ROCKFIELD FARM

NOISE ASSESSMENT ADDENDUM

CONFIDENTIAL

JANUARY 2017

WSP | PARSONS BRINCKERHOFF

ROCKFIELD FARM

NOISE ASSESSMENT ADDENDUM

Monmouthshire County Council

Confidential

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APPENDICES

1 EXECUTIVE SUMMARY

1.1.1 WSP | Parsons Brinckerhoff has been instructed by Monmouthshire County Council (MCC) to undertake a noise assessment in support of the outline planning application for a mixed development at Rockfield Farm, Undy. This addendum should be read in conjunction with the noise assessment prepared by WSP | Parsons Brinckerhoff in July 2016. It presents updated results of the noise assessment following iteration in the traffic data used to inform the study. It should be noted that the traffic data includes trips associated with the Vinegar Hill development.

1.1.2 The noise survey methodology and results described in the July report have not been revised in this addendum and they are still valid for the purposes of noise modelling validation.

1.1.3 The noise model has been updated for the design year only. The assessment of the suitability of the site has been carried out in accordance with Technical Advice Note 11: Noise (1997).

1.1.4 The results of the updated assessment confirm that no proposed residential buildings will be subject to Noise Exposure Category (NEC) D, and that residential areas would be exposed to noise levels equivalent to NEC C as a worst case. In addition, a noise mitigation strategy is proposed to meet MCC's aspiration on noise levels in private garden areas.

2 INTRODUCTION

2.1 CONTEXT

2.1.1 A noise assessment has been prepared by WSP | Parsons Brinckerhoff for Monmouthshire County Council (MCC) in support of a planning application for a mixed development at Rockfield Farm, Undy.

2.1.2 The development proposals are understood to comprise of the following:

- 265 new dwellings;
- 5,575 m^2 employment (B1) land-use;
- A new access from the B4245 near Rockfield Grove

2.1.3 This addendum provides a reassessment of the suitability of the site for the proposed development, further to an iteration of the traffic data.

2.1.4 This addendum report presents a summary of the findings of the following scope of work:

- Noise modelling for scenarios with and without M4 Corridor Around Newport (CAN);
- Assessment in accordance with Technical Advice Note 11: Noise; and
- Noise mitigation options, where required

2.1.5 The baseline noise survey undertaken within the boundary of the site is discussed in the Noise Assessment July 2016.

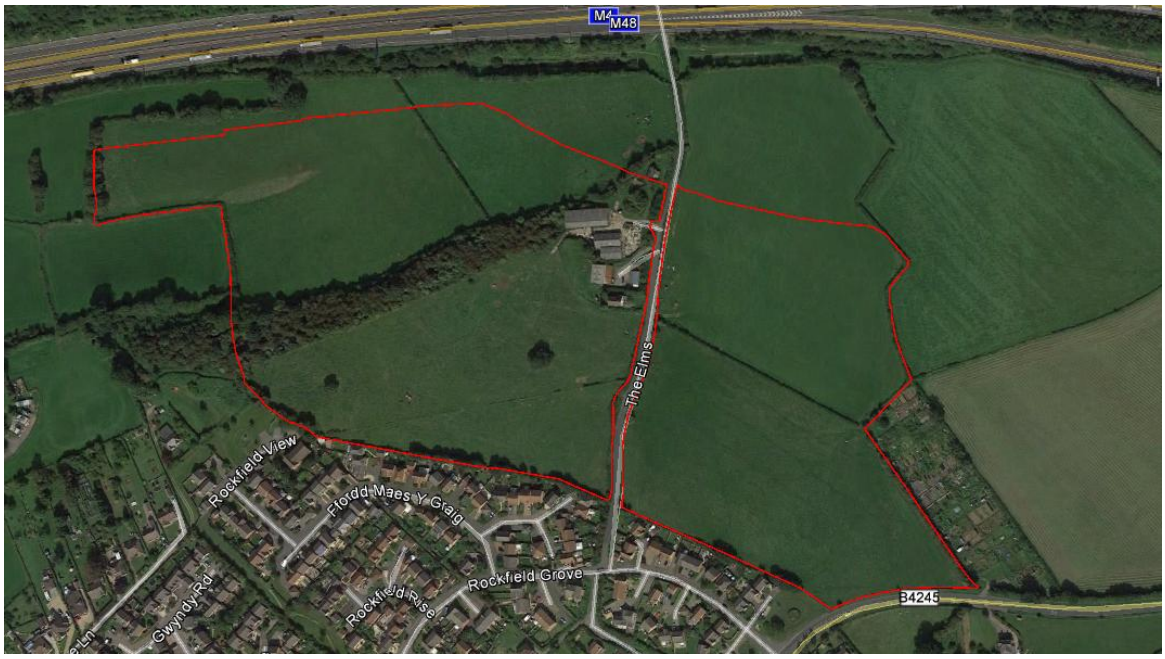
2.1.6 A glossary of the acoustics terminology is presented in Appendix A.

2.2 SITE DESCRIPTION

2.2.1 The site is located in the northern-eastern side of Undy. It is limited by a safeguarding area for the M4 CAN to the north and amenity open space and safeguarding route for a Magor/Undy by-pass to the south. The site is currently farmland and it is divided by the road The Elms. Existing residential development is situated immediately south of the site. Behind the residential area it is the B4245 and the railway line connecting Newport with Severn Tunnel Junction.

2.2.2 The terrain within the site boundary is irregular and generally on a slope. The motorway is elevated in comparison to the site.

Figure 1 - Site Location



3 POLICY AND GUIDANCE

3.1 NATIONAL POLICY

PLANNING POLICY WALES (PPW), 2016

3.1.1 The PPW sets out the land use planning policies of the Welsh Government. This document is supplemented by 21 Technical Advice Notes (TANs). It communicates the approach from the Welsh Government to sustainable development. The PPW, TANS, circulars and policy clarification letters comprise national planning policy in Wales.

3.1.2 Chapter 4 'Planning for Sustainability' states that the goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations. With regard to mixed use developments it states that good design is important for the success of these developments for example in helping to keep noise levels low.

3.1.3 Chapter 13 'Minimising and Managing Environmental Risks and Pollution' states that noise can affect people's health and well-being and have a direct impact on wildlife and local amenity. The document advises that the development plan policies should be design to ensure, as far as is practicable, that noise-sensitive developments, such as hospitals, schools and housing, that need to be located close to an existing source of transportation noise are designed in such a way as to limit levels within and around those developments.

3.1.4 The PPW refers to Technical Advice Note 11: Noise, 1997.

TECHNICAL ADVICE NOTE (WALES) 11: NOISE (1997)

3.1.5 TAN 11: Noise (1997) provides guidance on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development.

3.1.6 It provides advice on the consideration of noise during the development plan and control (management) processes as well as noise exposure categories for different types of activity which should be taken into account during the consideration of proposals for residential development. It outlines some of the main considerations which local planning authorities should take into account when drafting development plan policies and determining planning applications for developments which will either generate noise or be exposed to existing noise sources.

3.1.7 TAN 11 introduces the Noise Exposure Categories (NECs) to assist local planning authorities their consideration of planning applications for residential development near transport sources.

Table 1 - Description of the TAN 11 Noise Exposure Categories

NEC	Summary
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.

C	Planning permission should not normally be granted. Where it is considered that permission should be granted, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 2 - Recommended Noise Exposure Categories for New Dwellings ($L_{Aeq,T}$ dB)

Time Range	Noise Exposure Category – Road Traffic			
	A	B	C	D
0700 – 2300	<55	55-63	63-72	>72
2300 – 0700	<45	45-57	57-66	>66

3.1.8 The note advises on mitigation measures to control the source of, or limit exposure to, noise which may include:

- → Engineering: protection of noise-sensitive buildings by improving the sound insulation of these buildings or implementing screening (i.e. noise barriers);
- → Layout: adequate distance between noise source and noise-sensitive buildings, screening by natural barriers, arrangement of sensitive rooms away from the main source of noise;
- → Administrative: limiting operation time of the noise source, introducing noise limits.

3.1.9 The note recommends early consultation with the applicant about the implementation of any of the above measures so these can be incorporated into the design. Alternatively, the note states that the local planning authority may impose planning conditions to ensure that measures used as protection against noise are implemented.

3.2 LOCAL POLICY

MONMOUTHSHIRE LOCAL DEVELOPMENT PLAN, 2014

3.2.1 The Monmouthshire County Council Local development Plan (LDP) 2011 – 2021 was adopted in February 2014. The LDP has a fundamental role in delivering sustainable development.

3.2.2 Policy EP1 aims to prevent incompatible land uses and development being located in proximity to existing sources of pollution. In this respect, an extract of the policy reads:

"Development proposals that would cause or result in an unacceptable risk / harm to local amenity, health, the character / quality of the countryside or interest of nature conservation, landscape or built heritage importance due to the following will not be permitted, unless it can be demonstrated that measures can be taken to overcome significant risks:

- *Air pollution;*
- *Light pollution;*
- *Noise pollution;*
- *Water pollution;*
- *Contamination;*

- *Land instability;*
- *Or any identified risk to public health or safety"*

3.2.3 The LDP informs about Rockfield Farm site in Policy SAH5 as follows:

"11 hectares at the Rockfield Farm, Undy, site are allocated for a mixed residential and employment development. Planning permission will be granted provided that:

a) Around 270 new dwellings are provided during the LDP period;

b) A Section 106 Agreement has been signed that, in addition to standard requirements, include the provision with the site for 2 hectares of serviced land for industrial and business development (Class B1 of the Town and Country Planning(Use Classes Order);

c) The masterplan for the development takes account of the SINC at the site;

d) A Section 106 Agreement has been signed that, in addition to standard requirements, includes provision for any necessary off-site highway improvements to the highway network through Magor/Undy;

e) A Section 106 Agreement has been signed that, in addition to the standard requirements, includes provision for making an enhanced financial contribution to community facilities in the Magor/Undy area;

f) It is ensured that safeguarding routes for a potential Magor/Undy by-pass and for a potential M4 Relief Road are not prejudiced by the development.

3.3 GUIDANCE

BS7445, 2003

3.3.1 BS 7445:2003 'Description and Measurement of Environmental Noise' defines and prescribes best practice during recording and reporting of environmental noise. It advises that the information to be reported should include measurement technique (including type of instrumentation, measurement procedure and position of measurements), prevailing conditions during the measurements and any relevant qualitative data such as the nature of the sound source.

BS8233, 2014

3.3.2 BS8233 'Sound insulation and noise reduction from buildings – Code of practice' gives recommendations for the control of noise in and around buildings, identifying appropriate criteria and limits for different situations. These criteria are intended to assist in the design of new or refurbished buildings.

3.3.3 The standard advises on the design criteria and limits for intrusive external noise. Table 3 presents the criteria for external noise considering anonymous noise, such as road traffic.

Table 3 - Indoor Ambient Noise Level Design Criteria

Typical Situation	Design Range $L_{Aeq,T}$ dB	
	Daytime – 16h	Night-time – 8h
Living Rooms	35	-
Bedrooms	35	30

BS4142, 2014

3.3.4 BS41412:2014 'Method for rating and assessing industrial and commercial sound' advises with regards to:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and uploading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

3.3.5 The method set out in BS 4142 compares a rating of the noise from the specific source being assessed with the background sound climate existing at relevant noise-sensitive receptors (NSRs) in the absence of the source operation. The difference in levels established is taken as an indication of the magnitude of the noise impact, subject to contextual considerations:

a. "*Typically, the greater this difference, the greater the magnitude of the impact.*

a. *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*

b. *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

c. *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

CALCULATION OF ROAD TRAFFIC NOISE (CRTN)

3.3.6 The CRTN memorandum describes the methodology to calculate the road traffic noise at a given distance from the highway.

3.3.7 The methodology takes into account the intervening ground cover, road configuration and road layout. The calculation assumes typical traffic (i.e. free flowing) and noise propagation conditions. Noise levels are presented in terms of the noise descriptor $L_{10,18h}$ which is the noise level exceeded for just 10% of the time between 06:00 and 24:00 hours. The variables used in the calculation of the traffic noise level are:

- The annual average weekday traffic flow (AAWT) for the 18-hour period from 06:00 to 24:00 hours;
- Mean traffic speed;
- Percentage heavy vehicles;
- Road gradient;
- Type of road surface;
- Distance of the receptor from the road; and
- Nature of the ground cover between the road and the receptor

METHOD FOR CONVERTING THE UK ROAD TRAFFIC NOISE INDEX $L_{A10,18H}$ TO THE EU NOISE INDICES FOR ROAD NOISE MAPPING, 2002

3.3.8 The national method for predicting road traffic noise is described in CRTN. The TRL report provides a method to convert the UK road traffic noise indicator to those utilised in the strategic noise maps (EU noise indices).

3.3.9 The conversion from $L_{A10,18h}$ to L_n ($L_{Aeq,8h}$) and $L_{Aeq,16h}$ have been used in the assessment presented in this report to assist with the TAN 11 assessment.

4 METHODOLOGY

4.1.1 The methodology for this addendum is consistent with the noise assessment report July 2016. The changes to inputs are outlined below.

4.2 NOISE MODEL

4.2.1 The proposed layout as presented in the 'Rockfield Farm Site, Undy; Masterplan' dated July 2016 has been used to inform the model in regards to the location of buildings and roads on the site (see Figure 2 for extracted image).

Figure 2 – Indicative Proposed Layout

4.2.2 Furthermore, the proposed land uses have been considered as illustrated in Figure3, also extracted from the Masterplan report. It can be seen from the figure that residential areas are proposed on parcels A, B, C2 and D.

Figure 3 – Indicative Proposed Land Uses

4.2.3 The existing CadnaA noise model has been updated to include updated traffic flow for the M4 and M4 CAN scenarios. Traffic data in AAWT format was prepared by the WSP | Parsons Brinckerhoff Transport team was included in order to model the following scenarios:

- → Design Year 2026 – with Rockfield Farm Development, without M4 CAN;
- → Design Year 2026 – with Rockfield Farm Development, with M4 CAN;

4.2.4 Appendix B presents a note describing the methodology used to prepare the traffic data informing this addendum. It should be noted that the traffic data includes the trips associated with Vinegar Hill development.

4.3 CONSULTATION WITH MONMOUTHSHIRE COUNTY COUNCIL

4.3.1 A further telephone consultation was held with the Environmental Health Officer (EHO) at MCC in December 2016 to discuss the preliminary noise model results and the likely requirement for noise mitigation.

4.3.2 It was agreed that positioning of residential areas in NEC C would be in principle acceptable provided that appropriate façade noise mitigation is devised at the design stage to ensure that internal noise levels comply with recommendations in BS8233. In addition, the EHO advised that the noise climate in private garden areas should not exceed a noise level equivalent to NEC B.

5 FINDINGS

5.1 SUITABILITY OF THE SITE FOR RESIDENTIAL DEVELOPMENT

5.1.1 The noise model predictions have been used to determine the suitability of the site for residential development in accordance with TAN 11. Noise contours showing the results of the noise modelling are shown in Figures 4 to 7. The noise intervals in each of the figures correspond to the Noise Exposure Categories (NEC) (see Table 2) for the daytime and night-time periods. Noise grids have been calculated at a height of 4m above ground.

5.1.2 Figures 4 and 5, without M4CAN scenario, show that the majority of the proposed residential areas would be subject to noise levels equivalent to NEC B. Figures 6 and 7, with M4 CAN scenario, show that the majority of the residential areas proposed in the southern part of the site (parcels A and B) would be subject to noise levels equivalent to NEC B. Some dwellings proposed in parcel A and B, the majority of dwellings in Parcel D and all those proposed in parcel C2 would be exposed to NEC C.

5.1.3 In response to the aspiration set by the EHO at MCC, noise mitigation will be required to ensure that daytime noise levels on private gardens proposed at the northern parcel C2 do not exceed NEC B. Mitigation options that could be considered include:

- Noise barrier at the northern site boundary, 6m in height and approximately 100m long;
- Re-orientation of buildings at this parcel such that private gardens are screened by the same dwellings. It is further recommended that the internal layout of each dwelling is designed to avoid habitable rooms overlooking the M4.

5.1.4 The first mitigation option has been modelled at a ground floor level to illustrate the potential performance in parcel 2. Results of this exercise are presented in Figures 8 and 9, with and without M4CAN scenarios, respectively. It can be seen from the figures that outdoor areas in Parcel C2 would not exceed NEC B. Investigation of the second option should be undertaken at a detailed design stage, if necessary.

5.1.5 It is expected that in addition to the mitigation options studied above, suitable façade mitigation will be developed at a detailed design stage to ensure that the internal noise levels recommended in BS8233 are met. Glazing units and alternative means of ventilation and cooling with the appropriate acoustic properties should be used.

5.1.6 As an indication, for proposed houses lying on NEC C then it is likely that a glazing unit with a minimum Weighted Sound Reduction Index R_w 33 - 36 dB will be required. For the remainder of the proposed houses subject to NEC B, it is likely that glazing units with a minimum Weighted Sound Reduction Index R_w 30 dB will be required. Calculations should be made at a design stage to verify the requirements.

6 CONCLUSIONS

6.1.1 An addendum to the noise assessment has been undertaken to support the planning application for a mixed development at Rockfield Farm, Undy.

6.1.2 The existing noise model has been used to ascertain the suitability of the site for residential development in accordance with TAN 11. The assessment included updated traffic data for scenarios with and without the M4 CAN proposals.

6.1.3 The study shows that the site would fall into Noise Exposure Category B and C. Mitigation options have been discussed in order to ensure compliance with MCC's aspiration on noise levels at private garden areas.

Appendix A

GLOSSARY OF ACOUSTICS TERMINOLOGY

Glossary of Acoustics Terminology

Glossary of Acoustics Terminology

Decibel (dB)	The decibel scale is used in relation to sound because it is a logarithmic rather than a linear scale. The decibel scale compares the level of a sound relative to another. The human ear can detect a wide range of sound pressures, typically between $2x10^{-5}$ and 200 Pa, so the logarithmic scale is used to quantify these levels using a more manageable range of values.
Sound Pressure Level (SPL)	The Sound Pressure Level has units of decibels, and compares the level of a sound to the smallest sound pressure generally perceptible by the human ear, or the reference pressure. It is defined as follows: $SPL\ (dB) = 20\ Log_{10}(P/P_{ref})$ where P = Sound Pressure (in Pa) P_{ref} = Reference Pressure $2x10^{-5}$ Pa An SPL of 0dB suggests the Sound Pressure is equal to the reference pressure. This is known as the *threshold of hearing*. An SPL of 140dB represents the *threshold of pain*.
A-Weighting	The human ear can detect a wide range of frequencies, from 20Hz to 20kHz, but it is more sensitive to some frequencies than others. Generally, the ear is most sensitive to frequencies in the range 1 to 4 kHz. The A-weighting is a filter that can be applied to measured results at varying frequencies, to mimic the frequency response of the human ear, and therefore better represent the likely perceived loudness of the sound. SPL readings with the A-weighting applied are represented in dB(A).
L_{10} or L_{A10} and other percentile measures	This represents the SPL which is exceeded 10% of the time, expressed in dB or dB(A). L_{A10} is used to quantify road noise levels. Other percentiles exist and are used for various types of noise assessment. These include L_{01}, L_{50}, L_{90}, L_{99}.
Noise	A noise can be described as an unwanted sound. Noise can cause nuisance.
Noise Sensitive Receptors (NSR's)	Any identified receptor likely to be affected by noise. These are generally human receptors, which may include residential dwellings, work places, schools, hospitals, and recreational spaces.

Appendix B

TRAFFIC DATA NOTE

Project Title	Rockfield Farm Strategic Development Sites	
Project Number	70018501	
Title of Technical Note	Revised M4CaN Traffic Flows	
Client	Monmouthshire County Council	
Version	1	
Date of Issue	04/11/2016	
Quality Management	Author:	Alison Simpson
	Checker:	Stephen Hayward
	Approver:	Rob Jones

1 INTRODUCTION

WSP | Parsons Brinckerhoff (WSP | PB) were commissioned by Monmouthshire County Council (MCC) in March 2016 to undertake transport, noise, and air quality assessments for the Rockfield Farm site, Magor/Undy. These assessments were to inform an Outline Planning Application and to address scenarios both with and without the proposed M4 Corridor around Newport (M4CaN) based on the Welsh Government's Preferred Route.

The Rockfield Farm proposed development is located on site SAH5 within the Adopted Monmouthshire Local Development Plan (LDP) 2011 - 2021. Rockfield Farm (SAH5) comprises a Strategic Mixed Use Site of predominantly housing development with part employment use (Class B1 of TACP (Use Classes) Order).

The development proposals outlined in the application comprise the following;

- 265 new dwellings
- 5,575m^2 employment (B1) land-use
- A new access from the B4245 near Rockfield Grove

The proposals for the site have been revised following allocation in the LDP, as the allocation for the site is for 270 houses together with approximately 5 acres of employment land. The Transport Assessment (TA) undertaken in July 2016 assessed the potential for up to 345 housing units as well as 5,575m^2 B1 employment uses. As such, the assessment was considered robust.

The TA and the noise assessment undertook an indicative sensitivity test of the impact of the M4CaN in the 2026 Design Year with the Rockfield Farm and all committed developments, based on the Welsh Government's Preferred Route (TR111). To inform these assessments, base traffic flows were extracted from Traffic Data Wales for the M4 and M48, as well as the Welsh Government's 2012 Traffic Forecasting Report (TFR) ('New M4 Project, Magor to Castleton', prepared by Arup).

The TA concluded that "with the M4 improvements, queues and delays reduce in all junctions" that were assessed, with "a reduction in traffic along the B4245".

Following the assessments, additional traffic data has been ascertained from the Welsh Government's TFR (March 2016) and TFR Supplement (September 2016). These reports show fewer vehicles using the M4 in the future year scenarios than were tested in WSP | PB's initial assessments. These documents have been used to undertake a revised noise assessment with the M4CaN to determine if mitigation measures are required.

2 METHODOLOGY

M4CAN TRAFFIC

The methodology to extract the relevant traffic flows used in the revised noise assessment from the 2016 TFRs is as follows:

- Forecast AADT flows were extracted for the 2022 and 2037 Do Minimum (DM) (without M4CaN) Core Scenario from Figures 9.6 and 9.10 in the March 2016 TFR. The revised Do Something (DS) (with M4CaN) Core Scenario forecast AADT flows for 2022 and 2037 were extracted from Figures 3.4 and 3.8 in the September 2016 TFR Supplement.

- Both scenarios in the TFR use NTEM traffic growth factors, which take account of specific development sites in Monmouthshire, including Rockfield Farm and Vinegar Hill and other committed developments.

- The figures in these reports provided traffic flows on several links in the vicinity of the development site, including on the existing M4, on the new motorway, and on the M48. They did not; however, provide flows on any of the slip roads adjacent the site.

- For both DM and DS scenarios, the AADT flows for 2022 and 2037 were used to calculate the AADT flows for WSP | PB's 2026 Design Year, which assumed a linear growth from 2022 to 2037.

- The 18hour AAWT required for the noise assessment used the conversion factors supplied in the March 2016 TFR, which the WG used to carry out their environmental assessments (see 3.10 Annualisation Factors).

- The 8hour night period flows required for the noise assessment used conversion factors for the individual links calculated using the base Traffic Wales data.

- The TFRs do not include HGV % information for the links so the HGV % were calculated using the base Traffic Wales data, and kept constant for all scenarios.

The resulting traffic figures used in the noise assessment can be found in Drawing Numbers N7 (DM) and N8 (DS).

DEVELOPMENT TRAFFIC

It is necessary to consider the traffic generated by the Rockfield Farm and Vinegar Hill developments within the noise assessment. In order to refine the assessment, assumptions have been made to determine the distribution of flow on the internal links through the site. Using the latest draft masterplan (WYG, July 2016), the traffic flows have been considered on the three links illustrated on Figure 1.

It has been assumed that 100% of the Rockfield Farm development to include 265 dwellings and 5,575m2 of B1 office use will use the link shown in yellow. It has been assumed that the link shown in red will be used by approximately 66 dwellings, and the B1 office use. The blue link will be used by the B1 office use only. Each of these links have also been tested with the additional traffic generated by the Vinegar Hill development of 225 dwellings adjacent.

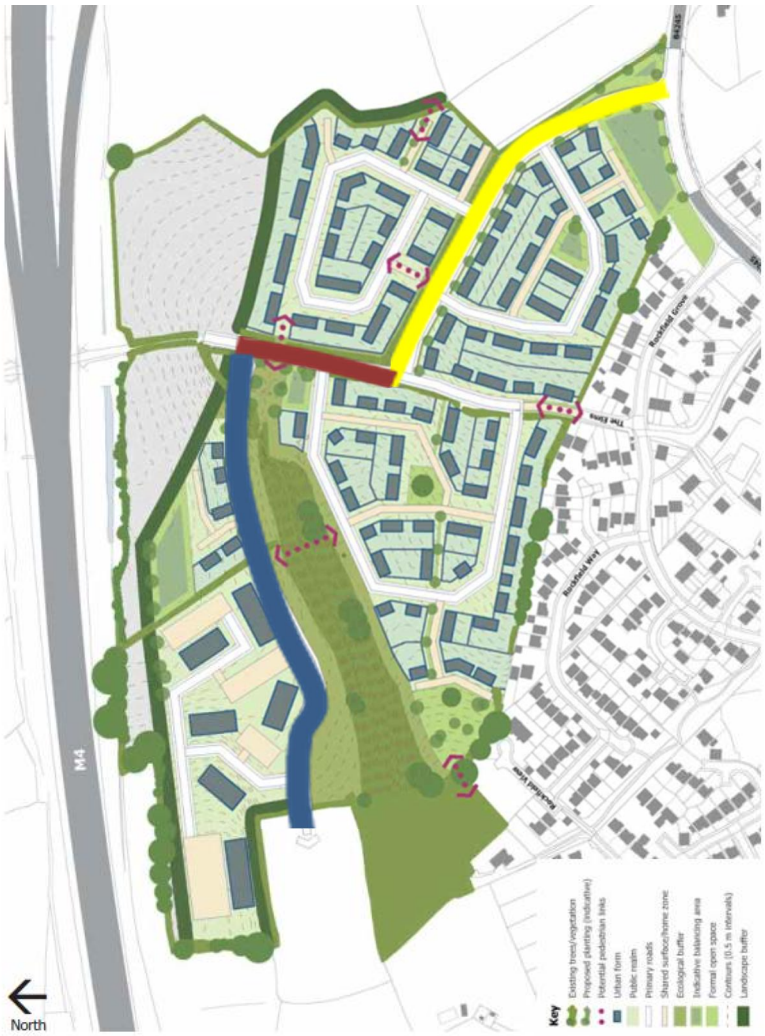


Figure 16 Indicative master plan 1 (not to scale)

Figure 1: Links through development

Trip rates were obtained from the Trip Rate Information Computer System (TRICS) database to calculate two-way trips rates for residential and employment uses for the twelve hours between 07:00 and 19:00. The ATC undertaken on the B4245 in March 2016 was used to convert the 12hour flows to the 18hour AAWT and 8hour night flows for each of the development links. The resulting slows are shown in Table 1.

Table 1: Traffic flow on development links

	TWO-WAY TRAFFIC FLOWS	ROCKFIELD FARM	ROCKFIELD FARM + VINEGAR HILL
12 hr	Yellow Link	1,615	2,604
	Red Link	735	1,725
	Blue Link	444	1,434
18 hr	Yellow Link	1,924	3,104
	Red Link	876	2,055
	Blue Link	530	1,709
8 hr	Yellow Link	123	198
	Red Link	56	131
	Blue Link	34	109

Appendix C

FIGURES

Date Modified: 03/01/2016

Drawn By: Ben Saunders

Knollbury

M48

M4

23

Elms Hill

Key

- Boundary
- Buildings

$L_{Aeq,16hr}$ (dB)

- NEC A — NEC A
- NEC B — NEC B
- NEC C — NEC C
- NEC D — NEC D

0 0.025 0.05 0.1 0.15 0.2 Kilometres

WSP | PARSONS BRINCKERHOFF

TITLE:

Rockfield Farm Development

FIGURE 4:

TAN11 NECs
2026 Day without CAN
Grid height: 4m

Date Modified: 03/01/2016

Drawn By: Ben Saunders

Knollbury

M48

M4

23

Elms Hill

Key

- Boundary
- Buildings

$L_{Aeq,8hr}$ (dB)

- NEC A — NEC A
- NEC B — NEC B
- NEC C — NEC C
- NEC D — NEC D

0 0.025 0.05 0.1 0.15 0.2 Kilometres

WSP | PARSONS BRINCKERHOFF

TITLE:

Rockfield Farm Development

FIGURE 5:

TAN11 NECs
2026 Night without CAN
Grid height: 4m

Date Modified: 03/01/2016

Drawn By: Ben Saunders

Key

- Boundary
- Buildings

$L_{Aeq,16hr}$ (dB)

- NEC A — NEC A
- NEC B — NEC B
- NEC C — NEC C
- NEC D — NEC D

Knollbury

M48

M4

23

Elms Hill

0 0.025 0.05 0.1 0.15 0.2 Kilometres

WSP | PARSONS BRINCKERHOFF

TITLE:

Rockfield Farm Development

FIGURE 6:

TAN11 NECs
2026 Day with CAN
Grid height: 4m

Date Modified: 03/01/2016

Drawn By: Ben Saunders

Knollbury

M48

M4

23

Key

Boundary

Buildings

$L_{Aeq,8hr}$ (dB)

NEC A — NEC A

NEC B — NEC B

NEC C — NEC C

NEC D — NEC D

0 0.025 0.05 0.1 0.15 0.2 Kilometres

WSP | PARSONS BRINCKERHOFF

TITLE:

Rockfield Farm Development

FIGURE 7:

TAN11 NECs
2026 Night with CAN
Grid height: 4m

Date Modified: 03/01/2016

Drawn By: Ben Saunders

Key

- Barrier
- Boundary
- Buildings

$L_{Aeq,16hr}$ (dB)

- NEC A — NEC A
- NEC B — NEC B
- NEC C — NEC C
- NEC D — NEC D

Knollbury

M48

M4

23

Elms Hill

0 0.025 0.05 0.1 0.15 0.2 Kilometres

WSP | PARSONS BRINCKERHOFF

TITLE:

Rockfield Farm Development

FIGURE 8:

TAN11 NECs
2026 Day with Mitigation and CAN
Grid height: 1.5m

Date Modified: 03/01/2016

Drawn By: Ben Saunders

Knollbury

M48

M4

23

Key

- Barrier
- Boundary
- Buildings

$L_{Aeq,16hr}$ (dB)

- NEC A — NEC A
- NEC B — NEC B
- NEC C — NEC C
- NEC D — NEC D

0 0.025 0.05 0.1 0.15 0.2 Kilometres

WSP | PARSONS BRINCKERHOFF

TITLE:

Rockfield Farm Development

FIGURE 9:

TAN11 NECs
2026 Day with Mitigation
and without CAN
Grid height: 1.5m