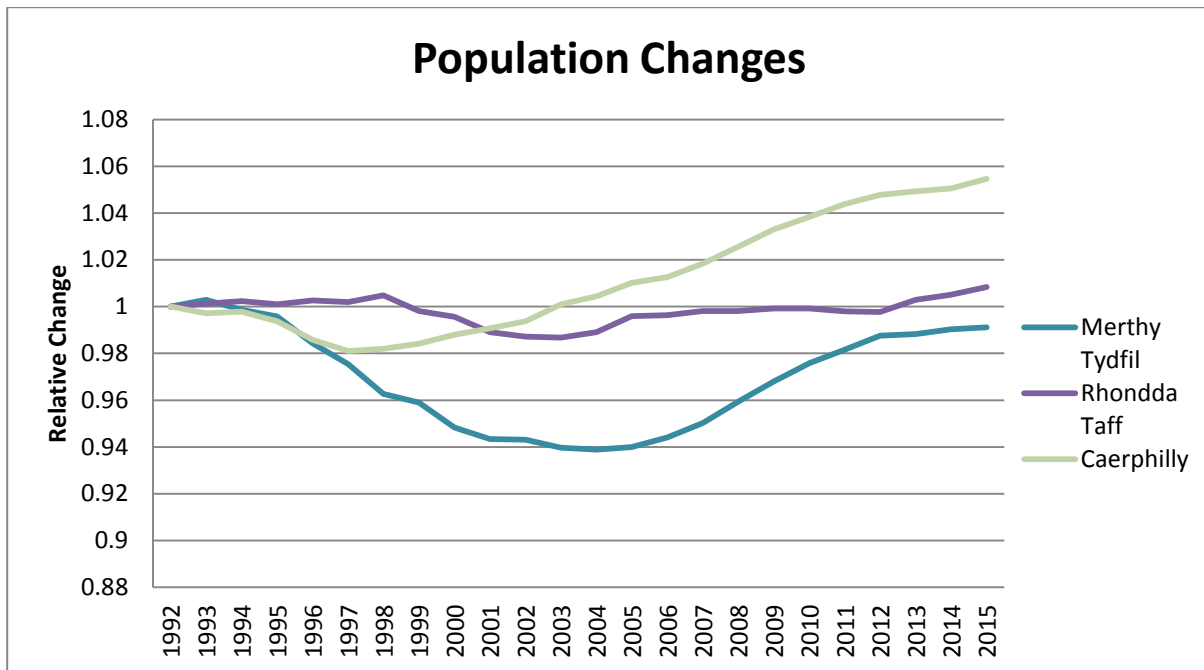
Source: NOMIS/ONS

3.4.3.3 Population

Declining employment opportunities led to a significant population fall between 1991 and 2004 in the local area (Plate 7: Population trends). Merthyr Tydfil for instance experienced a fall of about 7%, the greatest amongst all Welsh local authorities. This was mainly driven by emigration to other regions of the UK that offered a better prospect for employment, particularly among the young. However, the three boroughs still have a low proportion of people over retirement age, the lowest in Wales after Cardiff and Newport.

The population decline has steadily been reversed in recent years. Caerphilly's population has grown reasonably strongly in the last decade, as has Merthyr Tydfil's although it still has a smaller population than 25 years ago.

Plate 7: Population trends



Source: NOMIS/ONS

3.4.3.4 Education

The area is characterised by low attainment levels, with above average educational deprivation levels⁵. The National Qualifications Framework, known as NQF, sets out the level at which a qualification is obtained. Qualifications in the NQF are grouped together according to their difficulty and range from 1 to 8, where one is the lowest form of education.

Table 3.2 shows that the proportion of people with higher levels of qualifications has improved in the region in recent years, albeit still being considerably lower than in Wales or the UK as a whole. In Merthyr, for example, the proportion of residents with level 4 or above is 8 percentage points below the level for Wales as a whole. When comparing it to surrounding and competing regions it becomes evident that the study area has a significantly higher proportion of lower qualified people than Wales as a whole.

⁵ Welsh Government, Welsh Index of Multiple Deprivation (WIMD) - Annual indicator data

Table 3.2: NQF attainment levels

Region	NQF Qualification Level	2009	2010	2011	2012	2013	2014	2015
Wales	2 or below	30.6	28.7	27.2	25.9	24.6	23.4	23.8
Rhondda, Cynon, Taf		35.2	34.6	29.4	31	32.4	28.8	27.3
Merthyr Tydfil		40.8	38	38.3	31.8	31.9	30.9	32.1
Caerphilly		41.4	37.7	34	32.5	27.9	26.6	27.3
Wales	4 or above	29.2	30.2	31	32.1	33.2	35.2	35.8
Rhondda, Cynon, Taf		24.2	24.2	28.1	26.6	26.7	27.7	31.4
Merthyr Tydfil		19.5	21.3	22	26.1	27.8	26.8	27.2
Caerphilly		18.7	20.6	22.8	23.8	27.4	29	30

Source: NOMIS/ONS

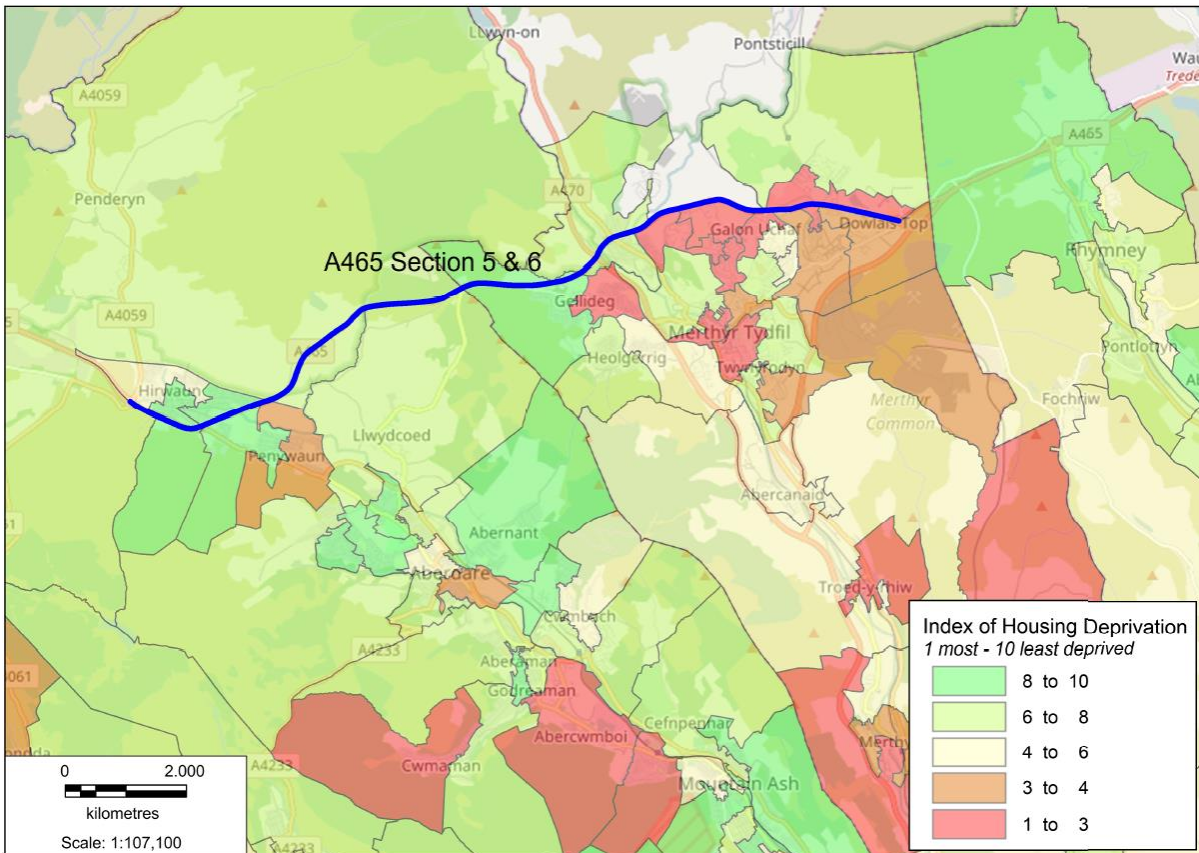
3.4.3.5 Property

The average UK house price in 2017 is £215,000, around 20% higher than the Welsh average (£180,000). These are significantly higher than the average prices in Merthyr Tydfil (£93,000), Rhondda Cynon Taf (£100,000) and Caerphilly (£119,000). With an average market value of £88,000, house prices along the corridor are even lower.

This highlights the low demand for property in these areas in part due to limited employment opportunities, but if transport links are improved then low property prices are also an opportunity making it an attractive place to live.

The Welsh Index of Multiple Deprivation (WIMD) housing index is based on overcrowding and lack of central heating. The corridor's low house prices generally mean overcrowding is limited but an older and poorer housing stock can lead to lower quality. Hence the wide range of deprivation from least to most deprived in the area as shown in Plate 8.

Plate 8: Welsh index of multiple deprivation: housing index



Source: Welsh Government, Welsh Index of Multiple Deprivation (WIMD) - Annual indicator data

Commercial property rents are on average half of those in Cardiff / Newport which while making the area competitive means much new commercial development is unviable and dependent on public sector support. This in turn leads to an aging stock for which rents are very low but are also unattractive to tenants and unviable to replace with more modern stock. While there has been a small increase in commercial floor space in Wales as a whole (2%) in the last ten years, there has been a 5% fall in Rhondda Cynon Taf, a 1% fall in Merthyr Tydfil and a 2% rise in Caerphilly⁶ reflecting the weak commercial property market in these locations.

3.4.3.6 Transport

Another barrier to development in the corridor and wider region is the limited availability of public transport. Table 3.3 shows that a considerable number of industrial and retail estates in the wider area are subject to poor public transport accessibility. This makes it more difficult for those without private transport to access employment opportunities and for employers to recruit.

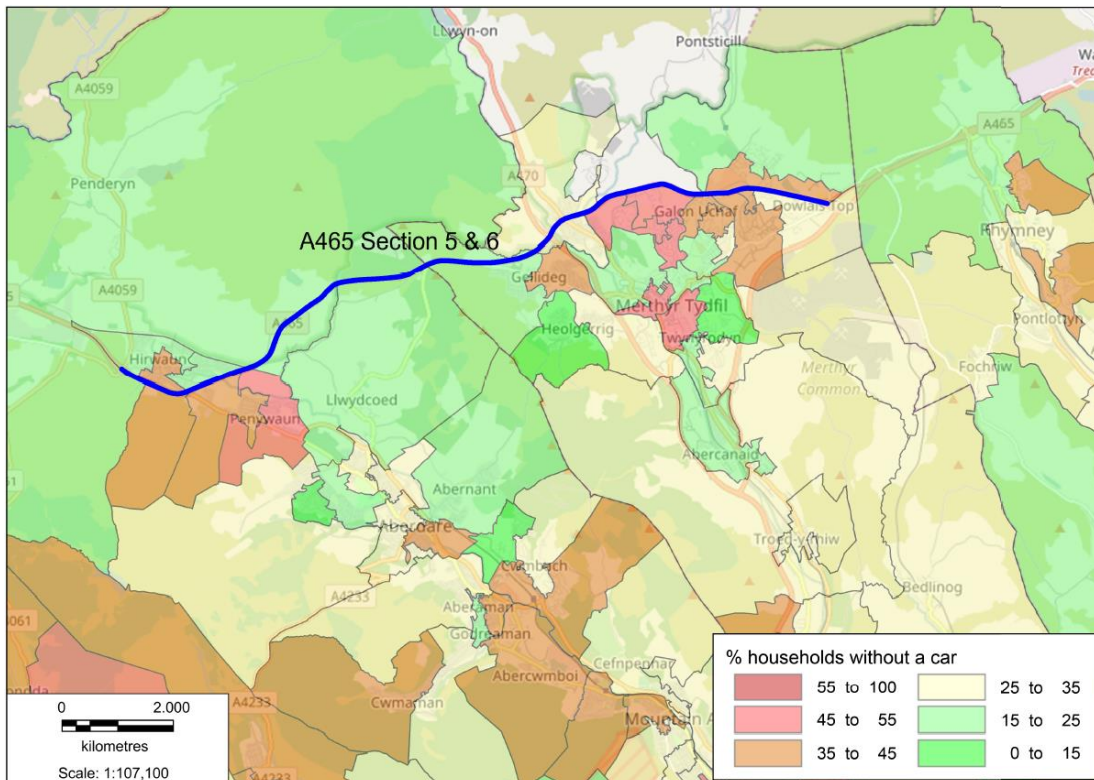
⁶ VOA Administrative Data as at 31 March 2016

Table 3.3: Accessibility to employment sites via public transport

Accessibility		
Retail Sites		
<u>Council area</u>	<u>Name of facility</u>	Accessibility G=good, A=average and R=poor
Rhondda Cynon Taf	Llantrisant Retail Park	R
Merthyr Tydfil	Cyfarthfa Retail Park	A
Merthyr Tydfil	Dowlais Retail Park	R
Industrial Sites		
Merthyr Tydfil	Pentrebach Industrial Area	A
Merthyr Tydfil	Abercanaid / Candy Hoover	G
Rhondda Cynon Taf	Treforest Industrial Estate	G
Rhondda Cynon Taf	Llantrisant Business Park	R
Caerphilly	Industrial Estate	G
Caerphilly	Hawtin Park	A
Caerphilly	Bedwas Industrial Estate	R
Caerphilly	Pantglas Industrial Estate	R
Caerphilly	Penallta Industrial Est, Ystrad Mynach	R
Caerphilly	Duffryn Industrial Est, Ystrad Mynach	R
Caerphilly	Oakdale / Pen-y-fan Industrial Estate	R
Rhondda Cynon Taf	Pontyclun Industrial Areas	A
Rhondda Cynon Taf	Hirwaun Industrial Estate	R

As Plate 9 shows there are pockets of very low car ownership which amplifies this constraint. In addition the perception that the A465 is an unsafe road with a high accident rate is also a barrier to people using it to seek employment opportunities in the wider area.

Plate 9: Percentage of households without a car



Source: 2011 Population census

3.4.3.7 Summary

The Heads of the Valleys corridor is subject to high levels of deprivation, low levels of private sector job creation, low employment rates, a poorly qualified workforce relative to competing locations and a lack of private investment. In addition to these barriers, transport is also a key influencing factor to economic development.

3.4.4 Society

The key settlements in the study area are Hirwaun and Merthyr Tydfil, and their component suburbs and villages including Treawaun, Penywaun, Clwydyfagwyr, Cefn Coed, Trefechan, Gurnos, Pant and Dowlais Top. Merthyr is one of the largest towns in the South Wales valleys.

Some of these settlements date back to the 18th Century and are similar to all other South Wales Valleys areas in having strong community traditions and identities, with multiple generations of families often living in close proximity to each other. There are significant connections with West Wales. Firstly, given the established tradition of holidaying on the west and south west coast, with many in the South Wales Valleys region regularly travelling west to enjoy touring caravan or static caravan holidays throughout the year. Secondly, due to the historic generational links with forefathers from West Wales who migrated to the industrial areas throughout the 18th and 19th Centuries.

Patterns of travel and daily life within these local areas are mainly confined to key destinations within them for example the population of Merthyr travels to schools, hospitals, shopping and leisure destinations within Merthyr. Hirwaun residents mainly travel to Aberdare for access to key services. Pupils who attend Ysgol Rhyd-y-Waun living in Hirwaun need to cross the A465 to get to school. However, some key shopping and leisure destinations draw in visitors from a wider area for example Cyfarthfa Retail Park, the Rhyd y Car leisure complex to the south of Merthyr town centre and the Brecon Beacons National Park to the north of the proposed scheme. These destinations draw in day trippers from across the wider Heads of the Valleys region and South Wales.

Further details are provided in the following sections.

3.4.4.1 Healthcare provision

There is a full range of health care provision along the A465 corridor, which includes pharmacies, GP surgeries, medical centres and a hospital which provides 24 hour accident and emergency facilities. Details of the GP surgeries and hospitals are set out below.

- **GP Surgeries** – Hirwaun Health Centre, Pontcae Surgery, Keir Hardie Health Park and Dowlais Medical Practice are located close to the proposed scheme and serve the local communities in the area. In addition, further south St John's Medical Practice is located in Aberdare and could serve some local residents who live closer to the A465.
- **Hospitals** – Prince Charles Hospital is located within Merthyr Tydfil (less than 300 m from the A465), this hospital serves the wider Heads of the Valleys region and road access from the local road network and the A465 is critical to ambulance times.

3.4.4.2 Education

There are a range of educational facilities within the proposed scheme area which offer opportunities for learning through the medium of Welsh and English. Details of the schools and colleges close to the proposed scheme are set out below.

- **Primary Schools** – There are small primary schools in most of the communities close to the proposed scheme, these include Hirwaun Primary School, Penywaun Primary School, Ysgol Coed-y-Dedderwen, Ysgol-y-Graig Primary, and Pantysgallog Primary School. In addition, within Merthyr Tydfil, the primary settlement in the area, there are a larger number of primary schools, Ysgol-y-Graig Primary is located closest to the A465.
- **Secondary schools** – There are two secondary schools close to the proposed scheme, these are Ysgol Gyfun Rhydywaun in Pen y Waun (less than 300m from the A465) and Pen-y-Dre High School in Merthyr Tydfil (directly south of the A465).
- **Colleges** - Merthyr Tydfil College. This is a new college and attracts students from a wide catchment area.

Further afield, but within a daily commuting distance, are a number of universities, these include Swansea University, Cardiff University, Cardiff Metropolitan University, the University of South Wales and the University of Wales Trinity Saint David (which has campuses in Swansea and Carmarthen).

3.4.4.3 Places of worship, cemeteries, crematoria and burial grounds

There are numerous places of worship close to the proposed scheme, most of which are located within Merthyr Tydfil. Closest to the proposed scheme are: St Lleurwg's Church, Anglican Church and Ramoth Christian Centre in Hirwaun; St John's Church, Cefn Coed Pentecostal Mission and Unitarian Chapel Hen Dy Cwrdd in Cefn Coed; St Aloysius Catholic Church, Park Baptist Church, St Aloysius Church, St Dubricius Christian Church, Hebron Evangelical Church, All Saints Church of Wales, Dowlais Elim Family Church, St Illtyds R C Church and Jehovah's Witness in Merthyr Tydfil; Living Truth Church in Penywaun; and Christ Church in Dowlais. In addition, Llwydcoed crematorium is located close to the proposed scheme along with Cefn Coed cemetery, a Jewish burial ground and a natural burial ground to the north of the A470 junction.

Llwydcoed crematorium is located close to the proposed scheme south of the proposed Baverstock junction. Cefn Coed cemetery and a Jewish burial ground are located north east of the proposed A470 junction, and a natural burial ground to the south of the Cefn Coed High Street / A470 junction.

3.4.4.4 Community facilities and recreational open space

There are a number of communities and villages close to the A465 that have a range of community facilities and recreational open space. The facilities include:

- Hirwaun – post office, library, community hall, rugby football club, public houses, cemetery, Welfare Ground containing football and rugby pitches, a bowls pavilion, tennis courts, basketball courts and a children’s play area. Llwydcoed Crematorium is located approximately 2.5 km north-east of Hirwaun. To the east of Hirwaun is Nant Hir Reservoir, which offers fishing and other recreational opportunities. The village also has a number of public houses and cafes;
- Penywaun – post office, Manor Bach Common to the east of Penywaun and Llwydcoed Crematorium to the north-east of the village;
- Clwydyfagwyr - small outdoor basketball and football court, as well as a convenience store;
- Gellideg - a children’s outdoor sport court, a convenience store and post office;
- Cefn Coed – a village at the northern fringes of Merthyr Tydfil which has a post office, newsagent, pharmacy and two public houses. Within the village there is a community centre and a rugby club. The Taff Trail is routed through this community and the Cwm Taf Fechan Riverside Common is situated to the east of the village;
- Merthyr Tydfil - The town functions as the main retail, economic and services centre of the wider Merthyr Tydfil County Borough. It contains the County Borough administrative headquarters, Cyfarthfa Castle (which houses a museum, art gallery, park, bowls, tennis and lake with fishing), Gurnos Community Centre, Galon Uchaf Residents Centre, Galon Uchaf Park, Hillcrest Park, Merthyr Tydfil Leisure Village, Merthyr Tydfil Cilsanws Golf Club, LoadLok Community Stadium, Thomastown Park Recreation Ground, West End Bowling Club;
- Pant is a small village east of Merthyr which includes a cemetery and the Morlais Castle Golf Club and Castle; and
- Dowlais is a village to the east of Merthyr Tydfil that developed around ironworking in the 18th and 19th centuries, in particular the vast Guest Ironworks. It includes a public house, post office, rugby club, kennels and stables, and a children’s play area. The Penywern Ponds located either side of the A465 between Pant and Dowlais are important local fishing destinations for a local angling group.

3.4.4.4.1 Brecon Beacons National Park (BBNP)

The existing A465 skirts to the south of the southern boundary of the BBNP for the majority of Sections 5 and 6, with some short sections of the proposed scheme within the national park itself. The national park is a popular recreational destination for national and international tourists, as well as the local population, containing the highest peak in south Wales. Day trippers travel to walk and cycle in the National Park throughout the year, and, in winter, to sledge on the slopes. Countryfile.com named the Storey Arms in the BBNP one of the best five places in the UK to go sledging (Countryfile, 2010). The BBNP also contains a natural burial ground.

3.4.4.5 Shopping

There are a number of shopping facilities serving the study area. Merthyr Tydfil is the largest business and retail centre which serves the wider region as well as the local area.

Key shopping facilities which draw visitors from the wider South Wales and Mid Wales regions include:

- Cyfarthfa Retail Park (located approximately 1.7 km south of the A465) – Argos, B&Q, Currys PC world, Carphone Warehouse, Boots, Debenhams, H&M, Marks and Spencer, Matalan, New Look, Next, TK Maxx, Wilko;
- Dowlais Top Retail Park (located immediately adjacent to the Dowlais Top junction at the eastern end of the proposed scheme) includes an ASDA and Lidl supermarkets, B&M Homestore, carpet and sofa stores and is located directly north of the Dowlais Top roundabout; and

- The Trago Mills development currently under construction on Swansea Road, Merthyr, but which is expected to draw in visitors from the wider South Wales and Mid Wales regions.

Facilities with a more local catchment area include:

- St Tydfil Shopping Centre (located approximately 2.7 km south of the A465) – mobile phone stores, banks, discount retail, pharmacy, healthfood stores, clothing, jewellery, travel agency;
- High Street (which crosses the A465 in Cefn Coed) – contains a range of retail, banking, supermarkets, jewellery, clothing and shoe shops; and
- Tesco (located approximately 2.7 km south of the A465), Aldi (located approximately 3.15 km south of the A465) and Iceland (located approximately 2.7 km south of the A465) supermarkets located in Merthyr Tydfil.

Along Hirwaun High Street there is a pharmacy, florist, embroidery and school wear shop, clothes alterations, newsagent, betting agency and clothing shop.

Cefn Coed has a number of local retail businesses including, a newsagent, general store, off-licence, beauty clinic, funeral services, pharmacy and a clothing store.

Pant contains a small supermarket and in the industrial estate, close to the A465, there is a carpet shop, cake decoration shop, beauty supply store, hardware store, building and plumbing supply stores, motor mechanic services.

Larger scale shopping destinations are located in Cardiff, Newport and Swansea. These are all located approximately 25 – 30 miles from Merthyr Tydfil. Some of the shopping facilities at these key regional hubs include:

- Cardiff – Key city centre locations are Queen Street, High Street, the Capitol Shopping Centre, St David's Centre and Queens Arcade. In addition there are several out of town destinations such as Culverhouse Cross, Cardiff Bay and Newport Road;
- Newport – Key city centre locations are Kingsway Shopping Centre and Friars Walk Shopping Centre. The key out of town destination is Newport Retail Park; and
- Swansea – Key out of town destinations are Morfa Retail Park, Fforestfach Retail Park, Park Tawe Retail Park and Swansea Enterprise Zone. The key city centre locations are Oxford Street, Union Street and The Quadrant Shopping Centre.

'Outlet' shopping malls in the region are located south of the A465 at Ebbw Vale and at junction 36 of the M4 at Bridgend. Market towns to the west, north and east offer boutique shopping and small local retail outlets. These destinations include Neath, Abergavenny, Monmouth, Ross-on-Wye and Hereford.

3.4.4.6 Public transport and Active Travel

3.4.4.6.1 Footpath, cycleways and bridleways

There is a wide network of existing public footpaths (both definitive and claimed), cycleways and bridleways that cross or navigate close to the proposed scheme. There are many local footpaths for pedestrians. The study area contains the NCN Routes 8 (Taff Trail), 46 and 478. There are a number of bridleways and bridleways / byways exist throughout the study area, both adjacent to and crossing the existing A465. Equestrians travel between the Hirwaun and Baverstock junction using the Llwydcoed Crematorium road. This route also forms part of the NCN Route 46 and is used by cyclists despite the steep gradients. Once at Baverstock junction, equestrians travel across the junction from the B4276 Merthyr Road to a riding area to the north-west of the junction.

3.4.4.6.1 Train services

There are two railway lines to the south of the A465 and the study area. One commences at Aberdare and the other at Merthyr Tydfil which provides regular and daily services to Cardiff. There are no east west train routes in the study area.

3.4.4.6.2 Bus services

There are a range of bus services in close proximity to the study area. The bus companies include, First Call Travel Service, Stagecoach South Wales and New Adventure Travel and John's Service. The bus companies provide services connecting the towns and villages in the study including Merthyr Tydfil, Cefn Coed, Hirwaun, Llwydcoed, Penderyn, Clwydfagwyr, Pant and Dowlais. Stagecoach is the main provider of services in Methyr Tydfil including local services and services out of the County Borough such as Newtown and Cardiff. There is a Bus Station at Merthyr Tydfil Town Centre. There is a free bus service to ASDA at Dowlais Top by New Adventure Travel. In addition, there is a school bus stop located on the existing Cefn Coed High Street overbridge which serves Cyfarthfa High School and Ysgol-y-Graig primary school.

3.4.5 Environment

Chapters 8 to 17 of the ES (Jacobs, 2017a) provide detailed information regarding the local environmental features close to the proposed scheme and include an assessment of how the proposed scheme could potentially have significant effects on them. Below is a summary of the key baseline features that are considered for several topic areas.

3.4.5.1.1 Noise and vibration

The primary receptors for noise and vibration are the communities through which the proposed scheme routes. Noise monitoring has been undertaken at a range of locations and the assessment included potential effects on residential properties along with a range of community facilities. The community of Trewaun and to the west of Gurnos are particularly close to the route of the existing A465.

3.4.5.2 Air quality

As with noise and vibration, the communities along the existing A465 will be the most significantly affected by the proposed scheme. A total of 107 receptors representative of human health exposure, and 26 different habitat sites were modelled to capture the full effects of the proposed scheme across the whole of the study area.

3.4.5.3 Ecology and nature conservation

Important ecological features in the study area include protected nature conservation sites (statutory and non-statutory) and other sensitive habitats including woodland, grassland and watercourses. These include Blaen Cynon Special Area of Conservation (SAC), Tir Mawr a Dderi Hir and Cwm Taf Fechan Sites of Special Scientific Interest (SSSI), 28 Sites of Importance for Nature Conservation (SINCs), several areas of ancient woodland, and a local nature reserve. There are also a number of protected species close to the proposed scheme.

3.4.5.4 Cultural heritage

The study area for the cultural heritage assessment includes the proposed scheme footprint along with an area 200 metres from the proposed scheme boundary, extended to 1 km from statutorily designated sites. Information was obtained from desk-based assessments, site visits and invasive survey techniques. In total 160 cultural heritage assets, comprising 96 archaeological remains, 34 historic buildings, and 30 historic landscape types, dating from the prehistoric period to the recent past form the cultural heritage baseline. These Gurnos Tramway and Leat Scheduled Monument, Cefn Coed Cemetery and Jewish Burial Ground Historic Landscape Character Area, Farmhouse and lofted cow shed, Coed Meurig Farm

3.4.5.4.1 Landscape

The scheme is set in a dramatic hilly landscape with ancient woodlands and striking exposed geology with a series of gorges and valleys, including the Taf Fechan and Taf Fawr gorges. Part of the proposed scheme lies within the BBNP. In addition, the existing A465 is routed through a number of local communities, who currently experience views of the road.

The key visual receptors comprise people in residential properties, people undertaking recreational activities such as using footpaths, bridleways and playing fields, people moving around within communities, people at work or school and people travelling on roads.

3.4.5.5 The water environment

There are 58 watercourses that cross or lie within a 50 m buffer zone around the extent of the proposed scheme, the majority of which are currently crossed by the existing road. These include two large tributaries of the Afon Taf (Taf Fechan and Taf Fawr) and the Afon Cynon.

3.4.6 Culture

There are a number of local cultural attractions in and around the proposed scheme study area that reflect the rich industrial history of the Merthyr and Dowlais areas, most notably the former Crawshay Ironworks at Merthyr and associated viaduct and Cyfarthfa Castle (the Crawshay family home).

Given Merthyr Tydfil has the highest population in the study area, there is a higher concentration of cultural and local attractions in Merthyr Tydfil than at the other local communities in close proximity. Some of the facilities and services in the study area include:

- Local tourist attractions and museums – Brecon Mountain Railway, Cyfarthfa Park and Castle (including a museum and art gallery), Gethin Woodland Park, Joseph Parry's Cottage, Cynon Valley Museum and St John's Church.
- Arts programmes.
 - Head for Arts - is a community organisation that works across the Eastern Heads of the Valleys areas, including the county boroughs of Caerphilly and Merthyr Tydfil. It delivers a diverse programme of work, ranging from running drop-in workshops at festivals to staging large-scale regional performances at high-profile events.
 - Arts Connect - is a unique collaboration that aims to bring even more arts opportunities to Rhondda Cynon Taf, The Vale of Glamorgan, Merthyr Tydfil, Bridgend and Caerphilly. It is based in the Merthyr Tydfil Central Library.
- Markets – There is a street market, twice per week and a farmers market, once per month. They are both located in High Street, Merthyr Tydfil.
- Social clubs and community groups including Con Voce Choir, Dowlais Male Choir in Merthyr Tydfil, Penydarren Social Club, Voluntary Action Merthyr Tydfil, Gellideg Foundation Group, Dowlais Engine House, 3G's Development Trust, Town and Park Communities First Partnership.
- Theatres, cinemas and art centres – Theatre Royal, Canolfan Soar, Redhouse Cymru, Vue Cinema in Merthyr Tydfil and Coliseum Theatre in Aberdare.

Further afield the National Museum of Wales Big Pit mining museum is located off the A465 east of Brynmawr. Other key National Museum of Wales sites are located in Swansea (National Waterfront Museum) and Cardiff (National Museum of Welsh Life, St Fagans and the National Museum and Gallery of Wales, Cathays Park).

During the summer, open air concerts and events are occasionally held at Cyfarthfa Castle, Merthyr Tydfil. Major arts and concert venues are located in Swansea and Cardiff, such as the Brangwyn Hall in Swansea and the Millennium Centre in Cardiff. Major pop concerts are held regularly at the Liberty Stadium, Swansea, the Motorpoint Arena, Cardiff and the Principality Stadium, Cardiff.

3.4.7 Welsh Language

In the 2011 Census, 19% of people three years old and over and living in Wales said they could speak Welsh. In relation to the study area, the Census is broken down to the constituent local authorities. In the 2011 Census, within the local authority boundary of Rhondda, Cynon Taf it was 12.3%, 8.9% in Merthyr Tydfil and 11.2% in Caerphilly.

Whilst the percentage of Welsh speakers in the local authority areas through which the proposed scheme passes is around half the national average, all of the South Wales Valleys areas are well known for having a resurgence in the Welsh language, and increased popularity of Welsh medium education, since the end of World War II.

The Welsh medium schools in the study include Ysgol Coed-y-Dederwen (primary school in Merthyr Tydfil, 820m south of the A465) Ysgol Santes Tudful (primary school in Merthyr Tydfil, 2.2 km south of the A465) and Ysgol Gyfun Rhydywaun (secondary school, in Hirwaun, 290 m south of the A465). There is also; “Meithrin movement” (Welsh Language pre-school groups), residents may take part in choirs, folk dancing groups, recitation groups, ‘Urdd’ (Welsh League of Youth) activities, local eisteddfods, Merched y Wawr, local chapel activities within the local area or within the wider region for example Urdd Eisteddfod in Bridgend in 2017; National Eisteddfod in Cardiff in 2018.

4. The Sustainable Development Principle in Decision Making

This chapter considers how the proposed scheme has applied the sustainable development principle in decision making.

4.1 Identification of the Objectives of the Proposed Scheme

The original Abergavenny to Hirwaun Project was proposed in the 1990s and the overarching scheme objectives of improvements, to road safety and reduction in journey times, remain the key aims of the proposed scheme, in terms of the improvement to the strategic highway network. The scheme objectives for the proposed scheme were identified prior to the Well-being of Future Generations (Wales) Act 2015 coming into force, but they have been updated to align with the Act insofar as they require the proposed scheme to be sustainable, facilitate economic regeneration, promote walking and cycling and healthy lifestyles, and have due consideration of the potential impacts on the environment.

The Project that was promoted in the 1990s was developed before the WeITAG appraisal process was adopted and no formal WeITAG process was followed. However, at the time, the key periods of public consultation are summarised as follows

- October to December 1994 – Public Consultation on Proposed Route Options;
- April 1995 – Publication of the Scheme Assessment Report, which included consideration of issues raised during the Public Consultations in 1994;
- July 1995 – Preferred Route announced, based on the recommendation of the Scheme Assessment Report;
- 1997 - Orders Exhibitions following publication of the Draft Line Order in 1997; and
- 1998 – the Public Local inquiry into the Line Order for the entire 40 km scheme.

Other key stakeholders consulted during these key periods included the local authorities, Brecon Beacons National Park, statutory environmental bodies and affected landowners.

When further design work commenced on Sections 5 and 6 (Dowlais Top to Hirwaun) in 2015, a review of the proposed scheme based on WeITAG principles was undertaken. This assessment considered a number of options, these were: Option 1 Do Nothing; Option 2 Do Minimum (Highway Improvement); Option 3 Road Improvements (Made Line Order Route); Option 4 Rerouting of the Trunk Road Network; Option 5 Removal of Overtaking Lane; Option 6 Improvements to NMU provision; Option 7 Park and Ride; Option 8 Car Share Schemes; Option 9 Bus Improvements; Option 10 Rail Improvements; and Option 11 Tram / Guided Busway.

The appraisal concluded that the economic sustainability of the region is influenced by the standard and condition of the local transport infrastructure and that the only option which is likely to provide the efficient and reliable infrastructure necessary to attract inward investors is major highway improvements.

Non highway improvement options would have less direct impact on the environment. Highway improvements would impact on landscape, visual, loss of habitat etc., but also provide opportunity for long term benefits in noise levels and biodiversity through improvements to water quality, habitat creation and planting.

The only option that performed well against the Transport Planning Objectives, the objectives established to address the problems being experienced and aligned with current policy, is the major highway improvements option which is now presented as the proposed scheme.

The Welsh Government has two main over-arching objectives for the proposed scheme which are to facilitate economic regeneration of the Heads of the Valleys Area by improving accessibility, reducing journey time and improving journey time reliability; and to strengthen resilience on the A465 by improving standards and enhancing road safety. In addition to the overarching objectives there are ten scheme objectives for the proposed scheme. These are to:

- reduce journey times for private and commercial road users;

- facilitate economic regeneration;
- bypass congested towns and villages;
- enhance road safety and reduce casualties;
- deliver a scheme that is sustainable;
- promote cycling and walking and provide opportunities for healthy lifestyles;
- deliver a scheme which minimises future maintenance requirements and disruption to the network;
- reduce journey time variability and improve resilience on the A465;
- use the A465 to manage traffic effectively and improve resilience on the strategic road network in South East Wales; and
- ensure all of these objectives are met with due consideration given to the impact on the environment.

However, the identification of the specific objectives of the proposed scheme has been an iterative process which was developed in order to assist with the process of considering various alternative solutions. The scheme objectives for the proposed scheme were identified prior to the Well-being of Future Generations (Wales) Act 2015 coming into force but they align with the Act insofar as they require the proposed scheme to be sustainable, facilitate economic regeneration, promote walking and cycling and healthy lifestyles, and have due consideration of the potential impacts on the environment. In meeting these scheme objectives the proposed scheme would be contributing to sustainable development.

In identifying the key objectives for the proposed scheme regard has been had to the other policies and plans for the region to ensure that there was integration with those policies and plans; and that the proposed scheme would not unnecessarily impact on the ability of other public bodies to action their own priorities. Identification of alternatives and consideration against sustainability criteria

The Welsh Transport Assessment Guidance provides a structure for assessing new transport schemes to identify a preferred option, and aid the decision making process. WeITAG reviews were undertaken in respect of the proposed scheme during 2015. These reviews considered the criteria set out in

Table 4.1.

WeITAG guidance states that if the proposed scheme has published draft orders it can continue without a WeITAG Appraisal. This proposed scheme has a made Line Order which meets this criteria but due to the significant length of time that has passed since the original Line Orders were published the Welsh Government considered it appropriate to review the preferred route in light of current policy, regional development strategies and national infrastructure planning.

Table 4.1: WeITAG criteria

Economy	Environment	Social	Wider criteria
<ul style="list-style-type: none"> • Cost • Vehicle Operating Costs • Travel Time Savings • Reliability • Impact during Construction • Impact during Maintenance • Economic Activity and Location Impacts 	<ul style="list-style-type: none"> • Noise • Local Air Quality • Landscape and Townscape • Biodiversity • Heritage • Water Environment • Soils 	<ul style="list-style-type: none"> • Transport Safety • Personal Security • Permeability • Physical Fitness • Social Inclusion • Equality, Diversity and Human Rights 	<ul style="list-style-type: none"> • Transport Planning Objectives • Public Acceptability • Acceptability by Other Stakeholders • Technical and Operational Feasibility • Financial Affordability and Deliverability • Risk

A WelTAG Phase 1 review for Sections 5 and 6 was completed in May 2015 by Jacobs (Jacobs, 2015). The Transport Planning Objectives assessed as part of the WelTAG appraisal are described in Chapter 1 of this ES (Jacobs, 2017a) and included Table 4.2 below for ease of reference. These are updated Objectives since the highway improvements were first proposed in the 1990s, reflecting changes to legislation, particularly in respect to sustainability and the environment.

Table 4.2: Scheme objectives reviewed in the WelTAG review

Scheme Objectives for A465 Sections 5 and 6 Hirwaun to Dowlais Top Dualling (as amended 2015)	
<ul style="list-style-type: none"> Maintain current level of service and to carry out improvements 	<ul style="list-style-type: none"> Improve NMU provision, providing opportunity for healthy lifestyle and reduction in short vehicle journeys
<ul style="list-style-type: none"> Reduce journey times for private and commercial road users 	<ul style="list-style-type: none"> Deliver a scheme which minimises future maintenance requirements and distribution to the network
<ul style="list-style-type: none"> Facilitate economic regeneration 	<ul style="list-style-type: none"> Reduce journey time variability and improve resilience on the A465
<ul style="list-style-type: none"> Enhance road safety and reduce casualties 	<ul style="list-style-type: none"> Use the A465 to manage traffic effectively and improve resilience on the strategic road network in South East Wales
<ul style="list-style-type: none"> Deliver a scheme that integrates with public transport and the local transport network 	<ul style="list-style-type: none"> Deliver a scheme that is sustainable
<ul style="list-style-type: none"> Do all this with proper care for the environment 	

The inclusion of the proposed scheme objective to ‘deliver a scheme that is sustainable’ was added to accord with the Welsh Government’s commitment to ‘become a one planet nation, putting sustainable development at the heart of government’.

The review identified and appraised multi modal options for transport improvements at the Heads of the Valleys. The WelTAG Phase 1 Review identified and appraised multi-modal option concepts to identify the Preferred Solution, making best use of recent work undertaken in the development of Sections 2 and 3.

The following multi-modal option concepts were identified:

- Option 1 Do Nothing;
- Option 2 Do Minimum (Highway Improvement);
- Option 3 Road Improvements (Made Line Order Route);
- Option 4 Rerouting of the Trunk Road Network;
- Option 5 Removal of overtaking lane;
- Option 6 Improvements to NMU provision;
- Option 7 Park and Ride;
- Option 8 Car Share Schemes;
- Option 9 Bus improvements;
- Option 10 Rail improvements; and
- Option 11 Tram / Guided Busway.

These options were subject to a WelTAG Sift that assessed their performance against the Transport Planning Objectives (TPO). The performance of the following options resulted in them being discarded:

- Option 4 Rerouting of the Trunk Road Network;
- Option 5 Removal of overtaking lane;
- Option 8 Car Share Schemes;
- Option 10 Bus improvements; and
- Option 11 Tram / Guided Busway.

The remaining options were then subject to a WelTAG Stage 1 qualitative assessment against the following criteria:

- Welsh Impact Area Economy;
- Welsh Impact Area Environment;
- Welsh Impact Area Social;
- Transport Planning Objectives;
- Acceptability;
- Feasibility and affordability; and
- Risk.

The assessment of multi-modal options concluded the following:

- **Economy:** The economic sustainability of the region is influenced by the standard and condition of the local transport infrastructure. The only option which is likely to provide the efficient and reliable infrastructure necessary to attract inward investors is major highway improvements.
- **Environment:** Non highway improvement options would have less direct impact on the environment. Highway improvements would impact on landscape, visual, loss of habitat etc., but also provide opportunity for long term benefits in noise levels and biodiversity through improvements to water quality, habitat creation and planting.
- **Social:** Closely linked with economic aspects, the social sustainability of the region is significantly influenced by the standard and condition of the local transport infrastructure. It is unlikely that improvements in public transport services in the region would have a significant impact in addressing the current problems. NMU provision could be enhanced in isolation or as part of wider highway improvements.
- **Transport Planning Objectives:** The only option that performs well against the Transport Planning Objectives, the objectives established to address the problems being experienced and aligned with current policy, is the major highway improvements option.
- **Acceptability:** It is considered that, in general, the public and wider stakeholders will be unlikely to consider that options other than major highway improvements would provide the improvement necessary to address the problems experienced and assist in the economic regeneration of the region. It is likely that improvement to dual carriageway, providing continuity of standard with the adjoining sections of the A465, would be considered necessary by stakeholders to provide the efficient and reliable infrastructure required to attract inward investment to the region.
- **Feasibility and affordability:** All options are feasible. However, affordability will be reliant on cost benefit analysis including patronage of the softer interventions.
- **Risk:** The only option concept which is likely to provide a significant improvement in accident rates, journey times and reliability, and the economic viability of the region is a highway improvement.

The overall conclusion of the WelTAG Appraisal 1 was that the preferred solution identified in the 1997 draft orders (on-line dualling) was still the most appropriate solution. This process took into account similar work undertaken during the development of Sections 2 (Gilwern to Brynmawr) and 3 (Brynmawr to Tredegar) of the Heads of the Valleys Dualling Scheme.

The purpose of the WelTAG Phase 2 Review was to provide a comprehensive study of the previous work undertaken to determine the Preferred Route, to make a defined statement upon its robustness and, if necessary, recommendations for further work. A WelTAG Phase 2 review for Sections 5 and 6 was undertaken in August 2015. This review took into account the WelTAG criteria of economic, environmental and social factors.

This concluded that:

- the structure and coverage of the appraisal completed with the 1995 Scheme Assessment Report aligned with the requirements of WelTAG;
- that developments across the proposed scheme area since 1995 did not influence the selection of the Preferred Route;
- there were additional ecological and cultural heritage designations, but the proposed scheme remained the most appropriate route;
- it was considered that the route alternatives appraised and reported in the 1995 Scheme Assessment Report capture all viable route alternatives between Hirwaun and Dowlais Top and appropriately considered the views of stakeholders through consultation; and
- the Preferred Route identified within the 1995 Scheme Assessment Report remained the correct option for development.

4.2 Evolution of Environmental Design Objectives

The Guidance on the Well-being and Future Generations (Wales) Act 2015 suggests a need to take account of the long term, in order to work in a sustainable way. It considers that best practice would be to consider a period of 25 years ahead. In designing the proposed scheme the needs of the existing community and road users have been taken into account while considering the longer term. This can be demonstrated by the use of general highway design standards and performance specifications that, for example, require a minimum of 120 years design life for structures. Furthermore, the design of flood mitigation includes provision for a 1 in 100 year flood event plus allowance for climate change. The assessment of landscape impacts takes into account the effects of construction and the contribution to mitigation that can be afforded in the winter of year 1 and summer in year 15. It not only includes the requirement for a five-year post construction maintenance period to ensure that mitigation measures, particularly planting, have been implemented satisfactorily; but also includes a 30-year 'Operational and Maintenance' phase management obligation for the road, its soft estate and the land acquired for essential ecological mitigation. These design assessment and mitigation measures therefore take account of long term planning for sustainable design and management.

A set of 12 environmental design principles were established in November 2015 in order to inform good environmental design and reduce the potential effects of the proposed scheme on the environment. The principles were developed around a range of environmental topic areas. The environmental design principles are set out below:

- Principle 1 – Minimise impact on existing marshy grassland habitats by minimising risk of drying out whilst considering the whole life cost of the proposed scheme;
- Principle 2 – Minimise impact on ancient woodland in close proximity to the proposed scheme;
- Principle 3 – Where technically feasible and not entailing excessive cost, consider opportunities to enhance existing ecological connectivity;
- Principle 4 – Aim to achieve an earthworks balance;
- Principle 5 – Minimise habitat loss from Sites of Importance of Nature Conservation (SINCs) in close proximity to the scheme;

- Principle 6 – Simple and elegant design for structures;
- Principle 7 – Minimise lighting on scheme as a whole, particularly viaducts over Taf Fawr and Taf Fechan;
- Principle 8 – Ensure structures design, facing and finishes provides integration to current vernacular balanced by whole life cost;
- Principle 9 – Maintain existing underpasses to maintain connectivity for wildlife and minimise habitat severance;
- Principle 10 – Provide linear landscape strips in areas where they currently exist, if appropriate, to re-integrate proposed scheme as per existing highway planting;
- Principle 11 – Where appropriate, minimise tree and shrub planting to create open, outward views from the scheme and integrate with existing upland landscape character; and
- Principle 12 – Minimise flooding and water quality impacts.

These design objectives were influenced by scientific evidence, environmental legislation and consideration for Well-being Objectives.

Extensive survey effort has been employed to inform the assessment of potential environmental effects and mitigation measures have been employed. Best practice, including the latest scientific knowledge in the relevant environmental topic field, was taken into account during development of survey techniques, undertaking of environmental assessment and the designing mitigation measures. These objectives help meet Well-being Objectives, by connecting communities through sustainable and resilient infrastructure whilst managing the use and enhancing Wales' natural resources in order to support long-term well-being for current and future communities.

4.3 Collaboration and Involvement

Throughout the development of the proposed scheme the Welsh Government has sought to involve a range of people and organisations. The aim has been to ensure that the comments received reflect the views of the local community as well as statutory bodies and interest groups.

With regards to NMU provision, Briars bridleways (affiliates of the British Horse Society) detailed a number of key riding routes utilised within the study area. In particular a number of routes around Croesbychan and Baverstock were identified. As a result, equestrian crossings have been provided through the Croesbychan and Baverstock junctions, with equestrians also able to use the off-line NMU route between the two junctions.

Consultation with Sustrans revealed that two missing links existed in NCN Route 46. These links have been completed as part of the proposed scheme, allowing cyclists to travel from Hirwaun to Dowlais using an offline cycle track.

From discussions with the local authorities, it was made apparent that an issue existed with school children walking along the A465, as they travelled from Trefechan to Pen-y-Dre High School. As part of the design, a separate structure for pedestrians and cyclists has been constructed over the Afon Taf Fechan, connecting Vaynor Road in Cefn Coed with the Gurnos Ring Road, providing a safe route to school for school children.

As mentioned in Section 4.4.2 and in Table 4.4, it was noted during technical working group meetings with local authorities, that between Dowlais Top and Asda, and the Pengarnddu Business Park, at grade footpaths across the A465 are habitually used by workers (including shift workers) and shoppers travelling by foot between Dowlais and Asda, St Merryn Foods and Pengarnddu Business Park. A number of pedestrian accidents and fatalities had been recorded. The design has included a NMU overbridge to prevent pedestrians from crossing at grade.

The proposed scheme has been developed through an iterative process, where collaboration between different professionals and stakeholders views were critical. This involved continuous collaboration between highways engineers and environmental professionals to ensure that the design took into account the constraints in the area and that opportunities for enhancement were taken forward where appropriate. The views and aspirations of key stakeholders, including the local authorities, BBNP, landowners, interest groups such as Sustrans,

and members of the local community were taken into account as far as practicable within the parameters of the proposed scheme objectives. The process of collaboration and involvement with a broad range of consultees has resulted in some key modifications to the proposed scheme.

For example, in working with the local authorities, the Welsh Government has incorporated the Cynon Valley Gateway proposal into the proposed scheme, with the Croesbychan junction designed to link into this road scheme should it be brought forward at a later date by Rhondda Cynon Taf County Borough Council (RCTCBC).

A number of different forms of collaboration and involvement have taken place during the process of designing the proposed scheme, which are set out below.

4.3.1 Public Information Exhibitions

Four Public Information Exhibitions (PIEs) were held in December 2015, two at Cefn Coed, one in Hirwaun and one at Dowlais. The aims of the PIEs were to:

- allow the public to be involved in the decision-making process by raising concerns and identifying issues that should be considered as part of the proposed scheme design;
- provide information about the proposed route that was developed in the 1990s;
- identify the aspects of the design that are currently being reviewed by the project team; and
- introduce the project team, informing the public how they can engage with the development process going forward.

The exhibitions were well attended and useful feedback was provided. The main concerns related to local access issues for those who currently use the A465 as part of their local journeys. There was a strong view that the needs of local people should be considered as well as the needs of those using the A465 as part of a longer journey. Table 4.3 provides a summary of the key issues raised and the way in which they have influenced the design of the proposed scheme.

Table 4.3: Feedback from Public Information Exhibitions

Element of proposed scheme	Issue raised	Influence on design evolution
Access to Hirwaun	Concerns were raised about the loss of direct access to the A465 at Croesbychan.	The original design at Croesbychan was to provide an overbridge to link communities at Llwydcoed and Hirwaun with access to the A465 lost. As a result of consultation feedback, an additional grade separated junction has been provided so that local traffic can access the A465 at Croesbychan.
Baverstock Junction	Concerns were raised about the appropriateness of the junction between the re-aligned B4276 and the Crematorium Road.	In the original design, the junction between the Crematorium Road and the B4276 occurred less than 50m south of the roundabout that connected to the westbound carriageway. This junction now connects to a modified roundabout layout, which is an improvement in terms of highways safety.

Element of proposed scheme	Issue raised	Influence on design evolution
Swansea Road	Concerns were raised about the loss of access from Swansea Road to the A465.	The current A465 alignment provides access from Swansea road for traffic heading westbound (there is no right hand turn from Swansea Road). The proposed scheme now provides for access between Swansea Road and the A465 for both eastbound and westbound traffic. This link is provided from the modified Baverstock junction.
A470 junction	Concerns were raised about the loss of direct access to the A465 from Grawen Lane and Lower Vaynor Road.	The options for maintaining these accesses was reviewed but it was determined that the loss of direct access to Grawen Lane and Lower Vaynor Road was necessary in order to achieve the scheme objectives.
A470 / Upper High Street junction	Concerns were raised regarding safety of the junction between the A470 and Upper High Street (A4054) and its appropriateness to take increased numbers of vehicles if the accesses to Cefn Coed were lost.	The proposed scheme includes modifications to the junction between the A470 and the A4054 (Upper High Street) which will improve junction safety.
Gurnos / Prince Charles Hospital junctions	Concerns were raised regarding the split junction design at Gurnos and Galon Uchaf. Additional pedestrian provision was requested.	The original design included a junction at Gurnos and at Galon Uchaf, the proposed scheme has been amended and a new junction would be provided next to Pen-Y-Dre school, which is located between Gurnos and Galon Uchaf. This junction would improve access to both communities and to Prince Charles Hospital. Provision for non-motorised users (NMUs) has been included in the design of the Prince Charles Hospital junction, the proposed scheme will result in the closure of a bridleway to the west of the junction, in order to mitigate for this provision for horse-riders through this junction is also provided.
Pedestrian and cycle provision generally	Concerns were raised about this connectivity within communities.	The proposed scheme has increased the provision for pedestrians and cyclists, there are 13 km of additional routes. Where footpaths or bridleways are closed, suitable diversions are included in the design.

4.3.2 Spring 2016 project update

Further public engagement was conducted in spring 2016 in the form of distributed leaflets / booklets informing local residents of the proposed scheme plans. In addition, individual technical specialists have attended meetings with local community groups throughout the Environmental Impact Assessment (EIA) process, in order to engage with the local public.

4.3.3 Public Liaison Officer

A Public Liaison Officer (PLO) was appointed from the outset of the project. The role of the PLO was to develop positive and open dialogue with landowners who would be potentially affected by the proposed scheme. This included regular meetings to discuss design proposals, in particular when any significant design changes were proposed.

4.3.1 Environmental Liaison Group

An Environmental Liaison Group (ELG) was established which included the following statutory environmental bodies: Natural Resources Wales (NRW); South Wales Trunk Road Agency (SWTRA); Cadw; Glamorgan Gwent Archaeological Trust (GGAT); Brecon Beacons National Park Authority (BBNPA); Merthyr Tydfil County Borough Council (MTCBC); Rhondda Cynon Taf County Borough Council (RCTCBC); and Caerphilly County Borough Council (CCBC). The purpose of the ELG was to facilitate collaboration between the design team and the statutory environmental bodies.

ELG meetings for the proposed scheme were held on 1 December 2015, 29 March 2016 and 28 February 2017 at Jacobs' office in Cardiff.

The first aim of these meetings was for all statutory environmental bodies to gain a better understanding of the proposed scheme so that they could raise and discuss any associated issues they considered needed to be addressed. This process allowed Jacobs to refine the outline design, as well as provide more specific details on proposed mitigation measures.

The discussions at this ELG have influenced the design of the proposed scheme in the following ways:

- soil nailing would not be used on the proposed scheme. Soil nailing at the A470 junction was considered due to the technical constraints in the area but was dismissed as it was considered unacceptable to consultees;
- provision for cyclists and pedestrians has been included in the design of the Dowlais Top junction and an NMU bridge is provided to the west of Dowlais;
- there is connectivity between the A465 and Swansea Road included in the design of the proposed scheme;
- the memorial tree would be moved to an alternative location which was agreed with the local authority;
- improvements to the National Cycle Network (NCN) are included in the proposed scheme;
- the lighting on the proposed scheme has been designed to take account of ecological and landscape impacts;
- the Croesbychan junction takes account of the proposals for the Cynon Valley Gateway highway scheme; and
- the routeing of the diversions of the Taff Trail were discussed with Sustrans prior to their inclusion in the design.

4.3.2 Technical Working Groups

A series of Technical Working Group meetings have taken place to address key issues including ground investigation, landscape, flood risk, drainage, nature conservation, NMUs and buildability. These meetings were attended by representatives of Cadw, NRW, RCTCBC, BBNPA, MTCBC, CCBC, Briars Bridleways, Sustrans, South and West Wales Wildlife Trust and Butterfly Conservation. Table 4.4 details the key issues that were raised at these meetings. These meetings were more collaborative and design decisions were discussed and agreed.

Table 4.4 : Technical Working Group meetings with associated discussion points summaries

Date	Meeting	Summary of discussion points
30 November 2015	NMU and junction design	Discussion about the design of the junction at Galon Uchaf which at this time was a split junction arrangement. This was identified as an area for further optioneering to improve access to Prince Charles Hospital. The PRow that were stopped up by construction of existing A465 were raised as an area for design development. Concerns were raised over pedestrian fatalities at Dowlais due to crossing A465 at grade. Concerns also raised as school children walking on hard shoulder at Taf Fechan. Attended by MTCBC.
1 December 2015	NMU	Discussion of the Cefn Coed subway. The proposed scheme design was unable to maintain the subway for pedestrian access. It was agreed by MTCBC this was best option as was associated with anti-social behaviour. Attended by MTCBC.
3 December 2015	NMU and junction design	Discussion over the proposed Cynon Valley Gateway scheme with an agreement to investigate the possibility of a junction with proposed scheme. Concerns were raised over the poor condition of Trewaun subway. Attended by RCTCBC.
4 December 2015	NMU	Discussion of gap in the cycle link between Dowlais Top and Caerphilly. Concerns were raised regarding youths climbing structures on A465 and pedestrians crossing at Dowlais reservoirs. The maintenance of fencing was also raised. Attended by CCBC.
13 December 2015	NMU	Discussion about completing the missing cycle link currently in NCN46 between Dowlais Top and Gypsy Castle. This proposal was welcomed as would be a safer than existing situation. Attended by CCBC.
13 January 2016	Land Quality and Ground Investigation	Discussion of the scope of Ground Investigation work programmed for Spring 2016. Attended by NRW.
19 January 2016	Landscape	The viewpoints to be considered in the EIA were discussed with suggestions from RCTCBC being taken forward. The implications of the Brecon Beacon Dark Sky Initiative were discussed and the methodology for assessing the impact of the proposed scheme on the night sky was agreed. It was agreed that LANDMAP landscape character assessments should be used and that the Upper Rhymney Valley Special Landscape Area should be taken into account. Attended by BBNP, NRW and RCTCBC.
27 January 2016	Flood and drainage	Discussion of the proposed drainage design and flood assessments required. Attended by NRW, MTCBC and RCTCBC.
3 February 2016	Nature conservation – Marsh fritillary	Proposed habitat suitability assessment survey for marsh fritillary <i>Euphydryas aurinia</i> within areas 2 km from SAC. Provision of area for marsh fritillary to mitigate likely significant effects. Established principle of larger single block of mitigation land rather than multiple small, scattered areas. Agreement that no construction works to be carried out within the Taf Fechan gorge – all construction to be from existing road level. Attended by NRW, MTCBC and RCTCBC.
22 February 2016	NMU - equestrians	The key issues raised were a crossing point over the Baverstock junction to access area to the north west of junction; equestrian use along NCN46 and possible provision along proposed Dowlais

Date	Meeting	Summary of discussion points
		foot bridge. Concerns were also raised over increased traffic along Crematorium road as a result of the proposed scheme. Attended by Briars Bridleways.
22 February 2016	NMU – cyclists	The improvement of connectivity for cyclists in section 6 was raised. Attended by Sustrans.
9 March 2016	Nature conservation – Marsh fritillary	Review of latest academic literature regarding marsh fritillary. Management options for mitigation area discussed. Attended by Butterfly Conservation.
29 March 2016	Nature conservation – Marsh fritillary and lesser horseshoe bat	Discussion of the likely effects - marsh fritillary and lesser horseshoe bat <i>Rhinolophus hipposideros</i> in relation to the Assessment of Implications for European Sites (AIES). Attended NRW and MTCBC.
19 April 2016	Taf Fechan Buildability	Design options for this structure, including the ability to construct, were limited due to significant ecological and cultural heritage constraints. These constraints, together with the potential impacts on visual amenity, due to the viaducts elevated location, meant that a multi-disciplinary workshop was the most appropriate approach to reaching a preferred option. Attended by Cadw, MTCBC and NRW.
23 November 2016	Nature conservation	Wildlife Trust clarified their access requirements for the Cwm Taf Fechan Woodlands SSSI. Agreement on lapwing <i>Vanellus vanellus</i> mitigation approach – provision of single area. Agreement on approach to marsh fritillary mitigation of 'no net loss' of area of suitable habitat with the increased provision of quality of habitat. Attended by NRW, MTCBC, RCTCBC and South and West Wales Wildlife Trust.
29 November 2016	Flooding	A discussion and progress update on the output of flood modelling, Water Framework Directive compliance and flood compensation. Attended by NRW, MTCBC and RCTCBC.

4.3.3 Design Commission for Wales

The Design Commission for Wales (DCfW) has also been involved during the design process. DCfW's vision is to make Wales a better place by promoting high standards of architecture, landscape and urban design into developments. DCfW is an expert public body which aims to communicate the benefits of proposals to help capture the public value of design excellence.

The project team sought the views of DCfW on the design development of the proposed scheme. Two design review workshops have taken place at the DCfW office. The design review workshops were a useful mechanism for collaboration where views could be raised and discussed.

4.3.3.1 DCfW design review 1, 18 February 2016

The first DCfW design review involved an overview of the design approach being taken, including presenting the scheme objectives and the approach to inclusive design that was being taken to reduce the potential barriers to the movement of people along the proposed scheme. In addition to the overview, DCfW were presented with a physical working model of the A470 junction to demonstrate the design options being considered. DCfW acknowledged that work on the proposed scheme had involved the design team understanding the landscape and context of the area.

Key issues raised by DCfW at this design review were:

- a narrative of observations would be useful;
- the transitions between townscape and landscape along the route need particular attention;
- there is a balance that needs to be struck between technical and highway design standards and the impacts on the surrounding landscape and communities;
- attenuation ponds should be integrated into the landscape;
- a uniform approach to structures would not be appropriate given the changing landscape;
- community connections are important; and
- DCfW supported the approach to design that was being undertaken.

These comments were taken into account in the development of the proposed scheme, key changes to the design concepts included a decision not to provide a uniform set of structures and to instead aim to fit them within their landscape context, this is due to the split between landscape and townscape along the length of the proposed scheme. Attenuation ponds have been designed to provide ecological and landscape value as well as perform their function in terms of managing road drainage.

4.3.3.2 DCfW design review 2, 19 May 2016

At this second workshop an update of the proposed scheme was provided by the project team and detailed working drawings of the design elements of each of the junctions were presented. In addition, a physical 3D model of the Baverstock junction was available. Key issues raised by DCfW at the design review were:

- the potential to remove existing boundary landscaping from the existing carriageway, once the proposed scheme has been constructed, should be considered and they would lose their context once the tarmac has been broken up;
- lighting can be used at some junctions to provide an attractive feature;
- the extent of any fencing around attenuation ponds should be kept to a minimum;
- design should be used to minimise the potential for antisocial behaviour where possible;
- long range views from the Taf Fechan and Taf Fawr bridges are particularly important;
- the design for the Taff Trail cycle bridge was broadly supported; and
- the Prince Charles Hospital junction was not considered ideal, although they appreciated that the area was constrained and options were limited.

The landscape masterplan has been influenced by these comments, particularly with regard to the treatment of existing boundary planting and fencing around the highway estate and attenuation ponds, which will be kept to a minimum and be of a style that reflect existing boundary features in the area.

The design of the subways, and the decision to stop up some subways, along with the siting of laybys has been heavily influenced by the desire to reduce antisocial behaviour. Where new crossings are provided for pedestrians and cyclists, such as at Penywern Ponds, they have taken the form of bridges rather than new underpasses.

The design of the Taf Fechan and Taf Fawr bridges have been the subject of numerous internal design review and buildability review workshops to ensure that the design is sensitive to the environment within which it will sit, while taking into account the construction constraints that exist as a result of the ecological and cultural heritage features in the area.

These comments were taken into account in the development of the design for the proposed scheme. Key changes to the design included a re-work of the Prince Charles Hospital junction, which was rationalised and moved further west than originally proposed. This modification improves the way that the junction sits within the landscape, provides improved access to Prince Charles Hospital, reduces the potential noise impacts on Pen-y-Dre High school and provides better connectivity to the local community.

4.3.4 Inclusive ways of working

An example to demonstrate the inclusive way of working is regarding the memorial tree located on the existing A465 between Hirwaun and Baverstocks. It commemorates the site of a fatal accident some years ago.

The Welsh Government retains confidential contact records for the families who have established these memorial sites on the trunk road network. The memorial tree is located in the existing soft estate of the A465 that would be lost due to the proposed dualling. The family in question were contacted by the PLO who subsequently met with them in person to discuss the proposed scheme, to understand their sensitivities and wishes in respect of the memorial tree. In conclusion, it was agreed that the tree would be re-located as part of the proposed scheme, to a location near the Baverstock Junction with safe access for parking. The exact location would be determined at the detailed design stage of the project, with further consultation with the family. These measures are captured in the Register of Environmental Actions and Commitments (REAC).

4.4 Construction and post construction maintenance

Should the proposed scheme complete the statutory process and proceed to the construction phase, the appointed Contractor would engage with relevant stakeholders to develop way of working to ensure the construction and maintenance phases would proceed whilst up - holding any existing and future commitments.

A contractor is not currently involved in the proposed scheme, however reasonable steps would be taken to help ensure the principles of sustainable development continue to be adopted during works.

This would involve:

- a) Construction operations to seek to minimise noise, vibration, dust and delays on the local community;
- b) Agreements with bus operators to minimise disruption and/or re-route services accordingly, so to help maintain access to local areas of shopping, education, health and other services;
- c) In developing traffic management operations, discussions with emergency services so that their activities are not affected;
- d) Access to any community/cultural facilities effected to be maintained, for example to local schools and places of worship; and
- e) Work carried out to complete a Carbon Management Plan based on industry best practice, a Site Waste Management Plan and a Materials Management Plan to reduce the waste and emissions footprint of the construction stage based on the evidence collected as construction proceeds.

Work would be carried out in accordance with a Communications and Engagement Plan, so that during the construction stages the local community would be informed and there will be opportunities for people to discuss problems and issues. Consideration would be given to holding events which would encourage community involvement in the proposed scheme and also involvement in the community by those working on the project.

A Public Liaison Officer would also be available so that issues can be raised and dealt with quickly and efficiently.

Liaison with key stakeholders carried out through earlier stages of the proposed scheme would continue during construction where necessary, for example in protecting the environment, especially if changes to the proposed scheme due to conditions during construction are found.

In the longer term, during the post-construction maintenance and aftercare period phases, work would continue to help ensure that the proposed scheme delivers the objectives of the proposed scheme and the commitments made. This would involve engaging with key stakeholders on how to take maintenance forward and manage the results of ongoing monitoring.

4.5 Operation

The proposed scheme would then be managed in line with the relevant legislation, policies and agreements used to ensure that the road is safe and meets the functions for which it was designed. In the longer term, the management of the proposed scheme would be influenced by information about the road at the time of handover, passed over from the construction and maintenance team; and the relevant Welsh Government well-being objectives and indicators in place at the time.

5. The Well-being Goals

The Well-being of Future Generations (Wales) Act 2015 (Welsh Government, 2015a) defines sustainable development as ‘the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle aimed at achieving the Well-being Goals’.

5.1 A Prosperous Wales

An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work.

The following Scheme Objectives are relevant to this Well-being Goal:

- reduce journey times for private and commercial road users;
- facilitate economic regeneration deliver a scheme that is sustainable;
- reduce journey time variability and improve resilience on the A465;
- use the A465 to manage traffic effectively and improve resilience on the strategic road network in South East Wales; and
- deliver a scheme that integrates with public transport and the local transport network.

The following Environmental Design Principles are relevant to this Well-being Goal:

- Principle 4 – Aim to achieve an earthworks balance.

5.1.1 An innovative, productive and low carbon society

The proposed scheme contributes to this goal by being a more efficient transport network both for the local area and the wider Heads of the Valleys and South West Wales regions, as part of the entire 40 km dualling project between Abergavenny and Hirwaun. The proposed scheme would provide greater benefits than its costs. The Economic Assessment Report establishes that the proposed scheme would provide value for money, with a positive adjusted overall benefit to cost ratio (BCR) of 1.2:1. This figure includes the estimated wider economic benefits. The BCR with the net economic benefits is 1.05:1. The Net Present Value, or expected economic return of the proposed scheme is £88.2M. This economic benefit could improve productivity in the area.

The proposed scheme also contributes to achieving this goal by taking into account resource efficiency and accounting for its climate change emissions. Topsoil that is removed would be stockpiled on site in such a manner as to ensure that it can be used as topsoil later in the project when the area is being landscaped. These stockpiles will be sited in such a manner as to provide screening for construction compounds and working areas where feasible.

Waste management controls will be in place during construction with general construction waste kept to a minimum and where necessary disposed of through licenced waste carriers.

A Carbon Impact Report has been prepared in respect of the proposed scheme which calculates the amount of carbon emissions equivalent (CO₂e) produced in constructing the proposed scheme⁷. This has calculated that 161,848 tonnes CO₂e would be generated during construction, with the majority of emissions coming from the embodied carbon of materials used (118,260 tonnes CO₂e). The design of the road has taken into account the

⁷ Based on the Highways England Carbon Tool v1.02

carbon footprint of new infrastructure and measures have been taken in order to minimise the extent of the carbon emissions.

The anticipated carbon emissions during construction are small in comparison with the total carbon emissions that would be anticipated from the operation of the road as a result of tailpipe emissions. However, it should be borne in mind that advances in engine technology and the move towards electric vehicles should result in a reduction in emissions per vehicle over the lifetime of the road.

Every construction project will involve some expenditure of carbon but the well-being of the people of Wales, particularly those living in the north of the South Wales Valleys region and others travelling between the English Midlands and South West Wales require that the development should take place.

The proposed scheme will generate construction jobs, the majority of which are likely to be filled from within the South Wales Valleys region.

5.1.2 Recognising the limits of the global environment using resources efficiently and proportionally

A key element of the design of the proposed scheme is to work towards achieving a materials balance between cut and fill, with the largest movements of materials from the cut at Baverstock to the embankments at the A470 junction. This approach ensures that the lorry movements beyond the scheme footprint are minimised avoiding where possible the need to import or export material that would otherwise be suitable for reuse.

The Contractor, will be encouraged to use locally sourced materials. During construction, it is anticipated that the reuse of site-won materials would be undertaken in accordance with the Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011). A Materials Management Plan (MMP) would be prepared that would set out the controls and approach for the reuse of the materials and document where and in what volumes materials are to be reused. The reuse of site won materials would initially be dependent upon their compliance with relevant engineering specification and assessment criteria. Should material not meet the criteria, these materials would either be treated and / or processed in order to make them suitable for reuse.

5.1.3 Developing a skilled and well-educated population and creating employment opportunities and wealth

In identifying the objectives for the proposed scheme the Welsh Government has considered the needs of existing residents and road travellers while also looking long term at future trends in traffic flows to ensure that the proposed scheme is resilient to the anticipated traffic flows.

The proposed scheme would improve accessibility to employment opportunities, improve accessibility to existing educational, health and other services, and provide increased opportunities for walking and cycling. These provisions would contribute to a reduction in deprivation and poverty, improved health outcomes and improved sustainability of local communities. It would also encourage the relocation of businesses into the area and support the local industrial estates and business parks by both actual and perceived improvements to the accessibility and connectivity of the area. These improvements will be good for businesses as well as for local people who would benefit from additional skilled employment opportunities.

Stakeholders highlighted the downward economic spiral the area faces. Poor quality industrial estates, lack of appropriate skills along the corridor, the condition of the road network, and poor public transport accessibility all conspire to make the area less attractive to employers which in turn leads to outward migration of skilled workers and a lack of investment in commercial property. Breaking this cycle and negative perception of the area requires a step change in the provision of facilitating investment and infrastructure. There is a need both to upskill the workforce and increase the size of the labour catchment area.

Once operational the proposed scheme will improve traffic flows and safety between west Wales and the Midlands, which will contribute to increased mobility for local residents when seeking employment opportunities.

The A465 improvements as a whole should attract investment into the Valleys and Ebbw Vale Enterprise Zone, provide resilience in the network and a link to the Enterprise Zones in Milford Haven and Cardiff, and support regeneration in northern valley communities.

Blaenau Gwent council reported that improvements to the section of the A465 running through its area had led a recent increase in interest from businesses seeking to locate in the Ebbw Vale area. While it is not possible to attribute this solely to the A465 upgrade, a number of recent inward investment enquirers have cited that the Heads of the Valleys is a good location to do business due to the excellent location and communication links.

The Public Liaison Officer for the proposed scheme has had a permanent presence in the local area, with an office at the Forsythia Youth Project within the Gurnos Estate. The Forsythia Youth Project offices were refurbished using young people through the 3T Trust, upskilling 20 students and 20 young people to help develop confidence in local people who are not in education, employment or training. These refurbished rooms are now available as meeting and recreation rooms for use by the children and the project team for larger scheme meetings. It also serves as a venue for Merthyr Tydfil community days and drop in events.

Over the past two years as the proposed scheme has been being developed, the Welsh Government has been active in encouraging young people into engineering, a career that can lead to well paid, skilled, employment opportunities. This has been achieved through a series of initiatives including the following key events:

- talks of the community benefit of the A465 Scheme at the University of South Wales;
- construction taster days at Forsythia Youth;
- Transforming Spaces: Design Factor;
- Chwarae Ted Industry Network;
- attending careers fayres and promoting careers in engineering and environmental consultancy; and
- attending mock interviews for students.

The Welsh Government is committed to ensuring as many construction jobs as possible would be filled by local workers, depending on the availability of suitably skilled local people. The Welsh Government is committed to achieving 20% of the total labour costs from employment of new entrant trainees who have an apprenticeship, trainee or employment contract with the contractor or a subcontractor, and are engaged in a training programme. As a result of the proposed scheme six young people and professionals within the proposed scheme catchment area have been recruited into full time positions at Jacobs UK Limited in Cardiff, including two apprenticeships.

To date, as a result of the Abergavenny to Hirwaun Project overall, the construction of the road has had a significant impact on local employment with 85% of workers coming from Wales, 42% from Heads of the Valley, and 21% from Blaenau Gwent. In addition, it has supported 24 apprentices, 155 weeks of work experience and 4,100 student engagements.

The construction phase of the proposed scheme would provide employment opportunities in the construction sector and local commercial opportunities. The economic assessment of the proposed scheme will calculate the number of full time equivalent construction workers who will be working on the proposed scheme during construction.

5.2 A Resilient Wales

A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).

In following the design objectives for the proposed scheme the Welsh Government has sought to minimise the impacts on the ecosystem of the proposed scheme area and maintain and enhance the natural environment where possible. Where potential impacts on the natural environment have been identified, these have been mitigated through scheme design or future commitments to land management. In addition, where opportunities to enhance ecosystems within the proposed scheme design are appropriate these have also been included.

The scheme objectives relevant to this Well-being Goal are:

- bypass congested towns and villages;
- enhance road safety and reduce casualties;
- deliver a scheme that is sustainable;
- promote cycling and walking and provide opportunities for healthy lifestyles;
- reduce journey time variability and improve resilience on the A465;
- use the A465 to manage traffic effectively and improve resilience on the strategic road network in South East Wales; and
- ensure all of these objectives are met with due consideration given to the impact on the environment.

The following environmental design principles of the proposed scheme are relevant to this Well-being Goal:

- Principle 1 - Minimise impact on existing marshy grassland habitats by minimising risk of drying out whilst considering the whole life cost of the proposed scheme;
- Principle 2 - Minimise impact on ancient woodland in close proximity to the proposed scheme;
- Principle 3 - Where technically feasible and not entailing excessive cost, consider opportunities to enhance existing ecological connectivity;
- Principle 5 - Minimise habitat loss from Sites of Interest to Nature Conservation (SINCs) in close proximity to the proposed scheme;
- Principle 7 - Minimise lighting on scheme as a whole, particularly viaducts over Taf Fawr and Taf Fechan;
- Principle 9 - Maintain existing underpasses to maintain connectivity for wildlife and minimise habitat severance;
- Principle 11 - Where appropriate, minimise tree and shrub planting to create open, outward views from the scheme and integrate with existing upland landscape character; and
- Principle 12 - Minimise flooding and water quality impacts.

The identification of an on-line improvement scheme rather than a new off-line route has minimised the footprint of the proposed scheme. By widening an existing carriageway there is only an incremental increase in width of the road rather than a requirement for a new swathe of infrastructure. This has reduced the potential effects on the wider landscape and ecologically designated sites such as SACs, SSSIs, SINCs and ancient woodland along with the BBNP.

When installing new drainage the potential beneficial effects of improving the design to provide mammal and amphibian passages under the road were considered and this provision is included in the design of the proposed scheme. The proposed scheme will provide the following ecological mitigation and enhancement through the design of the culverts:

- nine culverts that provide bat flight lines;
- eleven culverts with mammal ledges;
- one culvert with provision for great crested newt *Triturus cristatus*; and
- dipper boxes at the entry to four culverts.

Attenuation ponds have been designed with sensitive ecological and landscape planting to provide new areas of habitat. The verges of the road will be maintained in a manner that will provide habitat for wild flowers and insects and wider landscaping through tree planting will create new areas of habitat.

The assessment of potential effects on nature conservation has identified some impacts that require mitigation through the acquisition of land and future management of that land in the long term. Areas have been identified to enable the mitigation, maintenance or enhancement of ancient woodland, habitat for marsh fritillary butterfly *Euphydryas aurinia* and lapwing *Vanellus vanellus* breeding habitat.

The assessment of potential effects on nature conservation is reported in Chapter 11 of the ES. This assessment has identified the need measures to maintain biodiversity that would be adversely affected by the proposed scheme. This would require the acquisition of 28.4 ha of land. Further information on the location of this land is provided in Volume 4 of the ES (the Environmental Masterplan (EMP)).

The three key areas of land that would be acquired for ecological mitigation are detailed below:

- the construction of the proposed Croesbychan junction would result in the loss of an area of ancient woodland. Additional land would be acquired around this proposed junction to receive translocated ground flora, coppice and shrubs along with top soil salvage as mitigation for the loss of this important habitat (shown on Sheet 8 of 30 of the EMP); approximately 5 ha of habitat would be created using these techniques. (In addition approximately 2 ha of retained ancient woodland immediately adjacent which would be managed (coppicing, supplementary planting) to enhance biodiversity);
- to the southwest of the proposed Baverstock junction approximately 14.4 ha would be acquired and would be managed for marsh fritillary butterfly as mitigation for any impacts on this mobile species as a result of the proposed scheme (shown on Sheet 11 and 12 of 30 of the EMP); and
- at the eastern end of the proposed scheme, in the centre of the existing Dowlais Top junction, is land used by breeding lapwing. Approximately 7 ha of land to mitigate the impacts on this area have been identified east of the proposed Dowlais junction (see Sheet 30 of 30 of the EMP).

In identifying the locations for ecological mitigation the Welsh Government has considered the extent to which existing degraded habitat could be enhanced to achieve the necessary ecological status, the connectivity of the mitigation sites to other suitable habitat for species, maximising the benefits that the ongoing management of the land would have to metapopulations. However, this work on ecological mitigation has also considered the potential effects that such land acquisition would have on existing landowners and the viability of landholdings, which in the area are predominately sheep farming.

Future management of these sites, along with management of the larger soft estate of the proposed scheme, will provide benefits to biodiversity in the long term and contribute to the Welsh Government's Plan for Pollinators as well as the Trunk Road Estates Biodiversity Action Plan.

The design of bridges, culverts and attenuation ponds have taken into account the hydrological, geomorphological, ecological and landscape benefits that can be achieved through good design. Looking to the longer term the design of these features has taken into account the risks associated with climate change, with road drainage taking into account the potential for increased flood events.

5.2.1 Climate Change

In Britain, it is anticipated that climate change will bring a possible 2°C to 4°C increase in mean summer temperatures in the longer term with milder winters, changes in rainfall distribution and seasonality, more extremes of weather and sea level rise. The Climate Change Risk Assessment for Wales (DEFRA, 2012b), MONARCH project (Berry, *et al.*, 2007) and Biodiversity Climate Change Impacts Report Card (NERC, 2016) have identified potential future changes in the natural environment caused by climate change and consequential responses by sensitive habitats and species. However, whilst climate models project changes in temperature with reasonable confidence, the complexities of ecological responses mean that there is a large range of possible future outcomes. Potential changes to the ecological resources relevant to this assessment that were identified in these reports are summarised below.

5.2.1.1 Habitats

5.2.1.1.1 Grasslands and heath

- 1) Increased temperatures would promote earlier spring greening of grasslands and a longer growing season.
- 2) Long-established, low-nutrient grassland communities would show relatively little change through warm, dry summers.
- 3) Lowland heath would be vulnerable to reduced rainfall which could lead to changes in species composition. Increased fire risk could also have an impact on heathland ecosystems.
- 4) Many grasslands would likely remain similar in character, even with a rise in temperature of a few degrees.
- 5) Some grasslands would be likely to be very sensitive to changes in rainfall, particularly those that are associated with waterlogged conditions for part or all of the year. An increase in summer droughts could lead to a decline in distinctive wet grassland communities, including rush pastures. This could be offset by changes in winter precipitation and in catchment characteristics.

5.2.1.1.2 Woodlands

- 6) Beech, birch and sycamore are more sensitive to drought than other species. This could lead to major changes in the composition and structure of woodland. There would be reduced growth rates in a range of tree species during dry summers.
- 7) Pests and diseases (both those that are currently present in the UK and those that may be introduced from elsewhere) represent a major threat to woodland. These threats could be increased by interactions with the direct effects of climate change on tree function.
- 8) Different phenological responses (e.g. between canopy and ground flora and between different elements of food webs) could alter woodland composition; so could result in increases in herbivore numbers as a result of warmer winters.

5.2.1.2 Species

5.2.1.2.1 Marsh fritillary

- 9) Trends in many insect populations are influenced by variations in temperature and precipitation, but differ between species. The negative effects of warm wet winters would be greatest in species that overwinter as caterpillars or pupae, such as the marsh fritillary.
- 10) Changes in rainfall patterns (with more extremes) would likely affect flight period and food availability for many insects; this may directly cause death, as well as having an impact on habitat quality, particularly in wetlands.
- 11) However, research and modelling has specifically identified marsh fritillary as a species that would experience substantial net gain due to climate change due to there being an increase to their potential range due to a northward shift of suitable habitat.

5.2.1.2.2 Bats

- 12) Direct links have been found between summer rainfall and survival of bat species, with higher rainfall associated with greater insect abundance and increased bat survival, and drier springs and summers having a negative effect.
- 13) Bats are already reducing their period of hibernation. Warmer winters mean that metabolic rates cannot remain suppressed effectively; this can lead to poorer body condition, reduced breeding success and reduced survival rates.
- 14) Climate change may affect bat populations through changes in their yearly hibernation cycle, breeding success and food availability.
- 15) However, research and modelling has specifically identified lesser horseshoe as a species that would experience substantial net gain due to there being an increase their potential range due to a northward shift of suitable habitat.

5.2.1.2.3 Lapwing

- 16) Changes in summer rainfall and the consequences for soil moisture could affect many UK bird species by changing the abundance and availability of prey. Intense rainfall would likely reduce the breeding success of many bird species, especially those that nest on the ground, such as lapwing.
- 17) Lapwing also rely on invertebrates associated with wet conditions and could be negatively impacted by increasing summer temperatures and drought.

5.2.1.2.4 GCN

- 18) Changes in the timing of life-cycle events have been identified in British amphibian species and have related to increased mean temperatures. Congregation, spawning and hatching are happening earlier.

5.2.1.2.5 Otter

- 19) Juveniles are often more vulnerable than adults to extreme events (such as spring drought, flooding and cold winters); extreme weather events could, therefore, have a subsequent impact on otter populations.
- 20) Increased drought and reduced water flow in rivers could also adversely affect all otters.

5.2.1.3 Climate Change Influence

One important way of limiting potential adverse impacts from changing farming practices and climate change is to ensure existing ecological networks are maintained and enhanced when designing new development. The proposed scheme incorporates this 'maintain and enhance' rationale with the proposed creation of a species rich mosaic of habitats in the new soft estate which are of benefit to wildlife. Increased permeability for wildlife would also be delivered by the provision of new or replacement culverts. These provisions would lead to improved wildlife permeability through the scheme and improved habitat and species connectivity to the wider landscape.

There are 41 culverts associated with the proposed scheme. The structures and culverts have been designed with a 30% uplift for climate change.

5.3 A Healthier Wales

A society in which people's physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood.

The scheme objectives relevant to this Goal are:

- enhance road safety and reduce casualties; and
- promote cycling and walking and provide opportunities for healthy lifestyles.

There is well established research that demonstrates that physical exercise can benefit both physical and mental health, the proposed scheme provides 13 km of new footways / cycleways as well as improved connectivity through junctions. This improved provision for pedestrians and cyclists will encourage recreational use as well as active travel journeys.

The proposed scheme will contribute to the wider goal of a healthier Wales through inclusion of enhanced provision for NMUs. This provision will support attempts by the Welsh Government, and other bodies such as the NHS and Active for Life, in encouraging active travel and providing increased opportunities for walking and cycling.

Of particular note in the proposed scheme design is the provision of a bridge for cyclists and pedestrians across the Taf Fechan, which would provide enhanced east west connectivity for Merthyr residents undertaking active travel to Prince Charles Hospital and Pen-Y-Dre school. The design of the Trewaun junction also gave significant consideration to the provision of a safe route to school for pupils of Ysgol Rhyd y Waun living in Hirwaun. An underpass option for NMUs was rejected in favour of the proposed 'avenue' and overbridge which has a higher amenity value and lower risk of attracting anti-social behaviour. There would also be localised benefits as a result of improved routes through junctions for local residents travelling to GP practices on foot or bicycle.

In terms of recreational routes, there would be improvements to the National Cycle Network (NCN), particularly NCN Route 46 which is currently routed along the Llwydcoed crematorium road. This road is narrow and has steep sections, which makes it one of the more unattractive sections of this route, particularly when traffic is arriving / leaving funerals. By providing an alternative off-road cycle route between Croesbychan and Baverstock, the NCN route can be diverted and this conflict between traffic avoided.

Air Quality improvement is predicted within the Twynyrodyn Road Air Quality Management Area (AQMA). This is associated with a redistribution of traffic during the operational phase of the proposed scheme and a reduction of approximately 4.5% average daily traffic (AADT) flows along Twynyrodyn Road. There is not considered to be a significant effect on local air quality as a result of the proposed scheme. One SSSI is predicted to be at risk of acid and nitrogen deposition, however this particular site (Tir Mawr a Dderi Hir,), already exceeds habitat specific critical load ranges for nitrogen deposition. As such, the area of SSSI affected has potentially undergone some habitat degradation already meaning additional impact may not be proportionally as significant.

During the construction phase of the proposed scheme mitigation will be in place to alleviate impacts from noise, vibration and dust, on PRow.

Noise and vibration have been shown to have a negative impact on human health (as described in the Welsh Government Noise Action Plan 2013, section 1 "Why noise matters" (Welsh Government, 2013)). By applying sustainable principles during both construction and operational phases of the proposed scheme, reasonable steps have been taken to reduce the impact, where possible. Properties close to the existing A465 in Hirwaun will experience a decrease in noise levels as the proposed scheme moves the traffic further away. However, there will be an overall increase in the number of properties that experience an increase in noise with the proposed scheme in place.

5.4 A More Equal Wales

A society that enables people to fulfil their potential no matter what their background or circumstances (including their socio economic background and circumstances).

The following scheme objectives are relevant to contributing towards meeting this Well-being Goal:

- reduce journey times for private and commercial road users;
- facilitate economic regeneration;
- bypass congested towns and villages;
- promote cycling and walking and provide opportunities for healthy lifestyles;
- reduce journey time variability and improve resilience on the A465;
- use the A465 to manage traffic effectively and improve resilience on the strategic road network in South East Wales; and
- ensure all of these objectives are met with due consideration given to the impact on the environment.

As mentioned above, in identifying the objectives for the proposed scheme the Welsh Government has considered the needs of existing residents, taking into account the current levels of deprivation in the Heads of the Valley's region that can result in the local population being unable to reach their potential through the lack of high skilled employment opportunities.

The proposed scheme would improve accessibility to employment opportunities, improve accessibility to existing educational, health and other services, and provide increased opportunities for walking and cycling. These provisions would contribute to a reduction in deprivation and poverty.

A key contributing factor of the economic deprivation in this area of the South Wales Valleys is the poor transportation links between the former industrial communities and employment opportunities. By improving the road network there will be enhanced opportunities for residents to access job opportunities and improvements to the wider highway network will also enhance the accessibility to markets for all local businesses. New inward investment to the region may also be encouraged by the improvement of the highway network.

5.5 A Wales of Cohesive Communities

Attractive, viable, safe and well-connected communities

Several of the scheme objectives are relevant to contributing towards meeting this Well-being Goal:

- reduce journey times for private and commercial road users;
- facilitate economic regeneration;
- bypass congested towns and villages;
- enhance road safety and reduce casualties;
- promote cycling and walking and provide opportunities for healthy lifestyles;
- reduce journey time variability and improve resilience on the A465; and
- use the A465 to manage traffic effectively and improve resilience on the strategic road network in South East Wales.

The design of the proposed scheme has been developed in consultation with DCfW and others, and aims to provide high quality design and where possible minimise impacts on the wider landscape. In particular, the potential of the A470 junction to become a 'gateway to the Brecon Beacons' feature for vehicle travellers from the south is being promoted.

There are residential and commercial properties and agricultural land holdings within the proposed scheme area, including the larger urban area of Merthyr Tydfil.

There would be no loss to community facilities currently in use. The proposed scheme would affect a total of 13 residential properties on land that will be compulsorily purchased. Of the 13 properties, four would be completely demolished whereas for the remainder there would be either loss of small slivers of garden areas or loss of outbuildings only. The four residential properties that would be demolished are already within Welsh Government ownership. In addition, the existing Trade Centre Wales site at Pant would be acquired by the Welsh Government to construct the scheme; some farm buildings and stables would also be lost. The owners and occupiers of properties that would be demolished would be financially compensated for their loss.

As mentioned above, one of the key objectives of the proposed scheme is to enhance links between the communities located in the northern extents of the South Wales Valleys, and also to improve connectivity of these communities with South West Wales and the English Midlands.

As well as improvements to the links between communities for vehicle drivers, there would also be significant improvements to the links within communities for people on foot and bicycle. This is primarily through the installation of a segregated cycle path between Hirwaun and Gellideg. The proposed scheme would also provide improved connectivity from Cefn-coed-y-cymmer and Trefechan to Pen-y-Dre High School and the Prince Charles Hospital, The existing road at this location does not include provision for pedestrians and cyclists, putting them at increased risk of accidents.

There are several footpaths that currently cross the existing road at grade and these would be rationalised and re-routed over the proposed scheme on footbridges suitable for pedestrians and cyclists. This would also improve links to schools, hospitals, shops and employment sites, including improved access to the Dowlais Industrial Estate.

During the public consultation on early designs for the proposed scheme concerns were raised regarding the loss of a junction at Gurnos, Merthyr Tydfil. As a result of this consultation feedback a new grade separated junction, Prince Charles Hospital Junction, will now be provided for this community which will maintain access to the A465 and provide enhanced access to Prince Charles Hospital from the A465.

An aim of the proposed scheme was primarily to improve the road for through traffic, and part of this includes the provision of laybys for vehicle drivers to use as a rest stop or in case of emergency. The risk that such areas can be used for criminal activities, antisocial behaviour or fly tipping was considered when deciding how many laybys to provide and where they would be most suitably sited.

Good quality transport links bring social cohesion and integration and contribute to a higher quality of life and equality. Furthermore, social cohesion is enhanced by transport networks, which permit peripheral regions to integrate, as well as economic development and welfare to spread.

The improved accessibility overall will provide positive effects on the wider community, businesses and groups. There is strong interest from private sector house builders in developing new homes within the Valleys, with the local authorities working together to increase social housing stock.

A significant risk of fluvial flooding from the Nant y Bwlch is shown immediately upstream of the existing road crossing due to an undersized culvert. It is not believed that the road itself is vulnerable to inundation, but that during a 1% with climate change AEP event, an area of 3.59 ha has a predicted flood depth exceeding 0.1 m which would affect 195 buildings including Hirwaun Primary School. With the proposed scheme in place the upsized culvert will reduce the flooding risk to this area of Hirwaun. This beneficial impact will improve the safety and viability of the community of Hirwaun. See Plate 5.1 and 5.2 below which demonstrate the benefit of the proposed resized culvert.

Plate 5.1 Nant y Bwlch baseline flood extents

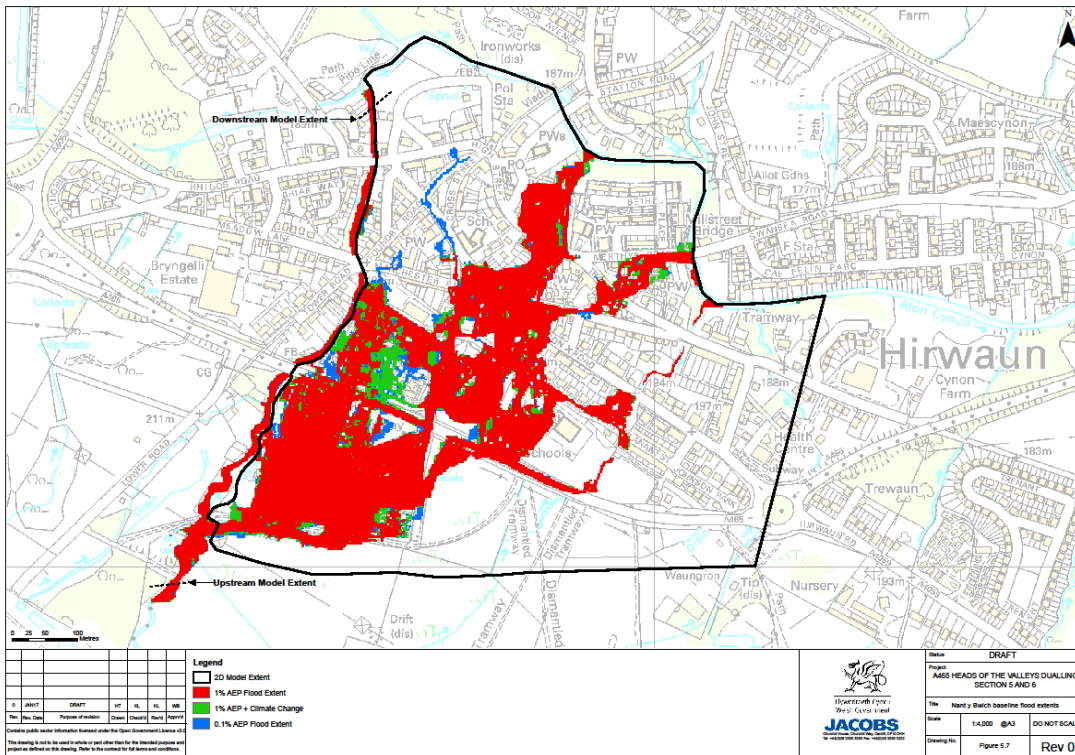
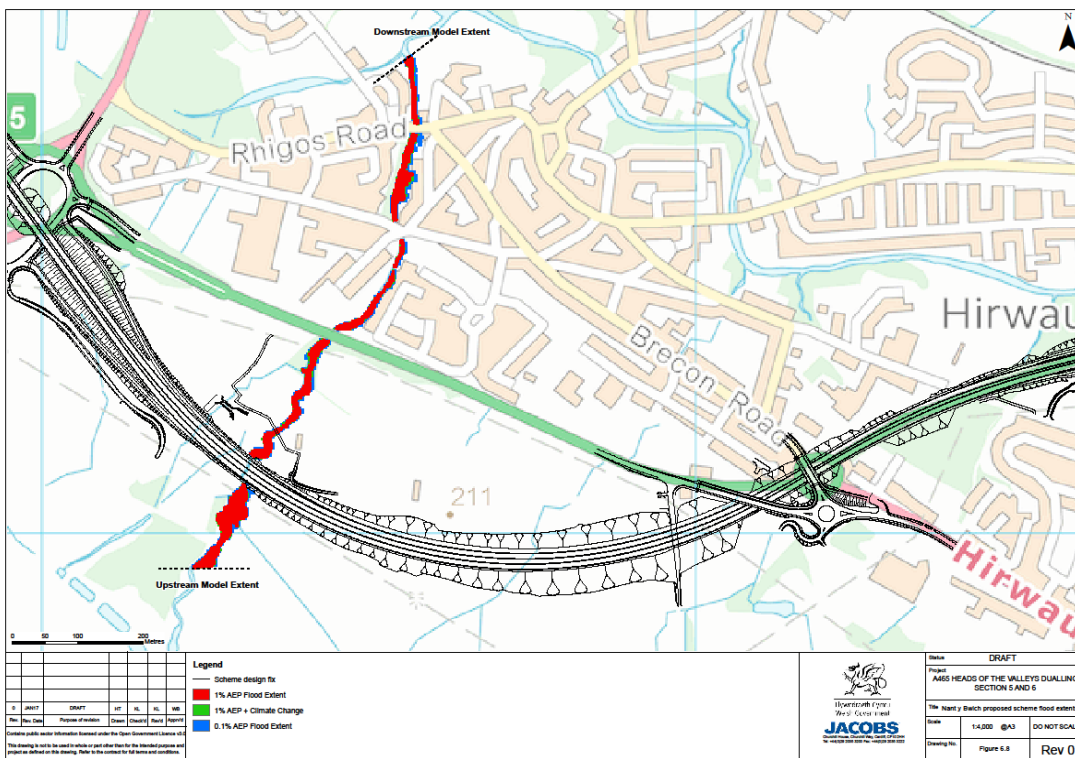


Plate 5.2 Nant y Bwlch proposed scheme flood extents



5.6 A Wales of Vibrant Culture and Thriving Welsh Language

A society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation.

The following scheme objectives have been identified as supporting this Well-being Goal:

- reduce journey times for private and commercial road users;
- enhance road safety and reduce casualties;
- promote cycling and walking and provide opportunities for healthy lifestyles; and
- reduce journey time variability and improve resilience on the A465.

5.6.1 Culture and Arts

Section 3.4 provides details on the existing provision for the arts within the Heads of the Valleys region as well as further afield. There would be improved accessibility and reduced journey times to local arts venues such as theatres, cinemas and art centres as a result of the proposed scheme.

In addition, there would be benefits to the local community with regard to their ability to access arts facilities further afield to the west, such Gwyn Hall and the Neath Little Theatre in Neath, the Princess Royal Theatre in Port Talbot and the Grand Theatre and Dylan Thomas theatre in Swansea. There would also be improved connectivity to facilities to the east such as the Borough theatre in Abergavenny. Cyfarthfa Castle is home to a museum and art gallery and is located in Merthyr Tydfil, as is the Joseph Parry's Cottage Museum.

Residents travelling to take part in choirs, amateur drama groups, folk dancing, music classes, brass bands, adult art classes, pottery classes and other music, art and cultural groups would experience improved accessibility and reduced journey times. In the wider Heads of the Valleys area, Abergavenny is home to the Borough Theatre, and the town is a notable destination for various cultural events and festivals held throughout the year. The journey time to Abergavenny would be improved due to the proposed scheme.

5.6.2 Heritage

Chapter 9 of the ES (Jacobs, 2017a) sets out the potential effects on cultural heritage, this has identified a number of significant adverse effects on cultural heritage assets, including Cefn Coed Cemetery and the Jewish Burial Ground Registered Park and Garden, to the north of the A465 close to the A470 interchange. Further effects will occur on some buried remains, and records would be maintained for any remains excavated during construction of the proposed scheme.

Joseph Parry's Cottage Museum is located in Merthyr Tydfil and is an example of a typical ironworker's cottage. Built in the 1820s for the workers of the Cyfarthfa Ironworks, the cottage was the birthplace in 1841 of Joseph Parry, Wales best known composer. The interior of the cottage is set in the 1840s, and shows the living conditions of the ironworkers at the time when Parry was a young boy. This museum provides a link for the current population with the risk heritage of the area from the past.

The Ynysfach Engine House was built in 1836 for the adjacent ironworks, the Engine House was restored in 1989, having closed originally in 1874, this heritage centre provides an introduction to the Merthyr Tydfil heritage story, promoting the rich heritage of the region to the current population.

The proposed scheme will enhance transport links within the Heads of the Valleys region generally, as well as within the local communities. The improved accessibility will benefit these heritage facilities.

5.6.3 Welsh language

Providing improved accessibility, improved connectivity and decreased journey times will benefit all Welsh language educational and cultural activities that residents in the Hirwaun, Merthyr and Dowlais areas travel to take part in. As well as travel to school and 'Meithrin' (Welsh Language pre-school groups), residents may take part in choirs, folk dancing groups, recitation groups, 'Meithrin' movement, 'Urdd' (Welsh League of Youth) activities, local eisteddfods, Merched y Wawr, local chapel activities within the local area or within the wider region for example Urdd Eisteddfod in Bridgend in 2017; National Eisteddfod in Cardiff in 2018.

In recent years the most prominent annual Welsh Language cultural festival, the National Eisteddfod, has been held at Blaenau Gwent (2010) and Abergavenny (2016). When local authority areas are bidding to host this prestigious national event, which attracts over 100,000 visitors over the first week in August each year, accessibility, transport links, public safety and proximity to strategic transport routes are a key consideration when considering proposed sites for the main event, and its associated camp sites, car parks and 'Maes B' pop music festival. Improving the A465 could result in increased visits by the National Eisteddfod to the region in future years, due to the improved travel times to the area that will result.

Providing road signage in both Welsh and English benefits both Welsh speakers and learners of the language, while raising the profile of the language, and its cultural value, with visitors from the English Midlands who are through the Heads of the Valleys region in order to access tourism opportunities in South West Wales.

In summary, the proposed scheme will increase the accessibility to and reduce the journey times to Welsh medium schools and other destinations / key events where the Welsh language is promoted and spoken.

5.6.4 Sports, Recreation and Tourism

As mentioned in Section 3, there are numerous recreational facilities close to the proposed scheme. These include the BBNP, NRW forestry, Cyfarthfa Park and Gardens, leisure centres, common land, public open space, playgrounds, rugby clubs, football clubs, golf courses, Penywern Ponds, indoor bowling at Rhyd y Car Merthyr, and a network of PRow. The proposed scheme will improve accessibility and enhance connectivity within the communities for people travelling by car, foot or cycle to these facilities. In improving these transport links the proposed scheme will encourage the use of these sports and recreational facilities by the local population as well as people from further afield.

The proposed scheme will enhance reliability and resilience in terms of journeys from the local communities, the wide Heads of the Valleys region, England, and elsewhere, to West Wales and is thus likely to support tourism and employment opportunities in West Wales. Many Heads of the Valleys residents travel regularly to West Wales for short breaks or longer holidays, as described in the baseline section.

The proposed scheme provides approximately 13 km of new off-road cycle / footpath provision, much of which is also suitable for horse-riders. The creation of a new cycle route along much of the length of the proposed scheme would encourage the local population to cycle both as a means of active travel but also as a recreational activity. The provision that is included in the proposed scheme improves the existing National Cycle Network provision within the area, as well as providing a 'missing link' to NCN Route 46 at Gypsy Castle.

Participation in the sports and recreation facilities in the local area and throughout south east Wales is facilitated by the provision of the new road and NMU facilities by making local and regional facilities more accessible. Most local sports teams are part of wider regional leagues, which result in the need to travel between communities in order to play matches. These leagues cover various age groups, encouraging sport for children and adults. The proposed scheme will improve transport provision within the Heads of the Valleys region.

The A470 is the primary route for visitors from Cardiff and the valley towns of Caerphilly and Pontypridd to access the BBNP. The National Park is a key recreational draw with significant numbers of people accessing it for recreational purposes throughout the year. The improvements to the A470 junction will benefit this journey by removing the A465 traffic from the roundabout, reducing the risk of accidents and removing congestion.

5.7 A Globally Responsible Wales

A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.

The United Nations Sustainable Goals Report 2016 states that on “1 January 2016, the world officially began implementation of the 2030 Agenda for Sustainable Development — the transformative plan of action based on 17 Sustainable Development Goals—to address urgent global challenges over the next 15 years”. This was agreed at the UN Summit in September 2015. There are 17 goals and 169 targets for action for people, planet, prosperity, peace and partnership.

Public bodies and the Welsh Government have a direct and indirect role in supporting and contributing to these international obligations. The Act recognises that Wales is part of an inter-connected world and that action taken within Wales can have both positive and negative impacts on a wider national and international scale.

The Welsh Government’s Shared Purpose Shared Future Core Guidance on the Act explains that:

To provide clarity on the key matters that public bodies should take account of it is suggested that bodies may wish to focus their attention on two areas;

1) Decarbonisation - This means reducing energy demand, increasing energy efficiency and the use of clean energy. Opportunities include sources deriving from the assets and infrastructure of public bodies.

2) Sustainable consumption and production - Through the procurement of products and services. This means looking at the way in which you procure goods and services to reduce global impact, whilst also increasing the local benefits. This includes areas such as waste, food, and the sustainable management of natural resources.

The proposed scheme will contribute to the economic, social, environmental and cultural well-being of Wales as it improves the connectivity and brings wider economic benefits to this area of Wales. Account needs to be taken as to whether the proposed scheme makes a positive contribution to global well - being.

Every construction project involves some capital expenditure of carbon but the well-being of the people of Wales requires that development takes place, in accordance with sustainable principles, to provide the infrastructure, services and facilities needed for society, business and industry.

The requirement to reduce carbon emissions is set out In the Climate Change Act 2008 and also in the Environment (Wales) Act 2016. The Welsh government has taken to reasonable steps to ensure that the proposed scheme minimises its carbon impacts. These steps include the construction phase of the proposed scheme in terms of material management and the operational phase of the proposed scheme. The traffic forecast indicate that without the proposed scheme in place there will be an increased journey of seven minutes and increased congestion at all junctions. The proposed scheme will alleviate this predicted congestion and so reduce the carbon impact.

The A465 also provides a key strategic link between South West Wales and the English Midlands and is a “comprehensive section” of the Trans - European Transport Network (TEN-T). This route provides links to the Republic of Ireland via the south - west Wales ports. In addition, it boosts the resilience of the trunk road network in south Wales by providing a key alternative route to the M4 corridor.

6. The Well-being Objectives

As outlined in Section 2 of this report, the Welsh Government has identified and published 14 Well-being Objectives. These form a specific programme for government and are necessarily more focussed than the Well-being Goals that have been considered in Section 5.

Below is a consideration of how the proposed scheme contributes to these Well-being Objectives, taking into account the Well-being Goals set out in the Act.

6.1 Create Conditions to Give Every Child the Best Start in Life

6.1.1 Rationale

The rationale for this Objective is:

'It is internationally recognised and reinforced by strong evidence that early childhood experiences are crucially important for children's long term development and their achievements throughout life. Ensuring children reach key developmental milestones is fundamental not only to attainment and occupational outcomes, but wider adult health and wellbeing. There is a wealth of evidence that children's life chances are heavily defined by their development in the first five years of life. It is family background, parental education, good parenting and the opportunities for learning and development in those crucial years that together matter more to children than money, in determining whether their potential is realised.'

6.1.2 Consideration

The proposed scheme would indirectly contribute to this Well-being Objective since the highway improvements would improve the reliability of journey times to educational facilities, including the reliability of bus services.

The proposed scheme would also provide significant benefits in terms of access to recreational facilities, the improvements to cycle and pedestrian provision and improvements to links through junctions will support the promotion of active recreation in the existing public open space. This would support and encourage parents and carers to take their children outside to recreational space, which aids interactions and language skills through play, and promotes mental and physical well-being in children associated with outdoor play, physical activity and access to fresh air. There is evidence linking physical exercise and outdoor play with improved cognitive performance in children.

The improvements to journey times for vehicle travel will have a beneficial effect for parents taking children to activities beyond the local area. Journeys could be made for sports matches as well as to access cultural, historic or arts facilities. All of these would enhance the early years of a child's life through maximising their opportunities. Access to Hirwaun welfare ground would be improved as it would no longer be necessary for residents of Hirwaun to cross the main road in order to get to it.

Key elements of the proposed scheme that support this Well-being Objective are the enhanced provision for pedestrians and cyclists along the route as well as improved crossing points. By enhancing this provision safer journeys within the community can be achieved.

6.2 Improve Education Outcomes for All and Reduce the Gap in Outcomes for Different Groups

6.2.1 Rationale

The rationale for this Objective is:

'Education is one of our greatest longer term levers which can improve the life chances for low income pupils and pupils with protected characteristics. It contributes to breaking the cycle of disadvantage and inequality and is also fundamental to the future of our economy. Schools play an important role in promoting social and emotional learning, both enhancing a variety of skills and positive attributes for life and the reduction of emotional and behavioural challenges. To maximise our impact in the future we need to raise outcomes for all while reducing the difference in outcomes for different groups.'

6.2.2 Consideration

The proposed scheme would indirectly contribute to this Well-being Objective through the provision of enhanced facilities for pedestrians and cyclists. The proposed scheme includes a new footway and cycleway to the south of the A465 as it crosses Taf Fechan, this bridge, connecting to existing provision for pedestrians and cyclists from Lower Vaynor Road and from the area of Cefn Coed that is located to the north of the A465 by utilising an existing subway. Access to Pen-Y-Dre school has been identified as a key concern in the existing situation, with pupils currently walking within the highway boundary when crossing the Taf Fechan when travelling to and from the high school from Cefn Coed. This route is shorter than other options which involve walking a long distance downstream to cross the river on Brecon Road or a walk on unmade footpaths, which involve walking down to the river to cross in what is a steep sided valley, but it puts pupils at considerable risk as there is currently no footway. The new provision for cyclists and pedestrians, in the form of a cycle / footbridge to the south of the road would create the link that has been identified as a desire line. This will significantly improve the accessibility of Pen-Y-Dre school for pupils living in Cefn Coed. The delivery of this provision will integrate elements of the proposed scheme with other schemes and plans of the Welsh Government to encourage active travel to schools.

By encouraging children to travel to school using active travel there is a benefit to them in terms of physical and mental well-being. This in turn is associated with improved concentration at school, which could enhance their opportunities as they pass through the education system.

The proposed scheme would take an off-line route past Hirwaun, improving the safety of access to Hirwaun Primary school as the existing road currently runs along the edge of the village.

There would also be improved connectivity between Hirwaun and Ysgol Gyfun Rhydywaun.

However, the proposed scheme would involve the closure of the Grawen Lane junction on to the A465, which would result in longer journey times for people travelling from Cefn Coed to the north of the A465 to Pen-Y-Dre school by car.

There would also be improved accessibility to higher education facilities in Neath, Swansea, Cardiff and further west by improving journey times and reliability on the A465 and A470. The proposed scheme would improve highway conditions for both private and public transport, as well as improving connectivity by walking and cycling.

Therefore, the accessibility benefits by different modes of travel would help improve access and improve education outcomes for all groups, including those who do not have access to a car.

The design team have to date been involved in a range of events aimed at children and young people in the Hirwaun and Merthyr areas encouraging them into careers in engineering or environmental consultancy. This has included attendance at career events, construction taster days, talks at the Chwarae Teg Industry Network, working with Pinkspiration and undertaking mock interviews. By promoting and undertaking these initiatives, is the Welsh Government is encouraging young people to be more aspirational with regard to future career opportunities and options available to them.

6.3 Help People Live Healthy and Independent Lives and Support a Healthy Workforce

6.3.1 Rationale

The rationale for this Objective is:

'Living healthy and independent lives allows us to fulfil our potential, meet our educational aspirations and play a full part in the economy and society of Wales. Meeting the changing needs of the population and closing the gap in health outcomes in our communities means building resilience for the whole population while focusing on those people with the greatest health need and poorest health outcomes. Helping children and young people to develop healthy behaviours through their formative years is fundamental to later life. General wellbeing through life is supported by promoting healthy lifestyles and choices through interventions on preventing ill health and encouraging more activity. Supporting people into sustainable employment and tackling mental ill health in the workplace broadens the impacts of jobs and growth to offer the support people need. Meeting the needs of older people requires working with communities to support the ageing population to stay well into later life. This requires a range of responses from birth through to old age maximising health and well-being throughout life embedding healthy living throughout our programmes working across Government and public services, placing the focus on health at the heart of everything that we do.'

6.3.2 Consideration

The proposed scheme would indirectly contribute to this Well-being Objective. The improved accessibility provided by the 13 km of new pedestrian and cycle provision and the enhanced safety of crossing points on the A465 will support independent lives for young people who would be able to enjoy safer routes to school.

The proposed scheme will contribute to the wider goal of a healthier Wales through inclusion of enhanced provision for NMUs. This provision will integrate with Welsh Government initiatives, and other bodies such as the NHS and Active for Life, in encouraging active travel and providing increased opportunities for walking and cycling.

Of particular note in the proposed scheme design is the provision of a bridge for cyclists and pedestrians across the Taf Fechan, which would provide enhanced east-west connectivity for Merthyr residents undertaking active travel to Prince Charles Hospital and Pen-Y-Dre school. There would also be localised benefits as a result of improved routes through junctions for local residents travelling to GP practices on foot or bicycle. The improvements in access across Taf Fechan were primarily undertaken as a result of consultation feedback regarding schoolchildren but equally contributes to accessibility to Prince Charles Hospital for employees, patients, volunteers and visitors. The proposed design of Prince Charles Hospital junction has been modified through scheme development as a result of involving interested parties. The new junction will improve accessibility to the hospital by road and reduce ambulance times to hospital for people travelling along the A465.

In terms of recreational routes, there would be improvements to the National Cycle Network, particularly NCN Route 46 which is currently routed along the Llwydcoed crematorium road. This road is narrow and has steep sections which makes it one of the more unattractive sections of this route, particularly when traffic is arriving / leaving funerals. By providing an alternative off-road cycle route between Croesbychan and Baverstock the NCN route can be diverted and this conflict between traffic avoided.

The provision of safer crossing points between Dowlais and the employment opportunities at Penygarnddu Business Park and Galon Uchaf to Pant Industrial Estate will support the aims of promoting active travel by providing safer routes between communities and the employment sites.

Enhanced access to Penywern Ponds from Dowlais, through the provision of a new bridge, suitable for pedestrians, cyclists and horse-riders, will also help encourage people to live healthy lives as it would make recreational activities to the north of the A465 more accessible.

The provision of the new footbridge across the Taf Fechan would also enhance provision for adults who are undertaking active travel journeys between Cefn Coed and Prince Charles Hospital and other employment locations within Gurnos and Galon Uchaf.

As mentioned in Section 3, there are numerous recreational facilities close to the proposed scheme. These include the BBNP, NRW forestry, Cyfarthfa Park and Gardens, leisure centres, common land, public open space, playgrounds, golf courses, rugby clubs, football clubs, indoor bowling at Rhyd-y-Car, Penywern Ponds, and a network of PRoW. The proposed scheme will enhance connectivity within the communities for people travelling by car, foot or cycle. In improving these transport links the proposed scheme will encourage the use of these sports and recreational facilities by the local population as well as people from further afield.

The proposed scheme will enhance reliability and resilience in terms of journeys from the local communities, the wide Heads of the Valleys region, England, and elsewhere, to West Wales and is thus likely to support tourism and employment opportunities in West Wales. Many Heads of the Valleys residents travel regularly to West Wales for short breaks or longer holidays, as described in the baseline section.

The proposed scheme provides approximately 13 km of new off-road cycle / footpath provision, much of which is also suitable for horse-riders. The creation of a new cycle route along much of the length of the proposed scheme would encourage the local population to cycle both as a means of active travel but also as a recreational activity. The provision that is included in the proposed scheme improves the existing National Cycle Network provision within the area, as well as providing a 'missing link' to NCN Route 46 at Gypsy Castle.

Participation in the sports and recreation facilities in the local area and throughout south east Wales is facilitated by the provision of the new road and NMU facilities by making local and regional facilities more accessible. Most local sports teams are part of wider regional leagues, which result in the need to travel between communities in order to play matches. These leagues cover various age groups, encouraging sport for children and adults. The proposed scheme will improve transport provision within the Heads of the Valleys region.

The A470 is the primary route for visitors from Cardiff and the valley towns of Caerphilly and Pontypridd to access the BBNP. The National Park is a key recreational draw with significant numbers of people accessing it for recreational purposes throughout the year. The improvements to the A470 junction will benefit this journey by reducing the risk of accidents and removing congestion.

Air Quality improvement is predicted within the Twynyrodyn Road Air Quality Management Area (AQMA). This is associated with a redistribution of traffic during the operational phase of the proposed scheme and a reduction of approximately 4.5% average daily traffic (AADT) flows along Twynyrodyn Road. There is not considered to be a significant effect on local air quality as a result of the proposed scheme. One SSSI is predicted to be at risk of acid and nitrogen deposition, however this particular site (Tir Mawr a Dderi Hir), already exceeds habitat specific critical load ranges for nitrogen deposition. As such, the area of SSSI affected has potentially undergone some habitat degradation already meaning additional impact may not be proportionally as significant.

6.4 Improve Prosperity for All Across Wales, Helping People into Employment and Sustaining Jobs

6.4.1 Rationale

The rationale for this Objective is:

'Increasing employability is fundamental to tackling poverty and reducing inequalities. It is widely recognised that moving people into work has a dramatic impact on their health and ability to function in everyday society. Supporting people to stay in stable jobs and sustaining long-term employment reduces the chances of unemployment and poverty. By focusing on reducing lower skill levels and investing in early childhood development, we can contribute to improving our long-term economic outcomes as well as combating disadvantage and promoting social cohesion. We also know that to have the greatest effect we must build on the regional differences in our economy ensuring sensitivity to the diverse needs of localities and communities to generate wealth and employment opportunities.'

6.4.2 Consideration

The proposed scheme would directly contribute to this Well-being Objective. A key scheme objective is to facilitate economic regeneration in the local area as well as managing through traffic effectively, supporting economic development of other locations in South West Wales by enhancing connectivity along the strategic highway network between Neath and the English Midlands.

By enhancing transport infrastructure it is possible to encourage businesses to locate in previously isolated locations, which provide new employment opportunities for the local population. By providing enhanced routes for cyclists and pedestrians it is also possible to support low income families to access employment sites without the need for a car.

In identifying the objectives for the proposed scheme the Welsh Government has considered the needs of existing residents and road travellers while also looking long term at future trends in traffic flows to ensure that the proposed scheme is resilient to the anticipated traffic flows.

The proposed scheme would improve accessibility to employment opportunities, improve accessibility to existing educational, health and other services, and provide increased opportunities for walking and cycling. These provisions would contribute to a reduction in deprivation and poverty, improved health outcomes and improved sustainability of local communities. It would also encourage the relocation of businesses into the area and support the local industrial estates and business parks by both actual and perceived improvements to the accessibility and connectivity of the area. These improvements will be good for businesses as well as for local people who would benefit from additional skilled employment opportunities.

Section 3 and stakeholder feedback has highlighted the downward economic spiral the area faces. Poor quality industrial estates, lack of appropriate skills along the corridor, the condition of the road network, poor public transport accessibility, all conspire to make the area less attractive to employers which in turn leads to outward migration of skilled workers and a lack of investment in commercial property. Breaking this cycle and negative perception of the area requires a step change in the provision of facilitating investment and infrastructure. There is a need both to upskill the workforce and increase the size of the labour catchment area.

Once operational the proposed scheme will improve traffic flows and safety at three key geographic levels:

- 1) for the specific travel to work area between Hirwaun, Merthyr and Dowlais Top served by the trunk road;
- 2) for the wider Heads of the Valleys region between Abergavenny and Neath, and
- 3) between west Wales and the Midlands.

This will contribute to reduced travel time and improved accessibility for all residents within those geographic areas when seeking employment opportunities within their local communities or further afield.

The Merthyr area is a key destination for residents of Brecon and other parts of Powys who access healthcare at Prince Charles Hospital and shopping facilities at Cyfarthfa Retail Park and Dowlais Top. These Powys residents would also benefit from the improved journey times and improved accessibility to these services that would be delivered by the proposed scheme.

The A465 improvements as a whole should attract investment into the Valleys and Ebbw Vale Enterprise Zone, provide resilience in the network and a link to the Enterprise Zones in Milford Haven and Cardiff, and support regeneration in northern valley communities.

Blaenau Gwent council reported that completed dualling of the sections running through its area had led to a recent increase in interest from businesses seeking to locate in the Ebbw Vale area. While it is not possible to attribute this solely to the A465 upgrade, a number of recent inward investment enquirers have cited that the Heads of the Valleys is a good location to do business due to the excellent location and communication links.

The Public Liaison Officer for the proposed scheme has had a permanent presence in the local area, with an office at the Forsythia Youth Project within the Gurnos Estate. The Forsythia Youth Project offices were refurbished using young people through the 3T Trust, upskilling 20 students and 20 young people to help develop confidence in local people who are not in education, employment or training. These refurbished rooms are now available as meeting and recreation rooms for use by the children and the project team for larger scheme meetings. It also serves as a venue for Merthyr Tydfil community days and drop in events.

A variety of educational events have been undertaken within the local area, these include mock interviews for Year 11 students at Ysgol Gyfyn Rhydywayn (Hirwaun is within this catchment), attendance at careers fairs at Afon Taf High School, Bishop Hedley High School and Merthyr College. The stand included information regarding the diverse nature of expertise going into developing the A465 and involved engineering and ecology based activities that the students could participate in such as bridge building competitions and lessons in ecological survey techniques for bats. Jacobs ecologists took along examples of field signs for identification and technical kit used for bat surveys for students to have a go with. Jacobs also have a licenced bat worker who does bat rescue and has some captive education bats that aren't fit for release in the wild. These bats and all of the props that people could see and use proved very popular and sparked some great conversations. Further careers and STEM events took place at the What Next Event at Merthyr Leisure Centre and at Brynmawr comprehensive school. These STEM events are a great opportunity to inform and influence students at a stage when they are choosing subjects to study which will enable them to have the best start to enter careers whilst also helping future resource requirements.

Over the past two years as the proposed scheme has been being developed, the Welsh Government has been active in encouraging young people into engineering, a career that can lead to well paid, skilled, employment opportunities. This has been achieved through a series of initiatives including the following key events:

- talks of the community benefit of the A465 Scheme at the University of South Wales;
- construction taster days at Forsythia Youth;
- Transforming Spaces: Design Factor;
- Chwarae Ted Industry Network;
- attending careers fayres and promoting careers in engineering and environmental consultancy; and
- attending mock interviews for students.

The Welsh Government is committed to ensuring as many construction jobs as possible would be filled by local workers, depending on the availability of suitably skilled local people. The Welsh Government is committed to achieving 20% of the total labour costs from employment of new entrant trainees who have an apprenticeship, trainee or employment contract with the contractor or a subcontractor, and are engaged in a training programme. As a result of the proposed scheme, six young people and professionals within the proposed scheme catchment area have been recruited into full time positions at Jacobs UK Limited in Cardiff, including two apprenticeships.

To date, as a result of the Project overall, the construction of the road has had a significant impact on local employment with 85% of workers coming from Wales, 42% from Heads of the Valley, and 21% from Blaenau

Gwent. In addition it had supported 24 apprentices, 155 weeks of work experience and 4,100 student engagements.

The construction phase of the proposed scheme would provide employment opportunities in the construction sector and local commercial opportunities. The economic assessment of the proposed scheme will calculate the number of full time equivalent construction workers who would be working on the proposed scheme during construction.

The estimated spend on labour during the construction of sections 5 and 6 is £75.0m. Of this figure 89%, or £66.7m is predicted to be spent on workers who live in Wales.

The Welsh Community measure tool estimates that 645 of the employees will have been previously unemployed for, on average, 21 weeks. This represents a potential savings to the Welsh Government of £1m in reduced unemployment benefits payments.

Average levels of Targeted Recruitment and Training opportunities during construction of A465 sections 2 and 3 were analysed and scaled to reflect a different level of spend in sections 5 and 6. The resulting estimates of TR&T opportunities show the extent to which construction of sections 5 and 6 would contribute to raising the low skills and attainment levels of the area through recruitment and training of economically inactive and under-active people:

- 91 apprenticeships for people in Wales;
- 5875 apprentice weeks in total;
- 46 traineeships for people in Wales;
- 2120 traineeship weeks in total;
- 235 work experience/internship opportunities for people in Wales;
- 622 work experience/internship weeks in total;
- 18 graduate placements for people in Wales;
- 144 graduate placement weeks in total;
- 38 work trials for people in Wales;
- 152 work trial weeks in total;
- 1308 national vocational qualifications started and completed; and
- 267 national vocational qualifications weeks in total.

As the proposed scheme progresses through future stages, the engagement activities with the local communities will continue, including promoting the relationships with local high schools to promote the opportunities associated with engineering and construction. The Welsh Government is committed to developing a skilled workforce and aims to support local young people to gain a firm foundation through apprenticeship programmes during the construction of the proposed scheme. The delivery mechanism for these commitments during future stages would be by means of specific requirements set out in the Contract Documents.

6.5 Create the Conditions for People to Learn and Use the Welsh Language with their Families, in their Communities and in the Workplace

6.5.1 Rationale

The rationale for this Objective is:

'The Welsh language is fundamental to the culture and identity of Wales as a proudly bilingual nation with the Welsh language making a significant contribution to our past, history and living culture. Central to our ambition for a million Welsh speakers by 2050 is to grow the language so it thrives as a vibrant, living part of our communities for future generations. We have seen increases in children and young people speaking Welsh with early language development providing a foundation for later language skills both at home and through early years provision. The education system has a vitally important role in developing the language skills of all learners and through embedding the Welsh language within meaningful learning to enable learners to reach fluency. We know there is a clear link between fluency and frequency of Welsh language use and that education and training alone cannot guarantee that speakers become fluent in Welsh, or choose to use the language in their everyday lives, at home, in the workplace and in their wider communities. We also know that in response to a changing population needs will differ across Wales.'

6.5.2 Consideration

The proposed scheme would indirectly contribute to this Well-being Objective.

Providing improved accessibility, improved connectivity and decreased journey times will benefit all Welsh language educational and cultural activities that residents in the Hirwaun, Merthyr and Dowlais areas travel to take part in. As well as travel to school and 'Meithrin' (Welsh Language pre-school groups), residents may take part in choirs, folk dancing groups, recitation groups,, 'Urdd' (Welsh League of Youth) activities, local eisteddfods, Merched y Wawr, local chapel activities within the local area or within the wider region e.g. Urdd Eisteddfod in Bridgend in 2017; National Eisteddfod in Cardiff in 2018.

In recent years the most prominent annual Welsh Language cultural festival, the National Eisteddfod, has been held at Blaenau Gwent (2010) and Abergavenny (2016). When local authority areas are bidding to host this prestigious national event, which attracts over 100,000 visitors over the first week in August each year, accessibility, transport links, public safety and proximity to strategic transport routes are a key consideration when considering proposed sites for the main event, and its associated camp sites, car parks and 'Maes B' pop music festival. Improving the A465 could result in increased visits by the National Eisteddfod to the region in future years, due to the improved travel times to the area that will result.

Providing road signage in both Welsh and English benefits both Welsh speakers and learners of the language, while raising the profile of the language and its cultural value, with visitors from the English Midlands who are travelling through the Heads of the Valleys region in order to access tourism opportunities in South and West Wales.

In summary, the proposed scheme will increase the accessibility to and reduce the journey times to Welsh medium schools and other destinations / key events where the Welsh language is promoted and spoken.

To promote and protect the Welsh language, the communication strategies for the Scheme have been developed in accordance with the duties of the Welsh Government, including publication of information to stakeholders provided in both Welsh and English and engagement opportunities provided to Welsh speakers.

6.6 Support the Transition to a Low Carbon and Climate Resilient Society

6.6.1 Rationale

The rationale for this Objective is:

'Increasing globalisation, changing technology and responding to a changing climate requires a different response which focuses on sustainable growth and a low carbon economy which also benefits our social, cultural and environmental wellbeing. There is overwhelming scientific consensus for human induced climate change and the significant widespread and irreversible impacts it is likely to bring. The impacts on people, communities and the environment are likely to be unevenly distributed and are generally greater for disadvantaged people and communities. There is growing momentum and international commitment towards a low carbon society to meet climate change targets and the UN sustainable development goals. There is also a growing body of evidence indicating that those nations that move more quickly can benefit and unlock the opportunities associated with green growth. Evidence supports the need to focus on flooding and coastal change risks to communities, businesses and infrastructure tackling the risks to health, wellbeing and productivity. We know that through our influence over and investment in infrastructure including building energy efficiency in housing and supporting the development of renewable energy generation we can maximise our impact.'

6.6.2 Consideration

The proposed scheme would indirectly contribute to this Well-being Objective.

The design of the proposed scheme has taken into account the risks associated with climate change, including the risk of increased storm events which can lead to localised flooding.

Further, the removal of existing at grade junctions, will reduce the congestion at peak times and the amount of time traffic spends idling, which contributes to increased air emissions. By enabling traffic to maintain a steady speed it is also possible to reduce overall end-pipe emissions.

The provision of new pedestrian and cycle routes, which can benefit both active travel and recreational use, will support a transition to a low carbon economy by supporting the Welsh Government's Active Travel strategy to support a transition from vehicles to walking and cycling for shorter journeys.

As mentioned above, a Carbon Impact Report has been prepared in respect of the proposed scheme which calculates the amount of carbon emissions equivalent that would be produced in constructing the proposed scheme⁸. This has calculated that 161,848 tonnes CO₂e would be generated during construction, with the majority of emissions coming from the embodied carbon of materials used (118,260 tonnes CO₂e). The design of the road has taken into account the carbon footprint of new infrastructure and measures have been taken in order to minimise the extent of the carbon emissions.

The traffic forecast has indicated that without the proposed scheme in place there will be an increase in journey time of seven minutes and increased congestion at all junctions. The proposed scheme will provide a safer road with reduced congestion. The reduction in congestion will decrease the user carbon emissions.

The culverts and structures associated with the proposed scheme have been designed with an uplift of 30% for climate change. There is a beneficial impact of the proposed scheme with a reduction in flood risk of 195 properties in Hirwaun.

⁸ Based on the Highways England Carbon Tool v1.02

6.7 Connect Communities through Sustainable and Resilient Infrastructure

6.7.1 Rationale

The rationale for this Objective is:

'Our influence over investment in and use of infrastructure is one of our most important enablers for achieving our shared goals and building resilience for people, communities, the economy and wider environment. There are strong economic, environmental and social reasons for improving Wales' infrastructure, climate change, adapting to changing technologies, population and the contribution to the wider benefits on health and poverty. Providing 'well-connected' communities allows people to be able to communicate and get around easily, sustainably and cheaply and supporting economic growth. We know that taking an integrated approach including aligning housing, transport, ICT, education, health, flood prevention, waste and energy infrastructure can better deliver these benefits. This includes creating sustainable transport, supporting the development of renewable energy generation, meeting changing needs created by the internet and wider technology change, continuing to invest in flood defence work and taking further action to better manage water in our environment.'

6.7.2 Consideration

The proposed scheme will directly contribute to this Well-being Objective.

The design of the proposed scheme has involved collaboration with local interest groups, including SUSTRANS and Equestrian groups, has given cognisance to feedback from the Public Information Exhibitions (section 4.3.1) and has taken into account the requirements of the Active Travel (Wales) Act 2013. It includes provision for cyclists and pedestrians who would be undertaking active travel journeys. It also provides improved routes for recreational cyclists, pedestrians and horse riders. Overall the proposed scheme would provide approximately 13 km of new cycle / footway, much of which would also be suitable for horse riders. As mentioned above, the foot / cycle bridge across the Taf Fechan will significantly enhance the provision for cyclists and pedestrians travelling between Cefn Coed and Pen-Y-Dre High School or Prince Charles Hospital, avoiding the current use of the main carriageway of the A465 by school children, which currently puts them at significant risk given the lack of pedestrian provision.

The proposed scheme also has addressed known concerns regarding access to both Pant Industrial Estate and Penygarnddu Business Park for people living in Dowlais.

The proposed scheme provides an improved maintenance access track for the Wind Farm south of Hirwaun and will result in reduced flood risk to 195 properties at Hirwaun based on a 1% with climate change annual exceedance probability (AEP) event. Additionally an allowance of 30% has been made for climate change to enable culverts to cope with future predicted floods.

The proposed scheme would help facilitate access to and integration with the two other key future transport investments proposed in the area – the Cynon Valley Gateway scheme being promoted by RCTCBC and the South Wales Metro being promoted by the Welsh Government.

6.8 Support Safe, Cohesive and Resilient Communities

6.8.1 Rationale

The rationale for this Objective is:

'Evidence tells us that people's personal well-being is heavily influenced by the physical and social characteristics of where they live, work and visit. This means communities which are attractive; which are well-connected and are viable; flourishing settlements where people interact and get on well with each other. We know that people and communities across Wales have different needs and supporting them when they need it the most requires different responses. These include reducing adverse childhood experiences, better managing transitions people experience within and between public services over their life course as well as helping communities prepare for a changing climate. We know that tackling crime and anti-social behaviour is important to building safe and cohesive communities. A diversity of economic activity within communities helps make them more resilient. We know that if people are involved in the decisions that affect them locally it improves their sense of wellbeing.'

6.8.2 Consideration

The proposed scheme indirectly contributes to this Well-being Objective.

As set out in Section 6.7 above, the proposed scheme will provide enhancement to routes for pedestrians and cyclists within the Heads of the Valleys region through improvements to crossing opportunities and NMU routes through junctions. In addition to the specific crossing provision for cyclists and pedestrians at junctions, there would be an indirect improvement to crossing opportunities by removing through traffic as a result of the grade separation of the junctions.

A summary of the key links provided for NMUs is provided in Table 6.1.

Table 6.1: Provision for Non-Motorised Users

Location	Description
Hirwaun junction	Shared use NMU facility to connect Rhigos Road and the de-trunked A465. Access would be suitable for pedestrians and cyclists.
Trewaun junction	Shared use NMU facility to connect de-trunked A465 with Brecon Road and Hirwaun Road. Access would be suitable for pedestrians and cyclists.
Penywaun Tramway	Underbridge replaced with an overbridge suitable for pedestrians, cyclists and equestrians.
Vale of Neath footbridge	New overbridge across the disused Vale of Neath mineral railway suitable for pedestrians, cyclists and equestrians.
Croesbychan junction	Shared use NMU facility through Court Lodge Underpass and Croesbychan junction. Access would be suitable for pedestrians, cyclists and equestrians. The facility would connect Swansea Road, Hirwaun, with the Crematorium Road.
Croesbychan junction to attenuation pond access track	Shared use NMU facility to run from Croesbychan junction to the attenuation pond access track. Access would be suitable for pedestrians, cyclists and equestrians.
Nant Moel underpass	Footpath HIR/3/1 re-routed through new underbridge.
Reservoir access road to Baverstock junction	Shared use NMU facility constructed from the reservoir access road, to the east of the Nant Hir Reservoir, up to Baverstock junction. Access would be suitable for pedestrians, cyclists and equestrians.

Location	Description
Baverstock junction	Shared use NMU facility to connect Crematorium Road with the Jah-Jireh care home. Access would be suitable for pedestrians, cyclists and equestrians.
Baverstock junction to Swansea Road, Gellideg	Shared use NMU facility to connect with NCN Route 46 along Crematorium Road to the west and Swansea Road in the east. Access would be suitable for pedestrians, cyclists and equestrians.
Cefn Coed subway	Subway stopped up and footpath 111/43 re-routed across Cefn Coed High Street bridge.
Taff Trail overbridge	Existing Taff Trail overbridge demolished, with a new bridge constructed to connect NCN Route 8 (Taff Trail) with New Church Street. Access would be suitable for pedestrians, cyclists and equestrians.
Taf Fechan NMU overbridge	A separate structure, to the south of the existing Taf Fechan viaduct, will carry a shared use NMU facility from Lower Vaynor Road to the Gurnos Ring Road. Access would be suitable for pedestrians and cyclists.
Gurnos Ring Road	Sections of shared use NMU facility along the ring road to tie into existing provision along the Gurnos Ring Road. Advisory cycle lanes will also be provided at the detailed design stage. Access would be suitable for pedestrians and cyclists.
Prince Charles Hospital junction	Shared use NMU facility provided through the western arm of the junction. Bridleway 103/2 to be re-routed along the facility. Access would be suitable for pedestrians, cyclists and equestrians.
Bryniau Road overbridge	Shared use NMU facility provided through overbridge. Access would be suitable for pedestrians and cyclists.
Pant Industrial Estate access road	Shared use NMU facility provided along the south side of the road. Access would be suitable for pedestrians, cyclists and equestrians.
Penywern Ponds overbridge	Pedestrian provision provided through overbridge.
Dowlais Top junction	Shared use NMU facility provided through western arm of the junction, connecting Dowlais Top High Street with the Pengarnddu Industrial Estate access road. Access would be suitable for pedestrians and cyclists.
Common Road at Dowlais	Shared use NMU facility constructed to the south of the Common Road, completing the existing missing link in NCN Route 46. Access would be suitable for pedestrians, cyclists and equestrians.

The public information exhibitions provided useful feedback regarding traffic patterns within Cefn Coed, with people unhappy with the proposal to close the Grawen Road junction, which is used as an off-slip, though it was acknowledged that many people did not want to join the A465 at this location. As a result of this involvement from the community, alterations in the design have been made, which include improvements to the A470 / High Street junction which will now form the primary access link for traffic heading to and from the north.

The dualling will contribute to development of a better integrated public transport system providing the critical northern cross Valley Link for the South Wales Metro and enabling improvements in efficiency of bus services and links to the railway network in the Valleys including the lines proposed for electrification from Cardiff to Aberdare, Merthyr Tydfil and Ebbw Vale.

6.9 Improve Access to Secure, Safe, Efficient and Affordable Homes

6.9.1 Rationale

The rationale for this Objective is:

'Improving access to secure, safe, efficient and affordable homes can deliver against a range of outcomes. There is consistent evidence that poor living conditions can adversely affect physical and mental health. Improving access to affordable homes and improving housing conditions contributes to tackling poverty, improves health and wellbeing and helps to reduce health inequalities. Through improving energy efficiency in homes we can help people maintain warm homes whilst contributing to our carbon reduction commitments to help mitigate the impacts of climate change. Through investing in housing we can support the economy. We know that an ageing, growing and changing population brings with it the challenge of improving access to homes that meet these changing needs.'

6.9.2 Consideration

The proposed scheme, as a highway improvement project, would indirectly contribute to this Well-being Objective.

The proposed scheme would provide enhanced highways connectivity to land that has been allocated for housing within the Local Development Plans of Rhondda Cynon Taf County Borough Council (Policy NSA9 – Housing Allocations), Merthyr Tydfil County Borough Council (Policy BW13 – Managing Housing Growth and AS1 – Housing allocations in the Primary Growth Area) and Caerphilly County Borough Council (Policy SP14 – Total Housing Requirements and HG1 – Allocated Housing Sites). By helping to bring forward housing development, the proposed scheme will also contribute to the provision of new affordable housing as developers have to meet their requirements to provide mixed housing sites, or provide funds for affordable housing to be built elsewhere. Of particular note are the housing allocations at the former Dowlais foundry which is very close to the proposed scheme.

The average UK house price in 2017 is £215,000, around 20% higher than the Welsh average (£180,000). These are significantly higher than the average prices in Merthyr Tydfil (£93,000), Rhondda Cynon Taf (£100,000) and Caerphilly (£119,000). With an average market value of £88,000, house prices along the corridor are even lower. This highlights the low demand for property in these areas due to limited employment opportunities, but if transport links are improved then low property prices are also an opportunity making it an attractive place to live. An improved property market could encourage builders to construct new housing, including the provision of affordable homes.

There would also be reduced flood risk to 195 properties in Hirwaun.

6.10 Foster Conditions for Sustainable Economic Development and Employment, whilst Stimulating Innovation and Growth for a Modern Low Carbon Economy

6.10.1 Rationale

The rationale for this Objective is:

'Innovation can not only improve economic performance and help Wales contribute at the global level; through working together and sharing knowledge we can use resources efficiently and aid wealth generation and prosperity for all. We know that the foundations of economic success rest in the performance of our education and skills system and the quality of the supporting infrastructure including finance and support for business, effective transport, housing and strong collaboration amongst regional public sector partners. As we live for longer and our economy changes in light of technology and global changes we will need to help people fulfil their potential while ensuring an appropriately educated workforce. Fostering the conditions for innovation and growth, product and process innovation can help stimulate the wider take-up of innovative ideas across the economy. To create an innovative society we want to bridge the gap between education providers and the wider economy and work with our institutions and wider economic partners to build strong links between research and implementation.'

6.10.2 Consideration

The proposed scheme would improve accessibility to employment opportunities, improve accessibility to existing educational, health and other services, and provide increased opportunities for walking and cycling. These provisions would contribute to a reduction in deprivation and poverty.

A key contributing factor of the economic deprivation in this area of the South Wales Valleys is the poor transportation links between these former industrial communities and employment opportunities. By improving the road network there will be enhanced opportunities for residents to access job opportunities and improvements to the wider highway network will also enhance the accessibility to markets for all local businesses. New inward investment to the region may also be encouraged by the improvement of the highway network.

Improved journey time reliability and network resilience would improve accessibility for private and public transport, improving access to more sustainable forms of travel.

The proposed scheme would improve accessibility to employment opportunities, whilst the construction phase of the proposed scheme would also offer opportunities for local recruitment and training.

The proposed scheme would also improve access by all forms of travel to higher education services and other opportunities for learning and development, helping people access employment. Finally, the proposed scheme would help connect employees to workplaces by reducing the existing barriers to travel on the highway network and locally on foot or bicycle.

6.11 Promote and Enhance the Culture and Heritage of Wales

6.11.1 Rationale

The rationale for this Objective is:

'Culture and heritage are a source of identity and distinctiveness as a nation and there is growing evidence on the wider benefits culture can bring to society. Culture supports our economy and international profile, contributes to health and wellbeing, promotes diversity and innovation and helps educate our young people. To build, nourish and support a vibrant culture, the impacts of austerity and uncertainty require a sustainable approach, embracing the opportunities.'

Cyfarthfa Castle is located to the south of the proposed scheme near Cefn Coed. Improved access for pedestrians and cyclists would encourage greater use of this parkland and potentially increase the number of people visiting the museum and art gallery.

Chapter 9 of the ES sets out the potential effects on cultural heritage, this has identified a number of significant adverse effects on cultural heritage assets, including Cefn Coed Cemetery and the Jewish Burial Ground Registered Park and Garden, to the north of the A465 close to the A470 interchange. Further effects will occur on some buried remains, and records would be maintained for any remains excavated during construction of the proposed scheme.

Joseph Parry's Cottage Museum is located in Merthyr Tydfil and is an example of a typical ironworker's cottage. Built in the 1820s for the workers of the Cyfarthfa Ironworks, the cottage was the birthplace in 1841 of Joseph Parry, Wales best known composer. The interior of the cottage is set in the 1840s and shows the living conditions of the ironworkers at the time when Parry was a young boy. This museum provides a link for the current population with the risk heritage of the area from the past. Improvements in transport links to the A465 would benefit access to this museum.

The Ynysfach Engine House was built in 1836 for the adjacent ironworks, the Engine House was restored in 1989, having closed originally in 1874, this heritage centre provides an introduction to the Merthyr Tydfil heritage story, promoting the rich heritage of the region to the current population. By improving the existing road, the status of the area as appreciated by people passing through the Heads of the Valleys region could

also improve. This may result in more people stopping off in Merthyr Tydfil to experience the museums and art galleries that are available.

There would be a beneficial effect on local arts venues such as theatres, cinemas and art centres as a result of the improved connectivity within the local community. Residents travelling to take part in choirs, amateur drama groups, folk dancing, music classes, brass bands, adult art classes, pottery classes and other music, art and cultural groups would experience improved accessibility and reduced journey times. In the wider Heads of the Valleys area, Abergavenny is home to the Borough Theatre, and the town is a notable destination for various cultural events and festivals held throughout the year. The journey time to Abergavenny would be improved due to the proposed scheme.

In addition, there would be benefits to the local community with regard to their ability to access arts and cultural facilities further afield to the west, such Gwyn Hall and the Neath Little Theatre in Neath, the Princess Royal Theatre in Port Talbot and the Grand Theatre and Dylan Thomas theatre in Swansea.

6.12 Manage, Use and Enhance Wales' Natural Resources to Support Long-Term Wellbeing

6.12.1 Rationale

The rationale for this Objective is:

'Wales' natural resources are not only a valuable asset but provide essential benefits. These include benefits that range from the air we breathe to the food we eat; from the land we farm or develop to the seas we fish and the water we use for drinking. Wales' natural resources are as fundamental to the long-term success of the economy as they are to the quality of our natural environment and the health and wellbeing of communities. Maintaining and enhancing a biodiverse and resilient natural environment with healthy functioning systems supports people, contributes to health, supports a sustainable economy and builds ecological resilience and the capacity to adapt to change.'

6.12.2 Consideration

The proposed scheme would indirectly contribute to this Well-being Objective.

A key element of the design of the proposed scheme is achieving a materials balance between cut and fill, with the largest movements of materials from the cut at Baverstock to the embankments at the A470 junction. This approach ensures that the lorry movements beyond the proposed scheme footprint are minimised.

Working collaboratively with environmental bodies, the design team has identified and included construction mitigation measures as part of the proposed scheme. Mitigation measures including petrol interceptors and the creation of new habitats. The introduction of new mammal underpasses as well as the improvement of many existing culverts would provide environmental protection and enhancement.

Attenuation ponds have been designed with sensitive ecological and landscape planting to provide new areas of habitat. The verges of the road will be maintained in a manner that will provide habitat for wild flowers and insects and wider landscaping through tree planting will create new areas of habitat.

The assessment of potential effects on nature conservation has identified some impacts that require mitigation through the acquisition of land and future management of that land in the long term. Areas have been identified to enable the mitigation, maintenance or enhancement of ancient woodland habitat, marsh fritillary butterfly habitat and lapwing breeding habitat.

In identifying the locations for ecological mitigation, the Welsh Government has considered the extent to which existing degraded habitat could be enhanced to achieve the necessary ecological status, the connectivity of the mitigation sites to other suitable habitat for species, maximising the benefits that the ongoing management of the land would have to metapopulations. However, this work on ecological mitigation has also considered the potential effects that such land acquisition would have on existing landowners and the viability of landholdings, which in the area are predominately sheep farming.

Future management of these mitigation sites, along with management of the wider soft estate of the proposed scheme, will provide benefits to biodiversity in the long term and contribute to the Welsh Government's Plan for Pollinators as well as the Trunk Road Estates Biodiversity Action Plan.

The design of bridges, culverts and attenuation ponds have taken into account the hydrological, geomorphological, ecological and landscape benefits that can be achieved through good design. Looking to the longer term the design of these features has taken into account the risks associated with climate change, with road drainage taking into account the potential for increased flood events. The proposed scheme would result in a reduction of flood risk to 195 properties at Hirwaun and an overall reduced level of flood and pollution risk to receiving watercourses compared to the existing situation.

The scheme would achieve an earthworks balance and the need to import or export materials minimised during the construction phase.

It is considered that with an appropriate Construction Environmental Management Plan (CEMP) implemented, there would be no unacceptable dust nuisance to receptors during the construction phase and potential effects would be 'not significant'. There is not considered to be a significant effect on local air quality as a result of the proposed scheme, and there are no properties in exceedance of the Air Quality Objectives (AQOs) in either the Do Minimum (DM) or Do Something (DS) scenarios in 2022. With the improvement of automotive technologies there is the possibility of future improvements to air quality in the area.

By applying sustainable principles during both construction and operational phases of the proposed scheme, reasonable steps have been taken to reduce the impact, where possible. Properties close to the existing A465 in Hirwaun will experience a decrease in noise levels as the proposed scheme moves the traffic further away. However, there will be an overall increase in the number of properties that experience an increase in noise with the proposed scheme in place

6.13 Facilitate High Quality, Responsive and Better Integrated Public Services, to Those That Need Them Most; Enabling Citizens to be an Equal Partner

6.13.1 Rationale

The rationale for this Objective is:

'To meet our ambition for sustainable services for the future will require more integrated public services which help improve the capability of people, institutions, the infrastructure and environment of Wales to adapt to shocks such as recession or a more gradual longer term change such as climate change. Facilitating this change requires effective and efficient services which meet people's needs when they need them. This means better managing how people interact with and between public services, often as age milestones are reached, to ensure continuity and avoid dislocation in care and outcomes. To ensure that our public services are resilient and meet future needs there is a need to build on people's strengths, treating people who use our services as equal partners in their improvement, building independence and avoiding unnecessary intervention.'

6.13.2 Consideration

The proposed scheme would indirectly contribute to this Well-being Objective.

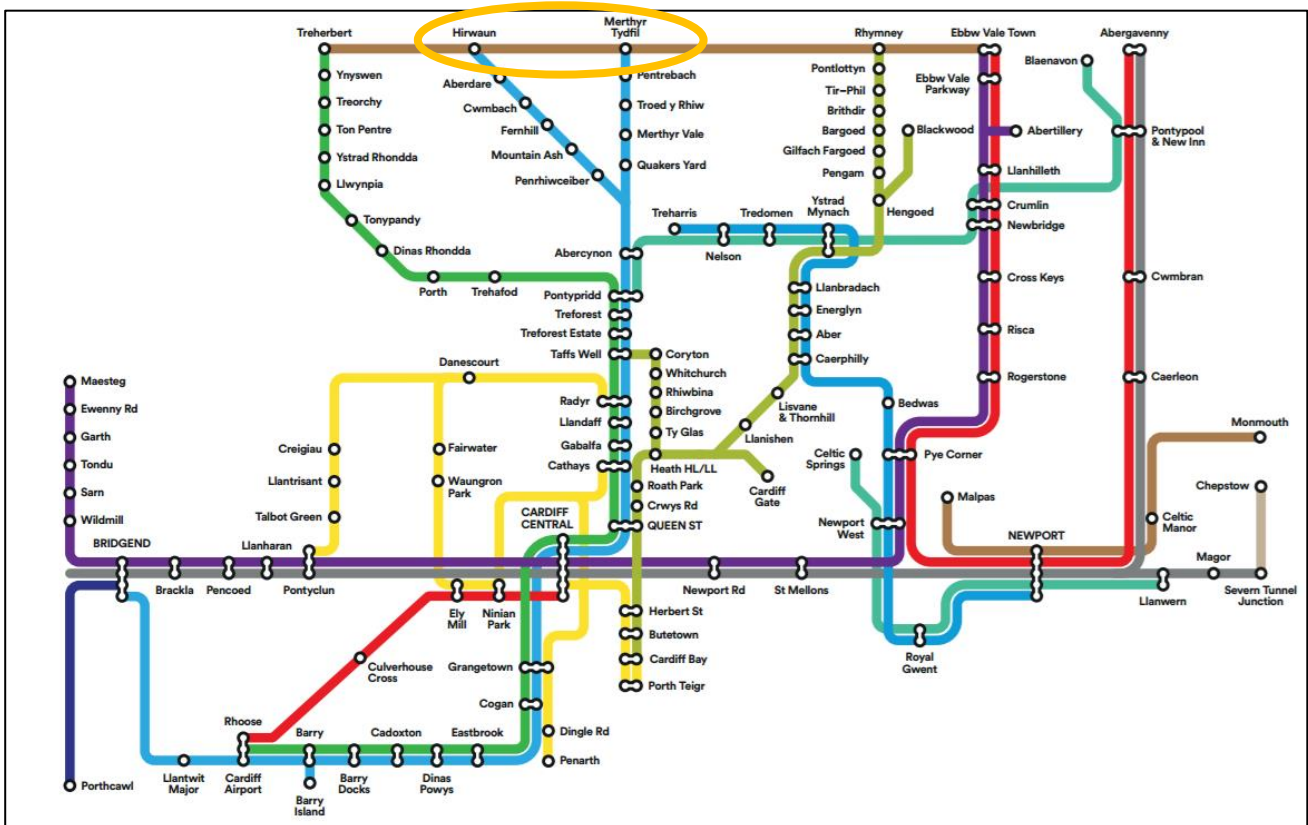
The proposed scheme would help to improve the capacity and resilience of the highway network to accommodate current and future demand, providing increased accessibility and connectivity for users of private and public transport.

Furthermore, by improving the transport connections in the area, there would be benefits to the movement of goods and services, whilst businesses are more likely to be attracted to locate in the Heads of the Valleys region as a result of better transport infrastructure, with the potential to create employment, with other associated wider economic benefits. This would improve the economic and social resilience of the area.

The proposed scheme would provide the infrastructure that would improve the accessibility of all groups of people to employment opportunities, educational facilities, healthcare provision, social care provision, community facilities and services.

The proposed scheme also forms a key element of the proposed South Wales Metro providing a critical northern, cross valley link. See Plate 6.1 below. This stage of the proposed metro is within the “Further phases” which goes beyond 2023. This will facilitate frequent and reliable public transport across the South Wales Valleys for example a potential bus rapid transit between Hirwaun and Merthyr Tydfil.

Plate 6.1 South Wales Metro during “Further Phases” stage (interaction with A465 Sections 5 and 6 highlighted)



Source: South Wales Metro, <http://gov.wales/docs/det/publications/160224-potential-metro-map-en.pdf>

6.14 Position Wales as an Internationally Focused, Ambitious Country Engaged and Connected to the Wider World

6.14.1 Rationale

The rationale for this Objective is:

‘We know that our place in the world in the 21st Century is changing. In light of the uncertainties of the UK decision to leave the EU, but also responding to the challenges and opportunities posed by changes such as globalisation, a changing climate and new technologies requires a focused and ambitious approach. Building on the successes of inward investment, supporting an innovative outward facing economy and building our international profile based on the uniqueness of Wales’ identity and culture positions Wales as an active international partner. Through fostering international links in higher and further education and promoting and sharing international best practice in healthcare helps Wales remain ambitious, engaged and connected to the wider world.’

6.14.2 Consideration

The proposed scheme indirectly contributes to this Well-being Objective.

The A465 is part of the Trans-European Transport Network (TEN-T) and as such provides a key link between the Heads of the Valleys region and the English Midlands to the ports of South West Wales. In addressing the identified transport related problems on the existing section of the A465 the proposed scheme would improve the perception of the Heads of the Valleys region as a place to do business, at a local, national and international level.

The proposed scheme, in addressing the identified transport related problems, would provide a long term solution that better connects people to their communities, places of work, educational facilities, healthcare provision and all other community facilities and services. The proposed scheme would also better connect markets and people to employment opportunities. The proposed scheme, in addressing the existing capacity and resilience problems on the highway network, would improve the perceptions of the Heads of the Valleys region as a place to visit and do business, supporting inward investment and an innovative outward facing economy.

7. Conclusions

This report summarises the consideration given to the principles of sustainable development, the ways of working and the Well-being Goals of the Well-being of Future Generations Act 2015. It also takes into account the Welsh Government's Well-being Objectives that have been published alongside its Programme for Government, Taking Wales Forward, which set out four cross-cutting strategies to drive improvement in the Welsh economy and public services. This aims to support the Welsh Government in delivering a Wales which is prosperous and secure, healthy and active, ambitious and learning, united and connected.

This report shows in Chapter 4 how the proposed scheme has considered the longer term in progressing a solution to the identified problems, and a solution that will offer economic, social, environmental and cultural benefits, as well as preventing as far as practicable negative effects through proposed prevention and mitigation measures.

As far as practicable, the proposed scheme affords multiple benefits to stakeholders and the wider area through improvements in the Welsh Government's strategic and local highway network. Additionally, this report shows how involvement and collaboration with stakeholders has informed scheme objectives, development work and decisions on the progress of the proposed scheme.

This report demonstrates that the proposed scheme would assist in increasing opportunities for economic growth in the wider area by improving the strategic connectivity and reliability of the road network; and improve the social and environmental conditions within local communities and economic areas within the Heads of the Valleys region. The proposed scheme is integrated with other plans and strategies in this region and complements other measures that are being taken to increase the prosperity of the area.

This report has explained how the proposed scheme would better connect people to communities, workplaces, education, health and other services, as well as to cultural assets and places of leisure and recreation. Mitigation and enhancement measures have been identified to protect and improve the environmental resources from the impacts of the proposed scheme where practicable, to help ensure ecosystem resilience in the longer term.

Chapter 6 shows how the proposed scheme contributes to the Welsh Government's Well-being Objectives. This work already done, or in preparation, will contribute either directly or indirectly towards the achievement of the wide ranging and cross-cutting objectives. In doing so, this report further demonstrates how the Scheme would contribute to helping the Welsh Government in their aspirations to deliver a Wales which is prosperous and secure, healthy and active, ambitious and learning, united and connected.

In conclusion, whilst there would be potential adverse environmental impacts as a result of the proposed scheme, with the scheme in place, other benefits would be realised. When the environmental impacts are balanced against the need for the scheme, the proposed scheme is considered to align with the Welsh Government's principles of sustainable development given the benefits identified to the economy, communities and cultural aspects of the Heads of the Valleys.

8. References

Arup (2017) *M4 Junction 28 Improvements Sustainable Development Report*.

Berry, P. M. et al., 2007. *MONARCH - Modelling Natural Resource Responses to Climate Change*: MONARCH 3. Oxford: UKCIP. Available at:
https://www.researchgate.net/publication/230853538_MONARCH_Modelling_Natural_Resource_Responses_to_Climate_Change_a_Synthesis_for_Biodiversity_Conservation. (Accessed and confirmed link June 2017).

CL:AIRE (2011) *The Definition of Waste: Development Industry Code of Practice* .Version 2. Available at:
<http://www.carbonaction2050.com/sites/carbonaction.ciobrebuild.io1dev.com/files/document-attachment/Definition%20of%20Waste.%20Development%20Industry%20Code%20of%20Practice.pdf>. (Accessed and confirmed link June 2017).

Countryfile.com (2017) *Five of the best sledging slopes* | Countryfile.com. [ONLINE] Available at:
<http://www.countryfile.com/countryside/five-best-sledging-slopes> (Accessed and confirmed link June 2017)

DEFRA, (2012). *A climate change risk assessment for Wales*. London: DEFRA . Available at:
<http://gov.wales/topics/environmentcountryside/climatechange/publications/riskassess/?lang=en>. (Accessed and confirmed link June 2017).

Jacobs (2015) *A465 Heads of the Valleys Dualling Sections 5 and 6 WelTAG Phase 1 Review*.

Jacobs (2017a) *A465 Heads of the Valley Dualling Sections 5 & 6 - Environmental Statement*.

Jacobs (2017b) *A465 Heads of the Valley Dualling Sections 5 & 6 - Interim Economic Impact Report*.

National Assembly for Wales (2000). '*Learning to Live Differently*'. Available at:
<http://www.assembly.wales/Laid%20Documents/Learning%20to%20Live%20Differently%20-%20The%20Sustainable%20Development%20Scheme%20of%20the%20National%20Assembly%20for%20Wales-09112000-23880/bus-GUIDE-3A0BD19D0006E0AE000061C90000000-English.pdf> (Accessed and confirmed link June 2017).

Natural Environment Research Council (2016) *RIDE Forum - Climate change impacts report cards*. Available at:
<http://www.nerc.ac.uk/research/partnerships/ride/lwec/report-cards/> (Accessed and confirmed link June 2017)

United Nations (2016) *The Sustainable Development Goals Report*. Available at:
<https://unstats.un.org/sdgs/report/2016/The%20Sustainable%20Development%20Goals%20Report%202016.pdf> (Accessed and confirmed link June 2017)

Welsh Assembly Government (2009) *One Wales: One Planet - The Sustainable Development Scheme of the Welsh Assembly Government*. Available at:
<http://gov.wales/docs/desh/publications/090521susdev1wales1planeten.pdf>. (Accessed and confirmed link June 2017).

Welsh Government and Sustain Wales (2010) *The Wales We Want Report*. Available at:
<http://www.thewaleswewant.co.uk/sites/default/files/The%20Wales%20We%20Want%20Report%20ENG.pdf> (Accessed and confirmed link June 2017)

Welsh Government (2013) *A Noise Action Plan for Wales 2013-2018*. Available at:
<http://gov.wales/docs/desh/publications/131217noise-action-plan-for-wales-en.pdf> (Accessed and confirmed link June 2017)

Welsh Government (2015a) *Well-being of Future Generations (Wales) Act 2015*. Available at:
<http://www.legislation.gov.uk/anaw/2015/2/contents/enacted> (Accessed and confirmed link June 2017).

Welsh Government (2016) '*Taking Wales Forward 2016-2021*'. Available at:
<http://gov.wales/docs/strategies/160920-taking-wales-forward-en.pdf> (Accessed and confirmed link June 2017).

Welsh Government (2015b) *Welsh Index of Multiple Deprivation*. Available at: <http://gov.wales/statistics-and-research/welsh-index-multiple-deprivation/?lang=en> (Accessed and confirmed link July 2017)

Page left intentionally blank.