

Adran yr Economi a'r Seilwaith
Department for Economy and Infrastructure



Llywodraeth Cymru
Welsh Government

**THE CHESTER TO BANGOR TRUNK ROAD (A55) (JUNCTIONS 16 AND 16A
IMPROVEMENT REALIGNMENT AND SLIP ROADS) ORDER 202-**

**THE CHESTER TO BANGOR TRUNK ROAD (A55) (JUNCTIONS 16 AND 16A
IMPROVEMENT REALIGNMENT AND SLIP ROADS) (SIDE ROADS) ORDER 202-**

**THE WELSH MINISTERS (THE CHESTER TO BANGOR TRUNK ROAD (A55)
(JUNCTIONS 16 AND 16A IMPROVEMENT REALIGNMENT AND SLIP ROADS))
COMPULSORY PURCHASE ORDER 202-**

PROOF OF EVIDENCE

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WELSH GOVERNMENT, AIR QUALITY

DOCUMENT REFERENCE: WG 1.10.02

Contents

| | |
|--|-----------|
| 1. Author | 1 |
| Links with other Proofs of Evidence..... | 2 |
| 2. Summary of Regulatory and Policy Framework | 3 |
| 3. Assessment of Effects | 6 |
| Consultation | 6 |
| Sources of Effects | 6 |
| Method | 6 |
| Baseline..... | 7 |
| Assessment of Construction Effects..... | 7 |
| Mitigation and Enhancement | 8 |
| Residual Effects | 8 |
| Cumulative Effects..... | 8 |
| 4. Objections to the Scheme | 9 |
| 5. Conclusion and Declaration | 10 |

1. Author

- 1.1 I am Graham Thomas Harker. I lead the air quality discipline of Ramboll UK Limited. I am a Chartered Mechanical Engineer (CEng), Member of the Institution of Mechanical Engineers (MIMechE), Member of the Institution of Environmental Sciences (MIEnvSc) and the Institute of Air Quality Management (MIAQM). I have over 20 years of experience in environmental regulation and consultancy.
- 1.2 I have previously been a Committee Member of the Institute of Air Quality Management and have contributed to the development of guidance on the assessment of the impacts of air quality impacts for land-use planning and development control, and the assessment of the air quality impacts on designated nature conservation sites.
- 1.3 My relevant highways experience includes the following projects:
- a) The Parkside Link Road including public inquiry evidence;
 - b) The West Midlands Interchange Development Consent Order; and
 - c) The Queensway Gateway Road and North Bexhill Access Road.
- 1.4 I am the air quality lead for the A55 Junctions Improvements scheme. My role involves the key tasks of:
- a) Review and approval of the Air Quality Environmental Statement (ES) Chapter (Document Reference WG 3.01.01); and
 - b) Review and approval of the responses to comments on the planning application.
- 1.5 The project for improvements at Junctions 15 and 16 has developed so that it encompasses Junctions 14 and 16A as well. Furthermore, the two sets of junctions, namely Junctions 14 and 15 to the west at Llanfairfechan, and Junctions 16 and 16A to the east at Dwygyfylchi and Penmaenmawr, are being treated under different sets of draft Orders and Environmental Statements. This proof of evidence addresses Junctions 16 and 16A, at Llanfairfechan, hereby referred in this proof of evidence as the 'Scheme' or the 'Junction 16 Scheme' as appropriate.
- 1.6 My Proof of Evidence provides an overview of the air quality aspects of the Junction 16 Scheme and sets out the reasons for the proposed environmental mitigation.
- 1.7 The opinions expressed are my own unless I state otherwise. I have been assisted by colleagues from within the project team in the various tasks that are reported in this document. Colleagues are also presenting evidence within their specialist environmental expertise. Where a topic is covered in

detail by the proof of evidence of another specialist, I provide a cross reference to the relevant proof.

- 1.8 It is not my intention to reproduce large sections of text from the ES, but simply to cross refer to, or highlight key procedural and technical matters that are pertinent to the assessment of the published Scheme. Consequently, I will refer in this Proof of Evidence to supporting material contained within the ES (WG 3.01.01) and the ES Supplements where relevant.
- 1.9 My Proof of Evidence covers air quality and is structured in the following manner:
- Part 2 This provides a summary of the Regulatory and Policy Framework for the assessment
 - Part 3 This provides a summary of the Assessment of Effects
 - Part 4 Objections to the Scheme – This provides a summary of the matters raised in the objections that are relevant to my Proof of Evidence
 - Part 5 Conclusion and Declaration

Links with other Proofs of Evidence

- 1.10 I will rely on the following expert witnesses to cover their respective specialist fields:
- Nigel Roberts, Traffic and Economics (WG 1.03.02)

2. Summary of Regulatory and Policy Framework

- 2.1 Relevant Legislation, Policy and Guidance applicable to air quality were set out in Sections 12.2 to 12.5 of the ES (Document Reference WG 3.01.01).
- 2.2 The European Directive 2008/50/EC¹ (Document Reference WG 4.01.58) on ambient air quality and cleaner air for Europe establishes a strategic framework for setting European-wide limit and/or target values for seven pollutants (nitrogen oxides, particulate matter, sulphur dioxide, ozone, carbon monoxide, lead and benzene).
- 2.3 Paragraphs 12.4.1 to 12.4.8 of the ES (WG 3.01.01) provides the Air Quality Objectives (AQOs) for nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀) which are set in Regulations² (WG 4.01.59, 4.01.60, 4.01.61) for the protection of human health. AQOs are policy objectives, local authorities are not required to achieve them, but have to work towards their achievement.
- 2.4 The objectives apply at locations of relevant exposure which are defined in relation to the potential time period over which exposure may occur. Guidance is provided within Local Air Quality Management Technical Guidance (LAQM.TG.16)³ (WG 4.01.67) issued by Defra for Local Authorities, on where the AQOs apply. The AQOs do not apply in workplace locations, to internal air or to places where people are unlikely to be regularly exposed (i.e. the centre of roadways) as set out in Table 1.
- 2.5 Paragraphs 12.4.9 to 12.4.14 of the ES (WG 3.01.01) provides the regulatory framework for the protection of ecosystems including the critical level of 30 microgrammes per cubic metre (µg/m³) for oxides of nitrogen (NO_x).
- 2.6 Paragraphs 12.4.15 to 12.4.21 of the ES (WG 3.01.01) provide a summary of Welsh planning policy.
- 2.7 Section 12.5 of the ES (WG 3.01.01) provides a summary of the guidance used to inform the assessment. The primary guidance⁴ (Document Reference WG 4.01.66) informing the construction dust impact assessment is that issued by the Institute of Air Quality Management (IAQM) as described in Paragraph 12.5.1 of the ES (WG 3.01.01).

¹ Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe [EUR-Lex - 32008L0050 - EN - EUR-Lex \(europa.eu\)](#)

² [The Air Quality \(Wales\) Regulations 2000 \(legislation.gov.uk\)](#), [The Air Quality \(Amendment\) \(Wales\) Regulations 2002 \(legislation.gov.uk\)](#), [The Air Quality Standards \(Wales\) Regulations 2010 \(legislation.gov.uk\)](#)

³ <https://iaqm.defra.gov.uk/supporting-guidance.html> [accessed 18.08.2021]

⁴ IAQM Guidance on the assessment of dust from demolition and construction

Table 1: Defra Guidance as to Where the Objectives Apply

| Averaging Period | Objectives Should Apply at | Objectives Should Generally not Apply at |
|------------------|--|---|
| Annual mean | All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc. | Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. |
| 24-hour mean | All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties. | Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term. |
| One-hour mean | All locations where the annual mean and: 24- and eight-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expect to spend one hour or longer. | |

- 2.8 Paragraphs 12.4.9 to 12.4.14 of the ES (WG 3.01.01) provides the regulatory framework for the protection of ecosystems including the critical level of 30 microgrammes per cubic metre ($\mu\text{g}/\text{m}^3$) for oxides of nitrogen (NO_x).
- 2.9 Paragraphs 12.4.15 to 12.4.21 of the ES (WG 3.01.01) provide a summary of Welsh planning policy.
- 2.10 Section 12.5 of the ES (WG 3.01.01) provides a summary of the guidance used to inform the assessment. The primary guidance⁵ (Document Reference WG 4.01.66) informing the construction dust impact assessment is that issued by the Institute of Air Quality Management (IAQM) as described in Paragraph 12.5.1 of the ES (WG 3.01.01).
- 2.11 The primary guidance informing the assessment of road traffic emissions is the Design Manual for Roads and Bridges⁶ (DMRB) HA 207/07 (Document Reference WG 4.01.63) as described in Paragraph 12.1.5 of the ES (WG 3.01.01).
- 2.12 Subsequent to the assessment the DMRB guidance was updated to LA105 Air Quality⁷ (Document Reference WG 4.01.65). As described in Section 12.1.4 of the ES (WG 3.01.01), applying LA105 would have required a lower level of assessment than has been undertaken for the J16 Scheme and therefore would not change the conclusions of the assessment.

⁵ IAQM Guidance on the assessment of dust from demolition and construction

⁶ <https://www.standardsforhighways.co.uk/dmr/> [accessed 18.08.2021]

⁷ [LA 105 - Air quality - DMRB \(standardsforhighways.co.uk\)](https://www.standardsforhighways.co.uk/la105/) [accessed 18.08.2021]

3. Assessment of Effects

Consultation

- 3.1 Paragraphs 12.6.1 to 12.6.3 of the ES (WG 3.01.01) describe the consultation undertaken for the scheme.

Sources of Effects

- 3.2 Paragraph 12.1.2 of the ES (WG 3.01.01) provides information on the sources of air quality effects of the scheme. These are dust and PM₁₀ during the construction period and emissions associated with road traffic (NO₂ and PM₁₀) during the operational period.

Method

- 3.3 The methodology for the assessment of construction impacts is set out in Section 12.7 of the ES (WG 3.01.01). The assessment of construction dust impacts was undertaken in accordance with the IAQM construction dust guidance (WG 4.01.66).
- 3.4 The effects of construction traffic were scoped out of the assessment as the construction vehicle movements were below the DMRB (WG 4.01.63) threshold for an assessment to be necessary.
- 3.5 The impacts of the operation of the scheme have been assessed by detailed atmospheric dispersion modelling of road traffic emissions as described in Paragraphs 12.8.1 to 12.8.12 of the ES (WG 3.01.01).
- 3.6 The modelling predicts how emissions from the vehicles on the road network disperse in the environment. The predicted concentrations from the modelling are added to an estimate of the baseline pollutant concentrations to provide the total predicted concentration at a specific location.
- 3.7 The pollutant concentrations with the development in place as well as the development contribution are used to determine the significance of the impact as set out in Paragraphs 12.8.15 to 12.8.18 of the ES (WG 3.01.01) in accordance with IAQM guidance on planning (WG 4.01.64). The significance of ecological impacts was judged against DMRB criteria as described in Paragraph 12.8.25 of the ES (WG 3.01.01).
- 3.8 The modelled road network is shown in Appendix 12.3 of the ES (WG 3.01.01).
- 3.9 There are two basic stages in the modelling process:
1. The model is set up to predict concentrations at a number of monitoring locations in the baseline year. Adjustments are made to the model set up to reduce the difference between the output of the model and monitored concentrations in the baseline year. Once this process has been optimised, the resulting average difference between the predicted

model output and the measured concentrations is determined, and this is referred to as the 'variation factor'. The factor is a measure of how much the model needs to be adjusted to match the measured concentrations.

2. The modelling is then repeated for the future development year for the do-minimum and do-something scenarios with the verification factor applied to the model output.

- 3.10 Defra produces a number of tools which can be used for the modelling process⁸. These tools are periodically updated by Defra and the latest version of the tools available at the time of the assessment were used.
- 3.11 Fourteen human health receptor locations were chosen as described in Paragraphs 12.8.13 to 12.8.14 of the ES (WG 3.01.01). Ecological receptors were chosen in accordance with DMRB criteria as described in Section 12.8.19 to 12.8.24 of the ES (WG 3.01.01).

Baseline

- 3.12 Baseline conditions at human health receptor locations are described in Sections 12.10 to 12.14 of the ES (WG 3.01.01). All of the measured and predicted data were well below the air quality objectives.
- 3.13 Baseline conditions at ecological receptors are described in Section 12.15 of the ES (WG 3.01.01). The baseline nitrogen deposition and nitrogen acid deposition are above the respective critical loads.

Assessment of Construction Effects

- 3.14 The assessment of Construction Effects is described in Section 12.16 of the ES (WG 3.01.01).
- 3.15 The scheme was found to be medium risk for earthworks and construction dust impacts and low to negligible for human health impacts.

Assessment of Operational Effects

- 3.16 The impacts on human health receptors are described in Paragraphs 12.17.1 to 12.17.4 of the ES (WG 3.01.01). The overall effect was judged to be not significant.
- 3.17 The impacts on ecological receptors are described in Paragraphs 12.17.5 to 12.17.7 of the ES (WG 3.01.01). The overall effect was judged to be not significant.

⁸ <https://laqm.defra.gov.uk/review-and-assessment/tools/tools.html> [accessed 18.08.2021]

Mitigation and Enhancement

- 3.18 Mitigation measures to control dust emissions are described in Paragraphs 12.18.1 and Table 12.18 of the ES (WG 3.01.01). The recommended dust mitigation measures would form part of a Construction Environmental Management Plan (CEMP) for the scheme.
- 3.19 The operational mitigation measures are described in Paragraphs 12.19.1 to 12.19.2 of the ES (WG 3.01.01). No additional traffic mitigation is required to reduce the direct effects of the Scheme on local air quality.

Residual Effects

- 3.20 The construction and operational phase residual effects are described in Section 12.20 of the ES (WG 3.01.01) and are not significant.

Cumulative Effects

- 3.21 Cumulative effects are described in Section 12.21 of the ES (WG 3.01.01). Both construction and operational phase cumulative effects are not significant.
- 3.22 Natural Resources Wales (NRW) (Respondent Reference R048) concurred with the conclusions of the assessment outlined in Summary Section (2.22) of the ES (WG 3.01.01).

4. Objections to the Scheme

- 4.1 Objections have been made that raise matters that fall within the scope of my proof of evidence.
- 4.2 An objection has been made that the scheme will increase pollution around the junctions due to the replacement of the roundabouts. It is not agreed that the scheme will increase pollution. Vehicle engines are more efficient when driving at a constant speed. Driving with less acceleration and deceleration and stop-and-go would improve fuel consumption, reduce exhaust and brake-wear and tyre-wear emissions and improve air pollution. Tyre-wear is exacerbated by the effect of the yellow rumble strips on the approach to the roundabout; the removal of these would reduce this tyre-wear and thus result in less particulates being emitted.
- 4.3 The replacement of the roundabout with slip roads and an overbridge would reduce congestion and increase the average speed by promoting free flowing traffic, resulting in an overall improvement in air pollution and reduction in vehicle emissions is due to the changes in driving style.
- 4.4 A suggestion has been made by objectors that as an alternative to the Scheme, the speed limit on the road should be lowered to 50 mph and that this would have the benefit of reducing emissions. Lowering the speed limit to 50 mph from 70 mph would have the effect of lowering emissions in free-flowing traffic. However, congestion at the roundabout would still remain and one would still be left with the increased emissions caused by the traffic having to slow down, stop and then accelerate.

5. Conclusion and Declaration

- 5.1 My proof of evidence includes facts which I regard as being relevant to the opinions which I have expressed, and the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.
- 5.2 As air quality lead I have supervised the preparation of the Air Quality ES Chapter (WG 3.01.01) and sought, with the engineering and other environmental specialists in the team, to minimise impacts of the Scheme and to optimise the effectiveness of proposed mitigation.
- 5.3 In my opinion the Air Quality Assessment, has been carried out and published in accordance with legislation and professional guidance.
- 5.4 In my opinion the development of measures to mitigate the Air Quality effects of the Scheme are effective, justifiable and achievable.
- 5.5 I believe the facts I have stated in this proof of evidence are true and that the opinions expressed are correct.
- 5.6 I understand my duty to the Inquiry to assist it with matters within my expertise and believe that I have complied with that duty.