



GWENT WILDLIFE TRUST, FRIENDS OF THE EARTH, CPRW AND THE
WOODLAND TRUST

CLOSING STATEMENT

In the matter of:

Public Local Inquiry into the M4 relief road around Newport: The effects of the
proposed M4
extension across the Gwent Levels

September 2017



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The Zeitgeist

Wales, and the world, are facing a ‘man-made perfect storm’ of truly cataclysmic proportions, comprising synergistic crises of

- **catastrophic climate change** (devastating hurricanes, droughts, floods, heatwaves and irreversible sea level rise), and.
- the mass extinction of biodiversity, or as one recent study calls it “**biological annihilation**”, representing a “**frightening assault on the foundations of human civilisation**”.

These crises unfold before our eyes as a steady process of environmental degradation - a phenomenon of subtle but relentless momentum – driven by the ‘business as usual’ forces which can be summed up as unsustainable development.

Halting the loss of biodiversity and avoiding increasingly dangerous levels of climate change will require unprecedented effort and coordination from governments, businesses, charities and civil society. This cannot be achieved without a major cultural shift in government away from short-term political expediency to a way of making decisions which gives much more regard to the needs of future generations.

Many countries, including the UK and Wales, have signed up to international Conventions and agreements to urgently tackle these issues. These international commitments include:

- The [UN’s Sustainable Development Goals](#)¹
- The Convention on Biological Diversity,
- The EU Biodiversity Strategy², and
- The Paris Climate Change Accord³

to name a few.

¹ <https://blogs.wwf.org.uk/blog/green-sustainable-living/what-on-earth-are-sustainable-development-goals/>

² http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm

³ http://unfccc.int/paris_agreement/items/9485.php

In fact, Wales has recently legislated to address these issues of biodiversity loss and climate change through important pieces of internationally acclaimed, world leading legislation, namely:

- The *Well-being of Future Generations (Wales) Act 2015* - which legislates for sustainable development.

Nikhil Seth, Director of Division for Sustainable Development, Department of Economic and Social Affairs, United Nations said of this Act: "*The Wales future generations Act captures the spirit and essence of two decades of United Nations work in the area of sustainable development and serves as a model for other regions and countries. 'One Wales, One Planet' captures it all. We hope that what Wales is doing today the world will do tomorrow. **Action, more than words, is the hope for our current and future generations.***"⁴

- The *Environment (Wales) Act 2016* – which legislates to
 - halt the loss of biodiversity and restore the resilience of ecosystems by requiring public bodies such as the Welsh Government to maintain and enhance biodiversity and the resilience of ecosystems, and
 - combat climate change (reducing greenhouse gases in Wales by at least 80% by 2050)

These Acts are the considered resolution of the Welsh Parliament and should not be interpreted as mere window dressing. They are a legislative recognition that a changed approach is necessary and the way that things have previously been done was not working.

The Environment Act also requires NRW to produce a State of Natural Resources Report (SoNaRR) and Welsh Government to produce a Natural Resources Policy.

⁴ <http://gov.wales/newsroom/environmentandcountryside/2015/150429-future-generations-act/?lang=en>

The first [State of Natural Resources Report](#)⁵ (SoNaRR) was published in 2016 and stated⁶ that

- *“many of our natural resources and the resilience of Wales’ ecosystem are continuing to decline...*
- *It is unlikely that ecosystems across Wales have sufficient resilience and this will impact on their capacity to provide services and benefits into the future...*
- *all habitats have problems with all four attributes of resilience*
- *Natural resources are continuously declining or are being used faster than can be replenished*
- *The health and resilience of our ecosystems is being compromised; this includes targets not being met or ‘limits’ in danger of being breached”*

Welsh Government produced the [Natural Resources Policy](#)⁷ over the summer. This policy states that

- *To build resilience into our ecosystems we need to: Proactively develop resilient ecological networks to maintain and enhance the wider resilience of Wales’ ecosystems. The evidence shows that diversity is declining and that land and sea use change, including **urbanisation, is leading to fragmentation and loss of habitats and species, and soil sealing. Building on the protected sites Wales, our aim is to improve resilience and reverse the decline of biodiversity in Wales. Reversing this trend, by better managing existing areas and creating new ones will also provide important wider benefits for society** (page 10)*
- *Through the Wales National Transport Strategy and Finance Plan **we are promoting a more sustainable road transport network and a modal shift away from roads for people and freight. This will reduce emissions and the impacts that transport has on our environment and our health.** We are committed to improving active travel opportunities and promoting public*

⁵ <https://naturalresources.wales/media/679409/chapter-8-summing-it-up-final-for-publication.pdf>

⁶ Chapter 8 – Assessment of the sustainable management of natural resources

⁷ <http://gov.wales/docs/desh/publications/170821-natural-resources-policy-en.PDF>

*transport. In taking this action forward we will: **take action on our transport network that enhances the resilience of our ecosystems and reverses the decline of biodiversity.** We will also explore opportunities for wider ecosystem service delivery, such as carbon, water and flood management (Page 28).*

The intention and spirit of the Acts is to drive radical change in how all public service decisions are made – a single shared purpose for Wales. Welsh Government itself is also accountable under the Acts, which presents a huge challenge to civil servants and Ministers.

It is not just the objecting bodies that hold this view, but the opinion of the person who is employed by Welsh Government to promote sustainable development by acting as guardian of the ability of future generations to meet their needs, the Future Generations Commissioner, Mrs Sophie Howe. Part of her role is to encourage public bodies, including the Welsh Government, to take greater account of the long-term impact of their actions. In her recent letter to the Inquiry, which challenges Welsh Government's M4 Team's interpretation of the Well-being Act, Sophie Howe stated that

- *I anticipate that **applications not demonstrating how the sustainable development principle has been applied would not be progressed** as they would not be compliant with the duty to carry out sustainable development under the Act.*
- ***historically it has not been uncommon for the economic benefits to be given precedence but this is one of the reasons why legislation was needed to redress the balance** between the different needs and the different core elements leading to decisions which are sustainable in the long-term.*
- *Under the Act, we must look for solutions which address the four pillars of well-being together and select the one which delivers best against the four pillars of well-being [Economic, Environmental, Social and Cultural]. **One pillar cannot override the others.***
- *I expect public bodies to demonstrate that they are seeking to take decisions which deliver the best outcomes across all four pillars of well-being. **The***

*projects and decisions must contribute to all of them as if they were one. The new Act requires public bodies to take holistic decisions and to cease making decisions which harm critical elements of well-being, including social, economic, **environmental** and cultural elements.*

- *I would expect that decisions only contributing to one or two pillars of well-being to be disregarded.*
- *The balancing in this revolutionary Act means giving as equal as possible weight to each element and not allowing one to tip the scale...rather than an exercise of trade-offs. The Act moves us away from the traditional trade-offs approach to one of balancing in a more literal sense*

Sophie Howe has also commented on the Natural Resources Policy statement, indicating the need to ***“take action on our transport network that enhances the resilience of our ecosystems and reverses the decline of biodiversity”***. She also stated that ***“The M4 proposals seem to directly contradict this policy statement as the scheme and the mitigation do not seem to support this aspiration”***.

The Commissioner states that the Welsh Government’s M4 Team has provided the Inquiry with an ***“incorrect interpretation of the Act”*** but also that this incorrect interpretation ***“could set a damaging precedent which could undermine the spirit and intention of the legislation”***.

Regarding Welsh Government assessment that short term traffic needs out-weight long term environmental harm, Sophie Howe states ***“This is clearly wrong as demonstrated by the letter of the law”*** and that she ***“would anticipate a decision which does not allow for this would be abandoned as not complying with the statutory duty”***.

The scientific world now recognises that we have entered the Anthropocene epoch in which we are only today beginning to recognise the scale and permanence of the changes we have brought and, if unchecked, will continue to bring to our planet. Therefore, sustainable development, including acting on climate change and the protection of biodiversity, is the zeitgeist.

Anti-zeitgeist

We need to urgently change our actions and our mind-set if we are to address 21st Century challenges – biodiversity loss, climate change, social inequality, mental and physical health – many of which are intertwined. The new legislation identified earlier is required because ‘business as usual’, which could be termed unsustainable development or ‘sustained development’, created the crises we now face. This is why the Commissioner, in her recent letter to you stated “*Business as usual is no longer an option*”.

Evidence from around the globe shows that building motorways to fight congestion doesn’t work. Building a motorway to ease congestion has been likened to ‘loosening your belt to fight obesity’. It may provide some short-term relief, but soon afterwards the extra road capacity generates more traffic than there was before. In the long term motorways just allow congestion to grow further: they don’t reduce it. The evidence for this can be seen on every road journey, the M25, the M5 and M6, and closer to Newport on the M32. Every project has led to significant increases in road use and pollution. All projects have come unstuck when accidents occur creating gridlock for miles around and the increased levels of traffic encouraged by the projects are forced to find alternative routes.

The problems around Newport are not unique, and neither is the Welsh Government’s proposed solution. The proposed solution is neither ‘innovative’ nor ‘low carbon’, both of which are required under the Well-being of Future Generations Act definition of a ‘Prosperous Wales’.

However, regardless of the above and despite the major cultural shift that is required to avert these crises, the Welsh Government think that a motorway which tarmacs approximately 16kms of green fields, 10kms of which is *nationally* important wildlife sites, *and* has a huge carbon footprint, is a good idea.

We have listened to Welsh Government consultants advocate the necessity for new road schemes to relieve old road schemes with a logic that would tarmac the world - no matter what the consequences are for the landscape, biodiversity, climate change or the

opportunity costs for the rest of society. The Welsh Government arguments are, in many cases, based on flimsy, non-existent or in some cases contradictory evidence. For example,

- Building more motorways leads to less congestion –
 - **building a motorway to bypass a motorway** ignores empirical evidence from the UK and around the world that proves building new roads actually creates more traffic.
 - the scheme is self-defeating because it attempts to address the symptoms of a network traffic problem (congestion), not the cause (volume of traffic). You are not stuck in traffic – you are traffic.
 - it is not, as the [Natural Resource Policy](#)⁸ (page 28) states “***promoting a more sustainable road transport network and a modal shift away from roads for people and freight***”

- Building more motorways lead to jobs and inward investment – this degraded and simplistic assumption hides the deep-rooted causes of economic stagnation. This is highlighted not only by our witnesses but also in [Welsh Government’s National Development Framework – Integrated SA Scoping Report](#)⁹(Table 4-1 Key Sustainability Issues and Opportunities), which include the following as key reasons for Wales’ relatively poor economic performance
 - “Relatively low skills level and poor educational attainment levels (although improving), particularly in the more deprived parts of the country.
 - The largely rural nature of the country resulting in relatively small urban areas which would otherwise be more strongly associated with agglomeration effects.
 - The relatively high proportion of older people who are retirement age.”

But it does not include Transport

There are far better ways of spending such a colossal amount of money to develop the economy of south-east Wales if that is the goal, as highlighted by the [Federation](#)

⁸ <http://gov.wales/docs/desh/publications/170821-natural-resources-policy-en.PDF>

⁹ https://consultations.gov.wales/sites/default/files/consultation_doc_files/consultation_document.pdf

[of Small Businesses](#) and the [Future Generations Commissioner](#) and our own expert witness, Professor Terry Marsden and [Professor Calvin Jones](#).

Much of the benefits the Welsh Government associate with this new road rely on assumed time savings for drivers. Such time savings are often not statistically significant, and are not experienced as **actual savings** by real people and are also most susceptible to the impact of induced traffic.

There is little or no evidence to show economic gains that result from additions to the existing network in areas already well-served by good infrastructure such as the UK including south Wales.

- It is stated that the M4 relief motorway will ‘*maintain and enhance*’ biodiversity (section 86 of [John Davies proof of evidence](#) states “*the Welsh Government has sought to maintain and enhance biodiversity*”) – building this 6 lane motorway over approximately 10kms of nationally important ecological wetlands will have a significant and long lasting impact on the SSSIs which cannot adequately be mitigated. Along with the direct loss of habitat beneath the concrete footprint of the motorway, one of the largest losses of SSSI land anywhere in the UK, the M4 bypass would rupture the essential cohesion of the place, acting as an impermeable barrier to all flightless wildlife, isolating wild animal populations on either side of the divide. However,
 - Dr Keith Jones states “it is accepted, in spite of the comprehensive mitigation measures proposed, that **it is not possible to entirely mitigate for the loss of complexity of the habitats of the SSSIs**. Thus Chapter 10 Ecology and Nature Conservation of the March 2016 ES (Document 2.3.2) recognises that **there would be a significant adverse long term impact on the Gwent Levels SSSIs** as a result of the land take for the Scheme”.
 - [John Davies, para 240](#), “*the Scheme... would conflict with planning policies in respect of cultural heritage, landscape, ecology and nature conservation*.”

Consequently it would fail to meet the fourth part of the planning policy definition of the sustainable development principle in PPW {Planning Policy Wales}, respect for environmental limits

- As the Welsh Government document highlights, ***“NRW considers the scale of permanent loss of SSSI in the Gwent Levels under the scheme is unprecedented and would not be in accordance with the statutory duties with respect to SSSIs under Section 28G of the 1981 Act and / or with respect to biodiversity and ecosystem resilience under Section 6 of the 2016 Act, and would be contrary to national planning policy¹⁰”***.

- Building a motorway over 10kms of the Gwent Levels SSSIs will avoid “key environmental assets” is advanced by [Matt Jones Evidence](#) (section 17.5) and Ben Sibert. However, if they wanted to avoid the SSSIs then they should have avoided them by not putting the motorway across the Gwent Levels.

- Building a motorway will reduce greenhouse gas emissions is advanced by Welsh Government. However, spending either
 - over half a million ([Tim Chapmans - WG figures](#)– section 4.3.13) with a potential and highly hypothetical date of 2072 – which could drift further out
 - to 1m tonnes ([Prof John Whitelegg](#) – section 21) of carbon constructing the motorway, which may never be repaid,will not help Welsh Government reduce greenhouse emissions by 80% by 2050.

John Davies MBE’s evidence that this proposal is, of itself, not intended to reduce greenhouse gas emissions exposes the ‘business as usual’ approach of the Welsh Government to this issue. It is an admission that this issue, while being investigated by the Welsh Government, has effectively then been ignored by

¹⁰ [ID/061National Designated Sites Statement of Common Ground - Extent of loss 2.3.2](#)

them so far as their requirement to address sustainability that is a requirement of law - Section 3(1) of the Well-being of Future Generations Act stating 'Each public body must carry out sustainable development.'

- Building a motorway will benefit the well-being of Wales is advanced
 - [Welsh Government documents](#)¹¹ (Page xi) admit that during its consultation process it received more comments against this motorway proposal than for it, however, it dismisses them without a trace of irony as possibly being "*the result of interest groups' initiatives*" while simultaneously championing the support they've received from corporate business and their 'consultation' exercises.
 - Sophie Howe, the Future Generations Commissioner, Professor Terry Marsden, Professor Calvin Jones and Professor John Whitelegg amongst others believe that the motorway will not benefit the well-being of Wales.
 - One of the 'ways of working' from the Well-being of Future Generations Act is 'preventative action' i.e. not to make things worse. However, in almost every conceivable way this scheme will make things worse, including climate change, ecology and transport.

The M4 Scheme is the continuation of 'business as usual', not only in the face of the historic failures of such projects to prevent the problems that they claim to solve, but now also set against the well-recognised harm to our planet that this course has contributed towards.

The Scheme is right out of the 1960s play book. We need to stop doing the same things over and over again and expecting different results - **definition of insanity or – anti-zeitgeist** if you will.

¹¹ <http://gov.wales/docs/det/consultation/140812-consultation-participation-report-en.pdf>

Our evidence

There are occasions when a campaign perfectly captures the zeitgeist. Our evidence has drawn attention to the fact that this scheme is not just unsustainable but hopelessly out of touch and in contradiction with,

- new legislation (Environment Act and Well-being of Future Generations Act), policies and commitments (National Resources Policy, Nature Recovery Plan, Paris Climate Change Agreement)
- the Well-being of Future Generations Commissioner's evidence
- even their own witnesses – with John Davies, the Welsh Government's 'sustainable development' 'expert' witness, saying it should go ahead even though the scheme doesn't '*respect environment limits*' which is the very definition of unsustainability.

This non-conformity with Welsh Government sustainability policies and legislation is a significant departure from legislative intention and is a serious matter. It represents a deliberate decision that is contrary to legislation, made in the full knowledge that there are many low carbon, zero carbon, and less ecologically damaging alternatives to the most damaging option.

Together with partners **we have brought in expert witnesses from the top of their disciplines to counter the case for a new road.** Most of whom, like our barristers, acted unpaid, in a pro bono capacity such were their concerns.

From the **ecological and landscape perspective**, the following expert witnesses either appeared or submitted written evidence –

- Professor Sir John Lawton – Habitat Fragmentation
- Professor John Altringham - Bats
- Professor Neil Ward – Water Quality
- Lindi Rich – Gwent Wildlife Trust – Water Quality
- David Boyce – Invertebrates
- Geoff Liles – Otters

- Richard Bakere – Gwent Wildlife Trusts, Reserve Manager for Magor Marsh Nature Reserve which includes Barecroft Common.
- Mike Webb – from Gwent Wildlife Trust - Cumulative impact
- Richard Barnes – from the Woodland Trust – Ancient Woodland
- James Byrne – Wildlife Trusts Wales - Mitigation and Sustainable Development
- Peter Ogden, Director of the Campaign for the Protection of Rural Wales

From a **climate change** perspective – due to the significant greenhouse gas emissions that the construction of the motorway alone would create - we called

- Professor Kevin Anderson
- Professor Lorraine Whitmarsh
- Professor John Whitelegg

From a traffic perspective - due to the weak case on traffic forecasting we called

- Professor John Whitelegg
- Gerald Kells – Friends of the Earth

From an **economic perspective** – due to the weak economic case for construction of the Motorway we had

- Professor Calvin Jones – who highlights the deep-rooted causes of economic stagnation in Wales, none of which is related to transport.
- Professor John Whitelegg

From a **sustainable development** perspective – due to the unsustainable nature of the scheme, and that it is at odds with the Well-being of Future Generations Act - we called

- Professor Terry Marsden - a Professor in sustainability who repeats that the proposed road is unsustainable, and that the blue route is a less damaging alternative
- All of the witnesses mentioned above contributed to the case against the motorway being a sustainable option.

Ecology

Here follows a summary of the Gwent Wildlife Trust evidence presented on ecology – as well as points on cross examination. It is worth highlighting that Dr Keith Jones – who was the main ecological consultant for Welsh Government could not be cross examined by Gwent Wildlife Trust and therefore we invite the Inspectors to give his evidence the appropriate level of weight. Mr Jonathan Davies, by his own admission a generalist ecologist, stepped in to assume some of Dr Jones evidence.

Before delving into the evidence on ecology it is worth highlighting the important context to our evidence;

WWF Living Planet Index (2016)

This report states that global biodiversity is declining at an alarming rate, putting the survival of other species and our own future at risk. The [Living Planet Index¹²](#) reveals that:

- global populations of fish, birds, mammals, amphibians and reptiles declined by 58 per cent between 1970 and 2012.
- **We could witness a two-thirds decline in the half-century from 1970 to 2020** – unless we act now to meet global commitments on addressing climate change, protecting biodiversity and supporting sustainable development. That is the world seeing two thirds of the species that have evolved over millions of years finding that they are no longer able to survive on this planet.

Biological annihilation

A peer reviewed, scientific study published in the [journal Proceedings of the National Academy of Sciences by Ceballos et al¹³](#) (July 2017), states that:

- ***“biological annihilation”, caused by habitat destruction, toxic pollution and climate change, of wildlife in recent decades means a sixth mass extinction in Earth’s history is under way and is more severe than previously feared.***

This is further strengthened by strong wording in the paper, highlighting that

¹² http://wwf.panda.org/about_our_earth/all_publications/living_planet_index2/

¹³ See the scientific paper here <http://www.pnas.org/content/114/30/E6089> or for the guardian article that highlights it <https://www.theguardian.com/environment/2017/jul/10/earths-sixth-mass-extinction-event-already-underway-scientists-warn>

this represents a ***“frightening assault on the foundations of human civilisation”***.

- They analysed both common and rare species and found billions of regional or local populations have been lost
- They conclude: ***“The resulting biological annihilation obviously will have serious ecological, economic and social consequences. Humanity will eventually pay a very high price for the decimation of the only assemblage of life that we know of in the universe.”***

State of Nature

The [State of Nature](#) 2016¹⁴ Report (which echoed the [State of Nature 2013](#)¹⁵), written by a coalition of more than 50 leading wildlife charities and research organisations, including The Wildlife Trusts, assesses the status of wildlife in the UK at land and sea. It shows, more clearly than ever before, that nature is in serious decline across the UK. **Over the last 50 years,**

- 56% of species have declined, while 15% are at risk of disappearing from our shores altogether.
- 57% of vascular plant species declined in Wales
- 60% of butterfly species declined in Wales
- 40% of birds have decline in Wales
- 53% of freshwater and wetland species declined over the long term
- 13% of freshwater and wetland species are threatened with extinction from Great Britain.
- In a global measure of the degradation of natural ecosystems – Wales is in the ‘top’ quarter (49th) for **biodiversity loss** of the 218 countries assessed

¹⁴ <https://www.wildlifetrusts.org/stateofnature16>

¹⁵ <https://www.wildlifetrusts.org/news/2013/05/22/state-nature-60-uk-species-decline-groundbreaking-study-finds>

State of Natural Resources Report

The [State of Natural Resources Wales¹⁶](#) report, by NRW, the first statutory product from the Environment (Wales) Act states that:

- *Ecosystem resilience in Wales...Overall, diversity is declining, which is shown by loss of habitats and species. The 'extent' of some habitats has also declined significantly.... 'connectivity' has greatly reduced. All ecosystems have problems with one or more attributes of resilience. This means that their capacity to provide ecosystem services and benefits may be at risk. No ecosystem, on the basis of our assessment, can be said to have all the features needed for resilience*
- *63% of all freshwater water bodies defined by the Water Framework Directive were not achieving good or better overall status*
- *only one out of six freshwater habitat types are in Favourable Conservation Status*

The Natural Resources Policy

The second statutory product from the Environment (Wales) Act is the **Natural Resources Policy¹⁷**. This policy states the following:

- *Page 10 - To build resilience into our ecosystems we need to: Proactively develop resilient ecological networks to maintain and enhance the wider resilience of Wales' ecosystems. **The evidence shows that diversity is declining and that land and sea use change, including urbanisation, is leading to fragmentation and loss of habitats and species, and soil sealing. Building on the protected sites Wales, our aim is to improve resilience and reverse the decline of biodiversity in Wales. Reversing this trend, by better managing existing areas and creating new ones will also provide important wider benefits for society.***

This aligns with the Welsh Governments Nature Recovery Plan.

¹⁶ <https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en>

¹⁷ <http://gov.wales/docs/desh/publications/170821-natural-resources-policy-en.PDF>

- **Page 28_– Transport**

*Through the Wales National Transport Strategy and Finance Plan **we are promoting a more sustainable road transport network and a modal shift away from roads for people and freight.** This will reduce emissions and the impacts that transport has on our environment and our health.... taking this action forward we will: take action on our **transport network that enhances the resilience of our ecosystems and reverses the decline of biodiversity.** We will also explore opportunities for wider ecosystem service delivery, such as carbon, water and flood management*

Biodiversity and Resilience Ecosystem Duty

The Environment (Wales) Act introduced 2 new requirements on public bodies:

- **Section 6 - Biodiversity and resilience of ecosystems duty** – a duty on public authorities to ‘seek to maintain and enhance biodiversity’ so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to ‘promote the resilience of ecosystems’.
- **Section 7 - Biodiversity lists and duty to take steps to maintain and enhance biodiversity** - The Welsh Ministers must also take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section, and encourage others to take such steps.

Gwent Levels

It is easy to forget due to the vast amounts of reports and technical detail at this inquiry, just how special the Gwent Levels are – both for people and wildlife. Therefore, before we dive into a summary of the above witnesses and concessions from Welsh Government, we must highlight what the Gwent Levels are and what they mean to people.

The Gwent Levels is one of the jewels in the crown of Wales, with immense cultural and historic significance. They are a unique, low-lying area wedged between the river estuary and the hills that rise to the north and are a designated cultural monument in Wales, a Landscape of Outstanding Historic Interest. They are an ancient, hand-crafted mosaic of fields, villages and grazing marsh, riddled by narrow waterways, which has been reclaimed

from tidal saltmarsh since Roman times. Most of the present-day reens are medieval in origin, some of them the work of monks who lived and worshipped on the Levels.

The Gwent Levels reflect the long and evolving relationship between coastal people and the sea and highlight the uniqueness of the historic, human-shaped landscape. They include an evocative line of majestic old sallow trees that are believed to have sprouted from the willow mats laid down by monks attached to Tintern Abbey when crossing a particularly wet field to reach their grange farm near Magor Marsh.

The Gwent Levels have been studied by archaeologists who have painstakingly sifted through alluvial silt to reveal boats from the Roman period buried miles inland or the astonishingly preserved Mesolithic footprints of the intertidal zone, the 7,500 year-old [steps of adults and children](#)¹⁸ off the coast, as well as those of various wild animals, including the common crane.

Reens, from the Welsh *rhewyn*, is the local word for the watery ditches that criss-cross the landscape like arteries. These are the primary feature of a complex drainage system, dug over many centuries, and which included a subtle variety of components, from parallel field depressions known as ridge and furrow to shallow surface grooves called grips. On a map of the region the reens appear in bewildering blue numbers, like a dense grid of city streets, carrying water from the uplands and local springs safely out to sea in order to protect the reclaimed land from flooding. It is these earthen-banked ducts that set the Gwent Levels apart, making them both culturally and ecologically unique.

The rare and complex wetland habitat is nationally important for its wildlife and is protected by national designations that encompass very rare water beetles and other aquatic bugs and wetland plants that live in and around the area's network of ditches and reens.

The list of species that live here - plants, fish, invertebrates, mammals and birds – is impressive. The Gwent Levels is a landscape that has been fizzing with a density of life comparable with the rainforests for hundreds, if not thousands of years. Each reen is subtly

¹⁸ <http://www.bbc.com/news/uk-wales-south-east-wales-20914482>

different. There are fast ones, slow ones, shaded ones, not so shaded ones, providing a massive variety of reens which suit a wide variety of invertebrates.

Each reen is wholly unique, supporting a singular cast of aquatic organisms according to the reen's physical characteristics, as if each waterway were a stage for a different play. They contain an extraordinary ecological diversity and vitality of the Gwent Levels, home to an enviable range of species from the totemic otter to the rootless duckweed, *Wolffia arrhizal*, the world's smallest flowering plant that's found nowhere else in Wales, so tiny that you could hold thousands of them in your cupped hands.

In recognition of the remarkable ecological richness, the Gwent Levels are listed as a suite of eight adjoining **Sites of Special Scientific Interest**, encompassing most of this beautiful and ancient place.

The Gwent Levels is also home to a variety of other important creatures such as otters, dormice, bats, common cranes (that are anything but common - a bird that until quite recently had been extinct as a breeding species in Britain for over 400 years) and water voles. Water voles occupy an unenviable position in modern Britain; it's the nation's fastest declining wild mammal, its population having nose-dived by as much as 90% since the 1970s. For a period of nine whole years it had gone unseen on the Gwent Levels until a successful reintroduction scheme returned the mammal to its native home in 2012. From those small beginnings at Magor Marsh the water vole has spread over miles on its own, journeying outwards across its former habitat by reen, like the ripples from a stone dropped suddenly into still water.

Legal note - effectiveness of proposed mitigation measures

It is worth highlighting here the legal note submitted by Gwent Wildlife Trust regarding the effectiveness of measures proposed by the Welsh Government. In summary, it states that, **the Welsh Government cannot rely upon proposed mitigation measures to grant consent unless it is confident that those measures will succeed.**

Confidence requires ‘no reasonable scientific doubt’ regarding the effectiveness of the mitigation measures.

In the alternative, if there is a sliding scale of confidence, Welsh Government cannot be confident that mitigation measures will be effective in the absence of some scientific evidence demonstrating their effectiveness. The lower the degree of confidence in the mitigation measures proposed, the less likely the scheme should be approved.

It is the considered and expert opinion of Gwent Wildlife Trust and their independent, expert witnesses such as Professor Sir John Lawton, that much of the ecological mitigation measures for the species, habitats, SSSIs and ancient woodlands have no grounding in empirical evidence. It is also our considered and expert opinion that the mitigation measures will not ‘maintain and enhance’ the SSSIs and the biodiversity of the Gwent Levels.

This view is shared by the witnesses from the Welsh Government:

- Mr Green stated that he only had 25% confidence in some of his mitigation measures.
- Mr Jonathan Davies stated that the mitigation was not going to be 100% effective and the reens after mitigation ‘*won’t be SSSI quality*’.
- Dr Keith Jones stated that “*it is accepted, in spite of the comprehensive mitigation measures proposed, that it is not possible to entirely mitigate for the loss of complexity of the habitats of the SSSIs.*” (Section 7.6.44 of Dr Jones proof)
- Mr John Davies (Sustainable Development) who stated in cross examination that it was self-evident that if you concrete over the Gwent Levels you cannot maintain them.

Therefore, as the mitigation is highly unlikely to have the desired effect to considerably reduce the impact of the scheme, we believe that the scheme will have a substantially greater impact on the Gwent Levels than the already grave assessment that is stated within the Environmental Statement “*a significant adverse long term impact on the Gwent Levels SSSIs as a result of the land take for the Scheme.*”

It is worth noting that, Welsh Government have summarised NRW position as believing the Scheme “**would not be in accordance with the statutory duties with respect to SSSIs statutory duties with respect to SSSIs under Section 28G of the 1981 Act and / or with respect to biodiversity and ecosystem resilience under Section 6 of the 2016 Act, and would be contrary to national planning policy**” (Extent of loss 2.3.2 ID/061 : National Designated Sites Statement of Common Ground)¹⁹.

In addition, based on the evidence and the effectiveness of the mitigation offered, if there was a risk that a derogation licence for European Protected Species would not be granted then, the Inspectors should not recommend the Scheme is taken forward.

Professor Sir John Lawton – Ecology

Professor Sir John Lawton is a fellow of the Royal Society, and was knighted in 2005 for his contributions to ecological science and he is one of the world’s leading ecologists and scientists.

In his evidence, he discusses the well-established ecological principles that underline conservation science “**which strongly support the view that if the proposed M4 extension across the Gwent Levels goes ahead, it will severely damage one of Wales's (indeed the UK's and Europe's) most important wildlife sites, and that the damage is very unlikely to be prevented by proposed mitigation measures... The measures proposed to mitigate the effect of the proposed M4 extension are unlikely to be effective. They are scientifically unproven and in some cases appear impossible**”. These ‘well-established ecological principles’ include

- direct habitat loss and
- fragmentation of habitats.

This was a common theme with many of our ecological witnesses. Professor Sir John Lawton also stated that the effect of the proposed M4 extension

- will be to destroy and fragment large areas of designated SSSI habitat

¹⁹ <http://bailey.persona-pi.com/Public-Inquiries/M4-Newport/E - PI Documents/PID/ID061.pdf>

- will significantly damage populations of vulnerable species, including European Protected Species. Making those populations more vulnerable to local extinction as a result of inevitable shocks.
- Will lead to fragmentation, reducing or eliminating the potential for dispersal and re-colonisation, ‘devaluing’ remaining habitat and ultimately resulting in a greater risk of the regional extinction of some species.

He also made reference to his seminal DEFRA Lawton Report²⁰ ‘Making Space for Nature’ which made a number of recommendations. In simple, headline terms what is needed is **more protected sites; bigger sites; better managed sites; and sites that are connected** either by corridors or ‘stepping stones’ of suitable habitat. This DEFRA paper and the ‘more, bigger, better and more connected’ mantra has been used, quoted and has influenced Welsh Governments policy and legislation, such as the Nature Recovery Plan²¹, Natural Resources Policy’s and the Environment (Wales) Act²². However, Professor Sir John Lawton stated that the M4 would make the Gwent Levels “**less, smaller, worse and fragmented**”. This is an extraordinarily cavalier approach to recognised SSSI areas.

Professor Sir John Lawton’s evidence was put to the Welsh Governments ecological consultants.

Extinction

When questioned over Professor Sir Lawton’s evidence, all the Welsh Government ecological consultants agreed with Professor Sir John Lawton’s assessments of impact. For example, Mr Jonathan Davies agreed that “*Smaller populations are less able to withstand inevitable ‘shocks’ (a hard winter, or a fire, for example), and as a result are more likely to die out, even in surviving fragments of suitable habitat. Fragmentation and isolation of habitat patches means that many species are also unable to disperse naturally across hostile environments (arable fields, a motorway, urban areas etc.) to recolonise suitable habitat*

²⁰ <http://webarchive.nationalarchives.gov.uk/20130402170324/http://archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf>

²¹ <http://gov.wales/topics/environmentcountryside/consmanagement/conservationbiodiversity/?lang=en>

²² See the Explanatory Memorandum <http://www.assembly.wales/laid%20documents/pri-ld10201-em/pri-ld10201-em-e.pdf>

patches, reducing the long-term viability of so called “meta-populations”, which can lead, eventually, to regional extinction, even if suitable habitat still survives”.

Ecological Mitigation

The Welsh Government consultants initially disagreed with Professor Sir John Lawton that the mitigation they proposed was unlikely to be effective, even though they could not present actual scientific, peer reviewed evidence, to state that it was likely to be effective.

For example,

- Mr Jonathan Davies, had scant regard for scientific peer reviewed evidence, which proved that creating new habitats to offset or mitigate for habitat loss resulted in a biodiversity deficit and a deficit of ecological functions. For example, he dismissed [Moreno-Mateos et al \(2017\)](#)²³ (highlighted in Iolo William’s evidence) which showed that, compared with reference levels, recovering ecosystems run annual deficits of
 - **46–51% for organism abundance**
 - **27–33% for species diversity.**

Moreno-Mateos *et al* stated that these “*results are consistent across biomes*” (which includes aquatic, grassland and forest) and that even if complete recovery is reached, an interim recovery debt will accumulate (due to time lag before species and vegetation recover). This scientific, peer reviewed paper was only one of a number of papers showing that mitigation for habitat loss and fragmentation leads to a significant biodiversity deficit. Another paper included in Mr James Byrne evidence, Curran et al (2014) *Is there any empirical support for biodiversity offset policy?*²⁴, stated that active restoration has inherently large time lags, uncertainty, and risk of restoration failure. This requires offset ratios that far exceed what is currently applied in practice – such as the 1:1 ratio of the reen mitigation.

- **Mr Davies, stated that he had 95% confident that the creation of new reens, to compensate for the loss of over 10kms of SSSIs reens and ditches, would be successful – even at a 1:1 ratio proposed.** However, he contradicted himself by stating

²³ [https://research-information.bristol.ac.uk/en/publications/anthropogenic-ecosystem-disturbance-and-the-recovery-debt\(1a216c25-fef4-4f52-95c8-18d6cc586875\).html](https://research-information.bristol.ac.uk/en/publications/anthropogenic-ecosystem-disturbance-and-the-recovery-debt(1a216c25-fef4-4f52-95c8-18d6cc586875).html)

²⁴ <http://onlinelibrary.wiley.com/doi/10.1890/13-0243.1/abstract>

- “not claiming it will happen immediately”
- “it is a possibility that it won’t be SSSI quality...”
- “its only an aspiration to be SSSI quality...”
- “you can’t replicate what is there”
- “it is difficult to replicate the complex drainage system with its niche habitats, even at a small scale”
- The mitigation was “in essence a salvage process”
- He cannot guarantee how long it would take to develop into an appropriate ecosystem.

He also stated, regarding the mitigation ratio of 1:1

- “was not what we planned ...we wanted significantly more...”
- “The harder it is to establish...the more replacement you need....”
- The “Constraint {to getting significantly more than 1:1 reed mitigation} is hydrological not ecological” and they were “stymied and hamstrung” by the hydrological requirements and as such could not provide a more appropriate mitigation package.
- “1:1 ratio **will not** create no net loss”

He agreed that 1:1 ratio was inappropriate due to the

- high risk of failure of the mitigation measures
 - significant time lag before the ‘successful’ measures create suitable conditions for the appropriate SSSI species – even if some survive the shock of being transferred via ‘seeding’ (scoping up buckets of reed water containing SSSI species from the ancient reeds that would be lost and placing them in the newly created reeds). Mr Davies, acknowledged, after a helpful intervention by the Inspector, that ‘seeding’ would likely kill a lot of the SSSI invertebrate species.
- In order to compensate for not getting ‘significantly more’ than 1:1, Mr Davies said that Welsh Government will ‘enhance’ some ditches. However, enhancement means make some ditches that already have some wildlife value a little bit better- it is not

compensation for the complete loss of over 10kms of SSSI reens and ditches and the failure to provide adequate ecological compensation.

- In a moment of naivety, Mr Jonathan Davies said “*He hopes GWT to take over migration areas...*”.

The risks of creating new habitats to replicate habitats which are to be lost to development (through, for example, failure of mitigation measures or time-lag before new habitats appropriately mature) apply to all other habitat types, such as grassland and woodland (please refer to Richard Barnes (Woodland Trust) evidence on ancient woodlands).

It is worth pointing out again, that Dr Keith Jones states “*it is accepted, in spite of the comprehensive mitigation measures proposed, **that it is not possible to entirely mitigate for the loss of complexity of the habitats of the SSSIs.** Thus Chapter 10 Ecology and Nature Conservation of the March 2016 ES (Document 2.3.2) **recognises that there would be a significant adverse long term impact on the Gwent Levels SSSIs as a result of the land take for the Scheme.**”.* However, based on Professor Sir John Lawton’s comments, he would likely want to slightly amend the above by removing ‘entirely’ so it reads “**it is not possible to mitigate for the loss of complexity of the habitats of the SSSIs**”. We agree that the mitigation measures are comprehensive (wide ranging), just not based on evidence and will not be effective.

This accords with the Statement within ID/061: National Designated Sites Statement of Common Ground (Section 2.3.2) that NRW believe that the Scheme “**would not be in accordance with the statutory duties with respect to SSSIs under Section 28G of the 1981 Act and / or with respect to biodiversity and ecosystem resilience under Section 6 of the 2016 Act, and would be contrary to national planning policy**”.

Therefore, even the most optimistic assessment of the scheme from the Welsh Government’s own ecological consultants state they cannot ‘entirely’ mitigate the impact of the loss of the SSSI’s. Therefore, it is logical and self-evident that the Welsh Government cannot

- “maintain and enhance biodiversity” or
- “promote the resilience of ecosystems”

as per Section 6 of the Environment (Wales) Act – or as per a Resilient Wales in the Well-being of Future Generations Act.

It is also worth noting that Mr John Davies (Sustainable Development), at least in part agrees with NRW, as he said

- John Davies, para 240, ***“the Scheme... would conflict with planning policies in respect of cultural heritage, landscape, ecology and nature conservation. Consequently it would fail to meet the fourth part of the planning policy definition of the sustainable development principle in PPW, respect for environmental limits”***

If the scheme doesn’t respect environmental limits it is, by definition, unsustainable.

Species Mitigation

Mr Jonathan Davies was also questioned on the proposals to mitigate the significant adverse impacts of fragmentation of the SSSIs on many vulnerable species including dormice, otters, shrill carder bee and water voles.

Water Voles

Mr Davies sought to ignore current guidance and/or any basic animal ecology to state that water voles²⁵ could use culverts under the motorway which have a minimum length of 70 metres (up to several hundred metres). However the [Water Vole Mitigation Guidance](#) (2016) states that water voles will use culverts of up to 35m²⁶. In fact, the entire scheme, ran contrary to the Water Vole Mitigation Guidance of “*avoiding/minimising effects – considerations at the design stage*” for example not ‘*retaining watercourses/wetland habitats in their current locations as part of a development*’ and ‘*avoiding the need to culvert watercourses*’.

²⁵ Since the 1970s, water vole numbers are thought to have declined by more than 90%. Water voles have declined by a fifth in the UK since 2011. <http://www.bbc.co.uk/news/science-environment-23975749>

²⁶ Section 4.5.2. states “The following types/lengths of culverts are known to be effective in allowing the movement of water voles, based on the authors’ personal observations: **Over-sized box culverts up to 30–35m in length**

Dormice

Mr Jonathan Davies stated that he had very little, if any, confidence in some of their mitigation methods, such as dormouse bridges and tunnels, to reduce the impact of fragmentation on dormice which he said were undergoing a '*catastrophic decline*'. He stated that tunnels/pipes and bridges were '*not tried and tested*' and '*hasn't be proven to work in situ*'.

However, he was happy with one of his main proposals to reduce the impact of fragmentation - capturing dormice, taking them to England, and allowing their offspring to return once the replacement habitat was suitably mature. Capturing and translocating any species, and taking them into captivity for an unknown or indefinite amount of time, is highly traumatic especially for small mammals – and this risky mitigation measure especially for this European Protected Species that is undergoing '*catastrophic decline*'.

While acknowledging that fragmentation of habitat was a significant issue for dormice, Mr Jonathan Davies thought that on this scheme it would not be significant because in **10-20 years** the compensatory planting, much adjacent to the motorway, would be sufficiently mature to provide suitable habitat. However, he did acknowledge that he was working in a '*world of uncertainty and best guesses*'. GWT argue that potentially 10-20 years before the habitat is mature enough to maintain a population of dormice is unacceptable,

Bats

We will explore the evidence on bats below, but it is worth noting again that Mr Green, the Welsh Government's bat witness, had only 25% confidence in some of the methods that he proposed to combat fragmentation of bat habitat. Professor John Altringham, one of the UKs, if not the world's leading expert on bats, especially in the context of infrastructure developments impact on bats, highlighted that the majority of Mr Greens mitigation measures where are not based on empirical evidence and were highly unlikely to work.

Otters

We will explore the evidence on otters below but it is worth noting in this section that the otter surveys fail to provide even the most basic ecological information on otters due to serious failings in each step of the process. Therefore, if the information to show how the

otters are using the Gwent Levels is lacking, the mitigation proposals are likely to be inappropriate too.

Shrill Carder Bee

The shrill carder bee is one of the rarest insects in the UK and a feature of 6 of the Gwent Level SSSIs. The Welsh Government propose to mitigate for the loss of SSSI habitat for this species by providing wildflower provision on the embankments of the new section of motorway. When asked, Mr Jonathan Davies, did agree that there was no evidential basis for the proposed mitigation but '*some mitigation was better than nothing*'. He also agreed that due to the location, shrill carder bees will likely be killed by traffic, but then incorrectly stated that Buglife think that the mitigation was a good idea. This was strongly refuted by Buglife who wrote to the Inspector to highlight Mr Davies false statement.

Professor John Altringham – Bats

Professor Altringham is one of the UKs, if not world's leading scientists on bat ecology and has a long and impressive list of scientific, peer reviewed publications. Of particular relevance to this case is his interest in the effects of transport infrastructure on bats (and other animals), so much so that he is extensively quoted, and mis-represented, in the Environmental Statement and in Mr Green's Proof of Evidence.

Professor Altringham published research has demonstrated that major roads reduce bat activity and species diversity. This includes a major DEFRA-commissioned report²⁷ which summarises the current knowledge in the field of road ecology related to bats, and provides detailed best practice guidance on survey, monitoring and mitigation for bats on transport infrastructure. **The report shows a decline in bats 1-1.6 km either side of the road, with the 'missing' bats having died or been displaced – and displacement probably also leads to population decline**, since displaced bats will be in competition for resources with other bats. **It also shows that the current mitigation practice is largely ineffective.**

²⁷ Berthinussen A and Altringham JD (2015) Development of a cost-effective method for monitoring the effectiveness of mitigation for bats crossing linear transport infrastructure. Defra research report WC1060. http://sciencesearch.defra.gov.uk/Document.aspx?Document=12712_WC1060MAINReport.pdf

It's worth noting that this effect is not only related to bats, there is a significant body of research in the UK and globally that highlights the impact of roads on wildlife such as

- [Benitez-Lopes et al \(2010\)²⁸](#) highlighted that *“mammal and bird populations decline with their proximity to infrastructure. The effect of infrastructure on bird populations extended over distances of over 1km and for mammals up to 5km”*.
- [Ware et al \(2015\)²⁹](#) highlighted that *“traffic noise is an invisible source of habitat degradation”*.

Professor Altringham highlighted that the Environmental Statement shows that the **footprint of the motorway covers part of an important bat habitat along most of its route. He highlights that the loss and fragmentation of habitat included, but was not limited to, the loss of**

- ancient woodlands,
- 10kms of reens and ditches
- 36km of hedgerow

He also highlighted that **it will take many years for the replacement woodland to mature and become useful to bats. In that time, populations could crash and local extinctions could occur.** There is also a high likelihood of cars colliding with bats. **Given the low population densities and barriers, these species may never recover.**

Professor Altringham highlighted that **the Environmental Statement concerns itself almost entirely with impact during construction and makes insufficient reference to the long-term, landscape-scale impact of the operational phase of the road** - this issue is a major part of his DEFRA report. The Environmental Statement also fails to take account of the many basic ecological principles, such as bat displacement, and assumes that there is lots of empty habitat waiting for these displaced bats to move into. There is not, it is already occupied.

²⁸

[http://www.academia.edu/4558621/The impacts of roads and other infrastructure on mammal and bird populations A meta-analysis](http://www.academia.edu/4558621/The_impacts_of_roads_and_other_infrastructure_on_mammal_and_bird_populations_A_meta-analysis)

²⁹ <https://www.ncbi.nlm.nih.gov/pubmed/26324924>

Professor Altringham highlights that

- **the mitigation offered in the Environmental Statement and Bat Mitigation Strategy is at best high-risk and largely ineffective and, at worst, completely ineffective.**
- Mr Green’s evidence for mitigation was not based on empirical scientific evidence - in fact many of the mitigation measures ignore the scientific evidence regarding their lack of effectiveness. In part, this is because **Mr Green equated occasional use with effectiveness – almost all of Mr Green’s mitigation is based on the exception not the rule.** For example, there is limited evidence to suggest that bats will actively use artificial corridors, with the only study available suggesting they are only used by 10% of the bats³⁰.

In fact, **Mr Green stated that in some of the mitigation measures proposed to reduce fragmentation, he had 25% or less confidence.**

Mr Green also proposed other mitigation measures where the *“value of new ponds and reedbeds is expected to reach full potential as bat foraging habitat within ten years, whilst planted woodland would provide some foraging habitat within ten to twenty years”*. This significant time lag (and ignorance of the likely failure rate) means that he is suggesting he believes that 20 years of *‘moderate adverse impact’* is acceptable based on the assumption that all the mitigation will be 100% effective.

David Boyce – Invertebrates

David Boyce is an ecologist with over 30 years specialising in invertebrate ecology and conservation and has undertaken many extensive invertebrate surveys of wetland sites throughout Wales, including the Gwent Levels for the Countryside Council for Wales (NRW’s predecessor).

It is worth noting that aquatic and terrestrial invertebrates are the main designated features of the Gwent Levels SSSIs.

³⁰ Britschgi A., Theiler A. & Bontadina F. (2004) Wirkungskontrolle von Verbindungsstrukturen. Teilbericht innerhalb der Sonderuntersuchung zur Wochenstube der Kleinen Hufeisennase in Friedrichswalde-Ottendorf / Sachsen. Unveröffentlichter Bericht, ausgeführt von BMS GbR, Erfurt & SWILD, Zürich im Auftrage der DEGES, Berlin.

Mr Boyce highlighted significant inadequacies in the invertebrate survey techniques, which means that the results of the surveys are very likely to significantly underestimate the invertebrate interest on the Gwent Levels SSSI. Therefore, any assessment of adverse impact is likely to be an under-estimate.

He highlighted that a **6 lane motorway, built of tarmac, concrete and steel, designed to facilitate vehicles that will emit pollution (copper, zinc, cadmium, oil, etc.) across nearly 10kms of SSSI designated for their invertebrate interest, will be catastrophic.** It will significantly weaken and fragment invertebrate populations through both direct mortality and behavioural avoidance. In his oral evidence he highlighted several studies, including Moreno-Mateos et al (2017), which showed, compared with reference levels, recovering ecosystems run annual deficits of

- **46–51% for organism abundance,**
- **27–33% for species diversity.**

As stated above Mr Jonathan Davies gave scant regard for available scientific evidence, preferring his own experience, none of which was on the Gwent Levels or recreating SSSI quality reens.

Mr Boyce highlighted that, among other impacts, pollutants in water treatment area outfalls from the Motorway scheme would be detrimental to the aquatic invertebrate fauna. Mr Jonathan Davies did admit that rare invertebrates such as the SSSI invertebrates require rare habitats. However, Mr Davies in cross examination, said that the water treatment works, designed to prevent pollution entering the reens

- ***“wouldn’t be 100% effective... are vulnerable to failure”*,**
- and would ***“kick out pollution into the reens”***.

However, Mr Davis did not know

- what level of pollution ‘kicked out’ into the reens would cause the SSSI invertebrates to die off and the reens to become uninhabitable for these rare invertebrates.

- **what the sensitivities of the rare SSSI invertebrates to various pollutants such as cadmium, copper, zinc and chlorine are.**

Therefore, **once again they had no empirical evidence so they cannot have any degree of confidence that pollution from the motorway which runs along nearly 10kms of SSSI habitats will not have an impact on the rare SSSI invertebrates.**

Geoff Liles – Otters

Geoff Liles is one of the UK's leading otter ecologist and conservationist and has been working in this field for over 35 years, including setting up and developing the otter conservation initiative for Wales. He is now an ecological consultant specialising in otter conservation and research. Of particular relevance to this inquiry is his work on otter road deaths in Wales to identify the scale, trends and factors involved in otter road mortalities.

Geoff Liles highlighted that the otter surveys for the new M4 failed to provide even the most basic ecological information due to serious failings in each step of the process:

- **Desk study** – there were many reports which provided details of potential breeding sites and resting sites that were not looked at by the Welsh Government consultants. If these reports were analysed, it would have led to a significantly more comprehensive investigation being undertaken.
- **Survey methodology** – the otter methodologies within DMRB were not followed, for example they undertook one survey not four throughout a year (four are required because otters use different parts of their home range at different times of the year). The consultants also combined surveys for otters and water voles which use different survey methodologies and therefore should not have been combined.

Mr Liles stated that the survey should have

- located and described protected sites (breeding and resting sites) and feeding sites;
- identified actual and potential otter travel routes (including 'short-cuts' across open land);

- provided an understanding of how otters utilise water habitats throughout the year;
- identified potential mitigation measures throughout the route;
- presented all the above data in a clear, detailed manner using maps

The Arup reports did not appropriately address any of the above.

- **Survey results** - failed to provide even the most elementary baseline ecological information on otters. Of the 1,442 water bodies apparently surveyed in their 'one-off' survey, otter signs were found at only 18 sites, a result that tells us nothing about otter use of the watercourses throughout the year.
- **Conclusions drawn** - The Arup/RPS surveys have added nothing to an understanding of otter use of the Levels and the potential impacts of the scheme on the species.

Mr Liles highlighted the choice of preferred route by Welsh Government appears to have been made without any understanding of the likely significant impact on otters. For example, he highlights DMRB 81/99 states "*Otter populations with low densities will be most at risk through road casualties.*" The scheme creates a barrier to otters therefore the scheme is contra to DMRB 81/99 which states "*It is also important not to create barriers to the re-colonisation of habitat by otter populations*".

Mr Liles also submitted a Cardiff University Report entitled '***Evidence of Eurasian Otter (Lutra lutra) population connectivity across the M4 Corridor around Newport Proposed Motorway***'. The report was based on Cardiff University DNA studies of otters which had been subject to road traffic accidents. The reports conclusion was that

- Individual otters regularly disperse and mate across the Gwent Levels and River Usk (i.e. across the proposed M4 motorway route).
- The populations of otters on either side of the river (and in the river itself) and above and below the proposed route should therefore be treated as a single demographic unit.

- Construction of a road, such as proposed for the M4 motorway, across this area will impede dispersal, fragment both otter habitat and this population, reducing connectivity and thus gene flow.

As otters are a European Protected Species (similar to bats and dormice) and a designated feature of the River Usk Special Area for Conservation (SAC) - all of the above has implications for

- Obtaining an otter derogation licence (a licence to disturb otters or their breeding or resting places) from NRW.
- The validity of the Statement to Inform the Appropriate Assessment for the River Usk SAC

Mr Liles highlighted that the failure to assess the otter impacts with any degree of adequacy also impacts on the ability of the scheme to meet other legislative commitments and requirements, including the Wildlife and Countryside Act 1981 (as amended) and the Environment (Wales) Act 2016.

Richard Bakere – Magor Marsh Nature Reserve

Mr Bakere is a Senior Reserves Officer for Gwent Wildlife Trust and has been responsible for many of Gwent Wildlife Trust's nature reserves since 2006, and the Magor Marsh nature reserve since 2010, which includes Barecroft Common.

Magor Marsh is the oldest, most visited and potentially the most cherished of all of Gwent Wildlife Trusts Nature Reserves. Each year:

- 3,000 visits are made to the education centre on the reserve by school children
- 10,000 people visit the nature reserve
- GWT undertakes events on Barecroft Common such as guided walks, volunteer work parties that help manage the reserve, University Group visits and species recording activities for bees, butterflies, water voles, harvest mice, etc.

Mr Bakere discussed how the Gwent Levels has evolved in parallel with people over millennia. Consistency in agriculture and management of the drainage structures produced

a stable environment where wildlife and farming flourished. The two fields on Barecroft Common, part of the Magor Marsh Nature Reserve, are also part of Redwick and Llandeenny SSSI. Mr Bakere, stated that this area is special because of the peat rich ground, high water table and history of sympathetic management without agricultural 'improvement', such as the addition of artificial fertilizers and pesticides, ploughing, etc. These fields and reens are home to rare habitats and plants (both rare on the Gwent Levels and rare in the UK), rare invertebrates such as the great silver beetle (*Hydrophilus piceus*), as well as otters, water voles and harvest mice.

Mr Bakere also highlighted that the impact of the motorway on the wildlife in the reens, ditches and fields would be severe and long-lasting on Magor Marsh Nature Reserve, namely

- it risks the very essence of the Nature Reserve at Magor Marsh as it threatens the water that creates the wetland habitat in the reserve.
- the scheme physically builds an embankment on the top of Magor Marsh Nature Reserve. This will cause direct habitat loss of Barecroft Common which would obviously be a significant impact upon Magor Marsh Nature Reserve and Redwick and Llandeenny SSSI.
- the wildlife on the northern side of the motorway would be isolated from the habitats to the south of the motorway and would like cause death of important species such as bats and otters as they try to cross the 6 lane carriageway.
- reduced water levels and reduced water quality (through the addition of pollutants) would lead to a loss of biodiversity and localised extinctions of sensitive species across the whole reserve (over 800 invertebrate species recorded).

The M4 embankment planned to replace part of Barecroft Common is over 5m in height, therefore piling will be used. This has the potential to impact spring flows into Barecroft Common and the rest of Magor Marsh Nature Reserve. The complexity of the water systems on the Gwent Levels as a whole, and in particular at Magor Marsh, is staggering. This is in part shown by the Welsh Government incorrectly stating that the Mill reen feeds Magor Marsh – the Welsh Government

consultants did not correctly identify the source of the water that feeds the reserve or the complexity of the water flows.

In addition, given the size and location of the scheme Mr Bakere, like other witnesses, has little confidence in the pollution control measures to protect the reens especially during the construction phase as he has personally witnessed simpler control mechanisms fail on the A465. Pollution control measures are never 100% effective.

- noise from the motorway would be carried from the elevated level on the prevailing wind over the nature reserve, adversely affecting both people and any wildlife that relies on calls, whether for establishing territories (such as cuckoos) or for warning of the approach of predators (water voles).

Mr Bakere emphasized that Magor Marsh does not function in isolation. It is only with resilient habitat in the wider context that these areas can support viable long-term meta-populations (in essence a group of individual populations made robust by mutual support from adjacent populations). Mr Bakere highlighted his significant concerns regarding the inadequacy of the proposed ree and ditch mitigation. In particular,:

- the timescales for equivalent habitat to become established on new watercourses.
- the mitigation ratio of 1:1.
- the sites of proposed mitigation within existing SSSIs.

Mr Bakere drew attention to the fact that Magor Marsh, Barecroft Common and the Gwent Levels SSSI is not a simple habitat system that can be recreated by digging a ditch. As one of the last fragments of unimproved peatland on the Gwent Levels, any loss of this ground is irreplaceable. This is clearly expressed in the lowland peatland survey of 2009 conducted by the Countryside Council for Wales *“The Barecroft Common area has, along with Magor Marsh, escaped the large scale habitat loss that has affected the Gwent Levels”*.

Richard Barnes – Ancient Woodland

Richard Barnes is employed by the Woodland Trust as a Senior Conservation Advisor and has worked in the nature conservation sector for over 25 years. His evidence regards ancient woodland, mitigation and compensation proposals and national policy.

He highlights that ancient woodland is defined as an irreplaceable natural resource that has remained constantly wooded since AD1600. Ancient woodland is one of the UK's richest habitats for wildlife, supporting 256 priority species. The length of time which ancient woodland takes to develop and evolve (centuries, even millennia), and co-evolve with plants, animals and the soil, only accentuate its irreplaceable status.

Mr Barnes states that the loss and damage of these amazing habitats is against planning policy. For example, Planning Policy Wales (PPW) makes explicit reference to the consideration of ancient woodland in paragraph 5.2.9: *“Ancient and semi-natural woodlands are irreplaceable habitats of high biodiversity value which should be protected from development that would result in significant damage”*. Welsh Government's Strategy for Woodlands and Trees, 'Woodlands for Wales' also recognises ancient woodland's irreplaceability. However, this scheme would completely destroy or damage ancient woodland (and the associated species that utilise them) at

- Berryhill Farm
- Pwll Diwaelod
- Roggiett Brake
- Pye Corner

Mr Barnes stated that the mitigation/compensation offered to offset the damage and loss of ancient woodland was utterly insufficient. Planting new trees does not mitigate for the loss of ancient woodland, at least 100 years are needed before a newly planted wood starts to resemble the ecological complexity of mature woodland. **Ancient woodland, by definition, is irreplaceable. Mr John Davies, in cross examination, agreed that ancient woodland are irreplaceable and therefore mitigation cannot replicate them leading to a net loss in biodiversity.**

Attempts to salvage ancient woodlands by translocations of soil or trees is not based on any empirical scientific evidence.

Mr Barnes highlighted the **Joint Nature Conservancy Council** (JNCC is the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation) information which shows that **it is not possible to move assemblages of species together without substantial changes taking place in the structure of the habitat and in its species composition, thus rendering the translocation unsuccessful with respect to sustaining the original flora and fauna.**

Since loss of ancient woodland cannot be mitigated, the question of adequate compensation arises. New planting at a ratio of 2:1 is woefully inadequate compensation for the loss of ancient woodland. Mr Barnes, in his evidence has stated that, if such a high value habitat is to be destroyed, then the compensation ratio of newly created habitat should be a minimum of 30:1.

Part of the loss of woodland from the scheme includes compensation woodland planted as part of the original construction of the M4. Therefore, Mr Barnes wondered how can any mitigation or compensation measures can be expected to deliver long term benefits if these areas of new planting are then subjected to damage and loss in later years from further harmful development.

Peter Ogden - Landscape

Peter is the Director of the Campaign for the Protection of Rural Wales (CPRW). He is a member of the International Union for the Conservation of Nature (IUCN) World Commission on Protected Areas and one of its Technical Advisors on World Heritage matters. He has 40 years' experience in environmental and landscape planning.

Mr Odgen highlighted that the Welsh Government's Environmental Statement which states that the motorway will cause major long term impacts to the character and heritage value of certain Local Landscape Character Areas of the Gwent Levels and the Gwent Levels

Historic Landscape. However, in Mr Odgen's expert opinion the motorways impact will be more significant than the Welsh Government indicate, as it is likely to be

- a prominent feature,
- very noticeable and
- significantly out of character with the Gwent Levels' landscapes, not only because of its physical appearance, but also the constant flow of traffic day and night, emitting additional noise and light.

These additional effects would be significant compared to the comparatively undisturbed circumstances which currently characterise the Gwent Levels and its surroundings. These effects will affect the crucial landscape value of this area (its tranquillity / undisturbed character) and increase clutter resulting from its construction.

Climate Change

Before we begin this section, it is worth highlighting the reason climate change is so important.

The **Intergovernmental Panel on Climate Change (IPCC)**, which is a scientific and intergovernmental body under the auspices of the United Nations, **has predicted that by 2100**, assuming that current trends in burning fossil fuels continue, the surface of the Earth will warm on average by as **much as 6 degrees Celsius** (around 11 degrees Fahrenheit) or more. Whilst it is not possible to predict how most species, including our own, and how most ecosystems, will respond to such extreme warming, **the effects are likely to be catastrophic.**

To put an average surface warming of 6 degrees Celsius into context, consider the following: all the changes we have seen to date that have been ascribed to global warming have occurred with an average warming of the Earth's surface since the late 19th Century, when this warming (and the Industrial Revolution) began, of less than 1 degree Celsius. These changes include:

- the melting of glaciers, sea ice, and permafrost;

- the bleaching and dying of coral reefs;
- extreme storms and flooding, droughts, and heat waves (droughts and desertification are already recognised by the UN as significant drivers of armed conflict and refugee movements); and
- major shifts in the ranges of organisms and in the timing of their biological cycle.

A new WWF report³¹, '**Developing and piloting a UK Natural Capital Stress Test**', shows the cost of inaction by 2050, and highlights why environmental decline must be considered in governmental and business decisions. It states that if we don't take action, extreme weather could have a significant impact on our jobs and economy. For example, without action to protect UK water supplies, a future drought could reduce UK GDP by around £35bn and 354,000 jobs may be lost.

It is also worth pointing out that acting on climate change is an essential component in three of the Well-being goals of the Well-being of Future Generations Act, namely

- **A Prosperous Wales** – An innovative, productive and **low carbon society which recognises the limits of the global environment** and therefore uses resources efficiently and proportionately (**including acting on climate change**); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work.
- **A Resilient Wales** – A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example **climate change**)

³¹ <https://www.wwf.org.uk/updates/extreme-weather-could-cost-our-economy-billions>

- **A Globally Responsible Wales** - A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may **make a positive contribution to global well-being**³²

We have shown that, and John Davies MBE in his evidence admitted that, the scheme does not address climate change. As such, we submit that the scheme is contrary to the

- Well-being of Future Generations Act Wellbeing
- the Environment (Wales) Act which requires Welsh Government to reduce greenhouse gas emissions by at least 80% by 2050.

Professor Kevin Anderson and Professor John Whitelegg

Kevin Anderson is Professor of Energy and Climate Change in the School of Mechanical, Aero space and Civil Engineering at the University of Manchester and is the Zennströmm Professor of Climate Change Leadership at the University of Uppsala, Sweden. He is Deputy Director of the Tyndall Centre for Climate Change Research, the UK's leading academic climate change centre. He is generally regarded as one of the UK's, if not the world's leading climate change experts.

Professor John Whitelegg is a visiting Professor in the School of the Built Environment at Liverpool John Moores University and a transport consultant. His PhD was in industrial location theory and change over time in the opening, closing, decline and growth of the firm. He has worked on transport projects for over 40 years, written 10 books on transport and now edits the journal "World Transport Policy and Practice". His projects include ex-post evaluation of job creation and inward investment following new highway and motorway investments, the impact of new highways on air quality and greenhouse gases

³² Addressing climate change and biodiversity loss is a significant part of this goal. For example, [Welsh Governments International climate change webpage](#) states that an historic climate deal was agreed between nearly 200 countries at COP 21, the 2015 International Climate Conference. The agreement is the first to commit all countries to cut carbon emissions in order to limit the rise in global temperatures to less than 2°C...and a clear pathway for decarbonisation... One of the seven goals of the Wellbeing of Future Generations (Wales) Act 2015 is to build **a globally responsible Wales**. See also <http://gov.wales/docs/desh/publications/151125-infographic-a-globally-responsible-wales-en.pdf>

and the performance of non-highway building measures on reducing congestion and pollution and stimulating local economic performance.

Both Professors highlighted that **the M4 scheme will lead to an increase in carbon emissions**. Professor Whitelegg challenged the Welsh Government assessment that motorway construction would create just over 500,000 tonnes of carbon. Mr Tim Chapman admitted that the scheme would be somewhat carbon neutral by 2072 but this figure could drift further out. However, Professor Whitelegg estimated, based on research from Leeds University, the motorway would, at a minimum, likely create nearly 1,000,000 tonnes of carbon.

Even putting aside Professor Whitelegg's carbon figure, both Professors believed that **this Scheme was an avoidable and unacceptable move in the wrong direction and will make the task of Welsh Government meeting the 80% reduction in greenhouse gases by 2050 required by Environment (Wales) Act 2016 much more difficult than it need be**. It is also directly contrary to the intentions, aspirations and objectives of the Paris Agreement, which the Welsh Government is signed up to, which recently significantly tightened the ambition of the international community to take action to limit global temperature rises associated with climate change to "well below 2°C" and to work towards limiting warming to 1.5° C.

For there to be any reasonable chance of limiting temperature rises to 2°C or below, emissions from nations such as Wales need to be falling by well over 10% per annum – a hugely challenging task. Professors Anderson and Whitelegg believe that **it is essential that the scale of the challenge is not made even more significant by policy decisions that have a high potential to increase emissions**, both in the short-term and by creating a lock-in to carbon intensive activities and infrastructure in the medium and longer term. Consequently, considerations of climate change have to be central to the decision-making process.

Professor Anderson highlights that the Climate Strategy for Wales (2010) and now the Environment Act underline the need for the **Welsh Government and wider public sector to lead by example**. However, he pointed out that is evident that **insufficiently rigorous analysis has been presented by the Welsh Government to appropriately address the**

implications of the M4 proposal for the total level of greenhouse gas emissions. In fact, if one was to take climate change seriously, one would have undertaken a carbon assessment to inform whether the proposal was sound in the initial options or scoping phase, rather than doing it to inform the Draft Orders / Public Inquiry.

If Wales is not to renege on the Paris 1.5°C commitment, then the timeframe and scale of action is very demanding. In light of this, the question that needs to underpin all proposals is: how can this potential development be reconciled with the Welsh Government's commitments enshrined in the Paris Agreement? The answer is, it can't.

Professor Anderson states that the **M4 scheme is emblematic of a failure to acknowledge the challenges enshrined in the Paris Agreement. If it proceeds it will illustrate the Welsh Government's disregard for its climate change commitments, and the impacts of unchecked emissions on future generations of Welsh citizens and those poorer and climatically vulnerable communities elsewhere in the world today** (this directly impacts our ability to create a **Globally Responsible Wales**).

Professor Anderson, states that if tackling climate change is a priority, and the 80% greenhouse gas emissions reduction by 2050 and the Paris 1.5°C and 2°C targets are to be taken seriously, then Welsh Government should not facilitate, or even permit, schemes that result in higher (or even static) greenhouse gases emissions and which lock travellers into high carbon lifestyles.

In fact this proposal simply repeats past failed road developments and does nothing to address the damaging underlying transport issues that give rise to the supposed need for the road.

Professor Lorraine Whitmarsh

Professor Lorraine Whitmarsh is a Professor of Environmental Psychology at Cardiff University. She is the Cardiff University partner coordinator for the Tyndall Centre for Climate Change Research. Her research examines environmental perceptions, communication and behaviour. She is involved in several research projects on travel

behaviours (including modal choice, vehicle choice, car use and driving style), attitudes to transport technologies (e.g. electric vehicles) and policies (e.g. congestion charging). Between 2011 and 2016, she sat on the Climate Change Commission for Wales, providing expertise in transport and behaviour.

She highlighted that there were various barriers to changing lifestyles that prevent awareness of transport problems manifesting in behaviour change. **Institutions and infrastructures serve to lock in carbon-intensive lifestyles, including car dependency.** She stated that travel behaviour is often habitual, and as such difficult to change, however infrastructure is critical to shaping and constraining travel choices, Furthermore, changes in infrastructure can play a critical role in breaking travel habits and creating modal shift.

She stated that building a motorway does not create a modal shift to more sustainable forms of transport and cannot be considered an integrated transport system. She was challenged on this by Welsh Government who stated that, as they were building a park and ride, surely that was creating an integrated transport system and facilitating modal shift. However, Professor Whitmarsh highlighted that while a park and ride system was indeed helpful it was still enabling cars usage and thus locking in carbon intensive lifestyles. She also highlighted that a motorway, or a park and ride, cannot be considered an integrated transport system.

A successful integrated transport system should result in higher demand for public transport, with a knock-on reduction in congestion and pollution. Transport integration means that whatever modes or types of transport are involved they all operate as one 'seamless' entity - for the benefit of the fare paying customer. For example, where electric street transports (trams and buses) and electric mainline railways are knitted together by an integrated multi-modal ticketing system, people are positively encouraged to make extensive use of the transports, perhaps running out of nodal points where several services are working together, sharing a terminus that was designed to make interchange as easy as possible. To minimize interchange waiting time the various services shown here are co-ordinated to arrive within a few minutes of each other.

Professor Terry Marsden agrees with Professor Whitmarsh and states that much of the evidence and policy direction in Europe is now pointing in the direction of re-investing in more integrated public transport systems, to encourage modal shifts both in commuter and commercial traffic, and the shifts in car use to more electric vehicles.

The review of the UK Government's Sustainable Travel Towns policy similarly concluded that the implementation of 'soft measures' (e.g. marketing, travel plans) to change travel behaviours had been limited due to failure to implement complementary measures to discourage car use. Policies to encourage sustainable mobility thus require both making car use less attractive ('push' measures) and making the alternatives more attractive ('pull' measures). She also highlighted that **while it is acknowledged that creating new roads induces traffic, the converse is also evident, and reducing road capacity reduces demand.**

Professor Whitmarsh was part of the Climate Change Commission for Wales (CCCW) and conducted a detailed review of transport policy and climate change in Wales for the CCCW. It concluded that road building would negatively impact climate change targets, as well as other sustainability goals (now embodied in the Well-being of Future Generations Act). For example, **road building is socially divisive for communities and negatively impacts on biodiversity.** She argued that implementing the transport hierarchy is key to:

- avoid using transport (by video conferencing etc.),
- shift (to more sustainable forms of transport – walk, bike, train),
- improve (electric vehicles over conventional)

Transport and Economics

Mr Gerald Kells

Mr Gerald Kells is an Independent Policy and Campaigns Advisor, with a background in transport, planning and environmental issues. He gave evidence on behalf of Friends of the Earth. He has 25 years' experience in the sustainable transport and policy sector, previously working for the Campaign to Protect Rural England (CRPE). Amongst other roles, Mr Kells was a member of the Regional Planning Executive of the West Midlands Regional Assembly as well as Vice-Chair of the West Midlands Regional Transport Partnership. He sat on the

steering group of two Multi-Modal Studies, and gave evidence to a number of Parliamentary Committees.

Mr Kells argued that **the problem is network wide**, not just on the motorway, and needs network solutions. Traffic currently passes through the system without significant delay **most** of the time. The wider problem that exists on the Network, put simply, is that there has been inadequate investment in alternatives and little management at peak times. He argued that modest measures to control traffic up-stream of the Brynglas tunnels should be able to smooth the flow and create an acceptable level of service for an urban motorway, (while also reducing emissions and noise impacts).

Friends of the Earth Cymru argued that a combination of alternative measures, both public transport and demand management, could resolve the problems.

Friends of the Earth Cymru likened this approach to a jigsaw where you needed to see the whole picture to understand the overall impact on traffic levels on the motorway and surrounding network. While the Welsh Government pointed the Inquiry to the high level package assessment of M4 CEM, these simply do not provide the traffic figures needed for such a comparison. What was clear from the rebuttal of their evidence was that public transport investment on its own could provide a 6% reduction in traffic on the M4, bringing almost all sections within the Motorway's Capacity Limits. Separately, the simple measure of closure of the Eastbound slips at Jn 26 would reduce traffic at the key pinch-point of the Brynglas tunnel by 5%. This should give confidence that a wider package of demand management and public transport ought to be able to address both the symptoms and the underlying problems of car dependency on the Newport Network.

Moreover, the approach Friends of the Earth Cymru advocates compliments the Welsh Government's admirable and essential policy goal of reducing car travel and promoting alternative modes. Unlike the motorway proposal it does not require a convoluted explanation to try to prove it will have knock on benefits for public transport.

Professor John Whitelegg

Professor John Whitelegg highlights that the most common justification for roadbuilding was that more road capacity would reduce congestion. However, old and new research shows the opposite. **New road building generates new traffic or “induced traffic” and adds to congestion problems in and near urban areas and city regions.** He cited

- extensively his own experience and studies from the UK and around the world
- from the UK's leading expert Professor Phil Goodwin including the gold standard Standing Advisory Committee on Trunk Road Assessment (SACTRA).
- Professor Phil Goodwin 2006 review of a major report “Beyond Transport infrastructure”
- CPRE commissioned report ‘*The Impact of Road Projects in England*’ by consultants Transport for Quality of Life Community Interest Company which drew upon evidence of short-term impacts from over 80 road schemes via Post-Opening Project Evaluation (POPE) process. This was supplemented by long-term evidence from four road schemes that were completed between 13 and 20 years ago. It showed that
 - All road schemes, bar one, saw traffic growing significantly faster than background trends for other regional roads. This suggests that the new schemes were inducing traffic. In the remaining scheme, the traffic growth was the same as the background trend.
 - The longer these roads schemes have been in place, the more traffic they have attracted. Schemes completed 8-20 years ago showed a 47% increase in traffic compared with a 7% increase of those completed 3-7 years ago.

If built to reduce congestion, these road and motorway schemes backfired. The road schemes studied did not solve the problems that they were supposed to but ratcheted up traffic levels year on year in a self-perpetuating cycle, by unlocking car-dependent development. Not only did this mean that the new roads filled up quickly, the bypassed roads did too in many instances. Worse still, traffic increased on roads feeding into the new roads, creating new pinch-points in the medium-term.

The reality is that a motorway proposal like this is likely to generate significant amounts of additional traffic, both through changes in journey lengths and through more fundamental changes in where people choose to live, work, shop and enjoy leisure facilities. The road removes a constraint and releases capacity for commuting, leisure, retail and business journeys, extending the commuter belt to Cardiff dramatically.

Professor Whitelegg stated that induced traffic is very important because of the effects it has on traffic forecasts, time savings, Benefit: Cost Ratios (BCR) and Value for Money (VFM).

A large amount of induced traffic will usually have the effect of cancelling out or minimising the travel time savings that have been predicted for a road scheme and then converted into a monetary estimate of benefits – here the Welsh Government predict time savings on average of between 3 and 9 minutes!

Professor Whitelegg stated that the Welsh Government report on traffic forecasting also ignores the reality of exaggerated and inaccurate forecasts made in the past. The traffic engineering and modelling world is well aware that forecasting is based on flawed assumptions and this has been expertly illustrated by Professor Phil Goodwin in his many writings and presentations presented by others at the Inquiry and through written submissions, notably from Friends of the Earth. This means that **the arguments made in support of road building, as in the case of the M4 motorway, are based on unreliable traffic forecasts.**

The Professor highlighted the successes of Reading buses, Brighton buses. Nottingham's Workplace Parking Levy combined with Nottingham's bus and tram projects are well documented and show that it is possible to reduce car travel and boost alternatives. However, these areas have not been fully explored by Welsh Government.

Professor Whitelegg, along with others, highlighted the **two way road argument** which shows that the new motorways are just as likely to drain jobs away from a local economy as it is to attract them. Roads don't equate to significant employment, as shown by the structural economic problems of areas very well served by motorways in the 21st Century such as Glasgow and Hull.

Professor Calvin Jones

Calvin Jones is a Professor of Economics at Cardiff Business School. He has 25 years experience examining issues related to the development of the South Wales economy and the broader Welsh economy. He is involved in numerous economic advisory committees for the UK and Welsh Governments and sits on the Institute of Directors' Wales Policy Committee, and the Institute for Welsh Affairs Re-Energising Wales steering group. He is regarded as one of Wales leading economists.

He stated that he had seen zero substantiated evidence that a problem with road connectivity is a significant downward pressure on economic or employment growth in the region. There is little evidence that such a relationship is discernible anywhere in Europe, especially when reasonable provision already exists. He highlighted that Wales has in recent years enjoyed its best ever performance in inward investment, including investment in south Wales by car manufacturers, an activity that a priori would be more susceptible to connectivity issues.

Professor Jones highlighted that the main reasons behind the economic problems of South Wales are long-standing such as:

- lack of economic variety and headquartered firms;
- low levels of entrepreneurship
- limited aspirations and
- poor skills and qualifications

This list is similar to the Welsh Governments consultation on the National Development Framework Integrated Sustainability Assessment which highlighted the Key reasons for Wales's relatively poor economic performance. It highlighted relatively low skills levels and poor educational attainment levels but not transport infrastructure. Professor Jones stated that globalisation, reduced demand for lower-skilled workers and the fragmentation of work have, since 1991, exacerbated these issues. The new M4 motorway addresses none of these issues.

Professor Jones believes that building the motorway could even discourage companies from moving to Wales, as it is at odds with Welsh Government policies that seek to build a **distinctive economic development** narrative for Wales based on sustainable development i.e. *A Prosperous Wales – An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change).*

Investment in the M4 Scheme could also exacerbate Intra- regional and social disparities by allocating the bulk (or all) of Wales’ borrowing ability on the M4. Across the region between 25- 30% of households do not own a car and car ownership correlated strongly with other poverty and income measures. Poorer people in the area would therefore rarely use the road themselves, which means the most direct benefits would be enjoyed by those regional residents who are already more affluent. Investments in public transport have a far greater impact on the poorer. The provision of a new motorway will generate very limited co-benefits – or ‘bang for buck’ – as required under the Well-being of Future Generations Act.

Professor Jones highlighted the study by Dr Mark Lang of Cardiff University’s Sustainable Places Research Institute which stated that:

*“Some of the key economic priorities that have emerged in Wales, notably **the proposed construction of an M4 relief road around Newport, appear to offer little to the well-being of future generations. They also appear to offer very little to the people and town of Pontypool, who like other communities have not been engaged in the conversation around setting the economic policy agenda**”.*

Costs vs Benefits

Professor Jones also highlighted that the costs are likely to be far more than anticipated, and many of the benefits will largely ‘leak’ from Wales. For example, the benefits from procurement will likely leak in large part from the region as Wales has a paucity of large ‘Tier 1’ contractors who are able to bid for the largest construction or design jobs, with labour and machinery also likely to be sourced from across the border in England.

He stated that **the Scheme is not a future-oriented investment** and that human society, in the West at least, appears on the cusp of radical change in productive, distributive and consumption systems due to the impact of digital technology, even leaving aside the key ecological and energy challenges that will change the way we live. Most relevant here are the huge strides being made in the development of connected and autonomous vehicles. Professor Jones went on to state that there is a substantive risk that capacity relevant to current trend-based projections will constitute a massive over- build in the light of autonomous passenger and freight travel. For example, the Department for Transport (DfT) stated that the average time spent delayed on city roads at rush hour will fall by 12.4% when 25% of vehicles are driverless³³. But as more people adopted the technology and it became common place on the country's road network, the study found that congestion could be cut by 40%³⁴.

In addition, the perception of journey times might change also with autonomous vehicles. As cars become less of a status symbol, and as the popularity of shared ownership and subscription-based mobility rises, auto manufacturers are increasingly focusing on the comfort and amenities inside vehicles. Wi-Fi, sound systems, comfortable seating, easy access to social media, and anything else that makes being in the vehicle as comfortable as possible – or even desirable – is the goal. In this context, the whole experience of congestion might shift dramatically: instead of feeling enraged by traffic delay and the ensuing lack of productivity, you could simply use the Wi-Fi, continue working, make calls, or engage in social media, much as you would at the office or home. Congestion might not even be that much of a hassle if only because people won't experience it in the same way.

Professor Jones highlighted that the Welsh Government's **Economic Appraisal Report (EAR)** fails to include some significant costs or dis-benefits that are likely to make the scheme poor or low value for money. The UK Government specifications also state that following a basic Value for Money (VfM) assessment, non-monetised impacts are then considered to ascertain whether those impacts are great enough to shift a scheme into a different category. The final VfM category is then assigned. However, the significant ecological (and

³³ <http://www.bbc.co.uk/news/uk-38533517>

³⁴ Ibid

ecosystem services) impacts have not been considered in the Benefit:Cost Ratio (BCR), which could be large enough to shift it into a different category. As Mr Bussell stated in cross examination, an evaluation of ecosystem services was not undertaken, even though this is a requirement of the January 2016 CIEEM Guidelines for Ecological Impact Assessment (the industry guidelines for EIA). This is inconsistent with the Environment (Wales) Act 2016.

The BCR also didn't include VAT or construction inflation which Professor Cole during his evidence stated was 7%. Professor Jones also highlighted that much of the major assumed economic benefits will go to Bristol and South Gloucestershire, one of the South Wales biggest economic competitors – and yet it is Welsh taxpayers paying the bill for the scheme including the ongoing repayments back to the treasury.

Professor Whitelegg

Professor Whitelegg stated that the evidence nationally and internationally is very clear and new road building is just as likely to drain jobs away from a local economy as it is to attract them. He stated that there is a **total lack of empirical evidence in support of the "roads=jobs" argument** or that roads assist the economy. The clear evidence of these studies is that it would be perverse to proceed with a large transport infrastructure investment on the unsubstantiated assumption that such an investment will lead inexorably and unambiguously to job creation, especially in disadvantaged areas. He highlighted the inspector's report into the proposed M74 motorway in Glasgow as especially relevant to a discussion about the impact of additional highway capacity in South Wales. Most, if not all, the issues relevant to the debate around social exclusion, relative disadvantage, business growth, job creation and new transport infrastructure were dealt with in a thorough manner by the Inspector and have a direct transferability to the sub-region centred on Newport. The Inspector came down firmly against the M74 and accepted the case made by the objectors.

Professor Whitelegg stated that any objective assessment of the weight of evidence, both scientific evidence and public policy, would lead inevitably to the rejection of a proposal that claimed economic and social gains from a large item of transport infrastructure. It would further reject the assertion that such investments could maintain accessibility

improvements over time as traffic levels rise and erode the temporary gains made in the few months following opening of a scheme.

Professor Whitelegg stated that the SACTRA report (1999) is central to the consideration of any claims made for the M4 Relief Road in terms of regeneration, job creation, inward investment and local economic gain. SACTRA concluded that *“there is no convincing general evidence”* in support of these desirable outcomes and that improved highway connectivity can also lead to the *“2 - way road effect”* where economic activity drains away from less prosperous regions to stronger regions.

Professor Whitelegg also cited that the principles of transport appraisal have not been followed and the adoption of a road-building option has not followed careful evaluation of all options, including the non-road building options. WebTag makes it very clear that there should be a sequential approach to dealing with transport problems followed by option listing and scoping and concluding with a clear and transparent comparison and evaluation of the options, leading to the selection of the best performer. This sequential approach has not been followed in the case of the M4 motorway. There is no evidence that *“genuine, discrete options”* have been identified and pursued and no evidence of the requirement to include *“A range of solutions... across networks and modes.”* Professor Whitelegg stated that, for the avoidance of doubt, the WebTag requirements of *“a range of solutions ...across networks and modes”* would include the *“smarter”* options, including the systematic application of workplace travel plans across the whole Cardiff-Newport corridor to reduce single occupant vehicle use and encourage modal shift to non-car alternatives.

He stated that there has been no detailed evaluation of the extent to which significant improvements in rail-based commuting opportunities could reduce vehicle numbers on this same corridor. The lack of robust and wide ranging option generation is a particularly serious defect in the case of the M4 relief road. He stated that it was very difficult indeed to avoid the conclusion that the M4 relief road, from the beginning, has been a *“preferred modal solution”* and a *“solution in search of problems”* as WebTag looks to avoid (para 2.8.3).

Professor Whitelegg stated that a reduction of peak hours traffic around Newport as a result of these non-road building measures by 21% is sufficient to deliver significant amounts of congestion relief without triggering the phenomenon known as “induced traffic” which has been proven by a remarkably robust and wide ranging body of evidence. He states that the M4 motorway proposal has not adopted a rigorous review of induced traffic and incorporated the findings from empirical evidence into the development of a road building option and the exclusion of non-road building options. The lack of attention to induced traffic means that congestion level is likely not to be reduced and a great deal of public money will be deployed in ways that cannot deliver the primary objectives of the project. It also means that VFM and BCR calculations are unsound and it cannot be right to proceed with a project based on flawed VFM and BCR calculations.

It is unacceptable that a major public investment of the scale contemplated by the matter before this Inquiry should proceed when there is an evidence base pointing to highly uncertain and contradictory outcomes that have not been addressed adequately by the promoters.

Sustainable Development

Professor Terry Marsden is the chair of Environmental Policy and Planning in the School of Geography and Planning at Cardiff University. He is the Director of the Sustainable Places Research Institute at Cardiff and was Co-Director of the UK Economic and Social Research Council’s Research Centre for Business Relationships, Accountability, Sustainability and Society (BRASS) at Cardiff University for 12 years. He has 25 years’ experience working in the field of sustainability. He is one of Wales’, if not the UKs, leading expert on sustainable development.

Professor Marsden has stated that Wales has a leading international position and reputation in developing environmental and sustainable development policy through the enactment of the Future Generations (Wales) Act 2015, the Environment Act 2016, and the climate emissions and change obligations associated with the Paris COP21 process.

Professor Marsden regards the proposed M4 scheme as a legacy proposal in the sense that it was conceived in earlier periods when carbonised solutions still held legitimacy both in the transport sector and in the wider economy. This is no longer the case. The proposal, in his view, is thus seriously out-of-date, and not commensurate with the obligations Wales is making to developing a post-carbonised transition for existing and future generations. Professor Marsden highlighted the urgency with which Governments around the world, including the Welsh Government, must take action to avoid dangerous climate change but this scheme does not do this.

He agreed that the 'blue route' proposal was a favourable alternative to the proposal.' By contrast, John Davies MBE was to admit that he had no sustainability experience other than that incidental to decisions that he has had to make in the past. He maintained that on the most optimistic carbon emission increase of half a million tons of carbon from the project, that the break even date of 2072 meant that the project was sustainable. This of course flies in the face of the reality and timescales of global warming, and also the 80% reduction goals that the Welsh Government states elsewhere. Without any apparent basis he was to assert that so far as the Future Generations Commissioner interventions on sustainability were concerned, he was right and she was wrong. Sadly it highlights the Welsh Governments failure to address sustainability in any serious way. In truth it is a bolt-on afterthought to a historic project.

Mr Davies, in cross examination, stated that the scheme doesn't 'respect environmental limits'. However, if it does not respect environment limits then by definition, its unsustainable.

Conclusion

The M4 Scheme is the continuation of 'business as usual', not only in the face of the historic failures of such projects to prevent the problems that they claim to solve, but now also set against the well-recognised harm to our planet that this course has contributed towards.

The Scheme is right out of the 1960s play book. We need to stop doing the same things over and over again and expecting different results –

- building a motorway to bypass a motorway is like loosening your belt to fight obesity
- building a road will not create an economic boon

against all the weight of evidence from around the world and at home, including the CPRE report, road building is not the answer.

One of the 'ways of working' from the Well-being of Future Generations Act is 'preventative action' i.e. not to make things worse. However, in almost every conceivable way this scheme will make things worse, including climate change, ecology and transport. It is clear that the scheme

- does not live up to the climate change measures / goals with the Environment (Wales) Act and the Well-being of Future Generations – as it will be carbon positive until at least 2072 – when, by 2050 we should have an 80% reduction.
- will lock us into carbon intensive futures and behaviours. It will not only create new generated traffic, but it will also hinder modal shift and legitimise non-sustainable behaviour.
- it will have little if any impact upon economic development in South Wales.
- will have a significant and long lasting damaging impact on many important habitats including the SSSIs wetlands and ancient woodlands, on vulnerable and rare species. As such it does not comply with the Resilient Wales of the Well-being of Future Generations Act or the Environment Act.

This non-conformity with Welsh Government sustainability policies and legislation is a significant departure from legislative intention and is a serious matter. It represents a deliberate decision that is contrary to legislation, made in the full knowledge that there are many low carbon, zero carbon, and less ecologically damaging alternatives to the most damaging option.

This is the first test case of both the Environment (Wales) Act and the Well-being of Future Generations Act. We hope that a recommendation that the scheme is not progressed will send out a strong message, that Wales stands for sustainable development, not sustained development.