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M4 Corridor around Newport

Appraisal of Objectors' Alternative Blue Route Proposals

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1 Introduction

1.1 Context and Purpose

1.1.1 An Inquiry into a road scheme is a review by an independent Inspector before a final decision is made whether to build it. A Public Local Inquiry will be held to consider the Welsh Government's published M4 Corridor around Newport Scheme. Any individual or organisation can suggest an alternative to the Scheme for consideration at the Public Local Inquiry. More information is available on the project website www.gov.wales/m4newport.

1.1.2 The Blue Route has been suggested as an alternative to the Scheme by several parties.

1.1.3 Whilst the Welsh Government is not promoting or supporting this alternative proposal, it is obliged to consider it so that the Inspectors conducting the Public Local Inquiry can report on the relative merits to the Welsh Ministers.

1.1.4 The Inspectors could not recommend in their report that any particular alternative proposal be adopted, but they could advise the Welsh Ministers that an alternative warrants further investigation. In such an event it would then be the subject of new statutory Orders which themselves would be open to formal objection.

1.1.5 Welsh Cabinet Minister for the Economy and Infrastructure, Ken Skates, announced on 15 July 2016 that an independent public inquiry into the M4 proposals will be held, and stated:

"This inquiry will provide open and transparent scrutiny of our proposed solution, and suggested alternatives, before providing vital feedback to inform a final decision on whether we proceed to construction."

1.1.6 In his earlier announcement on 21 June 2016, Mr Skates confirmed that:

"The historic consideration of options will be examined, as will all alternative routes proposed by objectors, including the much referred to 'blue route'… I am mindful of the continued interest in this alternative, and so, to address this, a fresh analysis of the blue route is being carried out and will be published prior to the inquiry. This will look again at scope, cost and traffic modelling and allow people to present their views to the inquiry inspector."

1.1.7 A suggested alternative was submitted to the Welsh Government in responses to the M4 Corridor around Newport draft Plan consultation (September to December 2013), referred to as the 'Blue Route'. The Blue Route was sometimes described as improvements to the Newport A48 Southern Distributer Road (SDR), and A4810 (previously known as the Steelworks Access Road). The suggested alternative was then published by Professor Stuart Cole in an Institute of Welsh Affairs (IWA) paper titled 'The Blue Route: a cost effective solution to relieving M4 congestion around Newport' (December 2013)[1]. The Blue Route is described in that paper as involving works to junctions along roads joining the SDR between

[1] http://www.iwa.wales/wp-content/uploads/2013/12/m4-a48-report-mj-v4.pdf, see Appendix B.

Junction 28 (Tredegar Park) and Junctions 24, and along the SDR and A4810 between Junction 28 and Junction 23a. The paper explains that:

"There would be two links onto the M4, at Junction 24 [Coldra] and Junction 23a [Magor]. As a result the Blue Route will be capable of attracting traffic to/from both the Severn crossings and the A449/M50 routes into Wales."

1.1.8 Only a high level plan is provided in that paper which did not show the link up to the M4 junction 24 (Coldra) – See Figure 1 over page.

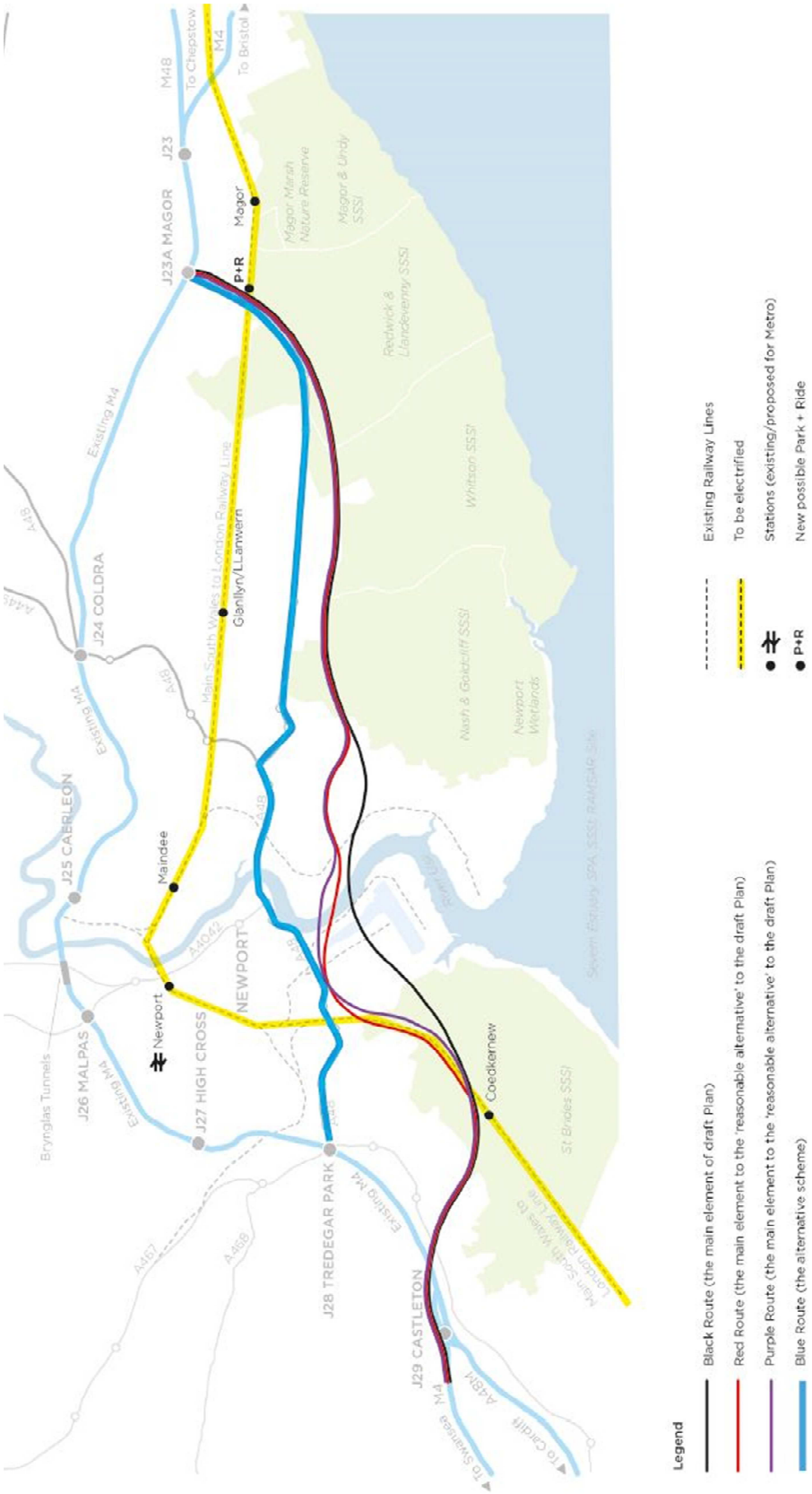
1.1.9 Based on the high level contents of that publication, the Welsh Government and its project team developed three scenarios which it engineered and assessed in order to provide Welsh Ministers with information to inform their decision making as to whether or not to adopt its Plan (July 2014)[2].

1.1.10 The results of that Blue Route assessment were published in the Strategic Alternatives Considered During Consultation Report (July 2014)[3]. The variants of the Blue Route were analysed to see if any of them could provide a feasible alternative to a new section of motorway to the south of Newport and which could address the identified problems on the M4 around Newport. The assessment at that time considered that the Blue Route would not address the problems on the existing M4 around Newport, and would create further operational and human health problems on some parts of the network.

1.1.11 Following the adoption of the Plan, Friends of the Earth brought a Judicial Review (March 2015)[4]. It was partly claimed that the Welsh Government's decision making that led to the adoption of the Plan was unlawful, in that, in a number of respects, it failed to comply with the Strategic Environmental Assessment Directive (including criticisms about how the suggested Blue Route had been considered). Mr Justice Hickinbottom found that on the basis of the evidence before them the decisions taken by the Welsh Ministers were rational and lawful. All grounds of challenge were dismissed.

1.1.12 In March 2016, the Welsh Government published its draft Orders[5], an Environmental Statement[6] and other associated reporting[7] for the proposed M4 Corridor around Newport Scheme. Consideration of options and alternatives, including the Blue Route are summarised in Chapter 4 of the published Environmental Statement[8].

[2] http://gov.wales/docs/det/policy/140929-m4-plan-en.pdf
[3] http://gov.wales/docs/det/policy/140929-m4-strategic-appraisal-of-alternative-options-en.pdf
[4] R (on the application of Friends of the Earth England, Wales and Northern Ireland Ltd) v Welsh Ministers CO/4433/2014
[5] http://gov.wales/topics/transport/roads/schemes/m4/corridor-around-newport/draft-orders/?lang=en
[6] http://gov.wales/topics/transport/roads/schemes/m4/corridor-around-newport/environmental-info/?lang=en
[7] http://gov.wales/topics/transport/roads/schemes/m4/corridor-around-newport/reports/?lang=en
[8] http://gov.wales/docs/det/policy/160310-m4-es-c4-development-alternatives.pdf



Source: Fig 1, Page 2, The Blue Route, IWA

1.1.13 Some objections to the draft Orders have included support for the Blue Route. Welsh Ministers have since confirmed that the M4 Corridor around Newport Public Local Inquiry will consider relevant alternatives to the Scheme, including the Blue Route. Therefore, further consideration of the Blue Route has been undertaken, to help prepare evidence for the Public Local Inquiry. Benefiting from the involvement and expertise of the contractor joint venture as part of the project team, four further scenarios have been developed, involving re-evaluation of the description, engineering, costing and buildability assumptions.

1.1.14 The results are provided in this Blue Route Appraisal Report.

1.2 Structure

1.2.1 This Blue Route Appraisal Report explains the history of the suggested Blue Route alternative and summarises and cross refers to previous development work where appropriate. This includes setting out the identified problems, aims and objectives **(Section 2)** and the earlier three scenarios as previously considered during the development of the M4 Corridor around Newport Plan **(Section 3)**.

1.2.2 This Report then describes the development of the four Blue Route scenarios as further considered, in response to the objections received to the draft Orders **(Section 4)**. This Report sets out the outcome of the re-evaluation of Professor Cole's Blue Route Report, and key assumptions made.

1.2.3 This Report outlines the existing conditions and traffic forecasts **(Section 5)**, cross referring to the Local Model Validation Report and Traffic Forecasting Report for the Scheme where relevant, for example in explaining how the traffic forecasts take into account planned public transport improvements. The traffic section of this Report explains the expected impact of the Blue Route scenarios on travel conditions.

1.2.4 An appraisal of the Blue Route is then presented adopting Welsh Transport Planning and Appraisal Guidance (WelTAG) principles, considering the scenarios against the identified objectives and Welsh Impact Areas of the economy, society and environment. This approach also lends itself to the recent sustainable development requirements of the Wellbeing and Future Generations Act 2016. This Report explains how the Blue Route scenarios have been subject to sifting for the further appraisal **(Section 6)**.

1.2.5 The economic appraisal **(Section 7)** considers the Transport Economic Efficiency of the Blue Route scenarios, including calculated Benefit to Cost Ratios, utilising the traffic model results. Appraisal of the Economic Activity and Location Impacts of the Blue Route scenarios present their likely wider economic impacts.

1.2.6 The environmental appraisal **(Section 8)** considers the likely impacts of the Blue Route scenarios on environmental criteria including noise, air quality, greenhouse gas emissions, landscape, biodiversity, soils, heritage and water.

1.2.7 The social appraisal **(Section 9)** considers the likely impacts of the Blue Route scenarios on safety, social inclusion, severance, equality and health.

1.2.8 The Appraisal Summary Tables **(Section 10)** help show and compare the performance of the Blue Route scenarios. The Blue Route is then compared to the proposed Scheme in terms of their comparative performance, against the

objectives and Welsh Impact Areas. A summary of their appraisal includes consideration of issues of acceptability, deliverability, feasibility and risk (as guided by WelTAG when comparing transport options).

1.2.9 A conclusion **(Section 11)** considers the benefits, disbenefits and key findings of the appraisal of the tested Blue Route alternative.

2 Problems, Aims and Objectives for the M4 Corridor around Newport

2.1.1 Welsh Transport Planning and Appraisal Guidance (WelTAG) requires that, at the planning stage, an objectives-led approach be adopted. This means that planning starts by identifying problems and opportunities and defining what is to be achieved. The ultimate outcomes are expressed as 'transport planning objectives'. As a result of consultation and previous development workshops, problems have been identified and aims and objectives have been set for the M4 Corridor around Newport.

2.2 Transport Related Problems

2.2.1 The Welsh Government has looked in detail at what travel related problems exist on the M4 Corridor around Newport, and asked the public, other stakeholders and those involved in managing transport in and around Newport what they thought the problems amount to 17 problems have been identified relating to capacity, resilience, safety and sustainable development issues. They are:

1. A greater volume of traffic uses the M4 around Newport than it was designed to accommodate, resulting in regular congestion at peak times over extended periods.
2. The M4 around Newport is used as a convenient cross town connection for local traffic, with insufficient local road capacity.
3. HGVs do not operate efficiently on the motorway around Newport.
4. There is insufficient capacity through some of the Junctions (e.g. 3 lane capacity drops to 2 lane capacity).
5. The 2-lane Brynglas tunnels are a major capacity constraint.
6. The M4 cannot cope with increased traffic from new developments.
7. Difficulties maintaining adequate traffic flows on the M4 and alternative highway routes at times of temporary disruption; alternative routes are not able to cope with M4 traffic.
8. The road and rail transport system in and around the M4 Corridor is at increasing risk of disruption due to extreme weather events.
9. When there are problems on the M4, there is severe disruption and congestion on the local and regional highway network.
10. The M4 requires essential major maintenance within the next 5-10 years; this will involve prolonged lane and speed restrictions, thus increasing congestion problems.
11. There is insufficient advance information to inform travel decisions when there is a problem on the M4.
12. The current accident rates on the M4 between Magor and Castleton are higher than average for UK motorways.

13. The existing M4 is an inadequate standard compared to modern design standards.
14. Some people's driving behaviour leads to increased accidents (e.g. speeding, lane hogging, unlicensed drivers).
15. There is a lack of adequate sustainable integrated transport alternatives for existing road users.
16. Traffic noise from the motorway and air quality is a problem for local residents in certain areas.
17. The existing transport network acts as a constraint to economic growth and adversely impacts the current economy.

2.3 Aims and Objectives

2.3.1 The M4 Corridor around Newport Plan (published in July 2014) sets out that the Welsh Government's aims for the M4 around Newport are to:

1. Make it easier and safer for people to access their homes, workplaces and services by walking, cycling, public transport or road;
2. Deliver a more efficient and sustainable transport network supporting and encouraging long-term prosperity in the region, across Wales, and enabling access to international markets; and
3. To produce positive effects overall on people and the environment, making a positive contribution to the over-arching Welsh Government goals to reduce greenhouse gas emissions and to making Wales more resilient to the effects of climate change.

2.3.2 The M4 Corridor around Newport Plan sets out how the Welsh Government aims to help to achieve or facilitate these aims as part of its wider transport strategy for South East Wales, as outlined within the Prioritised National Transport Plan.

2.3.3 Aiming to address one or more of the problems, 15 transport planning objectives were identified and agreed with the public and other stakeholders. The objectives for the M4 Corridor around Newport Plan, and its Scheme, are to help achieve:

1. Safer, easier and more reliable travel east-west in South Wales.
2. Improved transport connections within Wales and to England, the Republic of Ireland and the rest of Europe on all modes on the international transport network.
3. More effective and integrated use of alternatives to the M4, including other parts of the transport network and other modes of transport for local and strategic journeys around Newport.
4. Best possible use of the existing M4, local road network and other transport networks.
5. More reliable journey times along the M4 Corridor.

6. Increased level of choice for all people making journeys within the transport Corridor by all modes between Magor and Castleton, commensurate with demand for alternatives.
7. Improved safety on the M4 Corridor between Magor and Castleton.
8. Improved air quality in areas next to the M4 around Newport.
9. Reduced disturbance to people from high noise levels, from all transport modes and traffic within the M4 Corridor.
10. Reduced greenhouse gas emissions per vehicle and/or person kilometre.
11. Improved travel experience into South Wales along the M4 Corridor.
12. An M4 attractive for strategic journeys that discourages local traffic use.
13. Improved traffic management in and around Newport on the M4 Corridor.
14. Easier access to local key services and residential and commercial centres.
15. A cultural shift in travel behaviour towards more sustainable choices.

2.3.4 The initial review of the problems, aims and objectives for the M4 Corridor around Newport can be viewed in the Stage 1 Review of Problems and Goals report for the M4 Corridor Enhancement Measures, 2011[9]. The March 2013 Stage 1 (Strategy) WelTAG[10], June 2013 Stage 1 (Strategy) WelTAG[11] and the 2014 Stage 1 & 2 (Scheme) WelTAG[12] appraisals for the M4 Corridor around Newport confirm that they have been reviewed and subject to consultation during development work, and that:

"For the current circumstances, the objectives as previously proposed are considered to remain wholly relevant to the M4 transport corridor around Newport and, as such, represent a good framework within which to appraise the relative performance of strategic options for improvement of operating conditions/transport provision within the M4 Corridor around Newport."

2.3.5 The M4 Corridor around Newport Plan sets out how the 15 objectives have provided a framework in which to appraise the relative performance of different options at a strategic level, as part of the development work that has led to the adoption of the Plan and subsequent design development.

2.3.6 The history of the identification, consultation, review and assessment of the problems, aims and objectives is set out within the various WelTAG appraisals for the Scheme, its Plan and previous development work. Those are available online at www.m4cem.com, www.m4newport.com and www.gov.wales/m4newport.

9 http://m4cem.com/downloads/reports/ISSUE%20Report%20Stage%201%20Problems%20and%20Goals.pdf
10 http://gov.wales/docs/det/policy/140929-m4-draft-plan-cem-weltag-stage-1-report-en.pdf
11 http://gov.wales/docs/det/policy/140929-m4-draft-plan-weltag-stage-1-report-en.pdf
12 http://gov.wales/docs/det/policy/140929-m4-preferred-route-weltag-stage-1-2-report-en.pdf

3 The Blue Route: Background and Previous Work

3.1 Origins of the Blue Route

3.1.1 The Blue Route was put forward by third parties during the strategic consultation on the M4 Corridor around Newport draft Plan in December 2013. However, the acknowledgment of a Blue Route option was first mentioned in letters to the Welsh Government from environmental Non-Governmental Organisations (NGOs) dated 12 July 2013 and 19 August 2013. In their letter of 12 July 2013, Wildlife Trusts Wales stated that they had commissioned Professor Stuart Cole to produce a paper. At this initial stage of correspondence, no detail of the suggested alternative was provided but a cost of £380m was suggested. Some environmental NGOs had referred to the Blue Route on their websites and other publicity material as "a cost effective alternative, with far less economic and environmental impacts", since 16 October 2013.

3.1.2 The proposal was presented in Professor Stuart Cole's evidence to the Environment and Sustainability Committee on 6 November 2013, which was considering the M4 proposals at that time.

3.1.3 On 7 December 2013, during the draft Plan consultation (which ran between 23 September and 16 December 2013), the alternative was put forward in an IWA paper entitled 'The Blue Route ~ A cost effective solution to relieving M4 congestion around Newport', authored by Professor Stuart Cole. This alternative was also referred to by some respondents to the draft Plan Consultation.

3.1.4 The Blue Route paper described the alternative as follows: "The Blue Route is a combination of the A48 Southern Distributor Road upgrade (as in Option C) [of the M4 CEM Programme Consultation Document][13] together with the Steelworks road, linking together at the present Queensway Meadows Junction." It should be noted that Option C of the M4 CEM Programme was an option that was considered and subject to public consultation as part of development work between March and July 2012, involving grade separated junction improvements to the A48 SDR. Option C was published in the M4 CEM Consultation Document (March 2012) and the drawing that was provided to illustrate the option is shown at Figure 3.1 over page.

3.1.5 The Blue Route paper set out that it would "create a dual carriageway to motorway / expressway standard" and would cost £380m, including costs for construction, acquisition of land and property, preparation and supervision, and traffic-related maintenance. It outlines that "The Blue Route involves an upgrade between Junctions 23a and 24 to the east of Newport to Junction 28 to the west. This would involve upgrading the current A48 SDR whose traffic flows are lower than expected. That is largely a consequence of the number of intersections, which disrupt the free flow of east west traffic. Grade separated junctions, where the traffic flow is unimpeded, would give these flows greater priority". It lists the junctions "where this should be feasible" as:

13 http://m4cem.com/downloads/reports/to%20email%20Consultation%20Document%20REV%20B%20-%20E.pdf

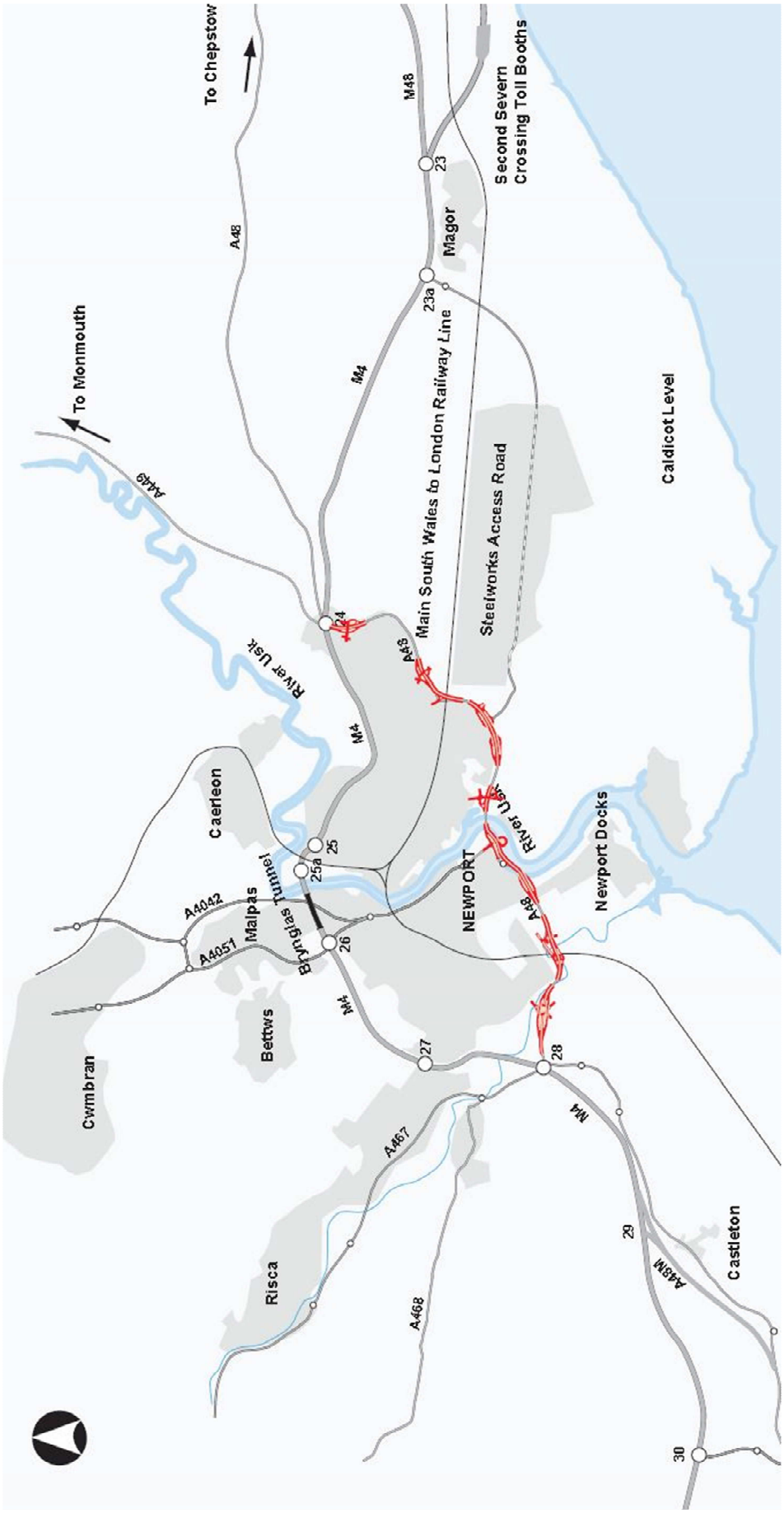


Figure 3.1: Highway Option C, M4 CEM Consultation Document WG14775

a) Pont Ebbw;

b) Maesglas West/East;

c) Docks Entrance;

d) Usk Way;

e) Corporation Road;

f) Nash Road;

g) Queensway Meadows;

h) Hartridge; and

i) Beatty Road.

3.1.6 The paper goes on to state "The result would be to increase east–west road capacity and reduce M4 congestion. This lower cost scheme could be constructed by 2018".

3.1.7 On 9 December 2013, a copy of the published Blue Route paper was sent to the then Welsh Minister Edwina Hart MBE CStJ AM by Wildlife Trusts Wales, signed jointly by representatives of Wildlife Trusts Wales, Friends of the Earth Cymru, Gwent Wildlife Trust and RSPB Cymru.

3.1.8 Whilst many responses to the draft Plan consultation expressed support for the Blue Route, Newport City Council's Cabinet met shortly after publication of the Blue Route and voiced opposition to the Blue Route. This view was presented in Newport City Council's response to the public consultation.

3.1.9 As a result, consideration was given to the Blue Route in the 'Strategic Appraisal of Alternatives Considered During Consultation Report', which helped inform the Welsh Government's decision making on its 'M4 Corridor around Newport Plan' (both documents were published in July 2014).

3.1.10 As explained earlier at section 1.1.8, following the adoption of the Plan, Friends of the Earth brought a Judicial Review (March 2015) claiming that the Welsh Government's decision making that led to the adoption of the Plan was unlawful, with criticisms about how the suggested Blue Route had been considered. The Welsh Government successfully argued why it did not consider the Blue Route to be a reasonable alternative to its then draft Plan. Mr Justice Hickinbottom found that on the basis of the evidence before them the decisions taken by the Welsh Ministers were rational and lawful. Nevertheless, given the ongoing expressions of support for the Blue Route from objectors, the Welsh Government has undertaken fresh appraisal of the Blue Route to assist further consideration at the M4 Corridor around Newport Public Local Inquiry.

3.2 Context for the Blue Route

3.2.1 The Newport A48 Southern Distributor Road (SDR) is a key local route between M4 Junction 24 (Coldra) and M4 Junction 28 (Tredegar Park), connecting the B4237, Usk Way, Corporation Road and Nash Road into important community and commercial centres, as well as the A449 to the north, and A48 to Cardiff to the west. A 50mph speed restriction is required on the A48 SDR in light of its multiple at-grade junctions.

3.2.2 The primary function of the existing A4810 (known locally as the Steelworks Access Road (SAR) or Queensway) is to provide increased network resilience between M4 Junction 23A (Magor) and M4 Junction 24 (Coldra). It also provides access to existing and new development areas in eastern Newport. When the ownership of the land required to build the A4810 was transferred from TATA and St Modwen to Welsh Government, the provision of access was stipulated in the legal agreements. A legal obligation has thus been placed on the Welsh Government to continue to provide defined access points to facilitate the Glan Llyn development area and TATA's entrance and emergency access.

3.2.3 Between M4 Junction 23A and the Queensway Meadows Roundabout on the A48 SDR, there are the following types of at-grade junctions along the A4810:

a) 5 roundabouts;

b) 5 signal-controlled junctions;

c) 2 all movements priority junctions;

d) 2 left in left out junctions;

e) 3 emergency/maintenance access points to TATA; and

f) Multiple agricultural field access points.

3.2.4 The A4810 serves the Newport City Council strategic development, as identified within its Local Development Plan (2016) at Glan Llyn, Llanwern. It also serves multiple commercial and industrial operations, including TATA steelworks, Gwent Europark, Magor Brewery and Wales One Business Park. Furthermore, along the A4810 are major gas pipelines associated with the industrial activities (Air Products) at a COMAH (control of major hazards) site. The pipelines are Major Accident Hazard Pipelines. The COMAH Regulations 2015 are enforced in Great Britain by the COMAH competent authority, which include Natural Resources Wales (NRW) and the Health & Safety Executive (HSE).

3.3 Previous appraisal of the Blue Route

3.3.1 The Strategic Appraisal of Alternatives Considered During Consultation Report explained how the option to upgrade the A48 SDR and [A4810] Steelworks Access Road to a 'Newport Expressway' was first considered by the Welsh Government in 2010 in the report 'M4 CEM Strategy, Appraisal and Monitoring'[14]. The purpose of that report was to outline a strategy to emerge from investigation of other potential schemes to improve the operation of the existing M4 around Newport, when the M4 Relief Road was considered as unaffordable in 2009. The report described and illustrated on a plan, a 'Newport Expressway', stating that:

"During incidents/maintenance works on the motorway, the SAR (Steelworks Access Road, now known as the A4810), A48 SDR upgrading and J28 improvements would provide increased network resilience."

3.3.2 The scheme was appraised against a set of Strategic Performance Indicators as well as Scheme Specific Objectives, which focused on encouraging the use of the A48 SDR. The report went on to state: "Limited reductions in traffic flows on

[14] M4 CEM Draft Strategy, Appraisal and Monitoring Report (May 2010)

the motorway around Newport may occur, especially during periods of congestion…Unless travel behaviour were to change significantly, even with corridor enhancement measures in place, traffic congestion and capacity problems could be expected to occur during weekday peak travel times with increasing frequency sometime during the period 2018-2024 on the approaches to Brynglas Tunnels."

3.3.3 The Welsh Government then decided to progress the M4 CEM Programme, to consider a range of possible measures, as part of a package to address the problems on the M4 around Newport.

3.3.4 The March 2013 Stage 1 (Strategy) WelTAG Appraisal considered an option known as M4 CEM Highway Option C. That option involved the upgrading of the A48 SDR with the inclusion of a number of grade separated junctions between M4 Junction 24 (Coldra) and M4 Junction 28 (Tredegar Park). This option was ruled out as a reasonable alternative to the draft Plan because of it being considered not to be able to sufficiently achieve the objectives for the M4 Corridor around Newport. Furthermore, it attracted many comments of opposition during the M4 CEM public consultation in 2012, whilst those who did offer support or qualified support often favoured its potential to improve resilience but there were concerns about it not increasing road capacity on the highway network.

3.3.5 Measures to upgrade the A4810 to dual 3 lanes were considered as part of the M4 CEM Programme, as part of the development of a packages of measures.

3.3.6 Whilst the upgrading of the A48 SDR and the upgrading of the A4810 have previously been ruled out as individual solutions as they separately did not fulfil the objectives set for the draft Plan, the combined effect of these proposals was then re-examined as the Blue Route, following the submission of the Blue Route paper by objectors as part of the draft Plan consultation in 2013.

3.3.7 The Strategic Appraisal of Alternatives Considered During Consultation Report explained that the Blue Route would not address the problems on the existing M4 around Newport, and would create further operational problems. Variants of the Blue Route were analysed to see if any of them could provide a feasible alternative to a new section of motorway to the south of Newport. Conclusions were:

a) Forecasts of future traffic volumes show that operational problems would continue to be experienced on the M4 around Newport with the variants of the Blue Route in place. Furthermore the addition of motorway traffic to the modified A48 SDR and A4810 would cause operational problems on parts of the Blue Route. Even in combination with significant investment in public transport measures, it was assessed that the Blue Route would not provide sufficient relief to the M4 Corridor around Newport.

b) Variants of the Blue Route would require land, beyond current highway boundaries, with associated impacts on businesses and individuals. There would be economic, noise, air quality and social impacts on communities, property and future development land allocations. Whilst disruption on the Gwent Levels would be significantly diminished this must be seen in the context of significantly greater disruption to those living and working along the Blue Route.

c) Delivery of the Blue Route could not be achieved quicker than the published scheme, due to the statutory process, strategic and preliminary design work and consultation, which would be required. This would take several years. In addition construction of the Blue Route, whilst keeping the A48 SDR and A4810 operational, has numerous uncertainties and construction risks associated with it, such that delivery quicker than the published scheme would be highly unlikely.

d) The cost of the Blue Route, as proposed by third parties, does not include free flowing connections to the existing M4, grade separation at existing M4 junctions, or resolution of access to TATA Steel and future development areas from the A4810 (which are already committed via legal agreements). The variants of the Blue Route considered include these improvements and taking these into consideration the cost of the Blue Route, excluding VAT, land and compensation costs, would be in the order of £600-800m (as assessed in 2013), depending on the scope. Such a scheme however would not create economic benefits of the same order of the published scheme. Neither would it alleviate the existing problems of the M4, as referred to above, and therefore the Blue Route cannot be said to provide value for money.

3.3.8 Furthermore, whereas the M4 Scheme would be constructed largely off-line, interfering with strategic traffic only at either end, the Blue Route would pose traffic management challenges along its length at multiple junctions and locations.

3.3.9 The Blue Route performed poorly compared to the Black Route when it was appraised against the WelTAG economic, social and environmental Welsh Impact Areas criteria at the strategic stage. Overall, it was not considered to provide a sufficient long term solution to the identified problems associated with the M4 around Newport.

3.3.10 Consideration of options/alternatives, including the Blue Route is summarised in Chapter 4 of the published Environmental Statement.

3.3.11 Objections received to the March 2016 draft statutory Orders have expressed support for the Blue Route. As directed by Welsh Ministers, the Blue Route will be considered by independent Inspectors at the Public Local Inquiry that will consider the M4 Corridor around Newport proposals.

3.3.12 This report aims to provide up to date information to help assist the consideration of the objectors' alternative Blue Route proposals at the Inquiry.

4 The Blue Route: Further Development

4.1 Overview

4.1.1 As Professor Stuart Cole states in his Blue Route Paper: "There is a consensus that additional capacity is required to cope with peak period traffic congestion on the M4 around Newport…the Blue Route, would be a more appropriate solution. It would deliver what is needed at a much lower cost and with significantly less impact on the environment. It would have a lower capacity than the option favoured by the government but would be sufficient to cope with the estimated need… The Blue Route could solve the congestion issue on the M4 earlier than the Black/Purple route since it could be completed sooner, by 2018. Combined with the Metro and rail electrification, it would provide more than adequate relief of traffic congestion over the period to 2035."

4.2 Assumptions

4.2.1 As set out in Section 3 of this report, the existing junctions on the A48 SDR and A4810 are primarily at-grade roundabouts, with signalised T or crossroad junctions at some locations. To develop the Blue Route, a combination of at-grade and grade separations have been considered to facilitate improved capacity and resilience, with free flowing through movements wherever practicable, taking into account physical constraints.

4.2.2 The key physical constraints present are summarised as: railway lines, overhead power lines crossing the A48 and A4810, various buried utilities, areas of SSSI, the River Usk, COMAH site at Air Products, and other property. The proposed engineering has been developed to avoid these constraints as far as practicable.

4.2.3 The A48 SDR and the adjoining section of the A4810 comprise urban dual carriageway (cross section) with 7.3m wide kerbed carriageways. The section of A4810 between the TATA main access and the M4 Junction 23A (Magor) is currently single carriageway and would be upgraded to the same urban dual carriageway standard in all Blue Route scenarios considered, in order to facilitate additional capacity for traffic transferring from the motorway at peak times.

4.2.4 Existing speed limits on the A4810 and A48 SDR range between 30mph and 50mph. The speed limits generally respond to the road alignment, and frequency and proximity between junctions.

4.2.5 Where possible the Blue Route aims to achieve increased safe speed limits compared to the existing situation through works to junctions, in order to make the Blue Route more attractive to motorway traffic (See Table 4.1 at the end of this section for details of assumptions made with regard to speed limits along the Blue Route). As above this is not possible in some areas without extensive offline realignment of the carriageway, or due to other physical constraints. Where proposed grade separations are achieved by elevating the mainline through alignment, a crest curve suitable for 50mph speeds is applied with one step relaxation as per DMRB. A maximum vertical gradient of 5% has been used. (See Table 4.1).

4.3 Blue Route Scenarios

4.3.1 As presented in the 2014 Strategic Appraisal of Alternatives Considered during draft Plan Consultation report, a range of options for the Blue Route have previously been considered, engineered and assessed, albeit at a strategic stage of appraisal. At that stage, three scenarios were appraised, ranging from a low cost option, to a route that aimed to be as attractive as possible to motorway users (with grade separated junctions joining the existing M4).

4.3.2 Now benefiting from an Early Contractor Involvement (ECI) joint venture project team, many of the assumptions and cost estimates made at that strategic stage of appraisal have been able to be challenged and/or revisited, as part of a review of responses received to the draft Orders and re-evaluation of previous work including the Professor Stuart Cole Blue Route Paper.

4.3.3 As a result, in addition to the three superseded options previously considered at the Plan making stage as published in 2014, four further Blue Route scenarios have been developed sequentially, taking into account the descriptions of the Blue Route provided by Professor Cole in the Blue Route Paper. These scenarios each develop on the previous to seek improvement to the operational performance at the various junctions along the route. The four additional scenarios considered in this appraisal are:

a) Blue Route Scenario 4: focusing on works to the A48 SDR route between M4 Junction 28 and M4 Junction 24, with a full dual provision on the A4810 up to M4 Junction 23a;

b) Blue Route Scenario 5: building on Scenario 4 to address identified operational issues by improving Junction 24 and keeping Beatty Road at grade;

c) Blue Route Scenario 6: building on scenario 5 and focussing on a range of improvements to the A4810 as far as M4 Junction 23A, keeping a spur to Junction 24;

d) Blue Route Scenario 7: building on Scenario 6 to address identified operational issues.

4.3.4 All of the Blue Route scenarios listed above take into account planned and committed measures including the Welsh Government's M4 Junction 28 Improvements project. This is also the case for the M4 Corridor around Newport Scheme proposals.

4.3.5 As is set out further in section 6.2, the Welsh Government met with Professor Stuart Cole in August 2016 to engage him on the development work undertaken to consider the Blue Route.

4.3.6 Plans of each of the Blue Route scenarios are provided in Appendix A.

4.4 Design assumptions

Scenario 4

4.4.1 Scenario 4 comprises grade separated junction improvements and closure of some side road connections along the A48 SDR between the Pont Ebbw

roundabout at the western end and the Beatty Road roundabout at the eastern end.

4.4.2 Describing the proposed changes west to east; Pont Ebbw would be grade separated, the connection to Lighthouse Road would be closed, the Maesglas junctions would be combined as one grade separated layout, a grade separated signalised junction would be provided at the docks entrance and would connect to the transporter bridge, Church Street roundabout would be removed, Usk Way would be grade separated by elevating the side roads, Corporation Road would be elevated on a bridge to provide grade separation, Nash Road would be left in/left out, Leeway Junction Roundabout would be grade separated with single lane slip roads, Balfe Roundabout would be removed, Hartridge Farm Roundabout would be grade separated, and Beatty Road roundabout would be grade separated. There would be no works to Cot Hill Junction.

4.4.3 Additionally there would be an upgrade of the A4810 from the TATA entrance to the M4 Magor Junction 23A to urban dual carriageway. The signalised left in/left out junctions to the B4245 would be retained with some modification to the layouts to connect to the proposed dual carriageway. Junctions at North Row and Bareland Street would remain as presently reconnected to the dual carriageway.

Scenario 5

4.4.4 Scenario 5 builds upon Scenario 4 with the following developments;

4.4.5 The slip roads at the Leeway Junction Roundabout would be upgraded to two lane and signalised at the roundabout and connections to Nash Road, to improve traffic movement.

4.4.1 The grade separated junction at Beatty Road has been identified as being too close to the M4 Junction 24 (Coldra). This is because the north facing slip roads would not be able to provide a safe method of entering the gyratory due to the restricted space available to merge into the A48 SDR and change lane. Scenario 5 would therefore revert back to the existing layout at grade roundabout at Beatty Road.

4.4.2 The layout and signal timings at M4 Junction 24 (Coldra) would be modified. This would allow greater opportunity for traffic entering from the A48 SDR to enter the inner lanes of the gyratory in order to exit onto the M4 eastbound merge slip road. Also an amendment to three lanes at the north east entry from the A48 Chepstow Road would increase opportunity for circulatory traffic to exit at the adjacent M4 eastbound merge slip.

Scenario 6

4.4.3 Scenario 6 builds upon scenario 5 with the following developments;

4.4.4 The full length of the A4810 from Queensway Meadows to the M4 Junction 23A at Magor would be improved. Describing the modifications west to east; the signalised McDonalds junction would be left in/left out, Meadows Road roundabout would be modified with a dedicated eastbound left turn lane, the junction near the new public house would be left in/left out, the signalised junction accessing Tarmac's site to the south would be left in/left out, Monks Ditch (Glan Llyn) Roundabout would be grade separated, the access to Newport Galvanising would be left in/left out, the direct access to Air Products would be closed and

diverted to the Newport Galvanising access, Gwent Euro Park roundabout would be grade separated, the Brewery roundabout would be upgraded (see below), M4 Junction 23A would be modified with a new westbound dedicated left turn lane.

4.4.5 A grade separation would not be provided at Meadows Road roundabout due to the cost and added complexity required to accommodate or divert two sets of overhead power cables spanning the A4810.

4.4.6 A grade separation would not be provided at the TATA access roundabout due to the proximity of the TATA building, which would necessitate a major realignment of a section of the A4810.

4.4.7 At the Magor Brewery a new larger roundabout would provide connectivity to Magor via a new single carriageway link to an upgraded roundabout on the B4245. This roundabout would replace of the existing B4245 signalised left in/left out junction. A grade separation is not practical nor cost effective due to the proximity of the railway and a substation near the brewery. At the section between the Magor Brewery and the M4 Junction 23A there would be three lanes southbound.

Scenario 7

4.4.8 Scenario 7 would enhance the capacity provided by Scenario 6, with the addition of the following measures:

a) An east arm to south arm dedicated left turn would be added to the Brewery roundabout in an attempt to allow traffic entering from the B4245 and heading towards the M4 more opportunity to enter and turn north from two flared entry lanes.

b) A north arm to east arm dedicated left turn would be added to the Brewery roundabout to ease the movement toward the B4245 from M4 Magor Junction 23A. This would be a lane drop from the third lane.

c) The new link between the Brewery roundabout and the B4245 would be urban dual cross section. This is as informed by traffic volumes and would be more suitable for connection to the proposed dedicated left facilities described above.

d) There would be an increased diameter and a dedicated left from the east to south arm at the B4245 roundabout.

e) The signalised north entry at Nash Road would be increased to two lanes.

4.4.9 Professor Cole has agreed in writing that he accepts the Scenario 7 as a fair representation of the Blue Route he envisaged. As described in paragraph 4.3.3, Scenario 7 also offers improved operational performance at junctions compared to Scenarios 4 to 6. Scenario 7 has therefore been taken forward for appraisal in this report.

4.5 Design Summary

4.5.1 Table 4.1 summarises the engineering assumptions made for each of the four scenarios (Scenario 4 to 7) considered in the 2016 Blue Route appraisal.

4.5.2 Complete layouts Plans of each of the Scenarios are provided at Appendix A.

Table 4.1: Summary of engineering assumptions and constraints

Location	Existing	Scenario 4	Scenario 5	Scenario 6	Scenario 7
A48 SDR - M4 Junction 28 to Queensway Meadows					
Tredegar Park, M4 J28	At-grade roundabout to four lane single carriageway link to Pont Ebbw.	M4 Junction 24 as existing. Dual to D2UAP to existing 4 lane road. A48 widened to the north. M4 Junction 24 as existing.			
Pont Ebbw	5-way Signalised at-grade roundabout	Traditional grade separated. Mainline over the top.			
Lighthouse Rd	Left in - left out T-junction (westbound only)	Close			
Maesglas West (Rugby Club)	3-way Roundabout	Single grade separated junction constructed to cater for all movements at Maesglas west. Single grade separated junction constructed to cater for all movements at Maesglas east. Reuse existing roundabout with the east arm becoming an eastbound merge link to the mainline.			
30mph link dual link between Maesglas roundabouts					
Maesglas East (Docks Way/ Landfill)	4-way Roundabout				
Alexandra Rd/ Eastway Rd (Docks Entrance)	5-way signalised cross-roads	New grade separated overpass carrying the mainline over the existing junction. The at-grade junction would be reconfigured and new signals would be installed. Four slip roads would connect the A48 SDR to the at grade junction. The westbound diverge would require new structures to span the flood plain of the Usk.			
Transporter Bridge	Signalised T-junction	Close junction, and connect to Alexandra Rd.			
Mill Parade/Church St.	3-way roundabout	Close roundabout and realign side roads for local connectivity. The A48 SDR is realigned on separate alignments for east and west bound carriageways. The westbound carriageway requires new structures to span the flood plain of the Usk.			
Usk Way	4-way signalised crossroads	Grade separated junction is provided with A48 SDR at grade and local connection provided to slip roads. The eastbound slip roads are provide at grade. The westbound slip roads are ramped and connect to an elevated signalised junction connecting to a new bridge over the A48 SDR.			
Usk Crossing		40mph Speed limit is maintained over the A48 SDR			
Corporation Rd	4-way signalised crossroads	Grade separated junction constructed. This allows the speed limit to be increased to 50mph form the current 30mph.			
Langland Way	Left in - left out T-junction (westbound only)	Retain left in/left out junction.			
Spytty Lane	Left in - left out T-junction (eastbound only)	Retain left in/left out junction.			

Location	Existing	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Nash Rd	4-way roundabout	Replace with left in/left out junction north and south	Replace with signalised left in/left out junction north and south		As Scenario 4, 5 & 6 but with two Lane entry at the new north junction.
Leeway Roundabout	4-way roundabout	New grade separated junction taking the A48 SDR over top of the roundabout. Four Single Lane slip roads are provided connecting to the A48.	New grade separated junction taking the A48 SDR over top of the roundabout. Four Two Lane slip roads are provided connecting to the A48. The roundabout is signalised to improve traffic flows.		
A4810 Queensway Meadows to Monks Ditch Roundabout					
Queensway Meadows McDonalds	Freeflow left in/left out with signalised right out.	Retained		Left in left out	
40mph Urban Dual		Speed limit of 50mph could be considered due to the removal of the traffic signals at McDonald's			
Meadows Road	4-way roundabout	Retained. Constrained vertically by high voltage power cables above.		Modify with eastbound dedicated left lane. Constrained vertically by high voltage power cables above.	
30mph Urban Dual		Retain 30mph Urban Dual due to limited length of this link			
A4810 SAR 'CHQ' Roundabout	3-way roundabout	Retained unmodified			
30mph Urban Dual		Retain 30mph Urban Dual due to the tight curves present on this section of the SAR.			
A4810 SAR Junction1 new near new public house	3-way signalised T-junction	Retained unmodified		Left in left out	
A4810 SAR Junction 2 - Tarmac	4-way signalised crossroads 40mph speed limit	Retained unmodified		Left in left out. Speed limit can be increased to 50mph	
Monk's Ditch Roundabout (Glan Llyn Roundbaout)	4-way roundabout 40mph speed limit	Retained unmodified		Grade separate by lifting the mainline over. Four Single lane slip roads connecting the SAR to the roundabout. The west facing slips would extent into the Tarmac junction (above) due to close proximity. Speed limit can potentially be increased to 50mph	
A48 SDR Steelworks Entrance to M4 J23A (Magor) – Existing single carriageway to be upgraded to Urban Dual					
New Steelworks Entrance Roundabout	3-way roundabout	Retain at grade roundabout. Modify eastern arm to dual two lane.			

Location	Existing	Scenario 4	Scenario 5	Scenario 6	Scenario 7
North Row (South – Redwick)	Ghost island priority junction	Left in/left out junction with dual two lane mainline			
North Row (North – Bishton)	Ghost island priority junction	Left in/left out junction with mainline			
Gwent Europark	3-way roundabout	Roundabout modified for dual carriageway alignment.		Grade separate by lifting the mainline over. Four Single lane slip roads connect SAR to the roundabout. The west facing slip roads extend to include the left in left out modification at North Row described above.	
Bareland Street	Left in - left out T-junction (eastbound only)	Left in/left out junction with dual carriageway (eastbound)			
Bareland Street	Left in - left out T-junction (westbound only)	Left in/left out junction with dual carriageway (westbound)			
Quay Point (Green Moor Lane / Magor Brewery South Gate)	3-way roundabout	Roundabout modified for dual carriageway alignment		Roundabout modified for dual carriageway cross section and reconfigured to four arm layout connecting to the new S2 cross section link to the B4245. The southbound carriageway between M4 Junction 28 and the Brewery roundabout would be three lane.	Roundabout modified for dual carriageway cross section and reconfigured to four arm layout connecting to the new dual carriageway cross section link to the B4245. The southbound carriageway between M4 Junction 28 and the Brewery roundabout would be three lane. Dedicated left turn facility added on north arm to ease travel toward the B4245. Dedicated left turn facility added on east arm to ease travel toward the SAR.
B4245 Newport Road (east)	Left in - left out signalised T-junction (westbound only)	Junction layouts and signals modified for dual carriageway alignment		Signals and left in left out junctions removed including short sections of link road connecting to the B4245.	
B4245 Newport Road (west)	Left in - left out signalised T-junction (eastbound only)	Junction layouts and signals modified for dual carriageway alignment		Signals and left in left out junctions removed including short sections of link road connecting to the B4245.	

Location	Existing	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Magor, M4 J23A	At-grade roundabout	Roundabout modified for dual carriageway alignment		Roundabout modified for dual carriageway alignment. Dedicated left facility added. The southbound carriageway between M4 Junction 28 and the Brewery roundabout would be three lane.	
Rogiet, M4 J23		Retained unmodified			
A48 SDR Balfe Road Junction to M4 J24 (Coldra)					
Balfe Road SDR Roundabout	3 Arm Roundabout	Remove Balfe Road link. Remove roundabout and construct a new section of SDR on a curve north of the South Wales Mainline. The speed would be limited to 30mph over the 150m radius.			
Hartridge Farm Road Roundabout	4 Arm Roundabout	New grade separated junction carrying the SDR over the existing roundabout. For single lane slip roads connect the SDR to the roundabout.			
Cot Hill	Left in/Left out, planned upgrade to Signals by others	Retain left in/left out on southbound SDR.			
Beatty Road	4 Arm Roundabout	New grade separated overpass with north facing slips connecting to Junction 24 gyratory.	Retain existing roundabout		
M4 J24 Coldra	6 Arm Signalised roundabout with through link A449 to M4 WB, and dedicated lanes M4 EB to A449 and M4 WB to A48 WB.	No change, but traffic control would need to be altered.	Expand the flare on the A48 North East entry arm to 3 lanes. Amend the south west section of the gyratory to enhance the exit to the B4237, and increase green time from A48 SDR.		

4.6 Construction and Programme

4.6.1 The construction of the Blue Route [online] along the existing A48 SDR and A4810 would require significant traffic management throughout the construction period. Reductions in the available running lanes and lane widths would be necessary to generate sufficient working space and safety clearances to construct the works.

4.6.2 Grade separation of existing junctions within a highly urban location requires substantial traffic management. This would have a significant impact increasing local traffic congestion for the duration of the construction period.

4.6.3 Typically the construction of grade separated junctions in an urban environment results in a fragmentation of construction activities, reduced construction output, increased safety risk and more complex planning and construction phasing compared to an off line scheme route. It is likely that concurrent working along

the length of the Blue Route would generate congestion in the Newport area significantly impacting local residents and businesses. To address this congestion impact, a combination of sequential construction and separation of concurrent junction work sites would be necessary.

4.6.4 Typically the construction of an individual grade separated junction in an urban location while maintaining existing traffic movements would be expected to take 18 to 24 months. The more difficult junction modifications adjoin each other and are predominately at the western end of the scheme. The overall construction period of the entire Blue Route would therefore be expected to be up to 8 years excluding the statutory process prior to commencing construction.

4.6.5 The lengthy construction period is likely to have a significant adverse impact on movements along the A48 SDR and A4810, including the strategic development area at Glan Llyn (the Eastern Expansion Area as identified within the Newport Local Development Plan). During the construction stage there would be disruption to access that would interfere with the planned development. This would be contrary to the Local Development Plan and national planning policy, which stresses the importance of housing delivery, especially on brownfield land, as is the case at Glan Llyn.

4.6.6 The procedure for consideration of alternatives is outlined in section 1.1 of this report. Should the Inspectors advise that the Welsh Ministers investigate further the Blue Route alternative, this scheme would require development in accordance with Welsh Transport Planning and Appraisal Guidance (WelTAG), surveys, preliminary design, leading to the preparation of new draft Statutory Orders, Environmental Statement and associated reporting. This would be likely to lead to a further Public Local Inquiry and this overall procedure could take up to four and half years before start of construction. The Blue Route could thus be open by 2031, assuming a Strategic Environmental Appraisal (SEA) is not required.

4.6.7 This compares unfavourably with the M4 Corridor around Newport Scheme, which if progressed to construction would see the proposed new section of motorway open in 2021, with the completion of reclassification works to the existing M4 in 2022.

5 Traffic

5.1 Existing traffic

5.1.1 The November 2015 M4 Corridor around Newport Local Model Validation Report explains how the M4 transport model is used to understand current traffic conditions in the area, to provide evidence for the planning of changes to the transport network and to produce traffic forecasts that are used in the detailed economic, social and environment appraisal of proposed interventions in the transport system. The transport model is made up of several components, including a highway assignment model, a public transport model and a variable demand model.

5.2 Traffic forecasting

5.2.1 The December 2016 M4 Corridor around Newport Revised Traffic Forecasting Report explains that traffic forecasts have been produced to inform the operational, economic and environmental evaluations of the new section of motorway to the south of Newport. The following scenarios have been tested:

a) A 'Do Minimum' scenario, in which committed transport improvement schemes have been added to the base year network; and

b) A 'Do Something' scenario, which includes the proposed new section of motorway to the south of Newport and reclassification of the existing M4 around Newport to an all-purpose road.

5.2.2 The traffic forecasts for the Do Minimum Core Scenario indicate that future traffic growth will result in severe congestion on the existing M4 which would result in increased journey times.

5.2.3 It should be noted that the model represents typical operating conditions during the AM, PM and Inter-Peak periods of a normal day. It does not therefore take into account conditions on those occasions when an incident takes place on the network and the resultant disruption, increasing congestion and increased journey times that arise.

5.2.4 The M4 transport model has been used to test the Blue Route scenarios, with the same assumptions made in the appraisal of the M4 Scheme, excluding the reclassification measures on the existing M4, which would not be reclassified with the Blue Route scenario (as there would not be a new section of motorway). The transport modelling has been undertaken in accordance with Government guidance and best practice, using the same methods used to appraise the M4 Scheme.

5.2.5 To assist any comparison of performance of the Blue Route, it is useful to understand how the proposed M4 Corridor around Newport Scheme would perform in traffic terms.

5.2.6 The M4 Corridor around Newport Revised Traffic Forecasting Report (December 2016) outlines:

a) For the Do Something Core Scenario, with the inclusion of the proposed new section of motorway to the south of Newport, the traffic volumes on the reclassified existing M4 between Junctions 23 to 29 would be reduced. Unlike the Do Minimum Scenario, this section of the route around Newport is not expected to be congested by the year 2037. Journey times along the existing M4 would be expected to reduce during peak hours as a result of the relief provided by the new motorway.

b) The proposed new section of motorway is also expected to reduce traffic flows on local roads within Newport as capacity is released on the reclassified existing M4 and the A48 Southern Distributor Road. Journey times along the proposed new section of motorway would be expected to reduce compared to those on the existing M4 in the Do Minimum scenario.

c) In summary, the new section of motorway would address the current and future congestion problems on the M4 around Newport. The Scheme would provide sufficient capacity and resilience to the network by taking up to about half of all traffic and most of the Heavy Goods Vehicles (HGVs) from the existing M4 to the new section of motorway. Through traffic would use the new section of motorway, whilst the reclassified existing M4 would continue to carry traffic connecting north of Newport, such as to the A4042 and A449.

5.3 Blue Route Traffic Results

5.3.1 An assessment of the traffic operational issues of each of the four Blue Route scenarios (4 to 7) has been undertaken. Traffic forecasts have been produced for the AM peak, inter-peak and PM peak hours for the assumed forecast years of 2022 (the opening year for the proposed new section of motorway south of Newport) and 2037 (the design year). This allows comparison of the Blue Route with the M4 Corridor around Newport Scheme. However, as explained in section 4.5, the Blue Route is more likely to be open by 2031, meaning in practice the opening year and design year of the Blue Route would be later than the modelled years as part of this appraisal.

5.3.2 More detailed transport modelling has been undertaken of Blue Route Scenario 7, in light of the fact that Professor Cole has agreed in writing that he accepts the Scenario 7 as a fair representation of the Blue Route he envisaged.

5.3.3 In the Blue Route Scenarios 4, 5, 6 and 7 the traffic flow figures demonstrate that the Blue Route would offer little relief to congestion along the existing M4 around Newport. It would not serve to attract through traffic, but it would provide better access to Newport once completed, acknowledging there would also be localised negative impacts on existing access arrangements along the A48 SDR and A4810, such as at the strategic Glan Llyn development area.

5.3.4 This is demonstrated by the transport modelling results for Scenario 7 that indicate the Blue Route works would see traffic volumes increase along the roads throughout its length. On average traffic volumes along the Blue Route roads would increase by around 42%, although levels are much greater or much lower than that average depending on location. Typically the uplift in flows is greater in an eastbound direction along the A48 SDR, and greater westbound along the

A4810, which indicates traffic travelling towards the centre of Newport rather than passing Newport.

5.3.5 Despite all of the Blue Route Scenarios performing poorly in terms of attracting motorway traffic, Scenario 7 performed marginally better than the others.

5.3.6 On average, Blue Route Scenario 7 would achieve less than 10% reduction in traffic on nearly all sections of the existing M4, with an average 6% reduction in traffic volumes on the M4 around Newport in an assumed opening year (2022).

5.3.7 It would marginally increase the traffic levels on the heaviest trafficked section of the M4 around Newport between Junction 28 and Junction 29.

5.3.8 The average reduction would reduce by the assumed design year (2037) to around 2.5%, largely as a result of traffic growth in the region, and the fact that the Blue Route would only offer limited additional capacity to the highway network. This means that the limited benefits of the Blue Route to providing relief to motorway traffic would begin to be offset by 2037 and there would be locations along the Blue Route where the traffic would be likely to reach the capacity of the road by the design year, resulting in operational problems, with queues forming along the Blue Route. However, as explained earlier and at section 4.5, the Blue Route is more likely to be open by 2031, meaning in practice the design year of the Blue Route would be later (2046).

5.3.9 It should be noted that the results are based on typical operating conditions and do not therefore take into account conditions on those occasions when an incident takes place on the network and the resultant disruption, increasing congestion and increased journey times that arise. However, it is considered that the Blue Route Scenarios would perform worse in those untypical conditions in light of the capacity constraints.

6 Selection of options for appraisal

6.1 WelTAG

6.1.1 WelTAG is the Welsh Transport Planning Appraisal Guidance.

6.1.2 WelTAG reporting process associated with the M4 proposals culminated in the M4 Corridor around Newport Stage 1 & 2 Appraisal Report (July 2014), with the adoption of the M4 Corridor around Newport Plan and modified Preferred Route. It is not intended to revisit that series of appraisal and associated reporting. However, it is logical to apply the principles of WelTAG to the appraisal of the Blue Route, as a transport option identified by objectors' as an alternative, and given the interest in the Blue Route, requiring proper consideration. It is considered that appraisal of the Blue Route against the Welsh Impact Areas and Transport Planning Objectives will provide robust appraisal and allow proper consideration of it at the planned Public Local Inquiry.

6.1.3 WelTAG was formally published by the Welsh Government in 2008. Paragraph 1.1.1 of WelTAG states that the guidance, "….has been developed by the Welsh Assembly Government with the intention that it is applied to all transport strategies, plans and schemes being promoted or requiring funding from the Welsh Assembly Government".

6.1.4 WelTAG has two primary purposes:

a) "To assist in the development of proposals enabling the most appropriate scheme to be identified and progressed – one that is focused on objectives, maximises the benefits and minimises negative impacts; and

b) To allow the comparison of competing schemes on a like-for-like basis, so that decision-makers can make funding decisions".

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

6.1.6 WelTAG sets out that strategies and schemes need to be appraised against Transport Planning Objectives (TPOs) and the Welsh Impact Areas. For schemes, there is a formal and standardised two-stage appraisal process. Following Stage 1 appraisal, usually a small number of options will be further developed and then appraised at scheme level in considerable detail in Stage 2.

Whilst works to the A48 SDR and A4810 have been appraised separately, the Blue Route as outlined by Professor Stuart Cole has not formed part of the 2013 WelTAG Stage 1 appraisal associated with the M4 proposals, as the Blue Route had not been suggested at that stage. The 2014 Strategic Appraisal of Alternatives Considered During Consultation report included strategic appraisal of the then assessed Blue Route, against the Welsh Impact Areas and Transport Planning Objectives, aligned to the WelTAG Stage 1 guidance. More detailed appraisal is expected at WelTAG Stage 2, and assessment of the Blue Route aligned to the WelTAG Stage 2 guidance is presented in Sections 7 to 10 of this report, where practicable. Chapter 4 of the M4 Corridor around Newport Environmental Statement summarises the alternatives considered.

6.2 Participation

6.2.1 Around 94 objections to the March 2016 M4 Corridor around Newport draft Statutory Orders included reference to the Blue Route, although no further information was received as part of those objections to assist the Welsh Government to engineer and assess it.

6.2.2 The Welsh Government met with Professor Stuart Cole in August 2016 to engage him on the development work undertaken to consider the Blue Route, in preparation for the M4 Corridor around Newport Public Local Inquiry, to help with the understanding of the Blue Route design assumptions. Professor Stuart Cole acknowledged himself as the originator of the Blue Route concept but confirmed he does not intend to promote it as an alternative at the Public Local Inquiry. Professor Stuart Cole explained that he envisaged the Blue Route as a 'relief road' to the M4 around Newport and had always considered works to the A4810 as a key component of his concept. Professor Cole has agreed in writing that he accepts the Scenario 7 as a fair representation of the Blue Route he envisaged.

6.2.3 On 4 October 2016 Cycling UK confirmed in email correspondence their intention to propose the Blue Route as an alternative, explaining that the Blue Route description can be found at Professor Stuart Cole's IWA paper 'The Blue Route' (December 2013), with web link provided. Cycling UK wrote to explain that:

"This has been furthered by the Welsh Government working with Professor Cole as Scenario 7 – and will be submitted into evidence by either Welsh Government or Professor Cole. Professor Cole will be submitting the Blue Route Report as well as Addendums as part of his proof of evidence".

6.3 Engineering and traffic performance

6.3.1 Key engineering issues are set out in Section 4.4, whilst the expected performance of the identified Blue Route scenarios in terms of impact on traffic and their ability to address the transport related problems is set out in Section 5.3.

6.4 Selection of Blue Route Scenario for Appraisal

6.4.1 Taking into account the above, the Blue Route Scenario 7 has been selected for further appraisal.

7 Economic Appraisal

7.1 Overview

7.1.1 This section sets out the results of the economic appraisal for the M4 Corridor around Newport Scheme and then for the Blue Route. A comparison of the Blue Route against the M4 Corridor around Newport Scheme is provided at section 10.2 of this report.

7.1.2 The December 2016 M4 Corridor around Newport Revised Economic Appraisal Report considers the likely costs and benefits of the Scheme, providing an indication of value for money (this is typically referred to as the Transport Economic Efficiency in WelTAG). The economic appraisal considers the costs and benefits of a transport scheme that are accrued over a 60 year period in monetary terms. Guidance on undertaking economic appraisals for transport schemes is given in the Department for Transport's Transport Analysis Guidance (WebTAG). The economic performance of the Scheme has been assessed by comparing the costs of the Scheme with the benefits that the Scheme would deliver. Costs and benefits are assessed over the 60 year period and discounted to a present value.

7.1.3 To assist any comparison of the performance of the Blue Route, it is useful to understand how the proposed M4 Corridor around Newport Scheme would perform in economic terms.

7.1.4 The December 2016 M4 Corridor around Newport Revised Wider Economic Impact Assessment Report considers the likely impacts of the proposed Scheme on the economy, during its construction and operation (this is typically referred to as the Economic Activity and Location Impacts in WelTAG). Applying the same approach, an assessment has been undertaken of the Blue Route, to consider any benefits to the economy of Newport and beyond, also taking into account benefits that aren't quantified.

7.2 M4 Corridor around Newport Scheme Results

Transport Economic Efficiency (TEE)

7.2.1 The Scheme cost estimate is £1,093m. The economic appraisal of the scheme includes allowance for costs incurred during the current design stage and the costs of the reclassification of the existing M4. The costs used in the appraisal are shown in Table 7.1.

Table 7.1: Cost estimates for the M4 Scheme (£m Q4 2015)

Component	Scheme Costs
Preliminaries including Traffic Management	£212.0
Roadworks	£268.0
Structures	£297.1
Landscaping and environmental works	£44.8
Works by other authorities	£38.3
Land and Compensation costs	£91.9

Component	Scheme Costs
Risk and Optimism Bias	£141.3
Project Estimate excluding VAT and Inflation	**£1,093.2**
Key Stage 4 Costs	£22.0
Reclassification and reconfiguration of Caerleon Junction[15] (including Optimism Bias)	£16.2
Total Costs for Economic Appraisal	**£1,131.3**

7.2.2 The Scheme's economic appraisal is shown in Table 7.2, indicating that the proposals would provide benefits greater than the costs, offering value for money:

Table 7.2: M4 Corridor around Newport Scheme Economic Appraisal Results

Present Value of Benefits (PVB)	£1,541.0
Present Value of Costs (PVC)	£952m
Net Present Value (NPV)	589m
Benefit to Cost Ratio (BCR)	1.62
All values in £000s, in 2010 market prices discounted to 2010	

Economic Activity and Location Impacts (EALI)

7.2.3 The economic appraisal also includes an assessment of Wider Impacts. Wider Impacts relate to a range of wider economic benefits that occur as an indirect consequence of the improvement in transport conditions. If Wider Impacts are included, the BCR for the Scheme increases to 2.23.

a) The Scheme would also result in improved journey time reliability and would reduce the costs of delays due to traffic incidents. The effects of this are not quantifiable but are expected to be of significant benefit to the Welsh economy.

b) The Scheme would have a positive impact on the economy of South Wales specifically. The construction of a scheme of this nature would have economic impacts in its own right, and whilst employment effects of the Scheme are temporary, the investment in training associated with the scheme is expected to have a lasting positive impact on the construction sector in the region.

c) Once operational, the scheme will reduce transport costs for business and provide businesses in Wales with improved access to domestic and international markets. The Scheme would reduce journey times and improve access to key residential and employment sites. For residents of South Wales, the Scheme would reduce journey times and improve access to employment opportunities.

d) Overall, the Scheme is expected to improve perceptions of Wales as a place to visit and do business, and stimulate new investment.

[15] These costs are not being delivered as part of the contract to construct the proposed new motorway.

7.2.4 It should be noted that the M4 Scheme economic benefits include appraisal of the disbenefits during construction, accident benefits and maintenance benefits. These elements of the economic appraisal are not included in the appraisal of alternatives in light of the limited information available compared to the Scheme, however they form a minor contribution to the overall calculated benefits. Whilst they form a minor contribution to the overall calculated benefits, it should be acknowledged that the Blue Route would have a lengthy construction period and require significant traffic management with associated disbenefits during construction. These have not been captured in the appraisal.

7.3 Blue Route Results

Transport Economic Efficiency (TEE)

7.3.1 Cost estimates for the Blue Route Scenario 7 (£m Q4 2015) are provided in Table 7.3.

Table 7.3: Cost estimates for the Blue Route (£m Q4 2015)

Component	Scheme Costs
Preliminaries including Traffic Management	£123.0
Roadworks	£106.2
Structures	£97.3
Landscaping and environmental works	£1.1
Works by other authorities	£96.7
Land and Compensation costs	£114.4
Risk and Optimism Bias	£237.0
Project Estimate excluding VAT and Inflation	**£775.5**
Key Stage 4 Costs	£62.3
Total Costs for Economic Appraisal	**£837.8**

7.3.2 It has been assumed that the maintenance costs throughout the 60 year period required for economic appraisal would be the same as for the Do Minimum highway arrangements.

7.3.3 It is important to note that the cost estimates for the Blue Route in this Report cannot be directly compared with the 2014 Blue Route appraisal due to different assumptions and base costs being applied, now benefiting from early contractor involvement.

7.3.4 As outlined above, an economic appraisal has been undertaken, excluding accident benefits and benefits during construction and maintenance works. It should be noted that these impacts are included in the economic appraisal of the M4 Scheme. The calculation of transport user benefits is based on outputs from the M4 Corridor around Newport transport model. The results of the economic appraisal are provided in Table 7.4.

Table 7.4: Blue Route Economic Appraisal Results

Present Value of Benefits (PVB)	£624.4
Present Value of Costs (PVC)	£660.8
Net Present Value (NPV)	-£36.4
Benefit to Cost Ratio (BCR)	0.94
All values in £000s, in 2010 market prices discounted to 2010	

7.3.5 The results of the economic appraisal for the Blue Route indicate that the NPV would be negative and the BCR would be less than 1 at 0.94. Therefore, the costs of the Blue Route outweigh the benefits it would deliver to users.

7.3.6 This BCR for the Blue Route excludes safety impacts as well as impacts during construction and maintenance. Given the high level nature of design development for the Blue Route, for modelling purposes it has been assumed that the timetable for construction is as calculated for the proposed M4 Scheme. However, as set out in section 4.4 of this report, it should be acknowledged that the Blue Route would necessitate a construction period likely to be up to 8 years with significant traffic management measures that would result in disruption to traffic with associated disbenefits.

7.3.7 Wider Impacts have also been assessed for the Blue Route. These are substantially lower than for the proposed Scheme but result in an adjusted BCR for the Blue Route of 1.37.

7.3.8 As noted in Section 5, the model represents typical operational conditions on the highway network. As a result, benefits of the scheme that relate to improvements in journey time reliability or network resilience have not been quantified and are excluded from the BCR. Notwithstanding this, the economic appraisal of the Blue Route suggests that it offers low value for money and performs poorly in economic terms in comparison with the proposed Scheme.

Economic Activity and Location Impacts (EALI)

7.3.9 In general terms, local and regional economic benefits of transport projects are derived from changes in transport costs and improved accessibility.

7.3.10 Whilst the Blue Route would provide additional network resilience which would reduce the costs of congestion and disruption during incidents, the Blue Route would have a limited impact in reducing transport costs and improving journey times.

7.3.11 During operation, a range of transmission mechanisms have been identified through which the proposed scheme is expected to benefit the local and regional economy. These are listed with reference to the likely relative performance of the Blue Route:

a) Reducing transport costs for businesses in the study area by providing faster and more reliable transport for business travellers and for the movement of goods;

The Blue Route would deliver minor improvements in reliability and some reductions in journey times. Transport cost savings for business users are likely to be limited.

Upon construction, the Blue Route would provide improvements to accessibility in southern Newport if local accesses are maintained, although there would be operational problems along the Blue Route by the design year (2037), meaning that the benefits would begin to be offset by traffic growth and associated capacity issues.

During and post construction there would be adverse impacts on some existing access points along the A48 SDR and A4810 to businesses and development areas, including at Glan Llyn.

b) Improving the functioning of the labour market in South Wales by increasing access to employment opportunities for workers and improving access to a suitable workforce for firms;

The Blue Route would improve accessibility in and around Newport which would improve the functioning of the labour market. However, such impacts would likely be local and limited.

c) Improving productivity by fostering agglomeration effects within South Wales and the South West of England and reducing travel times to other UK cities;

Transport improvements can foster improved economic performance by improving accessibility. The Blue Route would have limited benefits in contributing towards higher productivity by improving accessibility within South Wales and by reducing journey times between South Wales and other UK cities.

d) Stimulating land use change and new investment by improving access to key employment sites in the south of Newport;

During operation, the Blue Route could improve perceptions of Newport as a business location and improve access to local employment sites, potentially increasing local investment and employment. In some locations, such as Glan Llyn, there would be localised disbenefits as a result of works having adverse impacts on existing access arrangements. However, by 2037 the benefits would be reduced as a result of traffic growth and associated capacity issues. Increased traffic flows along the A48 SDR would increase traffic congestion around Junction 28, even taking account of planned improvements to this junction, where a number of large employers are situated.

e) Improving perceptions of South and South West Wales as a place to visit and do business.

The Blue Route would deliver an incremental improvement in transport conditions rather than a step change in accessibility. Impacts on business and visitor perceptions would be relatively slight.

7.3.12 During construction, the Blue Route would deliver a significant, albeit largely temporary boost to the construction and associated sectors. The extent to which

these construction jobs could be filled by local workers depends on the availability of suitably skilled local people.

7.3.13 Disruption during construction would be significant and likely further impact upon the movement of people and freight in and around Newport. These impacts during construction on roads such as the A48 SDR and A4810 would have a detrimental impact upon the local economy.

7.4 Impact on land and property

7.4.1 Land-take associated with the Blue Route would result in some adverse impacts on businesses and commercial operations along the A48 SDR and A4810 corridor. The re-design of the route and the access arrangements would likely involve land acquisition and diversion of major gas pipelines associated with the industrial activities at Air Products and Solutia.

7.4.2 Graphical Information System (GIS) analysis has been undertaken to approximate the Blue Route's likely impact on residential property. GIS indicates approximately 20 properties would be at high risk of demolition as a result of the proposed Blue Route works and required land take. GIS indicates that approximately 575 properties would be significantly affected or could be blighted by being situated within 100m of the Blue Route. These would experience increased noise and air pollution.

7.4.3 GIS analysis has been undertaken to approximate the Blue Route's likely impact on commercial property. GIS indicates approximately 15 commercial land plots and properties are within 30m and would be at high risk of demolition as a result of the Blue Route. GIS indicates approximately 95 plots of commercial land and properties would also be within 100m of the proposed Blue Route, and could therefore be blighted with increased noise and air pollution. In particular, commercial properties within the Usk Side Business Park, East Retail Park, Newport Retail Park and Anchorage Yard would be affected by the Blue Route.

7.4.4 GIS analysis has been undertaken to approximate the Blue Route's likely impact on utilities. It is estimated that around 15 utility lines would intersect the proposed Blue Route. Three types of underground electricity line, surface water drainage pipes, and hydrogen, oxygen and nitrogen pipelines intersect the route. Many telecoms and electricity pylons and overhead lines would be affected by the proposed route. There are associated risks and costs to diverting or mitigating these anticipated impacts.

7.4.5 Furthermore, the Blue Route works would most likely result in significant impact upon the Air Products site to the south of Newport, which is a COMAH (Control of Major Accident Hazards) site. Associated with this the Blue route passes through the 'Inner Zone' of the Health and Safety Executive's Consultation Zones associated with Air Products Limited's Hazardous Substances Consent. The consultation zones are shown at Figure 7.1.

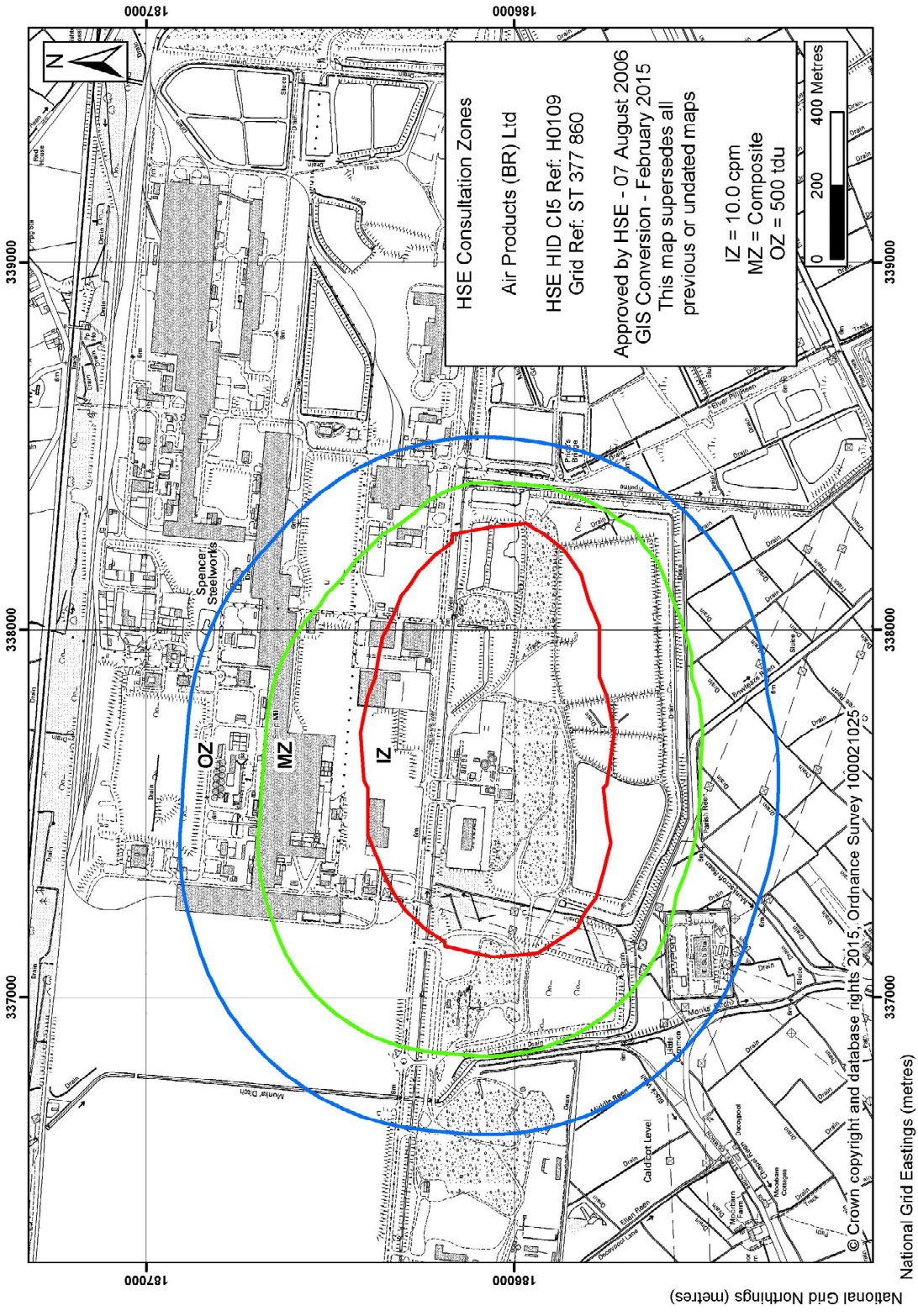


Figure 7.1: HSE Consultation Zones, Air Products

7.4.6 In accordance with the Health and Safety Executive's Land Use Planning Tool the HSE would 'Advise Against' the construction Blue Route due to increased safety concerns. Should the Blue Rote be constructed the Hazardous Substances Consent would need to be reviewed by the HSE. This may lead to activities currently undertaken by Air Products Limited being restricted through modification to the consent or stopped entirely by revoking the consent. There are associated risks and costs to mitigate this anticipated impact.

7.4.7 The Blue Route could also impact on proposed employment and residential developments and land allocations. In particular, this could have an adverse impact on the Glan Llyn development, should the area become a less attractive place to live as a result of increased traffic with associated adverse impacts on severance, noise and air quality.

8 Environmental Appraisal

8.1 Overview

8.1.1 This section sets out the results of the environmental appraisal for the Blue Route. A comparison of the Blue Route against the M4 Corridor around Newport Scheme is provided at section 10.2 of this report.

8.2 Noise

8.2.1 The Blue Route would provide a negligible noise change along the M4.

8.2.2 By contrast, properties near the roads which would form the Blue Route would experience a noise increase of approximately 2 to 3 dB. There are approximately 2,000 properties within 200m of the Blue Route that would experience a noise increase both during construction and once the works have been completed. Design measures would need to be explored that may offer some mitigation, for example noise barriers. However it should be noted that these can provide significant visual impacts when situated close to receptors such as residential properties, which would be the case along some lengths of the Blue Route.

8.2.3 Overall, there would not be a benefit to the Newport residents who live alongside the existing M4, whilst noise levels would worsen along the Blue Route.

8.3 Local Air Quality

8.3.1 There are currently no Air Quality Management Areas (AQMAs) along the roads that would form the Blue Route. Air quality monitoring is undertaken by Newport City Council adjacent to the A48 Southern Distributor Road (SDR) section of the suggested Blue Route. Monitoring was also undertaken as part of the Scheme specific monitoring undertaken by Welsh Government which was used to inform baseline air quality conditions in the Environmental Statement for the proposed M4 Corridor around Newport Scheme.

8.3.2 Monitoring results shows that all relevant air quality objectives are currently met along the Blue Route roads, however some areas in close proximity to the A48 SDR do experience elevated NO_2 concentrations.

8.3.3 The latest monitoring results available from 2015 at Alexandra Road, show annual mean nitrogen dioxide (NO_2) concentrations to be 31µg/m^3, more than 75% of the annual mean NO_2 objective (40µg/m^3). Measured annual mean NO_2 concentrations were 31µg/m^3 at Spytty Lane, with lower concentrations recorded at Fosse Road and Newport Athletic Stadium, 21µg/m^3 and 24 µg/m^3 respectively. The monitoring locations at Fosse Road and Newport Athletic Stadium were however at a greater distance from the road than the Spytty Lane and Alexandra Road monitoring locations. Monitoring of particulate matter (PM_{10}) was also undertaken at Newport Athletic Stadium which recorded annual mean PM_{10} concentrations of 17µg/m^3, less than 50% of the annual mean PM_{10} objective.

8.3.4 The Blue Route would lead to an increase in traffic along the A48 SDR and A4810 to Junction 23A of the existing M4. The Blue Route works would see traffic volumes increase on average by around 42%, although levels are much greater or much lower than that average depending on location. Properties and designated sites within 200m of the Blue Route (approximately 2,000 properties) would experience a deterioration in local air quality both during construction and once the works have been completed as a result of the increase in traffic. Given the measured existing elevated NO_2 concentrations adjacent to the A48 SDR, an increase in traffic would result in a risk of exceeding the annual mean NO_2 objective at properties situated within 100m of the route. GIS indicates there are approximately 575 properties within 100m of the Blue Route, which would be adversely effected.

8.3.5 Residents of Newport close to the existing M4 experience poor air quality as a result of motorway traffic. Out of seven Air Quality Management Areas designated by Newport City Council, four are influenced by the existing M4. As a result of the limited relief provided to the existing M4, there would be negligible benefits to the four Air Quality Management Areas in Newport that are associated with the existing M4. This would mean that motorway traffic would continue to contribute to poor air quality and associated human health problems in Newport.

8.4 Greenhouse Gas Emissions

8.4.1 The nature of works for the construction of the Blue Route would be likely to have a relatively low Capital Carbon impact. However, during construction, which would take up to 8 years as an on-line improvement, would involve a substantial increase in congestion on the existing roads forming the Blue Route, resulting in additional tailpipe emissions.

8.4.2 Once constructed, the Blue Route would initially provide some small improvement to congestion problems on the existing M4 around Newport and therefore the User Carbon would remain close to that of the Do-Minimum scenario. However, future traffic growth would then see further congestion problems, and thus increase emissions overall.

8.5 Landscape and Townscape

8.5.1 The Blue Route would pass through a number of important national and local landscape designations, these include:

- River Usk / Afon Wysg SAC and River Usk (Lower Usk) / Afon Wysg (Wysg Isaf) Site of Special Scientific Interest (SSSI);
- Gwent Levels Site of Special Scientific Interest (SSSI) – Nash & Goldcliff;
- Gwent Levels SSSI – Redwick & Llandevenny;Gwent Levels National Landscape Character Area (NLCA) 34; and
- Cardiff Bay & Newport NLCA 35.

8.5.2 Appraisal takes into account the Local Landscape Character Areas (LCA) as defined in the M4 Corridor around Newport Environmental Statement, Chapter 9 Landscape & Visual Effects, 2016. These LCA's were determined using

extensive analysis of the five aspects set out in LANDMAP to identify common characteristics representative of particular land areas in the locality.

8.5.3 The Blue Route would largely follow the alignment of the existing A48 and A4810 highway corridors. Along this alignment new elevated structures would be commonplace with associated built form such as retaining walls, widening of carriageway and junction alterations. These changes would add detracting features into the landscape as well as result in land and vegetation loss. The Blue Route would pass through 6 of the 11 Local Landscape Character Areas, of these it is considered that only LCA 7: Caldicot Levels, would see likely significant impacts in Landscape Character primarily due to the addition of new transport infrastructure to greenfield land.

8.5.4 The alignment of the Blue Route would largely navigate urban and/or suburban settlements. Due to the proximity of residential development, which is mainly alongside the existing A48 and A4810 Queen's Way, there are a large number of residential, non-residential and recreational receptors, as well as those of a transient nature passing along adjoining minor roads. The Blue Route would introduce new built form in the way of structures and retaining walls, which although commonplace, are sometimes considered detracting features within the current landscape setting, are likely to have a number of significant impacts on a large number of sensitive visual receptors in close proximity to the route.

8.5.5 Likely impacts along the Blue Route, west to east, are set out below:

a) The western end of the Blue Route would pass through LCA 1: Michaelston-y-fedw, which is broadly of urban character. Introduction of new structures and a number of retaining walls would incur some land and vegetation loss, with a small plot of existing allotment gardens being lost adjacent to Pine Grove. The elevated structures would be a dominant feature and may be seen by receptors in close proximity. Tredegar Park, a National Trust property, would likely experience clear unobstructed views of the structure.

b) A small portion of land would be lost as a result of the offline at-grade road alignment to the south of Church Street. The elements largely fall within the existing A48 corridor and on the boundary between LCA 3: Newport Docks & Uskmouth and LCA 4: Newport. Both LCA's are considered to be urban edges and/or extents of the surrounding city. The introduction of the built form would align with the current urban characteristics and the loss of land would have limited impacts on the character of the townscape. When viewed from close proximity, residential receptors around Alexandra Road would experience a change in view with the retaining walls and structures reducing the view across towards the Transporter Bridge.

c) Recreational and residential receptors using the Wales Coastal Path and Coronation Park east of the River Usk may also see an impact to the foreground view of the city. Adding additional structures and retaining walls may not be considered wholly out of character with existing views, however, these changes have the potential to have likely significant impacts when viewed by residential receptors close by.

d) The area around Corporation Road is currently dominated by transport infrastructure with the surrounding area being a mix of small open green spaces and brownfield sites with many currently under residential

development. The Blue Route would add additional structures into the view for residential receptors close by.

e) The Blue Route would largely follow the existing A48 alignment with the introduction of a wider carriageway and two new structures. The widening of the carriageway would see some vegetation loss along the alignment opening up views to those receptors in close proximity.

f) The Blue Route would add an additional structure to the existing A48 alignment at the Hartridge Farm roundabout. An offline alignment around the Balfe Road roundabout would result in loss of vegetation and land. Residential receptors located on the southern extents of Bishpool, which are in close proximity to the A48 corridor, would be likely to see a change in the view through additional structures and built form. Recreational areas located to the south of the alignment would result in land take and loss of some vegetation, this would change the view from receptors in close proximity and remove an area of recreational land adjacent to Llanwern High School.

g) The Blue Route would follow the A4810 Queen's Way with the introduction of two new structures over Monk's Ditch Roundabout and Green Moor roundabout. The Blue Route would run through LCA 6: Llanwern Steel Works at this location which is defined as a low lying, formal coastal flat, once heavily developed with industry. About half of the LCA is now brownfield land following dismantling of the steel plant and/or land undergoing redevelopment. The other half consists of industrial and office buildings, which includes the TATA steelworks, with large areas of tarmac and car parking.

h) Land loss would be minimal along the existing A4810, however, the Blue Route would run across existing open fields to the west of Magor. This would result in loss of allotments and agricultural land which lies between the edge of Magor and the existing A4810 Queen's Way. This section of the Blue Route passes through LCA 7: Caldicot Levels which is considered open, low lying, flat and exposed landscape, with a varied pattern of regular and irregular fields of reclaimed pasture and drainage channels. Severance of these field patterns by introduction of the Blue Route and loss of land and agricultural land would be considered to have a likely significant impact on the character of LCA 7. The route would also pass through LCA 9: Magor & Undy which is made up of suburban residential settlements and defined by the M4 corridor and the mainline railway. This would be considered to have a likely significant impact on the character of parts of LCA 9.

8.6 Biodiversity

8.6.1 Works to the A48 Usk Way adjacent to the west side of the River Usk in order to accommodate the Blue Route would result in a land take of approximately 0.1ha of the River Usk SSSI and SAC. This is represents approximately 0.02% of the designated site. At this strategic stage, with the implementation of appropriate mitigation, it is concluded that whilst there is potential for a significant impact on the SAC, requiring appropriate assessment to be carried out, there would be no likely significant adverse effect on the integrity of the SAC.

8.6.2 Works to the A48 through the Gwent Levels SSSIs - the Redwick and Llandevenny SSSI (floodplain grazing marsh with a range of plants and invertebrates associated with the reens and ditches of the drainage system) would result in the loss of a short section of reen within the SSSI. New sections of reens could however be constructed to mitigate losses from the development of the Blue Route.

8.6.3 Table 8.1. shows that non-statutory sites that would be impacted by works for the Blue Route include several Sites of Importance to Nature Conservation (SINCs):

Table 8.1: Non-statutory Sites within Land-take or Zone of Influence

Site Name	Description	Wildlife Site Qualifying Features	Potential impacts
Afon Ebbw River	Major river system with associated semi-improved neutral grassland and marshy grassland, swamp, scrub and semi-neutral woodland. Habitat for bulbous foxtail (*Alopecurus bubous*), kingfisher, sand martin, grass snake	H15-Major river system	A48 bridge over the SINC would result in construction impacts, loss of land and localised permanent shading from new bridge.
Monkey Island	H20 - Mosaic habitats and H18 – Post industrial Land.	Mosaic post industrial grassland, scrub and ruderal. Several blue pimpernel found on the site. The only known record in Gwent.	Site adjacent to B4237 / A48 junction works to east of Afon Usk. Potential for impacts during construction and drainage.
Ringland Way Marsh	Reed, swamp and marsh, with wet grassland areas; supports bird species including Cetti's warbler and reed bunting (a UKBAP Priority Species).	H7 - Marshy grasslands, H11 - Fens, reed beds and other swamps, S2	Site adjacent to road widening of A48 east of Liswary. Potential increase in drainage.
Flat Wood	Remnants of ancient semi-natural woodland	H1 - Woodlands.	Site adjacent to works to M4 junction 24 roundabout. Potential construction and drainage impacts.
Coed Rhedyn/Scotch Wood	Ancient semi-natural woodland	H1-Woodlands	0.2ha of ancient woodland adjacent would be lost during widening of M4 to east of junction 24.
Hartridge Wood	Ancient semi-natural woodland.	H1 - Woodlands.	No impact envisaged.
Coldra Wood	Ancient semi-natural woodland on base-rich soils with rich ground flora.	H1-Woodlands	No impact envisaged.

8.6.4 Loss of small areas of woodland and individual trees would occur as a result of works for the Blue Route at the following locations:

a) A48 south of Maes-glas under footprint of new Afon Ebwy bridge;

b) A48 south of Liswerry;

c) A48 to east of Alway; and

d) Cwm woodland to west of M4 Junction 24.

8.6.5 The loss of relatively small pockets of plantation woodland along existing networks is also considered to be likely. These losses could be mitigated through the planting of species rich native woodland that would be appropriately managed in the long term.

8.6.6 Approximately 0.2ha ancient woodland adjacent to Coed Rhedyn/Scotch Wood SINC would be lost during as a result of works that would be undertaken around Junction 24 of the existing M4. A survey to assess the condition of areas of ancient woodland would be required at detailed design stage to ascertain the extent and requirement for mitigation.

8.6.7 Works to the A48 and B4245 would likely result in the loss of up to 500m of hedgerow. Approximately 30m of this is classified as species rich hedgerows. All hedgerows are UKBAP priority habitats listed on Section 42 of the Natural Environment and Rural Communities Act 2006. Loss of hedgerows in the areas to the west of Magor would result in a likely impact at no more than a local level. Mitigation could include planting and long term management of new hedgerows.

8.6.8 The Gwent Levels are a renowned area for lowland drainage habitat. Impact upon reens and field ditches associated with Gwent Levels SSSI and associated aquatic flora and fauna has been considered above, with individual species discussed below. Other reens not within the SSSI would also be likely to be effected and would require assessment in terms of ecological quality and the presence of protected or rare species of flora and fauna. These reens include:

- Great Spytty Reen and Little Spitty Reen and associated drainage features along the A48 to the south of Liswerry;
- Monk's Ditch that flows under the location of A48 widening works to the west of TATA Steel; and
- Drainage features along the A48 to the south of Ringland.

At this stage it is envisaged that the Blue Route would use existing road drainage, which would limit the potential effects on the reens.

8.6.9 Two rivers pass under the footprint of the Blue Route; the River Ebbw SINC and Spytty Pill. Spytty Pill could be effected in terms of construction and operational (i.e. drainage) impacts. Spytty Pill flows along the southeast boundary of Ringland Way Marsh SINC, which could also be affected by works.

8.6.10 There would be no ponds lost as a result of the Blue Route. However ponds exist within 250m of the route that would require further assessment in terms of potential for great crested newt. In addition to the assessment of ponds, the reen network would also require detailed assessment. It is known that great crested newt populations are present the within the reen network around Llandevenny, Redwick and to the east of TATA Steel. These populations are present in small,

potentially isolated pockets. The presence of populations of predatory fish and the availability of habitat suitable for great crested newt (i.e. that with an absence of extensive 'fish-free' areas within which a significant and sustainable metapopulation of great crested newt could exist) is likely to be a significant constraint on the population within the vicinity of the Blue Route and more widely within the Gwent Levels.

8.6.11 Works through the Gwent Levels SSSIs - the Redwick and Llandevenny SSSI would affect known populations of water vole. During recent years successful release of water vole in the Magor Marsh area and active control of American mink have significantly increased the size of the water vole population. The potential for water vole to be present within reens, field ditches and ponds throughout area of the Blue Route would need to be undertaken and full surveys conducted where necessary. Land take, increases in drainage and construction impacts would all have the risk to impact on water voles.

8.6.12 Otter have been found to be present in low densities throughout the Gwent Levels SSSI. The River Usk (Lower Usk) SSSI and SAC is designated for otter populations and the River Ebbw provides suitable habitat for this species. Otter are also known to use Monk's ditch, which is an area that would be impacted by the Blue Route works. Should otter holts or lying up areas be identified within the footprint of the Blue Route then mitigation could include options to improve riverine habitats up and down stream by undertaking appropriate habitat management and enhancement such as dense river / reen side scrub and the provision of artificial holts.

8.6.13 Increased traffic levels at certain locations which could impact upon foraging bats. One building that would be lost under the footprint of the Blue Route within the Associated British Ports Ltd. landholding adjacent to the west bank of the River Usk is a modular warehouse structure, which is considered unlikely to present significant potential for roosting bats. However, a full assessment of the building would need to be undertaken to ascertain the likelihood of bats using it for roosting. Other buildings adjacent to the Blue Route would also require assessment to ascertain potential impacts on roosting bats. Trees and woodland to be lost to the footprint would be subject to full bat roost potential assessment, followed by emergence / re-entry surveys where necessary.

8.6.14 Dormouse populations are known to exist within suitable habitats in the Undy / Magor area; within the Green Moor east of TATA and to the north of the existing M4 near Castleton. In general dormouse is widely distributed in areas of suitably connected woodland and scrub habitats within southeast Wales. Along the Blue Route, woodland would require survey to understand the status of dormouse, whilst the species rich hedgerows that would be lost as a result of direct land take would also need to be assessed for the presence of dormouse.

8.6.15 Woodland and associated semi-natural vegetation in the vicinity of the Blue Route provides a range of suitable habitat for nesting birds. Where small areas of vegetation would be required for removal they should either be removed outside of breeding bird season or should be subjected to breeding bird survey to design appropriate mitigation or avoidance strategies.

8.6.16 Badgers are a nationally common species and are widespread throughout southwest Wales. Badger setts are known to be present along the A4810 corridor near Llandevenny and badger mitigation (artificial badger sett, badger

tunnels, and badger proof fencing with badger gates) exists along the A4810 near Llandevenny. An assessment of badger presence would need to be undertaken throughout semi-natural habitats along the Blue Route. There is likely to be a need for replacement (artificial) badger setts, badger tunnels and fencing along the route of the Blue Route.

8.6.17 Common species of reptile (grass snake, slow worm, common lizard) are all widespread in the Gwent Levels area and likely to be present within semi natural habitat along some sections of the Blue Route. Adder is less widespread and would be restricted to specific habitats including heathland and woodland. Grass snake are also widespread throughout Gwent Levels SSSI and extended reen and field ditch system within the agricultural landscape. The presence of reptiles within semi-natural habitats along the Blue Route would need to be assessed. Where found, reptiles would need to be displaced from the road verge through a program of habitat manipulation and degradation into habitat adjacent to the Blue Route.

8.6.18 The Gwent Levels SSSI is a nationally important site for aquatic invertebrates. Species such as shrill carder bee are known to exist within suitable areas of nectar rich grassland throughout the study area and should be considered following grassland surveys. Ancient woodland that would be lost under the footprint of the Blue Route should also be fully assessed for the presence of notable assemblages of invertebrates or protected or rare species.

8.6.19 In light of the above, works to the A48, A4810 and B4245 would have negative impacts on biodiversity, including to fauna and flora. Further survey information and assessments are required to better understand the potential severity of the impacts and to consider whether mitigation measures could prevent or reduce any adverse impacts.

8.7 Soils

8.7.1 The Blue Route would be within predominantly brownfield land and for the most part restricted to, and marginal to, the footprint of existing carriageways.

8.7.2 No geologically designated sites have been identified within a 250m corridor of the Blue Route.

8.7.3 In terms of land contamination, 10 sites with land contamination could potentially be affected by the Blue Route:

1. CL-12 West Ebbw Bank Landfill;
2. CL-13 Docks Way Landfill;
3. CL-14 Newport Docks;
4. CL-26 Llanwern Steelworks;
5. CL-27 Green Moor Landfill;
6. CL-28 Llandevenny Fields;
7. CL-29 Spoil Heaps and Old Quarry, Llanwern Approach Road;
8. CL-32 Magor Depot;

9. CL-33 B4245 Quarry; and

10. CL-42 Tesco Distribution Centre.

8.7.4 In addition, further sites of potential land contamination have been identified through inspection of available historical mapping, aerial photography and NRW environmental data, covering 250m either side of the Blue Route.

8.7.5 Sites considered to have a potentially significant impact on human health and/or the environment that would be affected by the Blue Route are considered below:

a) The Blue Route would cross a historical landfill 'Docks Way Phase 1' which accepted inert, industrial, commercial, household, liquids/sludge waste between 1958 and 1980. Aerial photographs indicate the landfill to extend further west of the NRW identified boundary. The Blue Route would be elevated across this area, however piers would be required to be constructed for the elevated section. Therefore there is the potential for landfill waste materials to be encountered. Potential contamination could include ground gas, asbestos and contaminated soils, waters and leachate. It is considered the likelihood of land contamination being present is high and it is likely that mitigation and/or remediation would be required.

b) The Blue Route would impact upon the northern section of the Docks Way landfill facility (Area 1 of Docks Way Landfill). Although the route is located outside the permitted waste boundary, unregulated tipping is known to have occurred beyond the Area 1 boundary. It is possible therefore waste would be encountered. Impact to Newport City Council's permitted activities at Docks Way landfill would need to be considered, particularly the potential disruption to landfill gas and leachate infrastructure and capping systems during construction of the Blue Route in this area. Potential contamination could include ground gas, asbestos and contaminated soils, waters and leachate. It is considered the likelihood of land contamination being present is high and mitigation and/or remediation would be required.

c) A spur road linking the Transporter Bridge would cut through the north eastern part of the Newport Docks junction area, historically occupied by land uses such as engineering works and fuel works. The potential for contamination including hydrocarbon contamination being encountered therefore exists.

d) Further north beyond Newport Docks area, the Blue Route would diverge from the existing highway with a new bridge. This area includes wharf infrastructure with similar land uses seen elsewhere in the Docks including engineering and ship repairing works, iron foundry, wagon repair works, builder's yard, scrap metal and timber yard. These uses all have a high potential for contamination to be encountered (contaminants include hydrocarbons, asbestos, metals, phenols, cyanides and solvents). It is considered the likelihood of land contamination being present is high it is likely mitigation and/or remediation would be required.

e) The Usk Way junction area has been subject to potentially contaminating land uses including iron foundry, wagon works and timber yard. A petroleum depot was also located immediately south of the proposed alignment.

f) The Blue Route spur road would link the A4042 and Alicia Crescent would cut through a historical landfill recorded by NRW. The landfill, known as Old

Town Dock, refers to the infilling of the Dock with foundry waste between 1930 and 1936. A residential development now occupies part of this landfill area, however the extent of any remediation is currently unknown. Likely contaminants may include hydrocarbons, asbestos, metals, phenols, cyanides and solvents. It is considered the likelihood of land contamination being present is moderate and it is likely mitigation and/or remediation would be required.

g) Corporation Road would be elevated to cross the Blue Route. Associated slip roads on embankments would be constructed to maintain connectivity. Adjacent land uses include an iron works, brick works, garage and concrete product works. These uses all have a high potential for contamination to be encountered (contaminants include hydrocarbons, asbestos, metals, phenols, cyanides and solvents). It is considered the likelihood of land contamination being present is high and it is likely mitigation and/or remediation would be required.

h) In the vicinity of the A4810 the Blue Route would be located immediately south of the southern boundary of an active landfill known as Llanwern Works East, authorised to receive industrial waste since 1977. Potential contamination could include ground gas and contaminated soils, waters and leachate. It is considered the likelihood of land contamination being present is moderate and it is likely mitigation and/or remediation would be required.

i) In the vicinity of the Magor Depot area and B4245 Quarry area, there is a risk of contamination being encountered (contaminants of concern mainly hydrocarbons) and it is likely mitigation and/or remediation would be required.

8.7.6 The reuse of contaminated soils has the potential to adversely impact upon human health and controlled waters. In the event site won soils were deemed unsuitable for use they would require offsite disposal.

8.7.7 The land take required for the construction of the Blue Route is principally on or adjacent to existing carriageway and areas of existing industrial and commercial development. The direct impact of the Blue Route in relation to mineral resources is not therefore considered to be significant.

8.7.8 The earthworks which would be undertaken to enable construction of the Blue Route would involve renovation of existing carriageways and cut to facilitate widening works. At specific locations, including the Maes Glas Junction, filling would be necessary to allow for embankments to accommodate elevated sections of the carriageway and to allow connection to the local road network.

8.7.9 Some existing structures would potentially require demolition to accommodate the construction of the new section of motorway. Materials that may be won during the demolition and site clearance works would be reused when appropriate, such as bituminous pavement material, aggregate sub-base, fill and landscaping material, concrete, masonry, brickwork and reinforcement / structural steelwork.

8.7.10 Overall, construction of the Blue Route would result in a net deficit of materials necessitating the importation of both primary and secondary aggregates. It is envisaged that embankment construction would utilise a combination of site won and imported soils. Pavement construction would require imported materials.

8.7.11 The movement of materials to and from the construction of the new road would impact upon the local road network. Whilst efforts can be made to manage road closures, divert traffic and avoid peak travel times given the potential disruption to traffic that may occur the impact is considered to be potentially significant throughout the construction period.

8.8 Heritage

8.8.1 No listed buildings would need to be demolished in order to construct and operate the Blue Route. However, the following listed buildings have the potential to experience visual and noise changes within their settings:

Table 8.2: Listed Buildings

Number	Name	Grade
18182	Waterloo Hotel	II
17415	Transporter Bridge including east and west anchor chambers	I
18177	Public conveniences, Pillgwenlly	II
18175	St Michael's Roman Catholic Church, Clarence Street	II
18173	Baltic Oil Works, Pillgwenlly	II
18179	Lock walls to mouth of Old Town Dock	II
18178	Malt House, formerly premises of Philips & Sons	II
16068	The Vicarage, Magor	II

8.8.2 No Scheduled Ancient Monuments would be physically impacted in order to construct and operate the Blue Route. However, the Scheduled Ancient Monuments as listed in Table 8.3 have the potential to experience visual and noise changes within their settings.

Table 8.3: Scheduled Monuments

Number	Name	Type
MM084	Tredegar Fort	Hillfort
MM190	Castell Glas castle mound	Motte
MM253	Moated site in Coldra Wood	Moated site
MM127	Wilcrick Hill Camp	Hillfort

8.8.3 There could be some very slight physical impact within the registered Gwent Levels Landscape of Outstanding Historic Interest as a result of the construction and operation of the Blue Route, and potential visual and noise changes within the setting of this registered historic landscape.

8.8.4 No registered historic parks and gardens would be physically impacted in order to construct and operate the Blue Route. However, the following registered historic parks and gardens have the potential to experience visual and noise changes within their settings:

Table 8.4: Registered Historic Park and Gardens

Name	Grade
Tredegar Park	II*
Belle Vue Park	II
Llanwern Park	II

8.8.5 There would be some slight physical impact within the Waterloo Conservation Area as a result of the construction and operation of the Blue Route, also potentially visual and noise changes within the setting of this Conservation Area. There could also be visual and noise changes within the setting of the Tredegar Park Conservation Area and the Belle Vue Conservation Area.

8.8.6 There would be physical impacts on the northern extents of the Gwent Levels Archaeologically Sensitive Area designated by Newport City Council and on an Area of Special Archaeological Sensitivity to the west of Magor designated by Monmouthshire County Council.

8.8.7 There would be potential for physical impacts on several possible sites identified on the regional Historic Environment Record. These include the locations of former industrial buildings such as mills and chapels, also features of Second World War date associated with the defence of Newport. If present, the impacts on the remains of these heritage assets could give rise to slight adverse effects.

8.8.8 Baseline assessment has demonstrated that there would be some potential for encountering as yet undiscovered archaeological deposits within the footprint of the Blue Route. These remains are likely to date predominantly from the later periods, though remains from the prehistoric and Romano-British periods could also be represented. At this stage it is not possible to determine the significance of such remains, however the waterlogged conditions that prevail along much the route suggests that any remains, in particular those that are organic in nature, such as wood, are likely to be well-preserved. Within the footprint of the scheme any such remains would be destroyed by construction activity, and those outside of the footprint may also be affected by changes to the water table/flows. Any such impacts have the potential to give rise to large adverse effects.

8.9 Water Environment

8.9.1 The principal water environment effects which would arise from the construction of the Blue Route would comprise the following:

a) Control of road run-off and preventing uncontrolled discharges from the site. Road construction run-off water would have elevated suspended solids as well as chemical impact from any spills or leaks from construction traffic or plant. Road construction run-off would need to be controlled and discharged at an appropriate rate and quality to avoid pollution.

b) Construction of new structures requiring new foundations may introduce new pathways for migration of water or contamination residing in shallow soils or water bodies. Such migration may cause deterioration of both existing shallow and/or deeper water bodies.

c) Dewatering of shallow water bodies to enable dry construction of foundations of drainage infrastructure may lead to interruption or cessation of water

abstractions in hydraulic continuity of such works. Similarly, drawdown of shallow water bodies may mobilise contaminants residing in soils or groundwater leading to pollution of the water environment.

8.9.2 The principal water environment effects which would arise from the operation of the Blue Route would comprise:

a) Changes to the impervious surface area producing routine run-off. Enlarging the drained areas through the provision of new junctions and general carriageway widening would increase the volume of routine run-off generated following rainfall.

b) Increases in the area of impervious surfaces increase the volume of surface run-off needing management to prevent flooding of the carriage way and surrounding land. Existing drainages infrastructure provision may be inadequate to capture, convey, store and release this water to satisfactory design standards. Larger run-off management infrastructure would require additional land take.

c) Discharges of road run-off would be required to be directed to surface watercourses or to ground soakaways.

d) Higher traffic numbers would increase the contaminant loading in run-off water resulting in lower drainage water quality. Discharges of such road run-off to either surface water or groundwater via soakaways would adversely impact baseline water quality. Replacement or new water treatment areas may be required to deliver an acceptable level of treatment for surface water run-off prior to discharge. These may require additional land take.

8.9.3 Appraisal shows that there would be adverse impacts on the water environment as a result of construction and during the road's operation. In particular, contaminants residing in soils or groundwater are likely to lead to pollution of the water environment unless appropriate mitigation measures are identified and put in place. Water management infrastructure would be required, with necessary land take, to control, treat and manage water run-off.

9 Social Appraisal

9.1 Overview

9.1.1 This section sets out the results of the social appraisal for the Blue Route. A comparison of the Blue Route against the M4 Corridor around Newport Scheme is provided at section 10.2 of this report.

9.2 Transport Safety

9.2.1 Current speed limits on the A48 SDR and A4810 range between 30mph to 50mph to safely accommodate traffic movements between the frequent junctions along the route. The close proximity of some of the junctions often necessitates the lower speed limits. Through modifications to the A48 SDR and A4810 and its junctions, where possible the Blue Route aims to achieve a speed limit of 50mph. This is not possible in some areas, without extensive offline realignment of the carriageway.

9.2.2 A reduction in congestion and delays is directly linked to improvements to transport safety. The Blue Route does not address the substandard geometry and cross section present in the existing M4 corridor between Junction 28 and Junction 24, and transport modelling has indicated little relief to motorway congestion as a result of the Blue Route. Whilst it is anticipated that there may be an initial reduction in congestion following up to 8 years of construction with associated traffic management, there would be operational problems along the Blue Route by the design year. As such, it is not expected that the Blue Route would improve transport safety.

9.3 Personal Security

9.3.1 Road users are more vulnerable to crime in circumstances where they are required to stop their vehicles or travel at slow speeds, such as at the approaches to signals or in congested conditions. In the roads context, security includes the perception or risk of personal injury, damage to or theft of vehicles, and theft of property from individuals or vehicles. There are three locations in which security issues may arise when using roads:

a) On the road itself (e.g. being attacked whilst broken down);

b) In service areas, car parks and so on (e.g. vehicle damage while parked at a service station, being attacked while walking to parked car); and

c) At signals or junctions (e.g. 'smash and grab' incident while queuing at lights).

9.3.2 The existing A48 SDR and A4810 has over a dozen at-grade major junctions, as well as three emergency/maintenance access points to TATA; and multiple agricultural field access points. The Blue Route would reduce the need for stopping at junctions for through traffic with the introduction of grade-separated junctions. This would in turn reduce the risk of personal security incidents whilst waiting at junctions.

9.3.3 The urban setting of the Blue Route would have both positive and negative impacts upon personal security. The ease of access to the route would mean that there would be an increase in risk for road users, but the number of people in

close proximity to the route could provide informal surveillance, thus providing benefits to personal security.

9.3.4 Improved traffic flow and less congestion would reduce the potential for delays, which would reduce travellers' perceptions of vulnerability to crime. However, these benefits would be reduced as a result of the anticipated operational problems. Transport modelling has also indicated little relief to motorway congestion as a result of the Blue Route, and when there are stop-start conditions as is often a consequence of congestion, the risks to personal security are increased.

9.4 Permeability

9.4.1 The Blue Route works would see traffic volumes increase along the roads throughout its length. On average traffic volumes along the Blue Route roads would increase by around 42%, although levels are much greater or much lower than that average depending on location. As a result of increased traffic, there would be adverse impacts upon pedestrian and cyclist movements as a result of increased severance issues. The Blue Route would cross several local accesses and crossing points, and alternative routes would need to be provided to reduce severance as a result of increase traffic volumes and junction works along the A48 SDR and A4810 route. In particular the Blue Route would impact adversely on segregated foot and cycle paths along the westbound lane of the A4810, the south-eastbound lane of the A4810 Queensway Meadows and along both sides of the A48 (Spytty Road). There would be limited opportunities to provide new or improved active travel measures with the Blue Route.

9.5 Physical Fitness

9.5.1 Transport modelling has also indicated little relief to motorway congestion as a result of the Blue Route, which would not contribute to reducing air pollution along the corridor, including the existing AQMAs associated with the M4 in Newport.

9.5.2 Due to the urban setting of the Blue Route, increased traffic and congestion along the A48 SDR and A4810 would have a detrimental impact upon the health of residents of Newport. There would also be an increase in noise levels resulting from an increase in traffic along the A48 SDR and A4810.

9.5.3 The Blue Route would not provide new or improved non-motorised user infrastructure, and by increasing severance along the route, would be likely to have a negative impact upon physical fitness as a result of a reduction in permeability and attractiveness of cycling and walking in particular.

9.6 Social Inclusion

9.6.1 By increasing severance along the route, there would be a negative impact upon the movement of people without access to a car, and using non-motorised modes, as a result of a reduction in permeability and attractiveness of cycling and walking. This would reduce social mobility and accessibility, in particular during construction when there would be a lengthy period of disruption to existing pedestrian and cyclist routes, as well as traffic management measures.

9.6.2 Once complete, the Blue Route would improve network resilience and is likely to provide local accessibility benefits to those with access to a car. However, the Blue Route would provide little relief to congestion on the M4. By 2037 the benefits of the Blue Route would begin to be offset by traffic growth and associated capacity issues, limiting the economic and social benefits. The Blue Route would offer poor value for money, with limited economic and associated community benefits.

9.7 Equality, Diversity and Human Rights

9.7.1 By increasing severance along the route, there would be a negative impact upon the movement of people without access to a car, including vulnerable groups.

9.7.2 Once complete, the Blue Route would improve network resilience and is likely to provide some local accessibility benefits. However, the Blue Route would provide little relief to congestion on the M4 and would have adverse impacts on some existing access arrangements including at Glan Llyn. By 2037 the benefits of the Blue Route would begin to be offset by traffic growth and associated capacity issues, limiting the economic and social benefits. The Blue Route would also offer poor value for money, with limited economic and associated community benefits. There would be limited benefits to social mobility and access to employment opportunities for all groups of people.

9.7.3 Car ownership is linked with age; under 17's are unable to drive, whilst the elderly are more likely to rely upon public transport. The Blue Route road would provide little additional benefit to these age groups without access to a car. In light that the benefits of the Blue Route would begin to be offset by 2037, any economic or social benefits initially realised by short term network resilience and capacity would not benefit future generations.

9.7.4 The Blue Route would initially provide benefits to those vulnerable persons with access to a car, making local and regional trips more accessible by improving the resilience of the road and improving journey time reliability. The Blue Route would by increasing severance and reducing permeability along the A48 SDR and A4810, reduce the accessibility to facilities and services for vulnerable people without access to a car, including those with mobility issues.

9.7.5 GIS indicates approximately 575 residential properties would be potentially blighted by the Blue Route as a result of land take, air pollution and noise impacts. GIS indicates approximately 95 commercial properties and businesses would be affected by the Blue Route. The need for land and impact on quality of life would impact on people's human rights.

9.8 Health Impact Assessment

9.8.1 As set out in Sections 8.1 and 8.2 of this appraisal, transport modelling has indicated little relief to motorway congestion as a result of the Blue Route, which would not contribute to reducing air pollution along the corridor, including the existing AQMAs associated with the M4 in Newport.

9.8.2 Due to the urban setting of the Blue Route, increased traffic and congestion along the A48 SDR and A4810 would also have a detrimental impact upon the health of residents of Newport. There would be an increase in noise levels as a result of traffic growth in Newport. Grade separated junctions along the Blue

Route would further exacerbate adverse air and noise impacts for the population of Newport situated along the A48 SDR and A4810 corridor.

9.8.3 Driver stress would be likely to continue and be exacerbated during the lengthy construction period.

9.8.4 As set out in Section 9.4 of this appraisal, the Blue Route would not provide new or improved non-motorised user infrastructure, and by increasing severance along the route, would be likely to also have a negative impact upon physical fitness as a result of a reduction in permeability and attractiveness of cycling and walking in particular.

10 Appraisal Summary

10.1 Appraisal Summary Tables (ASTs)

10.1.1 Appraisal Summary Tables (ASTs) present the core findings of the economic, environmental, social and other impacts from the considered option(s). The objective of preparing ASTs is to facilitate the interpretation and comparison of results. For this, the summary needs to be succinct, with full details provided in the body of the report. Providing the appraisal results in a standard format enables a consistent view to be taken by the decision-makers about the relative merits (or otherwise) of different proposals or proposal options. The ASTs enable individual judgement to be made about the relative significance and trade-offs of the various positive and negative impacts. The ASTs incorporate the results from the appraisal of the impacts within the Welsh Impact Areas and Transport Planning Objectives (TPOs). The ASTs cannot incorporate all the aspects appraised in greater level of detail. As such, ASTs should never be seen in isolation from the main appraisal, in order to avoid the risk of trivialising the appraisal process.

10.1.2 Comparative performance against the proposed M4 Corridor around Newport Scheme is then summarised against the WelTAG Welsh Impact Areas criteria and against the TPOs.

10.1.3 The history of the M4 Corridor around Newport WelTAG appraisals is set out within the various WelTAG appraisals for the Scheme, its Plan and previous development work. Those are available online at www.m4cem.com, m4newport.com and www.gov.wales/m4newport. The latest M4 Corridor around Newport WelTAG appraisal is the July 2014 M4 Corridor around Newport Stage 1 & 2 (Scheme) WelTAG Report. Since then there has been further information made available as a result of surveys and preliminary design, including the benefits previously described of Early Contractor Involvement. This succeeds the WelTAG appraisal process that led to the Welsh Ministers' decision to adopt its Plan and modified Preferred Route in July 2014, with subsequent Scheme development. It is therefore not appropriate to revisit the WelTAG appraisal process for the Scheme, but rather the 2014 M4 Corridor around Newport WelTAG Stage 1 & 2 (Scheme) appraisal provides an appropriate and useful tool for comparative purposes with the Blue Route. That appraisal can be found here: http://gov.wales/docs/det/policy/140929-m4-preferred-route-weltag-stage-1-2-report-en.pdf.

10.1.4 Appraisal Summary Tables (ASTs) for the Blue Route as considered within this report against the Do Minimum Scenario have been prepared using the seven point scale of impact significance. WelTAG recommends that the significance of impact for each criterion is assessed using a seven point scale detailed in Paragraph 3.7.1 of the WelTAG guidance. This scale includes the following assessment criteria:

Large beneficial (+++); Moderate beneficial (++); Slight beneficial (+);

Neutral (0); Slight adverse (-); Moderate adverse (--); Large adverse (---).

10.1.5 WelTAG also requires, in Paragraph 3.5.1, that the distribution of impacts is carefully considered. This part of the assessment refers to how impacts might be distributed geographically and how they might affect different groups in society.

Table 10.1: Assessment of the Blue Route against WelTAG Welsh Impact Areas Criteria and Transport Planning Objectives (TPOs)

Criteria	Assessment	Distribution	Significance
Welsh Impact Areas			
Transport Economic Efficiency (TEE)	Once complete, the Blue Route would improve network resilience and is likely to provide local accessibility benefits. However, the Blue Route would provide little relief to congestion on the M4. By 2037 the benefits of the Blue Route would begin to be offset by traffic growth and associated capacity issues. This does not provide a long term solution to the transport related problems on the M4 around Newport and sections of the M4 would continue to experience operational problems. The cost of the Blue Route has been estimated at £837,805,911 and the benefit to cost ratio has been calculated as 0.94, meaning the Blue Route offers poor value for money.	All	(-)
Economic Activity and Location Impact (EALI)	Impacts on the economy would be local and limited in terms of reduced transport costs and improved journey times.	All	(0)
Noise	The Blue Route would result in a slight noise increase (+2dB to +3dB) for those properties near the Blue Route. For properties along the M4, there would be negligible benefit (no significant change).	All	(-)
Local Air Quality	There would be some limited air quality improvements at properties close to the existing M4 as a result of the slight reduction in traffic along the existing M4 and a deterioration in air quality at approximately 2,000 properties within 200m of the alignment of the Blue Route. The little relief provided to congestion on the existing M4 and benefits being offset by traffic growth by 2037 would not help address the existing air quality problems as identified with AQMAs around Newport.	All	(--)
Greenhouse Gas Emissions	Construction of the Blue Route would cause significant additional congestion on the existing A48, resulting in increased tailpipe emissions over the construction period. Once construction is complete, there would be some initial reduction in congestion and smoother flow of traffic across the network, leading to an initial slight reduction in tailpipe emissions at the start of operation. However, when taking into account future traffic growth, the Blue Route would soon become congested again and is likely to result in similar, if not more onerous, tailpipe emission levels.	All	(-)
Landscape and townscape	The Blue Route would pass through six of the eleven Local Landscape Character Areas, of these it is considered that only LCA7: Caldicot Levels would see likely significant impacts in Landscape Character, primarily due to the addition of new transport infrastructure to greenfield land. The Blue Route would introduce further built development into the area, which although can be considered commonplace and sometimes detracting features, are likely to have a number of significant impacts on a large number of sensitive visual receptors in close proximity to the proposed route.	All	(-)
Biodiversity	Works to the A48 Usk Way adjacent to the west side of	All	(-)

Criteria	Assessment	Distribution	Significance
Welsh Impact Areas			
	River Usk would result in a land take of approximately 0.1ha of the River Usk (lower Usk) SSSI. This represents approximately 0.02% of the SSSI. The widening of the A48 through the Gwent Levels SSSIs - the Redwick and Llandevenny SSSI (floodplain grazing marsh with a range of plants and invertebrates associated with the reens and ditches of the drainage system) would would result in the loss of a short section of reen within the SSSI.		
Heritage	The Scheme would impact on the Gwent Levels, much of which comprises a registered Landscape of Outstanding Historic Interest in Wales. It would also pass through an Archaeologically Sensitive Area designated by Newport City Council and an Area of Special Archaeological Sensitivity designated by Monmouthshire County Council. The settings of several listed buildings would be affected, but none would need to be demolished.	Distribution assessment not required (Para. 7.10.7 of WelTAG June 2008)	(-)
Water environment	Construction of the proposed route would present potential risk to surface water and ground water quality but could be mitigated through the adherence to appropriate construction management practices. Operationally, the principal impacts would occur where traffic flows alter significantly resulting in material changes in the quality of road run-off. Additionally, increases in road surface area following route modifications may lead to significant increases in volume of road run-off. Where existing drainage infrastructure is being relied upon this may lead to adverse impacts on the water environment or to an increase in flood risk.	No significant distributional impacts	(-)
Soils	Predominantly the scheme would utilise the route of existing carriageways with minimal agricultural land impacted. It would cross several areas of land potentially affected by contamination including historical landfills, the docks and Llanwern Steel Works. However, it is considered that with the mitigation measures proposed no significant adverse impacts would be expected. Whilst the scheme would aim to maximise use of site won soils and minimise waste it is considered that there would be a significant import of materials for actual road construction. It is considered that the movement of these materials to the site would impact upon the local road network throughout construction.	No significant distributional impacts	(-)
Transport safety	There would be little relief to motorway congestion as a result of the Blue Route. Whilst it is anticipated that there may be an initial reduction in congestion, there would be operational problems along the Blue Route by 2037. As such, it is not expected that the Blue Route would improve transport safety.	All road users	(0)
Personal security	The Blue Route would reduce the need for stopping at junctions for through traffic with the introduction of grade-separated junctions. This would in turn reduce the risk of personal security incidents whilst waiting at junctions. The urban setting of the Blue Route would have both positive and negative impacts upon personal security. The ease of access to the route would mean that there would be an increase in risk for road users, but this increase	All road users	(0)

Criteria	Assessment	Distribution	Significance
Welsh Impact Areas			
	in the number of people in close proximity to the route could provide informal surveillance. By 2037 there would be operational problems along the Blue Route and severe operational problems on the M4 around Newport, which would increase personal security risks.		
Permeability	There would be adverse impacts upon pedestrian and cyclist movements as a result of increased severance issues with increased traffic volumes and junction works along the SDR and A4810 route. Alternative routes would need to be provided. There would be limited opportunities to provide new or improved active travel measures with the Blue Route.	Car and Non-motorised users	(-)
Physical fitness	Transport modelling has indicated little relief to motorway congestion as a result of the Blue Route, which would not contribute to reducing air pollution along the corridor, including the existing AQMAs associated with the M4 in Newport. Due to the urban setting of the Blue Route, increased traffic and congestion along the SDR and A4810 would have a detrimental impact upon the health of residents of Newport. There would also be an increase in noise levels. By increasing severance along the route, there would be a negative impact upon physical fitness as a result of a reduction in permeability and attractiveness of cycling and walking.	Car and Non-motorised users	
Social inclusion	By increasing severance along the route, there would be a negative impact upon the movement of people without access to a car, and using non-motorised modes, as a result of a reduction in permeability and attractiveness of cycling and walking. The Blue Route would offer poor value for money, with limited economic and associated community benefits. Once complete, the Blue Route would improve network resilience and is likely to provide local accessibility benefits. However, the Blue Route would provide little little relief to congestion on the M4. By 2037 the benefits of the Blue Route would begin to be offset by traffic growth and associated capacity issues, limiting the economic and social benefits.	All	(0)
Equality, Diversity & Human Rights	By increasing severance along the route, there would be a negative impact upon the movement of people without access to a car, including vulnerable groups. The Blue Route would offer low value for money, with limited economic and associated community benefits. There would be a significant number of properties blighted by the Blue Route as a result of proximity, air and noise impacts. Several commercial and community properties would be directly affected by the Blue Route.	All	(-)
TPOs			

Criteria	Assessment	Distribution	Significance
Welsh Impact Areas			
1	The Blue Route would improve network resilience and associated journey time reliability at peak times although transport modelling has indicated little relief to motorway congestion as a result of the Blue Route.	All	(+)
2	The nature of the improvement is local rather than regional or national, but it would provide an alternative east-west route and provide limited relief to congestion of the M4.	All	(+)
3	The Blue Route would improve network resilience at peak times using local roads, although transport modelling has indicated little relief to motorway congestion as a result of the Blue Route.	All	(+)
4	The Blue Route would improve network resilience at peak times using local roads, although transport modelling has indicated little relief to motorway congestion as a result of the Blue Route.	All	(+)
5	The Blue Route would improve network resilience at peak times using local roads, although transport modelling has indicated little or very little relief to motorway congestion as a result of the Blue Route.	All	(+)
6	The Blue Route would be unlikely to provide opportunity for improvements to non-motorised or public transport users.	All	(0)
7	The Blue Route would not improve safety on the M4 Corridor between Magor and Castleton. Transport modelling has indicated little relief to motorway congestion as a result of the Blue Route. There would be a greater risk of accidents in the urban area of Newport if there would be increased traffic at peak times using the Blue Route.	All	(0)
8	The Blue Route would have a limited effect on air quality on the M4 Corridor between Magor and Castleton. Transport modelling has indicated little relief to motorway congestion as a result of the Blue Route. There would, however, be increased emissions and deterioration in air quality near the A48 SDR and A4810 should traffic volume increase along the Blue Route. The effects of this would impact on existing properties and planned residential/employment development. The existing air quality problems on the M4 around Newport, with AQMAs, would not be helped by the Blue Route. During construction, air quality and dust issues would be likely to be experienced temporarily along the Blue Route as a result of construction vehicles and works, which would affect residential and commercial properties located near to the A48 SDR and A4810.	All	(--)
9	The Blue Route would have a limited effect on noise levels on the M4 Corridor between Magor and Castleton. Transport modelling has indicated little relief to motorway congestion as a result of the Blue Route. There would, however, be increased noise near the A48 SDR and A4810 should traffic volume increase along the Blue Route. The effects of this would impact on existing properties and planned residential/employment development. During construction, noise and vibration issues would be likely to be experienced temporarily along the Blue Route as a result of construction vehicles and works, which would affect residential and commercial properties located near to the A48 SDR and A4810.	All	(-)

Criteria	Assessment	Distribution	Significance
Welsh Impact Areas			
10	The Blue Route would have a limited effect on emissions on the M4 Corridor between Magor and Castleton. The Blue Route would improve network resilience at peak times using local roads, although transport modelling has indicated little relief to motorway congestion as a result of the Blue Route.	All	(0)
11	The Blue Route would improve network resilience at peak times using local roads, although transport modelling has indicated little relief to motorway congestion as a result of the Blue Route. Driver stress is likely to continue.	All	(0)
12	Transport modelling has indicated little relief to motorway congestion as a result of the Blue Route.	All	(0)
13	There would be a need for greater traffic management in and around Newport with the Blue Route, in particular during disruption during construction. Transport modelling has indicated little relief to congestion on the M4 as a result of the Blue Route.	All	(0)
14	The Blue Route would provide an improved local east-west route but transport modelling has indicated little relief to congestion on the M4 as a result of the Blue Route.	All	(+)
15	The Blue Route would not promote a cultural shift in travel behaviour to more sustainable choices.	All	(--)
Public acceptability	The Blue Route would improve network resilience at peak times using local roads, although it would provide little relief to motorway congestion. The Blue Route would provide air and noise impacts in urban areas, and there would be significant disruption during construction, which could attract significant public opposition.		
Acceptability to other stakeholders	The Blue Route would involve works to existing roads, which could be welcomed by environmental NGOs. However, impact on property and communities in Newport from could attract significant opposition from community groups. The Blue Route would provide little relief to motorway congestion, which would be likely to attract opposition from businesses that would be disrupted during construction and where existing access arrangements are adversely impacted with the Blue Route in place. Adverse environmental impacts would require mitigation and/or are likely to receive objection from NRW and/or Cadw.		
Technical and operational feasibility	The Blue Route corridor is largely constrained by urban areas and development sites on each side, and would most likely result in significant impact upon the Air Products site to the south side of the A48 SAR, which is a COMAH (control of major hazards) site. There is also existing ground contamination along the corridor, which would need to be remediated. Any works to the SDR would require contractual negotiations with the SDR concessionaire.		
Financial affordability and deliverability	Land acquisition and property demolition would result in CPO and likely compensation as well as negotiations with A48 SDR concessionaires. It is likely that there would be outstanding objections to the Scheme, necessitating a Public Inquiry into the required draft statutory Orders and Environmental Statement. A delivery programme of a minimum of around four years would be expected, in light of the requirement for the necessary assessments and statutory process to be satisfied, as well as likely phased construction programme with urban traffic management requirements. Construction of the works could be delivered in phases, which could improve affordability. The Blue Route would provide poor value for money.		
Risks	The Blue Route has not been subject to preliminary design level and therefore the risks require further exploration. A new draft Plan may be required, alongside an SEA and other assessments, with associated formal consultation. An Environmental Statement is likely to then be required, and potentially a Statement to Inform Appropriate Assessment, subject to EIA and Habitats Regulations screening opinions. New draft Orders would also be needed, and in light of its likely impacts and objections, a Public Local Inquiry would be required before any potential decision by Welsh Ministers to go ahead to construction.		

10.2 Comparative Performance

10.2.1 The M4 Corridor around Newport Scheme would provide benefits greater than its costs, including improving journey time reliability, journey times, and accident savings, offering value for money. The Blue Route, despite having a lower capital cost compared to the M4 Scheme, would offer poor value for money, with its costs being greater than its benefits.

10.2.2 The Blue Route would provide local benefits to accessibility and would reduce transport costs and improve journey times to a limited extent, however the M4 Corridor around Newport Scheme would offer significantly greater benefits to the local and regional economy, in particular in improving perceptions of South Wales as a business location and improving access to local employment sites, potentially increasing local investment and employment.

10.2.3 The Blue Route would impact on more properties compared to the M4 Corridor around Newport Scheme, in light of their more urban and rural contexts, respectively. GIS indicates approximately 575 residential properties would be likely to be blighted by the Blue Route as a result of land take and environmental impacts. GIS indicates approximately 95 commercial properties and businesses would be affected by the Blue Route. This compares to the M4 Scheme which would require significantly more land take (approximately 721 hectares) but would only require the demolition of twelve residential buildings (including one Grade II Listed building in Magor). Set against this are impacts of the M4 Corridor around Newport Scheme on commercial property at Newport Docks (including on ABP's statutory undertaking) and at Magor services, which would be greater than with the Blue Route.

10.2.4 The M4 Corridor around Newport Scheme would be largely an offline construction project and disruption and potential associated negative impacts on people and the economy would be limited and largely restricted to the short term works connecting the proposed new section of motorway route into the existing transport network at its interchanges and intermediate junctions. This is in contrast to the Blue Route, which would have a significant impact upon the existing road network due to its location within the existing urban environment, with associated disruption to local communities and businesses throughout its lengthy construction period, including commercial operations at Newport Docks and at Magor services. It is considered that the Blue Route would have a greater impact on the COMAH site at Air Products and TATA compared to the M4 Corridor around Newport Scheme.

10.2.5 When compared to the M4 Corridor around Newport Scheme, the Blue Route would be likely to offer reduced adverse environmental impacts, in particular when taking into account impacts on biodiversity, landscape, water and soils. The impact on the Gwent Levels and its SSSIs would be much less with the Blue Route. However, the Blue Route would not itself be free of such environmental impacts.

10.2.6 Approximately 2,000 properties would experience a deterioration in local air quality and increase in noise levels as a result of the Blue Route, whereas with the M4 Corridor around Newport Scheme, air quality within four of Newport's AQMAs would improve significantly, whilst on a wider regional scale air quality is predicted to improve. A greater number of receptors would experience a noise decrease rather than a noise increase with the M4 Corridor around Newport

Scheme. These impacts would lead to a consequential improvement in the health of the population, which would not be experienced with the Blue Route. The Blue Route has the potential to reduce the health of the population.

10.2.7 The Blue Route, by being an urban road and making use of existing roads, would have less requirement for soils, and impact on the water environment would likely be less, with urban drainage systems would be required, compared to the M4 Corridor around Newport Scheme which is routed through partly through the drainage network of the Gwent Levels.

10.2.8 The M4 Corridor around Newport Scheme would have a greater construction carbon impact than the Blue Route. However, the user benefits of the Blue Route would not be as great as it would achieve little relief to motorway congestion and because the Blue Route would experience operational problems by the design year. As such, tail pipe emissions with the Blue Route would be greater than with the M4 Corridor around Newport Scheme.

10.2.9 The Blue Route would perpetuate the mix of strategic traffic with local traffic, on two routes. However, the M4 Scheme would carry a high proportion of strategic traffic, thereby assisting other roads to perform their roles for local distribution.

10.2.10 The provision of a new section of motorway to the south of Newport would provide the opportunity to change the function of the current M4 route around Newport to better integrate it into Newport's road network. For example, this could enable better access to/from residential areas such as Caerleon and St Julians by potentially facilitating the re-opening the western approaches to Junction 25. Provision of a road link between the M4, M48 and the B4245 would also result in benefits to users of the local road network and relief to Junction 23A.

10.2.11 With the M4 Corridor around Newport Scheme, provision of additional non-motorised user infrastructure would help encourage healthy lifestyle choices for local trips, as well as potentially supporting social interaction. The Blue Route would not offer these opportunities, but rather increase severance through increased traffic in the urban area with reduced permeability.

10.2.12 The Blue Route would represent a new line of investigation, with associated unknown risks. As an example, any works to the A48 SDR would require contractual negotiations with the A48 SDR concessionaire. The Blue Route would also need to satisfy relevant statutory processes before construction, which would necessitate significant delay to providing a solution to the existing problems. The programme for the Blue Route would be significantly longer to that of the M4 Corridor around Newport Scheme, due to the requirement to satisfy the required statutory process and associated surveys and assessments, and due to the complexities of upgrading an existing, busy road whilst at the same time keeping traffic flowing.

10.2.13 Overall, appraisal of the Blue Route indicates that it performs slightly positively for most objectives and performs poorly against the Welsh Impact Areas when compared to the M4 Corridor around Newport Scheme, acknowledging that overall there would be greater economic and social benefits to be realised with the M4 Corridor around Newport Scheme.

10.2.14 Transport modelling has indicated little relief to motorway congestion as a result of the Blue Route. Analysis shows that with the Blue Route in place, operational

problems would continue on the M4 around Newport. By 2037, analysis has shown that the traffic levels on the motorway around Newport, with the Blue Route in place, would exceed theoretical capacity, resulting in severe operational difficulties. However, the M4 Corridor around Newport Scheme would provide sufficient long term relief to the existing M4, as well as addressing the identified transport related problems relating to capacity, resilience, safety and sustainable development. The Blue Route would not provide a solution to transport related problems on the M4 around Newport, whereas the M4 Corridor around Newport Scheme would.

11 Conclusion

11.1.1 The Blue Route would not address the identified transport related problems as well as the M4 Corridor around Newport Scheme. It would generally provide better access to Newport than existing, but would only offer little relief to motorway congestion at opening year or in the future. It would relieve less than 10% of traffic on nearly all sections of the existing M4 and would marginally increase the traffic levels on the heaviest trafficked section between Junction 28 and Junction 29. Taking in to account traffic growth, there would be operational problems along some parts of the A48 SDR and A4810. Operational problems would be exacerbated around Newport at times of incidents and delays.

11.1.2 The Blue Route has been appraised to offer limited economic benefits, whereas the M4 Corridor around Newport Scheme is expected to offer significant economic benefits, especially when taking into account wider benefits to the region such as increasing access to employment areas. The Blue Route would provide poor value for money, with its costs being greater than its benefits.

11.1.3 Disruption during construction would be significant and require traffic management, with associated adverse impacts upon the movement of people and freight in and around Newport until the works along the route are completed. This would have a detrimental impact upon the local economy during that time. The overall construction of the entire Blue Route works would be expected to be up to 8 years excluding the statutory process prior to commencing construction.

11.1.4 Despite offering some local accessibility benefits, the Blue Route would increase severance problems with increased traffic along the A48 SDR and A4810, whilst causing air and noise pollution problems for people living near to the route. Given its urban context, there would be an impact on a greater number of properties compared to M4 Corridor around Newport Scheme, with GIS indicating approximately 575 properties and approximately 95 plots of commercial land being within 100m of the Blue Route works. This would require land acquisition and diversion of major gas pipelines and works within a COMAH (Control of Major Accident Hazards) site. The M4 Corridor around Newport Scheme is expected to offer greater social benefits, including improvements in access to employment opportunities and offering non-motorised user infrastructure to benefit connectivity and encourage physical fitness.

11.1.5 When compared to the M4 Corridor around Newport Scheme, the Blue Route is generally likely to offer reduced adverse environmental impacts in some areas such as biodiversity, landscape and heritage. However, it would have greater impacts in other areas, such as in contributing to greater noise levels through Newport and resulting in air quality and associated human health problems.

11.1.6 With the M4 Scheme, air quality within four of Newport's AQMAs would improve significantly, whilst on a wider regional scale air quality is predicted to improve, with associated benefits to human health. However, with the Blue Route in place, properties and designated sites within 200m of the Blue Route (approximately 2,000 properties) would experience a deterioration in local air quality as a result of the increase in traffic. Furthermore, motorway traffic would continue to contribute to poor air quality and associated human health problems in Newport in light that the Blue Route would only provide limited relief to the existing M4, and its associated four Air Quality Management Areas.

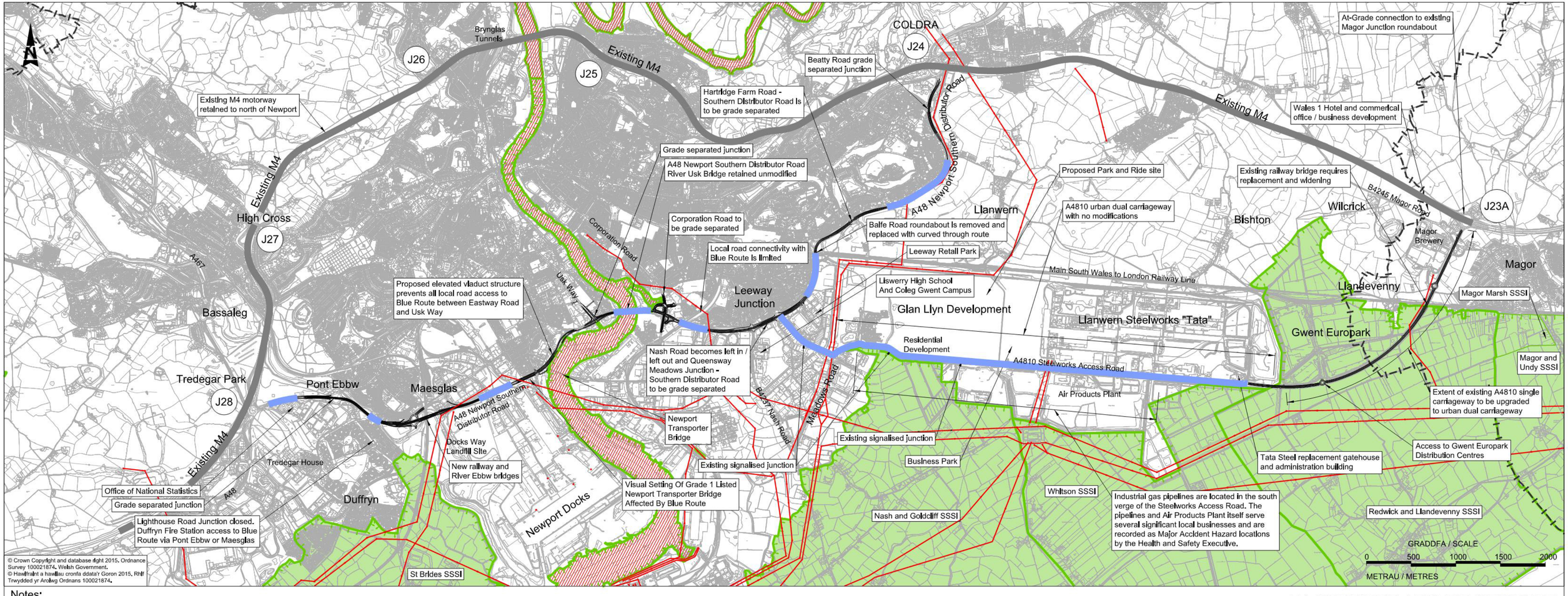
11.1.7 With the Blue Route in place there would be an increase in greenhouse gas emissions due to stop start conditions, especially when taking in to account future traffic growth which would exacerbate the congestion problems around Newport.

11.1.8 Whilst it has been demonstrated that the M4 Corridor around Newport Scheme would best address the identified problems and achieve the identified objectives, appraisal has demonstrated that the Blue Route would not address the transport related problems, or sufficiently address the objectives as well as the M4 Corridor around Newport Scheme, although acknowledging that it could offer some positive contributions to some of the objectives.

11.1.9 The Welsh Government is not promoting the Blue Route, which has been suggested by objectors. However, the Blue Route and the findings of this appraisal will be considered as part of the Public Local Inquiry into the Welsh Government's proposed M4 Corridor around Newport Scheme.

Appendix A

Blue Route Scenario Plans



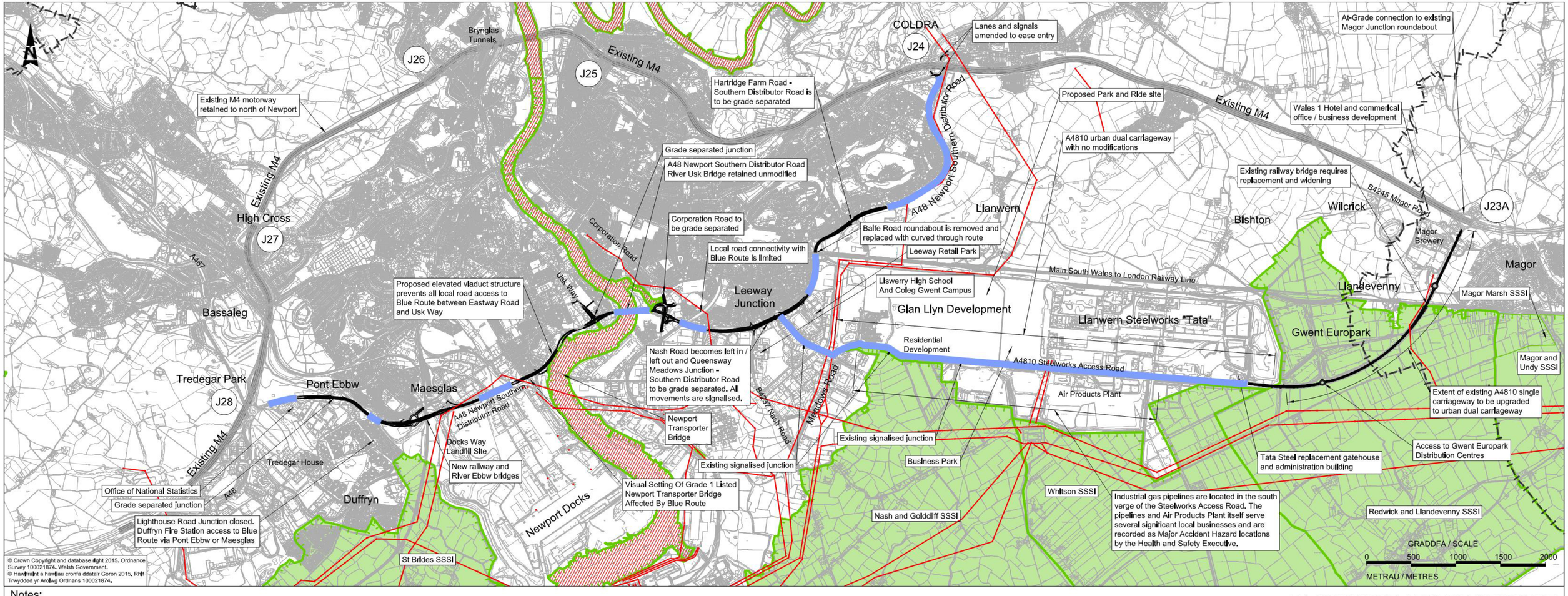
Notes:

1. Location Reference numbers refer to Blue Route

Legend:

Blue Route using existing highway

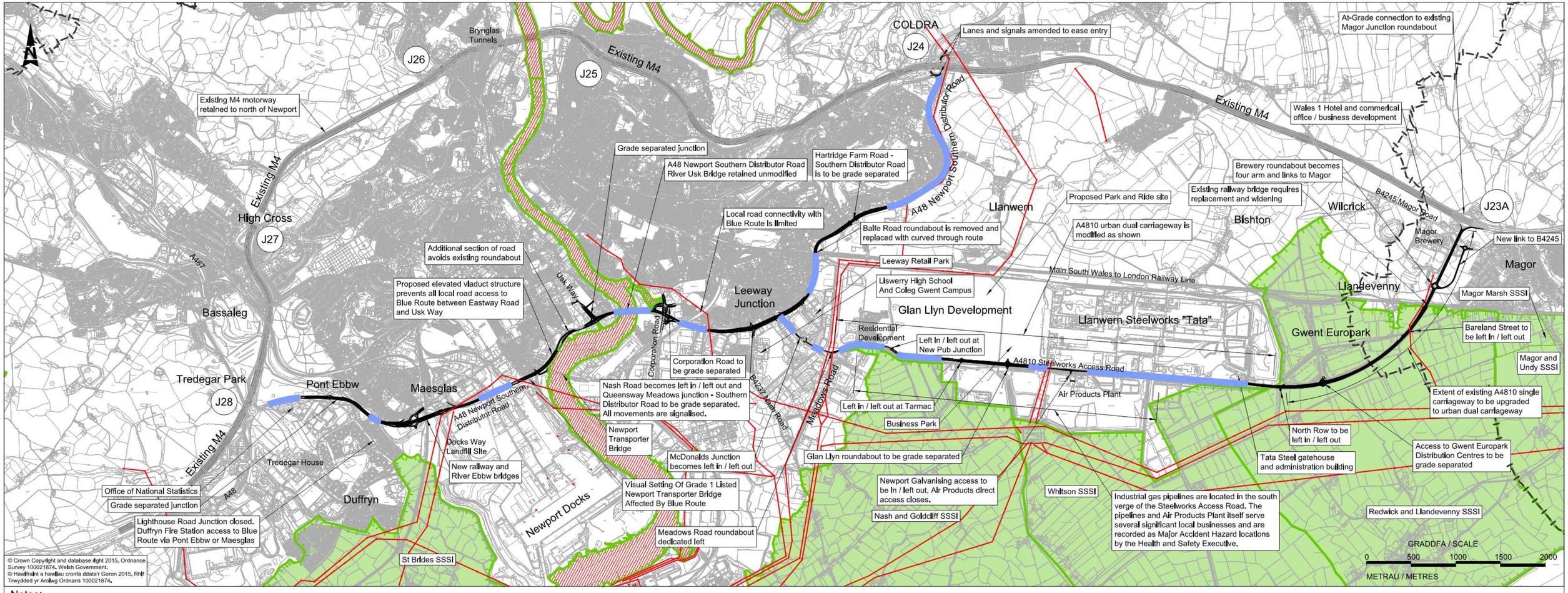
M4 CORRIDOR AROUND NEWPORT
BLUE ROUTE - SCENARIO 4



Notes:
1. Location Reference numbers refer to Blue Route

Legend:
Blue Route using existing highway

M4 CORRIDOR AROUND NEWPORT
BLUE ROUTE - SCENARIO 5



Notes:
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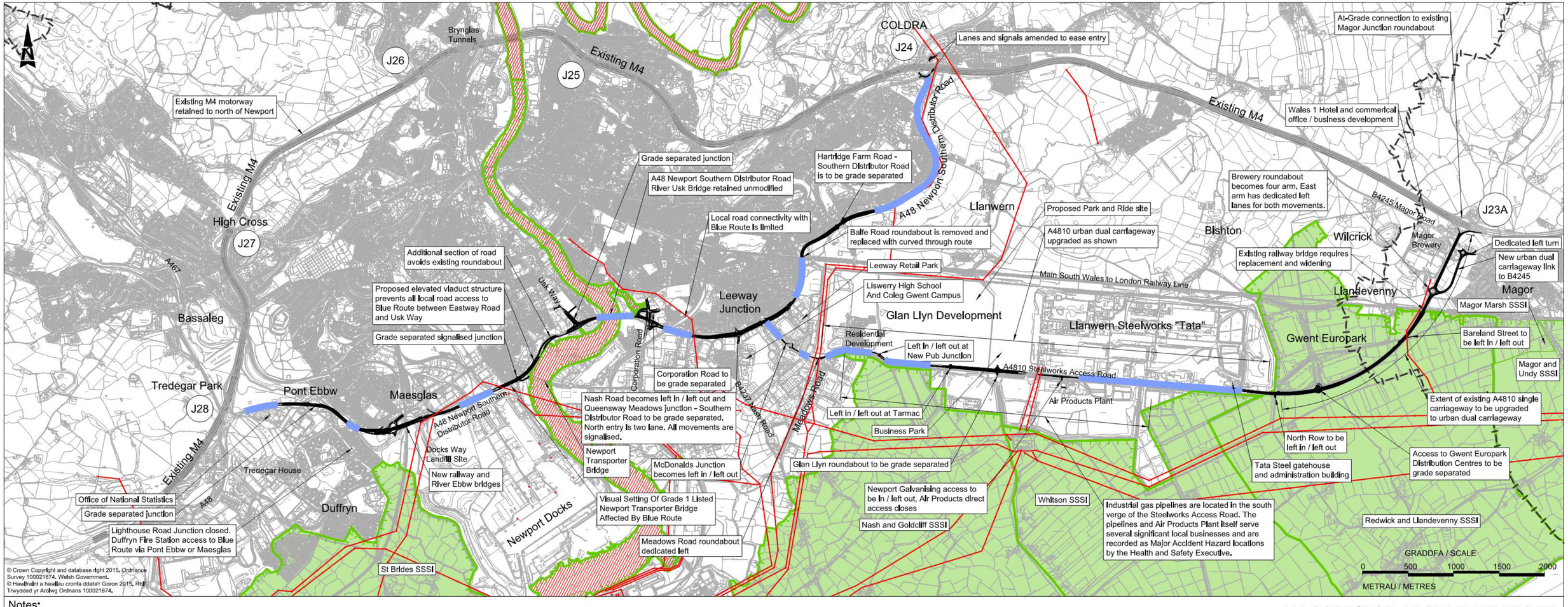
Legend:
Blue Route using existing highway

M4 CORRIDOR AROUND NEWPORT
BLUE ROUTE - SCENARIO 6



Notes:

1. Location Reference numbers refer to Blue Route

Legend:

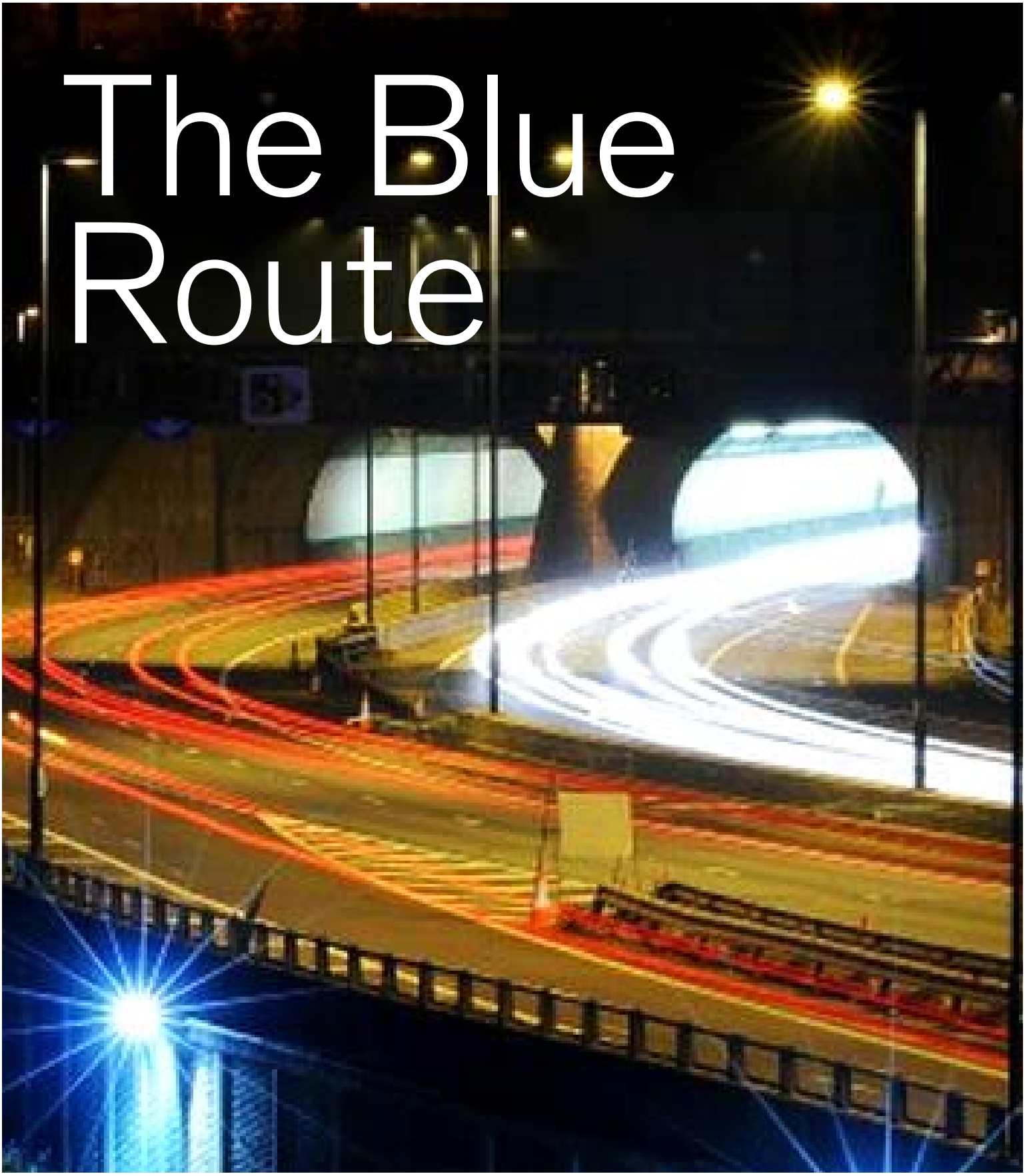
Blue Route using existing highway

M4 CORRIDOR AROUND NEWPORT
BLUE ROUTE - SCENARIO 7

Appendix B

The Blue Route: A cost effective solution to relieving M4 congestion around Newport, IWA, December 2013

The Blue Route



A cost effective solution to relieving M4 congestion around Newport

Stuart Cole

iwa

The Chartered Institute of Logistics and Transport

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Contents

The case for the Blue Route

There is a consensus that additional capacity is required to cope with peak period traffic congestion on the M4 around Newport. There are three main reasons:

- The Brynglas Tunnels on the M4 directly to the north of Newport are an acute pinch-point, reducing a six-lane motorway to four lanes. There have been many instances when there have been closures due to traffic incidents at this spot. For instance, in July 2011 the M4 was closed for two days after a lorry caught fire in the Brynglas tunnels. Nearby structures - the Usk Bridge to the east of the Tunnels and the canal bridge to the west - accentuate the difficulty of any road-widening project.

- There were faults in the original design of the Newport northern by-pass/ northern distributor road, later linked in to the M4, including the lack of a hard shoulder for some of its length. This reduces its capacity for current traffic volumes.

- The M4 is used by local traffic as a local distributor road for short journeys within the local urban area.

The Government has put forward the following three options for overcoming these problems, but has rejected the first two and is now only considering building the last, a new motorway at a significant extra cost:

- Using the existing A48 but improving it by upgrading the present junctions on the route that impede the free flow of traffic with new bridges and underpasses – that is, building grade separated junctions. This was known as Option C and would cost **£345m**.

- Building a new dual-lane carriageway – known as the Red Route – at a cost of **£830m**.

- Building a new road to full motorway standards – known as the Black/Purple route, at a cost of **£936m**.

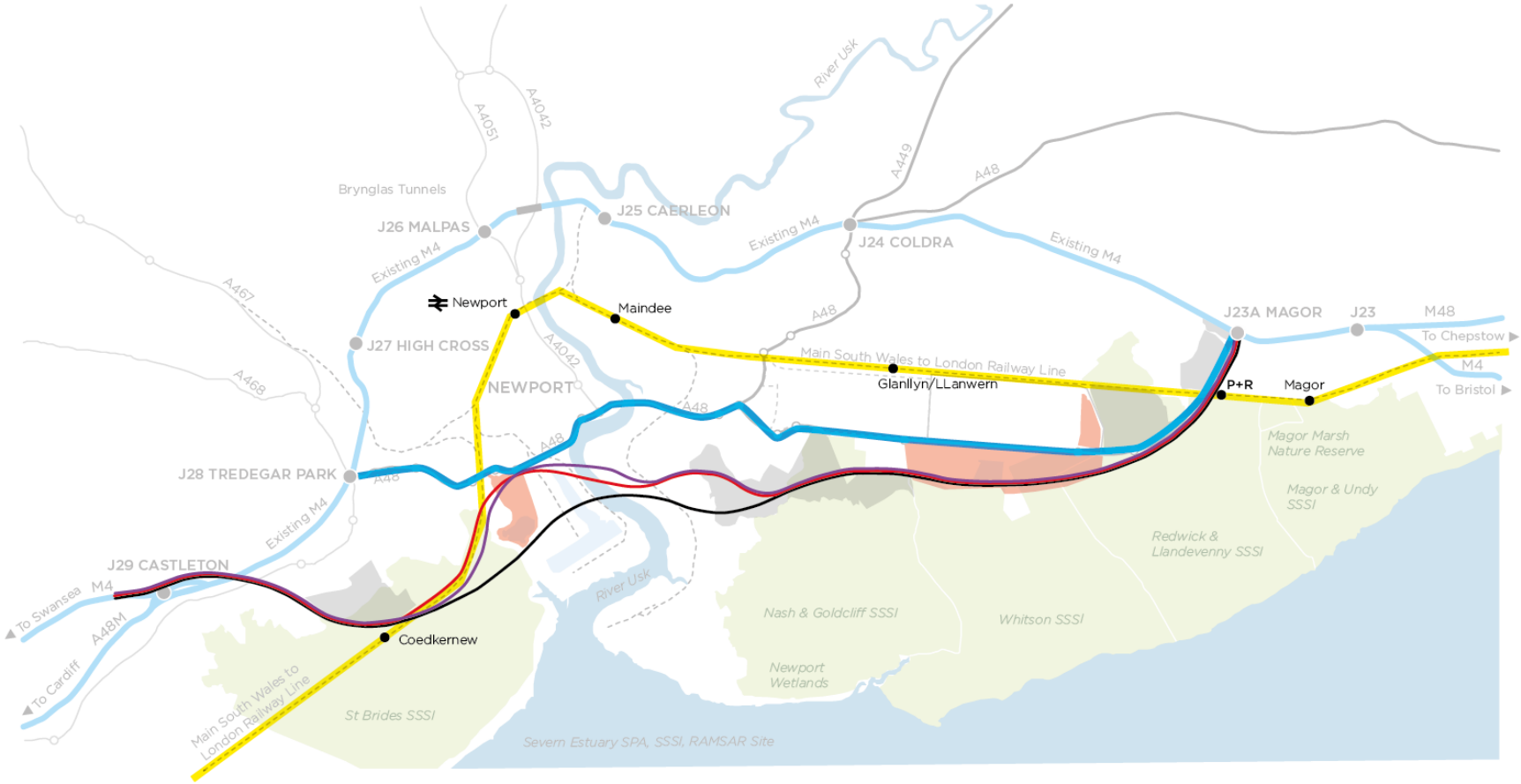
A fourth option put forward by the author, and developed from a Welsh Government plan in 2007, uses a combination of the A48 Newport Southern Distributor Road (SDR) around Newport and the former Steelworks Road to create a dual carriageway to motorway / expressway standard. Referred to as the Blue Route, it involves an upgrade of the A48 and the 'Steelworks Road' - a length of industrial roadway purchased by the Welsh Government in 2010 for building a motorway. It would run on a line to the south of Junction 23a on the east side of Newport to Junction 28 in the west. The roads would be re-constructed as a two-lane, dual carriageway at motorway standard. The land that has been acquired as Steelworks Road is sufficient for widening to a three-lane motorway at a future date if this is needed. The Blue Route would cost **£380m**.

The cost estimates for these four options are based on Welsh and UK Government figures and include costs for construction, acquisition of land and property, preparation and supervision, and traffic-related maintenance. They assume each scheme to have an opening year of 2020 to provide a comparable cost base.

Bringing forward the completion date for the Black Route initially set by the Welsh Government at 2031 is dependent on new borrowing powers but more significantly on the annual borrowing limit which HM Treasury will impose to maintain a decreasing Public Sector Borrowing requirement. A lower cost scheme will require less borrowing annually and could therefore be completed sooner while allowing other transport investment elsewhere in Wales using any surplus annual investment allowance.

The issue is whether the Welsh Government's present motorway option provides an unnecessary increase

Fig 1: Map showing alternative routes to relieve congestion on the M4 around Newport



Legend

- Black Route (the main element of draft Plan)
- Red Route (the main element to the 'reasonable alternative' to the draft Plan)
- Purple Route (the main element to the 'reasonable alternative' to the draft Plan)
- Blue Route (the alternative scheme)
- Existing Railway Lines
- To be electrified
- Stations (existing/proposed for Metro)
- P+R New possible Park + Ride

in capacity and in consequence unnecessary expenditure. The argument is that the fourth option, the Blue Route, would be a more appropriate solution. It would deliver what is needed at a much lower cost and with significantly less impact on the environment. It would have a lower capacity than the option favoured by the government but would be sufficient to cope with the estimated need.

The present traffic flows on the A48 southern distributor route around Newport route are lower than were expected. This is a consequence of the number of intersections, which disrupt the free flow of east west traffic. Grade separated junctions, where the traffic flow is unimpeded, would give these flows greater priority.

A key question in deciding between the various upgrades is calculations about future traffic forecasts. After the recession ends, will there be a lower level of car usage in absolute terms or will the rate of increase be similar to that in the immediate pre-recession?

An additional consideration will be the Welsh Government's plans to create a Metro rail and bus system for south-east Wales, as outlined in its *Cardiff Capital Region Metro Impact Study*, published in October 2013. This is an ambitious scheme, which will take between 10 and 15 years to deliver, at an estimated cost of £1.97 billion. There is no doubt that it will have a major impact on ameliorating traffic congestion around Newport.

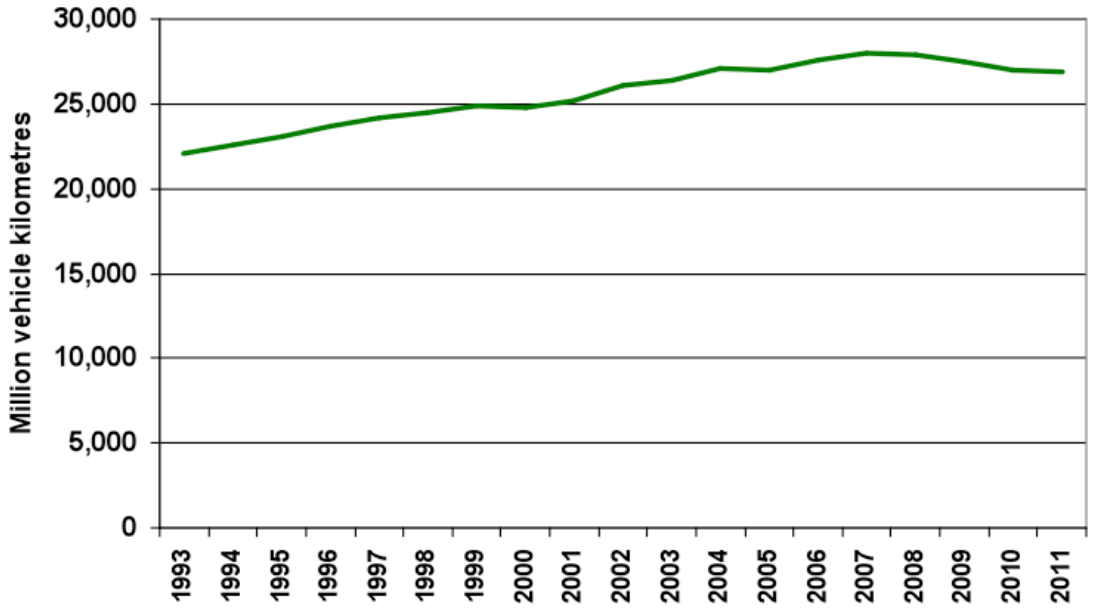
The Welsh Government's consultation paper *M4 Corridor around Newport* forecasts a need for 20 per cent more traffic capacity by 2035. It is estimated that an additional motorway (the Black/Purple Route) would divert up to 40 per cent of existing traffic away from the present M4. This is far more than necessary as a solution to current and future capacity problems.

At the same time the Government estimated that Option C was only expected to divert between 6 and 10 per cent of the traffic. This suggests that the Blue Route, which would utilise the Steelworks Road, would divert around 15 per cent. This may well be a conservative estimate. Furthermore, the consultation paper takes no account of the impact of rail electrification and specifically excludes consideration of future Metro developments along the M4 corridor despite significant modal transfer from car to rail at other similar locations.

The Blue Route could solve the congestion issue on the M4 earlier than the Black/Purple route since it could be completed sooner, by 2018. Combined with the Metro and rail electrification it would provide more than adequate relief of traffic congestion over the period to 2035.

Even with the UK Government's forecasts showing a 20 per cent growth in traffic flow between 2012 and 2030, the Blue Route would satisfy capacity requirements to 2025. However, the more likely change in car usage is a lower percentage increase, with the current plateau continuing for some time. The forecast for growth in the Welsh Government's consultation document has already been shown to be in excess of actual flows for 2012 and 2013.

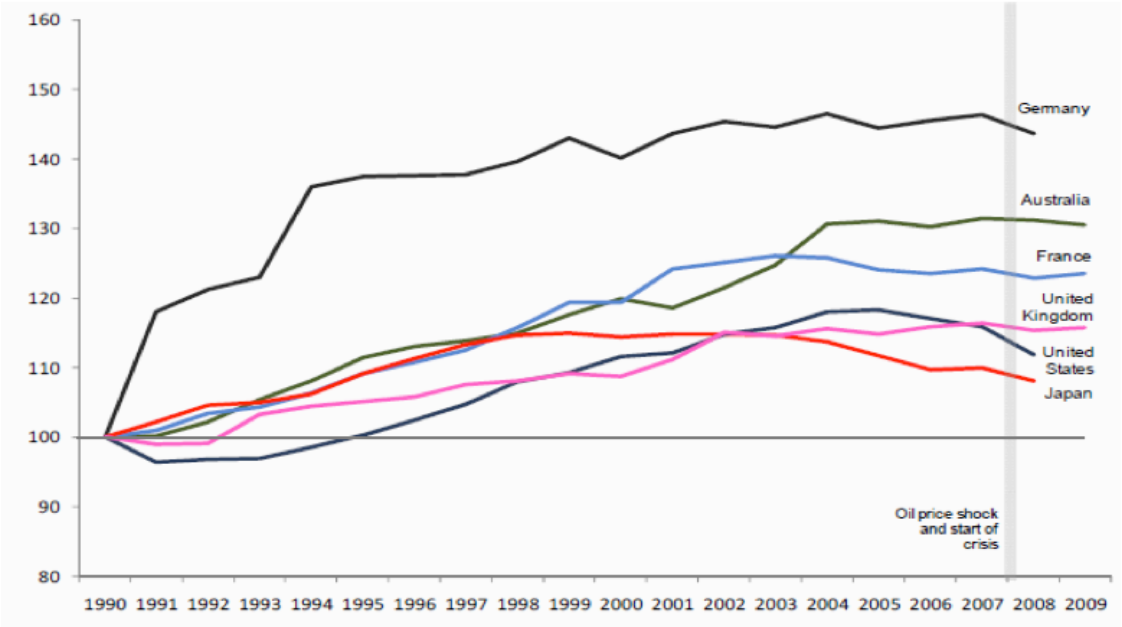
Fig 2: Wales traffic Trends 1993 – 2011



Source: Traffic in Wales, Statistics Wales, Welsh Government, 2012.

This plateauing of demand is not confined to Wales (Fig 2), nor to the UK as a whole. It is a pattern in other European Union countries, the United States and Japan (Fig 3). The policies now being employed from the EU to China are to prioritise investment in public transport, cycling and walking and to make improvements to existing roads rather than build new major highways. These are now seen as the way to sustainable solutions for traffic congestion and environmental pollution in growing cities.

Fig 3: International comparison of car usage in industrialised countries



Source: International Transport Forum statistics.

The main pressure for relieving congestion on the M4 around Newport has come from the business sector in Wales, represented by Federation of Small Businesses, the Institute of Directors, and CBI Wales. However, only the CBI supports the Welsh Government's position. The Federation of Small Businesses supports the Blue route, while the Institute of Directors says it would welcome a scheme which solves the M4 congestion problem and is future-proofed to extend road capacity if required. The Blue Route, in conjunction with the Welsh Government's plan for rail electrification and the Metro, will achieve that.

The Blue route in detail

The Blue Route is a combination of the A48 Southern Distributor Road upgrade (as in Option C) together with the Steelworks road, linking together at the present Queensway Meadows junction. It would be re-constructed as a four-lane dual carriageway road at expressway standard. The land that has been acquired would be sufficient for widening to three-lanes at a future date.

The Blue Route involves an upgrade between Junctions 23a and J24 to the east of Newport to Junction 28 to the west. This would involve upgrading the current A48 Southern Distributor Road whose traffic flows are lower than were expected. That is largely a consequence of the number of intersections, which disrupt the free flow of east west traffic. Grade separated junctions, where the traffic flow is unimpeded, would give these flows greater priority.

The junctions where this should be feasible are Pont Ebbw, Maesglas West/East, Docks Entrance, Usk Way, Corporation Road, Nash Road, Queensway Meadows, Hartridge, and Beatty Road. The proposed grade-separated intersection at Queensway Meadows would link onto the A4801 Steelworks Road. There would be two links onto the M4, at Junction 24 and Junction 23a. As a result the Blue Route will be capable of attracting traffic to/from both the Severn crossings and the A449/M50 routes into Wales. This is in contrast to the Welsh Government's motorway proposal which can only divert traffic to/from the Severn crossings.

At the western end of the A48, north of the Tredegar House conservation area and entering the M4 at Junction 28, there is currently a confluence of high peak traffic flows. The present A48 becomes a single carriageway four-lane road between the Pont Ebbw junction and Junction 28 on the M4. Currently there are traffic flow constraints at peak periods. There are Government proposals for redesigning this junction.

The present four-lane single carriageway road will require dualling to be able to carry the anticipated additional traffic, particularly from the A467 and the M4. There is woodland to the north adjacent to Tredegar Park sports facilities which could be affected. To the south are UK Government and Agency offices with car parking and some recent tree plantings immediately adjacent to the highway. The National Trust property at Tredegar House is not compromised by this scheme.

The Blue Route option rebuilds, with grade-separated inter-sections, the A48 south of Newport and the Steelworks road (A 4810). The result would be to increase east-west road capacity and reduce M4 congestion. This lower cost scheme could be constructed by 2018.

The Steelworks Road was purchased at a cost of £7.7 million by the Welsh Government from Tata Steel in 2010 to provide land for a 7 kilometre long section of the M4 relief motorway from Junction 23A. It was intended to link into the A48 at Queens Meadows junction between Junction 24 and Junction 28. Both roads would then have grade-separated junctions. This is the scheme that has been developed into the Blue Route.

The line of the Steelworks Road has major advantages in traffic terms, with little environmental downside. It is inside the footprint of the existing 'road' and industrial land and requires no public inquiry prior to construction. However, as a result of decisions over the last six years the land on either side of the Steelworks Road has been developed and would have to be repurchased.

The A 4801 Steelworks Road has recently been partly upgraded. What now exists is a local county road with several at grade intersections (roundabouts or traffic lights) with development taking place on either side. However, this does not preclude it being incorporated into the proposed Blue Route.

The proposition is that a four-lane motorway/expressway standard dual carriageway will provide the required resilience of flows on the existing motorway. The grade-separated intersections link into several areas of Newport including direct access to the Docks. This compares with what would be just one intersection, at a Site of Special Scientific Interest, along the new M4. The Blue Route would also avoid the complete bypassing of existing facilities such as retail parks and industrial estates with the inconvenience and negative economic impact that would be entailed.

The Blue Route compared with other options

LAND TAKE

- The Blue and Purple motorway option will take considerably more greenfield land than the proposed Blue Route which concentrates construction on using the existing road footprint - that is, the former industrial land at Llanwern Steelworks with some limited areas of green-field land.

ECONOMIC IMPACT

- The upgrade of the A48/Steelworks Road would improve journey times and reliability on the existing M4 corridor around Newport by offering an alternative route, especially in the event of major incidents on the present M4. This relief of traffic would improve the efficiency of long distance traffic, providing improved connectivity to and from England. An improved A48 passes through important retail, distribution and manufacturing areas.

- Initial traffic modelling showed that travel time on the network would be reduced, though there would be delays during construction. Delays occurred during the improvement of the M4 at Cardiff Gate but was not considered a reason for failing to proceed with construction.

- There would be economic benefits for the A48 corridor through journey time improvements, and enhanced accessibility for southern Newport, including some of the city's most disadvantaged wards.

ENVIRONMENTAL IMPACT

- The Red and the Purple / Black Routes (that is a new M4) cross a Special Area Conservation site and a Site of Special Scientific Interest at the River Usk, plus all but one of the Sites of Special Scientific Interest in the Gwent Levels.

- The Blue Route would give by far the lowest environmental impact of any of the proposals. It is not free of adverse environmental impact since it will intrude into the Redwick and Llandevenny Site of Special Scientific Interest at Barecroft Common. However, as the new Steelworks Road has largely been constructed this would militate against any further adverse environmental consequences.

- Negative environmental impacts would also include the possibility of some minor demolition of buildings, visual adverse impacts, and some biodiversity losses associated with the River Usk Special Area of Conservation. Even so, the biodiversity rating for the scheme is more positive than the motorway - according to the Welsh Transport Planning and Appraisal Guidance analysis in March 2013.

- The grade separated junction construction would create some issues but this could coincide with the proposed construction of 4,000 houses on the adjacent land. However, the resultant more freely flowing traffic could be expected to reduce emissions and noise.

- This route would reduce traffic congestion on the M4. There will be some increase in traffic noise along the A48 / Steelworks Road. The present land use is largely industrial or commercial with some housing where amelioration measures can be taken.

SOCIAL IMPACT

The comparitive analysis of all four routes using the Welsh Governments format is shown in Figure 4.

- A new 4,000 housing development on 40 hectares is planned between the Steelworks Road and the Great Western Main Line to the north. The Blue Route will provide enhanced access to this development.

- At present, the access junctions are controlled by traffic lights or roundabouts. This proposal would see these changed to grade-separated junctions. They would improve accessibility to the sites and provide greater connectivity to other parts of Newport and the M4 both east bound and west bound. There would be improved access to facilities such as the steelworks, the cement works, and the Magor Brewery.

- Adverse effects on cyclist and pedestrian movements will need to be taken into account. Alternative routes can be provided so that any increased traffic volumes on the proposed corridor do not increase hazards or community severance. In the case of the Purple/Black routes this would not be possible because, as motorway options, they would preclude provision for cyclists and walkers.

Fig 4: Comparison scores for alternative options for the M4 Corridor around Newport

Criteria	Doing Nothing	Red Route All-Purpose Road	Purple Route Motorway	Black Route new M4	Blue Route
Economy					
Transport Economic Efficiency (TEE)	(---)	(++)	(+++)	(+++)	(++)
Economic Activity and Location Impact (EALI)	(---)	(++)	(++)	(+++)	(++)
Environment					
Noise	(--)	(0)	(0)	(+)	(+)
Local Air Quality	(--)	(+)	(+)	(++)	(+)
Greenhouse Gas Emissions	(-)	(0)	(+)	(+)	(+)
Landscape and Townscape	(0)	(---)	(---)	(---)	(0)
Biodiversity	(0)	(---)	(---)	(---)	(-)
Heritage	(0)	(--)	(--)	(--)	(0)
Water environment	(0)	(--)	(--)	(--)	(0)
Soils	(0)	(---)	(---)	(--)	(0)
Social					
Transport safety	(--)	(++)	(+++)	(+++)	(++)
Personal security	(0)	(+)	(+)	(+)	(+)
Permeability	(-)	(+)	(+)	(+)	(+)
Physical fitness	(0)	(+)	(0)	(0)	(+)
Social inclusion	(-)	(0)	(+)	(+)	(0)
Equality, Diversity and Human Rights	(0)	(+)	(+)	(+)	(+)

Source: Welsh Transport Planning and Appraisal Guidance (WelTAG) Welsh Government / Author's application to Blue Route

Impact of public transport initiatives

The Welsh Government's case for a new motorway, put forward in its September 2013 consultation paper M4 Corridor around Newport, takes no account of the impact of rail electrification or the Metro. The paper says it does not take account of public transport measures "because the Welsh Government has commissioned a separate study and report on proposals to develop a Metro system for south east Wales". Yet these separate proposals cannot be considered in isolation. Each will have a significant impact on the other.

Indeed, the Welsh Government's *A Cardiff Capital Region Metro Impact Study*, published in October 2013, argues that it will help address congestion on the M4. The seriousness of the Government's intentions can be gauged from the £63m it has allocated to the Metro scheme in its 2013-14 transport budget. The longer term proposal is an ambitious scheme taking 10 to 15 years to deliver, at an estimated cost of £1.97 billion. Elements of the Metro that are directly relevant to transport congestion around Newport are:

- Four new stations on the M4 corridor, including Llanwern and Caerleon.
- Rapid transit bus solutions around the M4 corridor communities.
- Rail developments such as a direct link between Newport and Ebbw Vale.

Electrification of the South Wales Main Line and the *ValleysVale/CwmFro* rail network has passed HM Treasury's procurement criteria on cost-effectiveness. Work is under way on funding, planning, procurement and some construction. Completion of the electrification of the South Wales Main Line through Newport is expected by 2018, and the Valley Lines by 2019.

Both electrification and the Metro project are within the M4 relief road construction timespan. The South East Wales Transport Alliance (Sewta) Rail Strategy Final Report (2013) proposes over 20 new stations, including at Llanwern and Coedkernew, and increased capacity on the Ebbw Valley line. The objective is to attract car commuters away from the M4, A470 and other key routes and onto the railway. As the strategy concludes:

> "...several of its recommendations should be packaged to form an M4 corridor corporate strategy to provide realistic alternatives to car use in this congested corridor".

The *M4 Corridor around Newport* consultation paper forecasts a 20 per cent increase in traffic by 2035. However, it is estimated that the Black/Purple motorway proposal would divert up to 40 per cent of traffic away from the existing M4. This is in excess of the capacity required to address the problem.

The March 2013, the Welsh Transport Planning and Appraisal Guidance Report predicted that grade-separated junctions on the A 48 (Option C) would divert about 6-10 per cent traffic from the M4 around Newport through Junction 24. This suggests that the Blue Route, which would utilise the Steelworks Road from Junction 23a, would divert around 15 per cent. This may well be a conservative estimate. The diversion of traffic at Junction 23a westbound from the M4 and eastbound onto the M4 will enable traffic to avoid the M4 Coldra interchange at Junction 24. It is along this section of the M4 that capacity is insufficient at peak flow periods. This is because of the combination of the Brynglas Tunnels capacity limitations with the A449 and A48 bringing commuter traffic on to the M4.

Using state of the art technology (which measures average speeds) drivers could be advised of journey times between Junction 23a and Junction 28 on motorway screens at both junctions so giving them a choice of route.

Rail electrification coupled with the Metro will have an additional impact on relieving traffic congestion around

Newport. On the basis of the experience of the Newcastle upon Tyne Metro, completed in the 1990s, and the 2004 Bordeaux Tram network reduced peak traffic flows into those cities by over 30 per cent. A conservative assessment in south east Wales could be a transfer of between 20-30 per of traffic from road to rail at peak times.

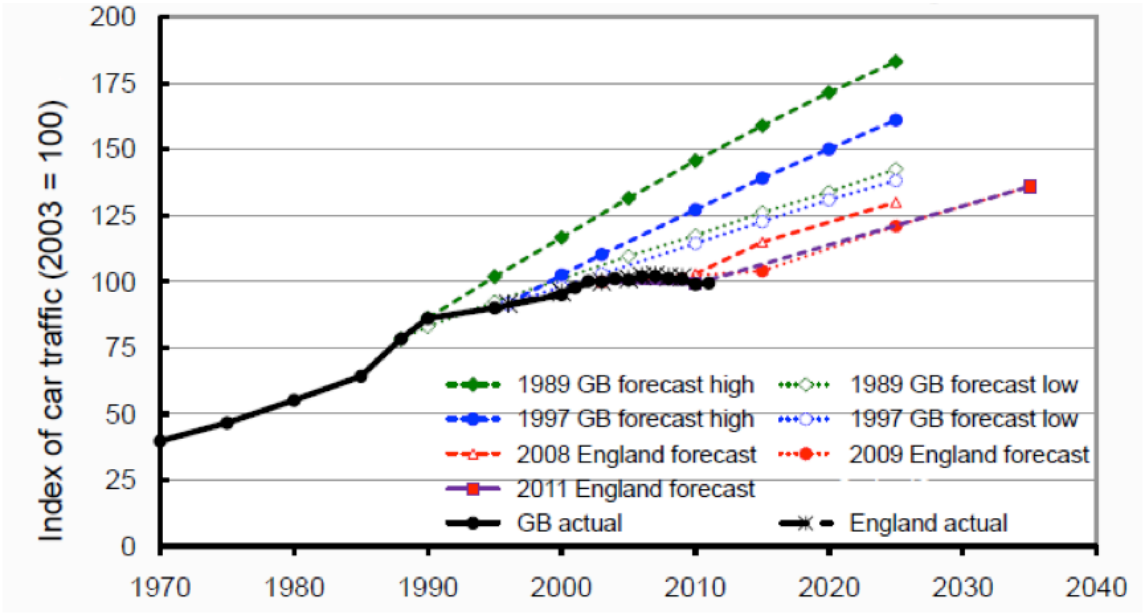
A similar impact could be expected in Newport and Cardiff. Electrification of the South Wales Mainline alone would reduce M4 peak traffic flows by up to 15 per cent. This level of modal change – the so called 'sparks' effect – has accompanied similar investment elsewhere in electrified track, new stations, trains / tram-trains / trams rolling stock, buses and interchange hubs.

Moreover, the Blue Route is likely to begin to solve the congestion issue on the M4 earlier than the Black/ Purple Routes because of its earlier completion date. The Blue Route combined with rail electrification would provide more than adequate relief to congestion over the period to 2035. The longer-term development of the full Metro proposals will lead to a further reduction in car use.

Traffic forecasts for the M4

UK Government road traffic forecasts continue to show significant growth (Fig 5). However, other research shows that car usage has flattened since 2006, continues to plateau at the present time, with only slow growth predicted for the future. Traffic flows on the M4 around Newport over the period 2006-2013 have been relatively level as shown in *The M4 Corridor around Newport*. They throw into question the need for a new motorway around Newport. In fact the Welsh Government's proposals were based on pre-recession traffic forecasts that are now being questioned.

Fig 5: Department for Transport forecasts and actual car traffic growth

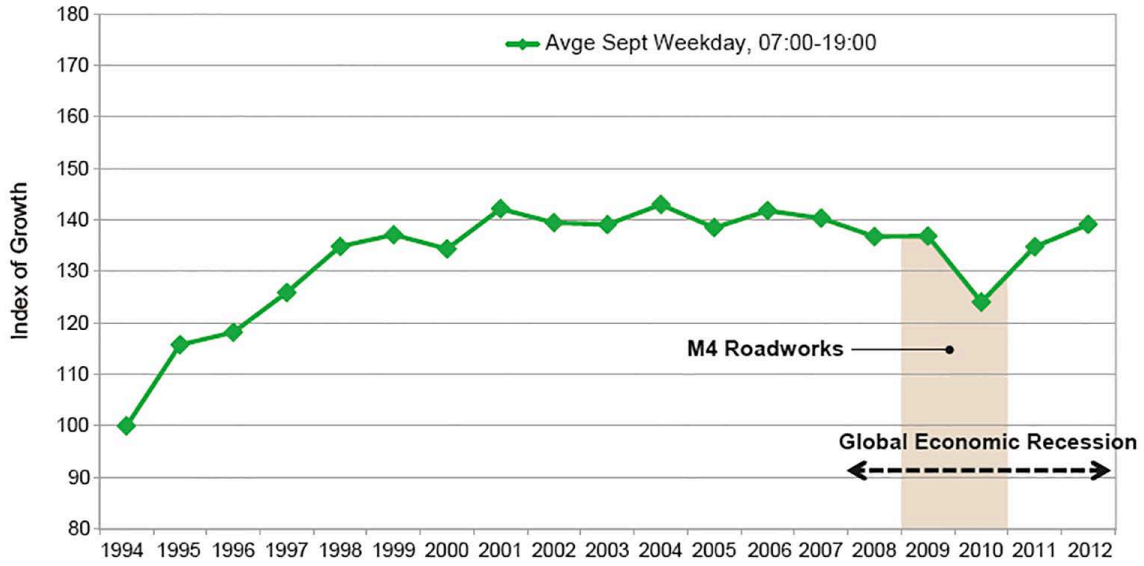


Source: Goodwin, P. and Mitchell K., *Analysis of DfT data*, Institute of Advanced Motorists, London, 2010.

Moreover, since 1985 transport planners have realised that large-scale road building does not solve urban traffic congestion because the extra capacity tends to attract more users. In his highly respected research, the late Dr Martin Mogridge has demonstrated that in some circumstances congestion actually got worse, particularly on routes to and from the new infrastructure.

The consultation document *M4 Corridor around Newport* predicts a 20 per cent increase in traffic over the period to 2035. These forecasts, developed by the Department of Transport, are based on population, household, workforce and employment projections, combined with a car ownership model. However, they exclude the impact of public transport developments on traffic flows.

Fig 6: M4 Junction J26-J27 – Traffic Growth Index



There was substantial growth in the late 1990s, but a levelling off from 2001 with a slight fall to 2012 (Fig 6). There is therefore limited evidence to suggest any change from the plateau in traffic flow that has occurred since 2001. The underlying trends in traffic flows over the last eight years have been affected by:

- The economic downturn, with journeys to work being reduced by unemployment and wages falling in real terms.
- Traffic congestion on strategic routes resulting in a transfer to rail.
- Improvements in rail service capacity and reliability following investment by the Government in rail services since the new franchise took effect in 2004- 05.
- The increase in petrol costs compared with rail fares has resulted in a cross price elasticity effect with a modal shift from car to rail.

Professor Peter Jones suggests a number of possible causal variables for the flattening of car usage:

- Increases in car costs.
- Income and GDP effects.
- Deterioration in road conditions.
- Improvements to the rail network.
- Spatial planning policies.
- Smarter choices.
- Improved mobile and Internet communications.
- Company car ownership and free fuel taxation regulations relating to payment in kind, have cut the number of taxpayers claiming both car and free fuel.

At the National Transport Conference in Cardiff in September 2013 Professor Brian Clarke, President of the Institution of Civil Engineers, made two key points: we are not sure if private motoring has peaked, and nor are we sure if the trend in reduced driving by young males will continue.

Professor Phil Goodwin has pointed to the following trends as explaining the plateauing of car use:

- Rise in mobile phone computing.
- Cultural and attitude changes.
- Health and environment as motivational factors to cut down on car use.
- Demographic changes – aging population; more single person households; women having children at a later age; young people and 'empty nesters' returning to city centre locations.
- Changing lifestyle images of travelling.
- Projected increase of Internet access and consequent growth of online shopping that will reduce work and retailing journeys.

It is noteworthy that increases in fuel excise duty had little effect on car usage until the mid-2000s and the onset of the recession. There is also potential for demand management to reduce car usage, through parking fees and road charging. Both of these could be deployed in Newport in conjunction with improvements to pubic transport.

It is noteworthy, too, that cities with high incomes and growing population show the greatest reduction in car use. There have also been reductions in medium sized towns and where high density new urban developments have occurred. This is the case in Cardiff and Newport.

Some evidence suggests that the cumulative effects to discourage car use and encourage alternatives - walking, cycling, or public transport - have bigger impacts on car use than income and prices. The Welsh Government's recent Active Travel Act should have that effect.

Meanwhile, population projections for the 30 to 69 age group in Wales, the biggest car users, are fairly constant from 2010 to 2034. Between 2007 and 2011 Wales saw reductions in all modes of transport except cycling, which in relative terms, experienced a dramatic increase, as shown in the table below:

Table 1: Change in Welsh transport modes 2007-11

Cars	- 4%
Buses/coaches	- 14%
Goods vehicles	- 16%
Motor cycles	- 11%
Pedal cycles	+ 26%

Source: Transport Statistics Wales 2012.

At the same time the stock of vehicles and the number of new registrations has fallen, for the following reasons:

- A modal shift to other forms of transport.
- High fuel prices coupled with static or falling incomes
- Demographic changes, including an ageing population.
- Behavioural change such as concern for the environment;
- Changing travel patterns.

Taken together these trends serve to throw doubt on the Welsh Government's reliance on forecasts that car usage is likely to increase substantially in the coming decades. At the very least, there is great uncertainty about the traffic flow projections and whether a peak in car usage has been reached. What is likely is that, as the recession ends, there will be a lower level of car usage in absolute terms together with a lower rate of increase, than in the period before the recession.

Certainly car usage is likely to grow following economic recovery and with increased consumer confidence. However, it is likely to do so at a declining rate in the next three decades. The Welsh Government's forecast of a sharp uplift of 20 per cent between 2012 and 2030 in its consultation document M4 Corridor around Newport does not reflect recent trends. Certainly, in the period between 2012-2014 there has been a plateau.

Neither do the Welsh Government's assumptions take account of projected changes in the modal split between road and rail following electrification of the South Wales Main Line, nor the longer-term Metro investment.

The main drivers of the growth of car use – population projections, income, fuel prices, and competing public transport – all suggest that congestion on the M4 corridor north of Newport will not be as intense as the Welsh Government is assuming. In turn this points to the more cost-effective Blue Route as being a more appropriate response than constructing a new motorway.

Views of the business sector

The business community is in no doubt of the need for a relief road for the M4 around Newport. For instance, CBI Wales says that the M4 relief road is its number one priority.

On the other hand the Federation of Small Business draws a parallel for the Government's three options with everyday retail expenditure where prices and quality are compared. The problem is that value for money is not part of the Welsh Government's consultation, since there is only one estimated published price of £936m for its preferred scheme (the Black/Purple Route).

The Institute of Directors Cymru Wales wants a solution to ease congestion on the M4 as quickly as possible. At the same time it says that any scheme has to be 'future proofed'. Not unreasonably, the business community does not want to see a repeat of the current M4 position in 20 years time. The Blue Route answers this point since, if traffic flow were to rise sharply, it could be upgraded to full motorway standard for the whole length.

The cost of the Welsh Government's preferred motorway option means that the cap that is likely to be set by HM Treasury on total Welsh Government borrowing could have a high proportion of allowed borrowing reached by just one scheme. The view of the Federation of Small Businesses is that this would deprive other parts of Wales of economically vital transport infrastructure. Accordingly, and along with the Institute of Directors, it has opted for the Blue Route at 40 per cent of the Black/Purple Route cost,

All three bodies accord with the principle of an integrated transport policy for south east Wales and question why the proposed Metro programme and electrification are not included in the Welsh Government's analysis and forecasts. By 2030 it is anticipated that improvements to public transport in southeast Wales will result in a modal split of near 30 per cent.

The Federation of Small Businesses concludes that there is "a lack of common sense" in the current consultation with the Government committing the vast majority of Wales' future borrowing capacity to a single project. This, it says, is not in the best interest of the wider Welsh economy.

Conclusion

The primary reason for putting forward the Blue Route is the uncertainty of current traffic forecasts. These look likely to be lower than has been assumed. As a result it is questionable whether a new motorway can be justified. If it cannot then unnecessary and harmful environmental impacts could be avoided.

There is also an opportunity cost of constructing a motorway if an excessive financial allocation is made to this one scheme. This could be a direct impact on the revenue account, or on the Welsh Government's borrowing limits, thereby precluding other transport projects.

Substantial cost savings would be made as a result of opting for the Blue Route – the A48 Southern Distributor Road and the Steelworks Road - rather than a new M4 (the so-called Black / Purple Route).

Even with the Department for Transport's forecasts showing a 20 per cent growth in traffic flow between 2012 and 2030, the Blue Route could satisfy capacity requirements to 2025. However, these forecasts are being questioned as being too high a rate of growth by some of Britain's leading transport economics academics. Moreover, rail electrification and the Metro will significantly reduce congestion on the M4 around Newport.

The most likely change in car usage is a low percentage increase but with the current plateau demand pattern continuing for some time. The forecast for growth in the consultation document has already been shown to be in excess of actual flows for 2012 and 2013

The Blue route will have significantly less impact than a new motorway on environmentally sensitive sites south of Newport. The motorway option is inconsistent with the Welsh Government's sustainable development duty, climate change commitments and aspirations to halt the loss of biodiversity

Much of the argument put forward in favour of the motorway option has related to resilience, specifically for example in the event of a closure of the M4 as has happened in the recent past because of an incident at the Brynglas tunnels bottleneck. However, the Blue route combined with improved traffic management and diversionary signage would be a sufficient answer to such emergencies.

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