South Wales Trunk Road Agent

Managing and Improving Motorways and Trunk Roads through South Wales

Asiant Cefnffyrdd De Cymru

Rheoli a Gwella'r Traffyrdd a'r Cefnffyrdd yn Ne Cymru

Noise Action Priority Areas - Noise Mitigation Optimisation

June 2015

Neath Port Talbot County Borough • Bwrdeistref Sirol Castell-nedd Port Talbot

Yn gweithio ar ran Llywodraeth Cymru
Working on behalf of the Welsh Government

Noise Action Priority Areas - Noise Mitigation Optimisation

June 2015

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1 Introduction

1.1 Context

WSP | Parsons Brinckerhoff (PB) was instructed by the South Wales Trunk Road Agent (SWTRA) to undertake noise assessments of Noise Action Plan Priority Areas (NAPPA) in the South of Wales. This scope of work is part of the Noise Action Plan (NAP) delivery under the Environmental Noise (Wales) Directive (END).

PB supported SWTRA in developing a tool to prioritise NAPPA which could be considered for further mitigation actions[1].

The purpose of the study is to optimise the noise mitigation options available on sites selected as part of the prioritisation process. The assessment presents the technical evidence to undertake a cost/benefit analysis and cross-policy impacts or benefits.

A glossary of acoustic terminology is presented in Appendix A.

1.2 Noise Action Plan Priority Areas

SWTRA provided details of 16 Priority 1 NAPPA sites, located within the SWTRA area, for assessment. Table 1 presents a list of these sites. Appendix B contains the site audit sheets which include location plans for each site.

Table 1: Noise Action Plan Priority Areas

Site ID	Description
303	A4232 Culverhouse Cross
304	A4232 South of Nant y Glaswg
349	A465 Aberdulais (Llangatwg)
352	A465 Resolven
357	A465 Blaengwrach
425	A465 near Clyne & B4242
426	A465 near Clyne & B4242
427	A4232 Heol St Y Nyll
428	A4232 St Bridges Road
429	A40 Dobsons Farm
430	A40 near Ty'r-pwll
431	A40 near Llangattoc Lodge
432	A40 Llangattock
433	A40 & New House Farm
434	A40 Bryngwyn
435	A40 Clytha (Raglan Roundabout)

[1] Noise Action Plans – Prioritisation Tool, February 2014, Parsons Brinckerhoff

2 Policy and Guidance

2.1 Environmental Noise Directive (END)

Directive 2002/49/EC of the European Parliament and of the Council relates to the assessment and management of environmental noise, and it is normally referred as the Environmental Noise Directive.

END promotes the implementation of three steps:

- Undertake strategic noise mapping to determine exposure to environmental noise;
- Ensure information on environmental noise is made available to the public;
- Establish Action Plans based on the strategic noise mapping results, aiming to prevent and reduce the environmental noise where necessary, and to preserve environmental noise quality where it is considered good.

As per the first bullet point, the END requires Member States to produce strategic mapping for the main sources of noise and agglomerations with a population of more than 250,000 persons, for the first round. For subsequent rounds of mapping, the requirement for the agglomeration was set to a population exceeding 100,000 persons.

2.2 The Environmental Noise (Wales) Regulations 2006

Similar to those applicable to England, these Regulations transposed the obligations of END into Welsh law. It requires that the National Assembly for Wales (the Assembly) has to identify the noise sources for which mapping should be prepared.

On items relevant to this report, Regulation 13 requires that quiet areas should be identified in the agglomerations. Action plans must be developed in two rounds (2008 and 2013) based upon the strategic noise mapping undertaken in these two rounds.

Regulation 14 requires the Assembly to publish guidance on how the priorities in action plans should be identified. Regulation 15 sets the requirements for the plans.

Regulation 17 requires the Assembly to develop NAPs for places near to major roads, railways and agglomerations. These should be reviewed every five years or sooner if major developments occur.

Regulations 20 elaborates on the public participation required during the preparation of the NAPs. Regulation 21 requires Public Authorities to give the NAPs the character of policy. However, it gives the flexibility to depart from these policies in specified circumstances.

Regulation 22 requires competent authorities in Wales to cooperate with their counterparts in England, Scotland and Northern Ireland, as necessary, to meet the obligations under the Regulations or END. Regulations 23 and 24 describe the mechanism by which the Assembly adopts the maps and NAPs.

2.3 Calculation of Road Traffic Noise (CRTN), 1988

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

The methodology takes into account the intervening ground cover, road configuration and road layout. The calculation assumes typical traffic 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 main variables used in the calculation of the traffic noise level are:

- annual average week day traffic flow (AAWT) for the 18-hour period from 06:00 to 24:00 hours;
- mean traffic speed;
- road gradient;
- heavy vehicle percentage;
- screening effect;
- type of road surface;
- distance of the receptor from the road; and
- nature of the ground cover between the road and the receptor.

2.4 DMRB, Volume 11, Section 3, 2011

Design Manual for Roads and Bridges Part 7, Noise and Vibration (HD 213/11) advises on the appropriate level of noise and vibration assessment for road schemes.

The procedure to assess impact uses three levels: a) scoping, b) simple and c) detailed. Selecting the appropriate level of assessment depends on the following threshold criteria:

- Permanent change in magnitude of 1 dB(A) in the short term (i.e. on opening);
- Permanent change in magnitude of 3 dB(A) in the long term (i.e. between opening and future assessment years);
- The predicted noise level during night-time $L_{night,outside}$ is greater than 55dB in any scenario. The night-time noise level was calculated in line with the methodology prepared by TRL.

A simple assessment is undertaken when the threshold values above are not expected to be exceeded. A detailed assessment will be appropriate when thresholds are expected to be exceeded at the assessed receptors.

The assessment is based upon the criteria for short-term and long-term noise impacts outlined in Tables 2 and 3 below.

Table 2: Magnitude of Operational Noise Impacts in the Short Term

Noise Change, $L_{A10,18h}$	Magnitude of Impact
0	No Change
0.1 - 0.9	Negligible
1 - 2.9	Minor
3 - 4.9	Moderate
5+	Major

Table 3: Magnitude of Operational Noise Impacts in the Long Term

Noise Change, $L_{A10,18h}$	Magnitude of Impact
0	No Change
0.1 - 2.9	Negligible
3 - 4.9	Minor
5 – 9.9	Moderate
10+	Major

Based on the tables above, a change in road traffic of 1 dB(A) in the short-term, when the project is opened, is the smallest considered perceptible. In the long-term, a 3 dB(A) change is considered perceptible. The assessment was based in the short-term.

The guidance advises on the use of low noise road surface. It specifies that "for any situation a maximum allowable surface correction of -3.5 dB(A) can be claimed from using thin surfacing systems". On the other hand, DMRB states that where the mean traffic speed is <75 km/h, then "a -1 dB(A) surface correction should be applied to a low noise surface correction".

2.5 Welsh Transport Planning and Appraisal Guidance, 2008

The Welsh Government requires that major transport initiatives seeking government funding are appraised with this guidance. WelTAG refers to the methodology in WebTAG which provides guidance on undertaking an environmental impact appraisal as part of the transport appraisal process in England. The noise assessment involves 5 steps:

- Scoping;
- Quantification of noise impacts;
- Estimation of the change in noise annoyance;
- Monetary valuation of changes in noise impact; and
- Consideration of the distributional impacts of changes in noise.

WelTAG advises that Planners in Wales are not currently required to estimate the net present value of noise from new proposals but that they are free to do so. The quantification of noise impacts is determined using the methodology in Design Manual for Roads and Bridges 11.3.7. The noise TAG worksheet is assessed in terms of the descriptor $L_{Aeq,18h}$. Therefore, a correction of -2.5dB is applied to the façade $L_{A10,18h}$ noise levels. The estimation of changes in annoyance is determined using a response relationship for road noise. The monetary valuation of noise impacts is based on the effect of noise on house pricing. An assessment of the distributional impacts of changes in noise was not undertaken.

3 Methodology

3.1 Screening - Evaluation of Site Audit Sheets

A desktop study was undertaken to screen the sites where mitigation measures would be feasible. The sites assessed are all adjacent to concrete carriageways. Whilst a low noise surfacing inlay or overlay may prove to provide acceptable noise reduction, the existing condition of the concrete carriageways is questionable and so only a full reconstruction is deemed to provide a satisfactory long term solution. Due to the logistical challenges and costs associated with reconstructing relatively short sections of carriageway, it was considered that noise barriers would provide a simpler and less disruptive solution in the shorter term. This is discussed further in the Cost/Benefit Analysis section below. Should a programme of concrete carriageway renewal be adopted by the Welsh Government, the current NAPPA sites would further benefit from the noise reducing properties of low noise surfacing. Therefore, this study focused mainly on the feasibility of noise barriers according to the topography of the site and the line of sight from the noise sensitive receptor to the road.

During screening the screening process, sites were ruled out for a variety of reasons as noted on the site audit sheets. The reasons included:

- Where there was insufficient highway land available to accommodate a barrier, or existing structures preventing a noise barrier
- Where the road height was significantly below that of the receptor (I.e. unfeasible to break the line of sight)
- Where there were less than two properties affected in the area.

It was concluded that noise barriers on sites 303, 349, 357, 432, 434 and 435 would be potentially feasible; hence, these sites have been promoted for a quantitative assessment via noise modelling.

Appendix B presents the site audit sheets for all sites. For those sites not listed above, noise barriers are not recommended due to either the inability to break line of sight (between the road and the receiver) or the limited number of receptors (i.e. where it was prejudged that the cost benefit of a barrier to protect few receptors would achieve a very low value for money score).

The implementation of low noise surfacing could be considered as an alternative. In accordance with DMRB, the noise reduction achieved using this mitigation measure would be either 3.5 dB or 1 dB depending on the traffic flow speed. For the purposes of this report, low noise surfacing was included as part of the calculations for one of the sites. The results are discussed in context with the cost / benefit results of the noise barrier.

Mitigation at the receptor, in the form of secondary glazing, can also be considered for protection against road traffic noise. This option, however, would not provide any acoustic screening for outdoor areas (i.e. private

gardens and amenity areas). Currently, this mitigation option is implemented as part of the Land Compensation Act 1973 (LCA 1973). For new and improved highways, the LCA 1973 allows the provision of compensation at properties affected by increased road traffic noise. If certain criteria are met, the Highway Authority must offer secondary glazing and alternative ventilation for habitable rooms of dwellings affected according to the Noise Insulation Regulations 1975. It is not clear what the delivery vehicle would be for SWTRA to offer glazing as part of the END action plan delivery, or the legal implications of doing so, and a legal opinion should be sought on this matter.

3.2 Site Visit

Site visits were undertaken on 26th and 27th January 2015 at the six candidate sites listed above to ascertain the possible locations for the noise barriers. Observations from the visit were used to inform the location of the noise barrier options in the noise model.

3.3 Assessment

3.3.1 Noise Modelling Methodology

A noise model was prepared for sites 303, 349, 357, 432, 434 and 435 using software CadnaA. Calculations in the model have been undertaken using CRTN. The study area adopted was 600m from the longest barrier option, as described later in this report.

Ordnance survey and topographical data (LIDAR) was incorporated into the model. An address database was used to obtain the location and number of properties within the calculation area (see Table 4 below). Noise levels have been calculated from the façade of each sensitive building. To account for reflections, a correction of +2.5 dB was added to the results.

Table 4: Number of Noise Sensitive Receptors

Site ID	Description	Number of receptor Properties
303	A4232 Culverhouse Cross	602
349	A465 Aberdulais (Llangatwg)	1354
357	A465 Blaengwrach	713
432	A40 Llangattock	116
434	A40 Bryngwyn	54
435	A40 Clytha (Raglan Roundabout)	496

Traffic and speed surveys were undertaken at each site in March 2015 for this commission. Traffic flows for the baseline year of 2017 have been used to create a ‘without noise barrier’ scenario. The same data was also used to create nine noise barrier options for each site.

3.3.2 Noise Barrier Option

The noise barrier options have been assessed using a combination of three heights and three lengths, as shown in Tables 5 to 10. Appendix C contains plans of each site, with the extents of the three length options shown.

Physical constraints identified during the site visits which are likely to affect the buildability of noise barriers have been considered, with reference to any potential issues identified in section 4.1.4 of this report. Only constraints likely to affect the preferred barrier option at each site have been discussed.

Ecological and environmental constraints have been considered and are included in the separate screening reports for each site.

Table 5: Noise Barrier Options – Site 303

Barrier Height (m)	Barrier Length (m)	Description
3	550	303 Option 1
	1080	303 Option 2
	1500	303 Option 3
4	550	303 Option 4
	1080	303 Option 5
	1500	303 Option 6
5	550	303 Option 7
	1080	303 Option 8
	1500	303 Option 9

Table 6: Noise Barrier Options – Site 349

Barrier Height (m)	Barrier Length (m)	Description
3	156	349 Option 1
	243	349 Option 2
	402	349 Option 3
4	156	349 Option 4
	243	349 Option 5
	402	349 Option 6
5	156	349 Option 7
	243	349 Option 8
	402	349 Option 9

Table 7: Noise Barrier Options – Site 357

Barrier Height (m)	Barrier Length (m)	Description
3	220	357 Option 1
	550	357 Option 2
	920	357 Option 3
4	220	357 Option 4
	550	357 Option 5
	920	357 Option 6
5	220	357 Option 7
	550	357 Option 8
	920	357 Option 9

Table 8: Noise Barrier Options – Site 432

Barrier Height (m)	Barrier Length (m)	Description
3	250	432 Option 1
	550	432 Option 2
	1300	432 Option 3
4	250	432 Option 4
	550	432 Option 5
	1300	432 Option 6
5	250	432 Option 7
	550	432 Option 8
	1300	432 Option 9

Table 9: Noise Barrier Options – Site 434

Barrier Height (m)	Barrier Length (m)	Description
3	170	434 Option 1
	600	434 Option 2
	1500	434 Option 3
4	170	434 Option 4
	600	434 Option 5
	1500	434 Option 6
5	170	434 Option 7
	600	434 Option 8
	1500	434 Option 9

Table 10: Noise Barrier Options – Site 435

Barrier Height (m)	Barrier Length (m)	Description
3	225	435 Option 1
	470	435 Option 2
	750	435 Option 3
4	225	435 Option 4
	470	435 Option 5
	750	435 Option 6
5	225	435 Option 7
	470	435 Option 8
	750	435 Option 9

Façade noise levels have been calculated at noise sensitive receptors within 600m at both ground and first floor levels. For the purposes of this assessment, an arithmetic average was calculated between the noise levels predicted at the most exposed façade of the two floor levels, hence, a single noise level describes the property in each option. Subsequently, this single number was used to feed into the WelTAG assessment. WelTAG

A WelTAG assessment was undertaken for each of the options. The study analyses the noise monetary value due to the likely beneficial noise impact per option. It should be noted that at this stage it was assumed that implementation of the noise barriers would be in 2017. Traffic data for a future year, 15 years after opening, has not been forecast, therefore, the assessment only considers a baseline year.

The assessment assumes an average household size of 2.36 people. The WelTAG valuation is based on the study 'Valuation of Transport-Related Noise in Birmingham', prepared by Bateman, Day and Lake in 2004. They used the method to estimate 'willingness' to pay for peace and quiet in the housing market based on real market behaviour. The TAG appraisal assigns a value attributed to the impact of a 1 dB change in exposure to noise at levels from $L_{Aeq,18h}$ 45 dB to 81 dB. These values are used with a positive sign to determine a benefit of noise reductions and with a negative sign for noise increases. The proposed barrier will only result in noise reductions, so only positive 'Net Present Value of Noise Proposals' have been determined.

3.3.3 Cost/Benefit Analysis

A cost/benefit analysis was prepared to determine the dimensions of the noise barrier for each site. Outcomes of the WelTAG, specifically the 'Net Present Value of Noise Proposal', have been used to inform the analysis.

Preliminary Costs – Barriers Only

In addition, the cost of each barrier option was estimated. It should be noted that this estimate only considers the likely cost of the noise barrier without any other associated costs (i.e. site clearance, safety barriers, relocation of street furniture, etc).

For the purposes of this study, the costs per linear metre have been derived depending on whether sound absorptive or reflective barriers are recommended. A barrier with sound absorptive properties is recommended for sites where there are receptor buildings to the opposite side of the carriageway in order to avoid any acoustic reflections and hence an increase in noise levels at these properties.

The estimated costs per linear metre are as follows:

Reflective Barrier:

- 3m high - £460
- 4m high - £620
- 5m high - £950

Sites where reflective barriers would be suitable are 303, 357 and 435.

Absorptive Barrier:

- 3m high - £695
- 4m high - £924
- 5m high - £1155

Sites where absorptive barriers would be suitable are 349, 432 and 434.

The cost of the noise barrier was also benchmarked against the number of noise sensitive receptors likely to experience a reduction in noise levels. The assessment, in accordance with DMRB, divides the noise level reductions in bands between 1 – 3 dB, 3 – 5 dB and greater than 5 dB. The significance of these magnitudes is indicated in Table 2.

Full Costs – Barriers and Low Noise Surface

As a sensitivity test only, a separate costing exercise was conducted to compare the low noise surfacing (thin surface) and noise barrier options. Due to the nature of the costs associated in the various stages of low noise surfacing, full costs have been derived to allow a more realistic comparison including costs for preliminaries, maintenance works and 20 % contingency. Site 357 was used for the comparison.

Table 11 presents the full costs considered for the comparison including options 10, 11 and 12 for the low noise surfacing. It was assumed that the segment of the road that would be resurfaced in these options corresponds to the same lengths of the barriers in options 1, 2 and 3. Resurfacing at year 10

would be required; hence, costs associated with this have been also added to the low noise surface options. An assessment period of 20 years has been assumed, in line with the DMRB "HA 66/95 Environmental Barriers : Technical Requirements" requirement that environmental barriers are free of major maintenance for 20 years.

Table 11: Full Costs for Barrier and Thin Surfacing Options – Site 357

Works	Description	Cost Estimate	Year 10 TSCS Inlay Cost
3m Barrier	Option 1	£251,000	-
	Option 2	£525,000	-
	Option 3	£825,000	-
4m Barrier	Option 4	£300,000	-
	Option 5	£635,000	-
	Option 6	£1,007,000	-
5m Barrier	Option 7	£394,000	-
	Option 8	£858,000	-
	Option 9	£1,377,000	-
Full reconstruction with low noise surface	Option 10	£818,000	£83,000
	Option 11	£1,722,000	£178,000
	Option 12	£2,584,000	£278,000

The table shows that the cost of the low noise surface, including the year 10 inlay costs, is greater than the equivalent length of environmental barrier. For example over the shortest segment of road length for site 357 of 220m, the cost of low noise surface reconstruction Option 10 is £901,000 compared to the environmental barrier Options 1, 4 and 7 with costs of £251,000, £300,000 and £394,000 respectively.

4 Results

4.1.1 WelTAG

Table 12 presents a summary of the 'Net Present Value of Noise Proposal' as an indicator of the monetary valuation for each option and are calculated as described in section 3.3.3 above. It shows the monetary valuation associated with the reduction in noise levels as a result of the noise barrier attenuation. A positive value in the table means a benefit, therefore all options are shown to provide a noise reduction. The WelTAG sheets for all the options are presented in Appendix D. The values in the following table have been used in the Cost/Benefit Analysis.

Table 12: WelTAG Summary Net Value

Description	Site 303	Site 349	Site 357	Site 432	Site 434	Site 435
Option 1	£62,813	£17,600	£113,309	£49,421	£6,147	£7,234
Option 2	£100,600	£21,529	£214,807	£86,394	£16,000	£7,234
Option 3	£107,545	£41,233	£223,552	£101,483	£33,261	£8,544
Option 4	£93,544	£22,592	£139,582	£56,411	£6,147	£7,234
Option 5	£152,297	£30,671	£276,265	£99,264	£17,753	£11,828
Option 6	£174,929	£59,340	£283,577	£134,238	£44,201	£11,828
Option 7	£123,099	£29,338	£170,185	£64,711	£6,147	£7,234
Option 8	£191,147	£39,591	£358,113	£115,443	£20,150	£16,422
Option 9	£220,524	£78,931	£382,988	£151,483	£65,615	£19,263

4.1.2 Cost/Benefit Analysis

Preliminary Costs – Barriers Only

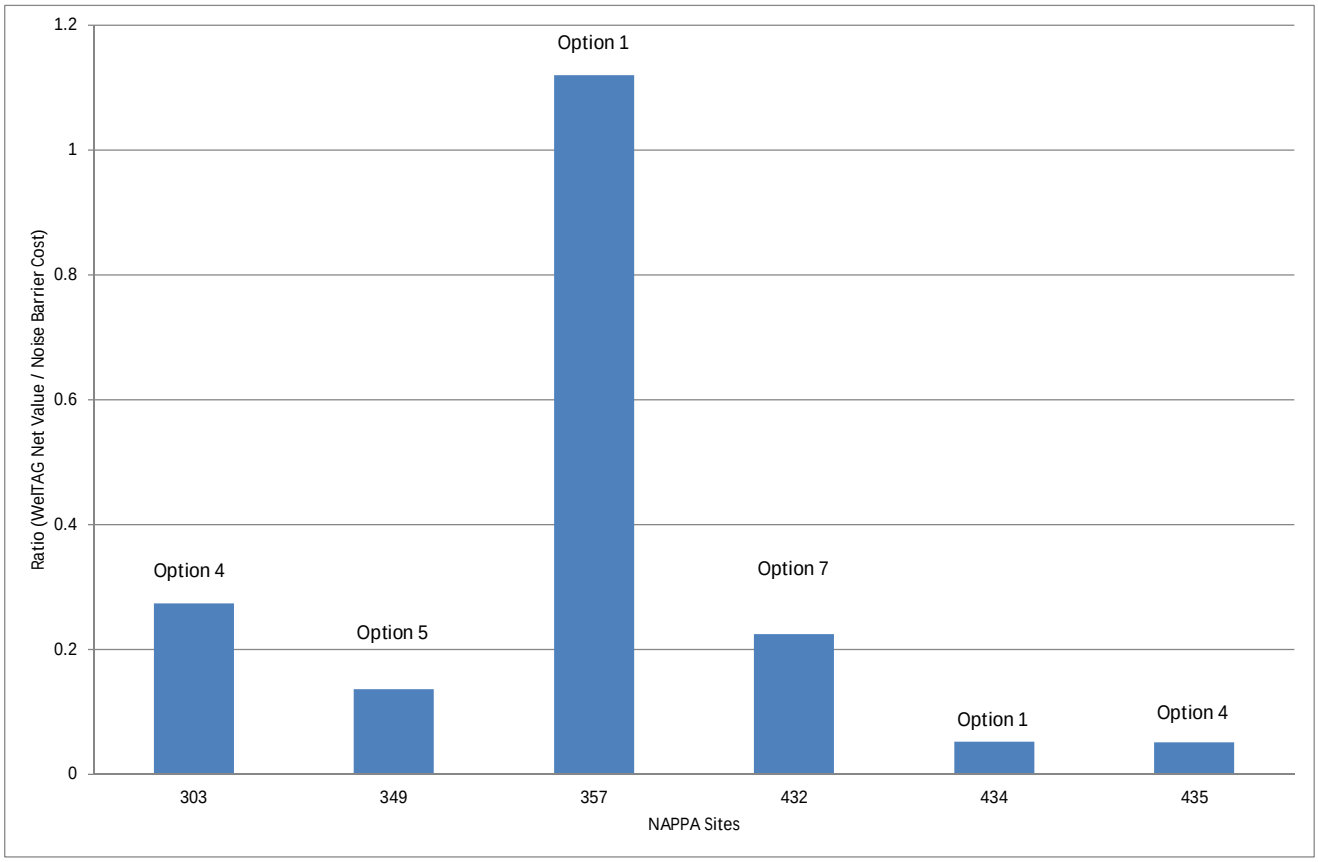
Graph 1 presents a summary of the preferred options per site, in terms of cost benefit. The ratio between the WelTAG Net Value over the cost of the noise barrier was used as a parameter to select the options shown in the graph. Whilst, there is a benefit if the barrier is either longer or higher than those selected, it is at this point where the cost/benefit is optimised. The purpose of this exercise is to assist SWTRA in making a decision, however, it should be noted that depending on the available budget, other options could be selected if deemed appropriate. The options selected in Graph 1 present the highest cost / benefit ratios in most of the sites, however, professional judgement was used in the selection process when the highest ratio was not significantly prominent in comparison to the other options.

Appendix E presents a more complete analysis per site. Graphs showing the cost benefits ratios for all options are shown. In addition, graphs showing the WelTAG Net values versus the noise barrier costs are presented, separated by barrier height. The selected options have been marked in all graphs.

The appendix also presents graphs showing the number of receptors per site that will be subject to a reduction in noise levels of either greater than 1 dB, 3 dB or 5 dB.

It should be noted that PB has selected barriers aimed at reducing the noise at the Priority Area receptors by at least 3 dB, but have included noise benefits for other receptors, who may fall outside of the priority area. This is not unusual for a barrier solution as barriers have to be very long to be effective.

Graph 1: Cost / Benefit Ratio per Site



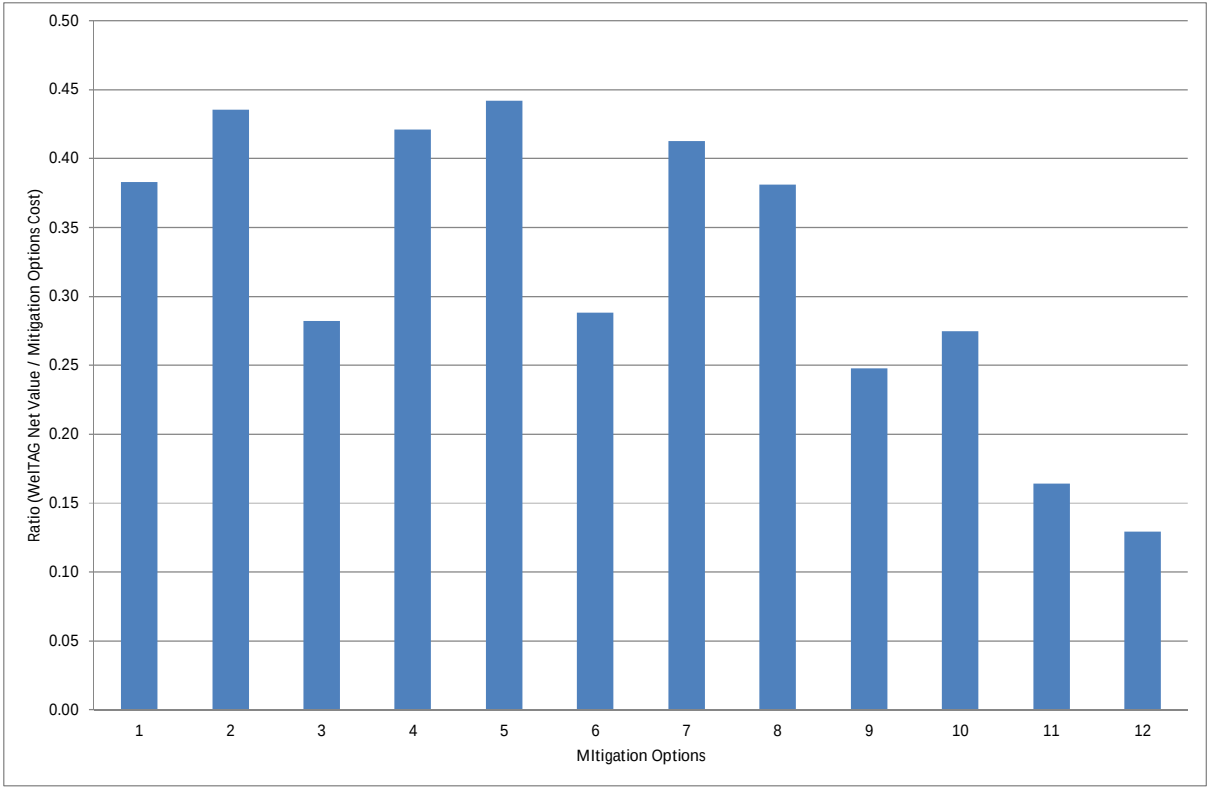
It can be seen from the graph above that most sites have ratios under 0.3, apart from Site 357. This is mainly triggered by the high WelTAG net value as a result of the barrier reducing elevated noise levels at the receptor (i.e. some above L_{Aeq} 70dB. For all other sites existing noise levels are generally lower, therefore, the WelTAG net values are not as high (see Table 11).

As noted above, the above graph sets out the most value for money option at each site, but some sites gain more benefit than others. It is therefore expected that the graph may not represent the final decisions once benchmarking has taken place, and the available budget apportioned between the sites.

Full Costs – Barriers and Low Noise Surface

To continue the sensitivity testing of the use of low noise surfacing instead of noise barriers, a separate cost benefit analysis exercise has been undertaken. Graph 2 presents a summary of the cost / benefit study for Site 357 comparing the full costs for the installation of noise barriers (options 1 – 9) against low noise surface (options 10, 11 and 12).

Graph 2: Cost / Benefit Ratio Site 357



Graph 2 demonstrates that when the full costs are considered then the low noise surface options show a lower cost / benefit ratio than those obtained as a result of the noise barrier options. It is believed that this pattern would be similar at other sites due to the added costs required to implement and maintain the thin surfacing.

4.1.3 Noise Contours

Appendix F presents the noise contours applicable for the options selected in the cost/benefit analysis for all sites.

Two noise contour figures are presented for each of the sites:

- Absolute noise levels $L_{A10,18h}$ dB at a height of 1.5m above ground; and
- Change in noise levels between 'with' and 'without' noise barrier. The change in noise level contours are presented in accordance with the noise impact magnitude for short term (see Table 2)

The figures show that the noise barrier will have a localised effect at all sites, and that the reduction in noise level will determine a minor to major significant impact, depending on the precise location of the receptors.

4.1.4 Buildability

During the initial site visits, a general assessment of each site was made in terms of locating the potential lines of acoustic barriers and any potential constraints to their buildability. The desired lengths and preferred location of acoustic barriers were not known at that time. The following briefly summarises the assessments at each site and the proposals to deal with identified site constraints. It is recommended that once a favoured option is selected and a construction date is agreed, the sites should be re-visited to confirm extents and identify any conflicts or further requirements to facilitate the installation and future maintenance of the proposed assets. The environmental barriers will need to be set out prior to construction and site clearance of significant vegetation agreed in liaison with environmental specialists.

Site 303 - A4232 Culverhouse Cross

Existing traffic sign is to be relocated such that it does not conflict with the position of the environmental barrier. At the easternmost end, the barrier has been repositioned to the back of the existing wall to avoid conflict with the wall. The barrier has been positioned on top of the existing cutting to avoid works on the slope, conflict with street furniture and minimise the number of trees to be removed under site clearance.

Due to the traffic sensitivity restrictions at this site, it is anticipated that works will be undertaken at night under a combination of nearside lane closures and temporary slip road closures. Temporary traffic orders will be required to close slip roads.

Site 349 - A465 Aberdulais (Llangatwg)

The position of the environmental barrier was adjusted to accommodate the existing lighting columns. The noise barrier is to be installed at the back of the existing lighting columns. The length of the environmental barrier was shortened at the easternmost end due to the very steep slope between the masonry wall and the A465 carriageway. The highway is on embankment leading to an underbridge over the river, with a relatively narrow verge. Structural and geotechnical assessment of the acoustic barrier design, particularly the western section, will confirm whether potential slope stability issues may adversely affect the specification of the post foundations. The location of this underbridge has resulted in a gap in the continuous the length of acoustic barrier proposed.

Lane closures are permitted at all times along the A465 between Resolven and Aberdulais. However, closures of the eastbound entry slip road will be required to safely undertake safety barrier and acoustic fencing works. Due to the narrow width of the slip road and the level differences either side, it is

recommended that the slip road is closed for the duration of the works for the safety of the road users and the construction workforce. Temporary traffic orders will be required.

Sites 357 - A465 Blaengwrach

The barrier has been positioned on top of the existing cutting to avoid works on the slope, conflict with street furniture and minimise the number of trees to be removed under site clearance.

The traffic sensitivity document does not identify any restrictions; therefore the works can be completed under lane closures at any time on the main line and the adjacent roundabout.

Site 432 - A40 Llangattock

The barrier has been positioned on top of the existing cutting to avoid works on the slope and minimise the number of trees to be removed under site clearance. The proposed line of barrier severs a public footpath, with an allowance made to provide a self-closing door within the fencing to maintain continuity to the footpath. To reduce future maintenance, consideration could be given to locally realigning the footpath around the proposed fencing. The implications on existing associated footpath/public rights of way orders should be investigated.

The traffic sensitivity document does not identify any restrictions; therefore the works can be completed under lane closures at any time.

Site 434 - A40 Bryngwyn

The barrier has been positioned on top of the existing cutting to avoid works on the slope and minimise the number of trees to be removed under site clearance.

The traffic sensitivity document does not identify any restrictions on the A40 at this location; therefore the works can be completed under lane closures at any time. It may be possible to undertake some of the fencing works from adjacent county or private roads, subject to liaison with these parties.

Site 435 - A40 Clytha (Raglan Roundabout)

The barrier has been positioned on top of the existing cutting to avoid works on the slope, conflict with street furniture and minimise the number of trees to be to be removed under site clearance. Subject to further investigation and associated permissions from the local authority, access may be gained from the adjacent Clytha Road.

In agreement with Monmouthshire County Council, single way working will be required on Clytha Road which is parallel to the A40 near Raglan Roundabout. It is not expected that traffic management will extend onto the A40. This should be confirmed when the contractor's working method is

identified. Access to private properties will need to be maintained within the length of the single way traffic management.

4.1.5 Land Ownership

During the course of this study, no investigation into land ownership has been undertaken. The proposed location of the permanent works at each of the six sites has been reviewed, and with the following exceptions, all appear to be located within the trunk road highway boundary. It should be noted that formal investigation into land ownership should be carried out prior to taking forward each scheme to construction. The environmental barriers will need to be set out prior to construction to identify any conflict with private land boundariesand ensure adequate space is allowed for access future maintenance.

Site 434 - A40 Bryngwyn

A short section of fencing proposed at the northwest of the site appears to be adjacent to the access of a private property. Should this be outside of the highway boundary, it may be possible to assess its location and relocate within trunk road land.

Site 349 - A465 Aberdulais (Llangatwg)

There does not appear to be a clear distinction between the trunk road and adjacent local authority highway boundaries at this site. Whilst the proposed location of the barrier is justified to the trunk road highway, clarification on boundaries should be sought.

4.1.6 Planned Works

A review has been undertaken to determine whether any other works are planned in the vicinity of the six sites which may provide reductions to noise levels, in lieu of the options identified in this report. For example, resurfacing with low noise surfacing.

There are no improvement plans in the near future on the A4232 near Culverhouse Cross (NAPPA site 303), although the long term aspiration is to replace the concrete carriageway. Landscape rehabilitation works are planned, subject to funding, within the next year or two, but these are unlikely to yield any benefits in terms of noise reduction.

Whist the A40 Raglan to Abergavenny road (NAPPA sites 432, 434 and 435) has previously been subject to condition assessment, there are no firm plans to replace the concrete pavement.

There are no plans for improvements or major maintenance on the A465 Heads of the Valleys Road at sites 349 and 357.

5 Conclusions

A noise assessment was undertaken to optimise the noise mitigation required at Noise Action Plan Priority Areas in South Wales. The mitigation measures have been concentrated on the implementation of noise barriers. A total of 16 sites were assessed from which 6 were considered to be suitable for noise barriers and to be taken forward for the preparation of works packages in readiness for potential construction. The potential for implementation of low noise surfacing and secondary glazing is also discussed.

A noise model was prepared to determine the likely road traffic noise level reduction at the nearest noise sensitive receptors due to the implementation of a noise barrier. A total of 9 options per site were modelled to optimise the location and dimensions of the barriers. The assessment was undertaken following guidance in the Design Manual for Roads and Bridges and the Welsh Planning Transport and Appraisal Guidance.

Preferred options were selected based on a cost / benefit analysis. The highest benefit is seen at Site 357, due to the high noise levels that the site is currently subject to at the moment. On this site, the implementation of low noise surfacing was also modelled and a cost / benefit analysis was carried out. It was concluded that the low noise surfaces provided a lower cost benefit compared to those obtained as a result of noise barriers.

Table 13: Preferred Barrier Option Summary Table

Site	Option	Description
303	4	Length 550m, Height 4m - reflective
349	5	Length 243m, Height 4m - absorptive
357	1	Length 220m, Height 3m - reflective
432	7	Length 250m, Height 5m - absorptive
434	1	Length 170m, Height 3m - absorptive
435	4	Length 225m, Height 4m - reflective

Noise contours are presented for all sites, based on the selected options. Implementation of those options will determine a beneficial noise impact (i.e. reduction in noise levels) from minor to major depending on the location of the receptor.

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Appendix A – 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 – NAPPA Site Audit Sheets

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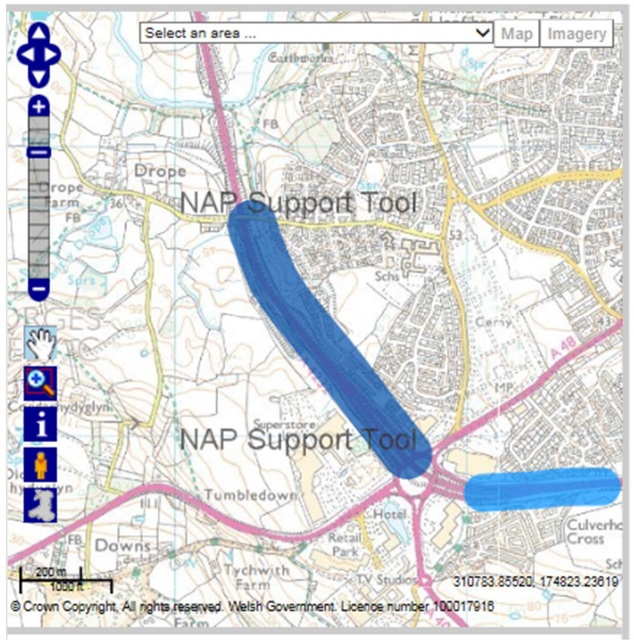
NAPPA Priority Site Audit Sheet					
Area ID	303	Area Type	Trunk Road	Area Name	A4232(T)



Priority Area Map Extract

A4232 Drope Rd – Culverhouse Cross

A4232 Culverhouse Cross – Caerau Lane

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt	✓	
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge	✓	
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture		
Safety Barriers	✓	
Lack of Width	✓	
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential	✓	
Non- Domestic Residential		
Commercial	✓	
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting	✓	
Carriageway on Embankment		
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details: - On the southbound slip road leaving the A4232 and joining the grade separated roundabout adjacent to		

Date of Assessment:
18/12/2014
Name of Assessor:
Omar Talat

Notes:

Between Drope Road and Culverhouse Cross the carriageway appears to be in concrete. Between Culverhouse Cross and Caerau Lane the carriageway surfacing appears to be HRA finish.

Acoustic barriers are mainly installed at the grade separated roundabout and slip roads.

Safety barriers and in few areas the lack of verge space could cause be an obstruction to installing acoustic fencing.

Dense vegetation exists along both sides of the road.

Acoustic Notes:

- Multiple receptors
- HRA road surface
- Potential for barriers
- Dense vegetation
- LNS obvious choice
- Full study recommended

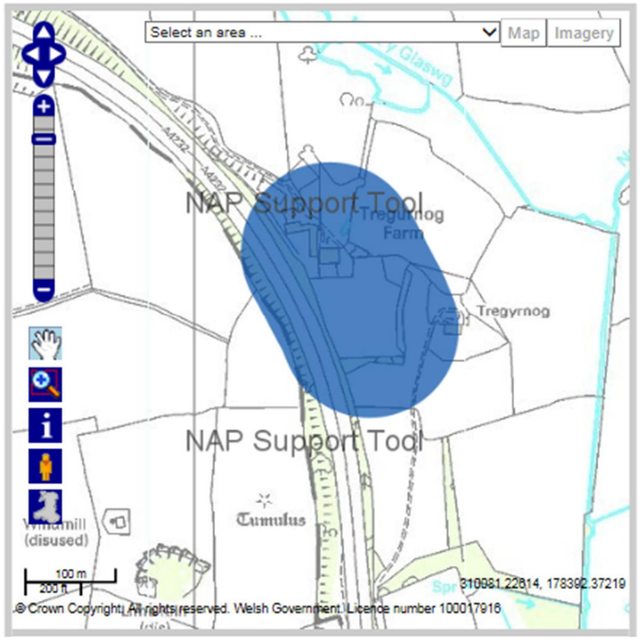
Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	303	Area Type	Trunk Road	Area Name	A4232(T)

Culverhouse Cross, a noise barrier exists on the slip road. - On the A4232 southbound approach, between the grade-separated roundabout and the southbound slip road joining the A4232, a noise barrier exists on the trunk road. - On the northbound slip road, leaving the grade separated roundabout and joining the A4232 a noise barrier exists in the slip road.	

NAPPA Priority Site Audit Sheet					
Area ID	304	Area Type	Trunk Road	Area Name	A4232(T) (South of Nant y Glaswg)



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture		
Safety Barriers	✓	
Lack of Width	✓	
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment		
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details: -		

Date of Assessment:
18/12/2014
Name of Assessor:
Omar Talat

Notes:

The carriageway appears to be in concrete on both sides of the road on the A4232.

Only few properties seem to be within the highlighted area towards the east side, which look like farm cottages. These are located approximately 20m from the A4232 carriageway.

Dense vegetation exists along both sides of the road.

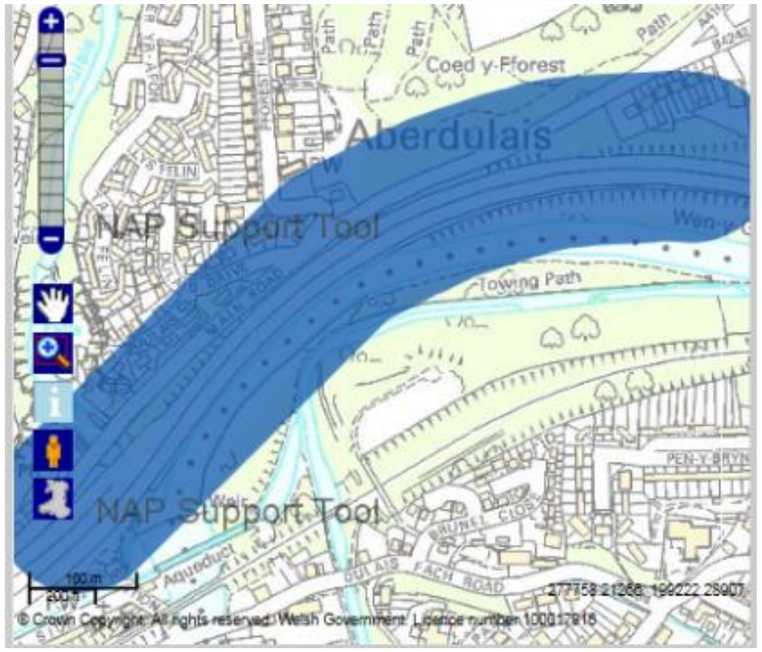
Acoustic Notes:

- 2-4 receptors
- Concrete Road
- Dense vegetation
- LNS obvious choice

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	349	Area Type	Trunk road and local authority road	Area Name	A465 & A4109



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt	✓	
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge	✓	
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Accoustic Fencing Provision		
Street Furniture		
Safety Barriers	✓	
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential		
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting	✓	
Carriageway on Embankment		
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details:		

Date of Assessment:

Name of Assessor:

Notes:

County road between A465 Trunk Road and properties to north of priority Area. County road rises up above trunk road from junction to west. Properties appear to be significantly higher than trunk road

Junction on trunk road at western end of site.

Underbridge(trunk road) located at western end of site. Surfacing on structure appears to be HRA, tying in to main concrete carriageway

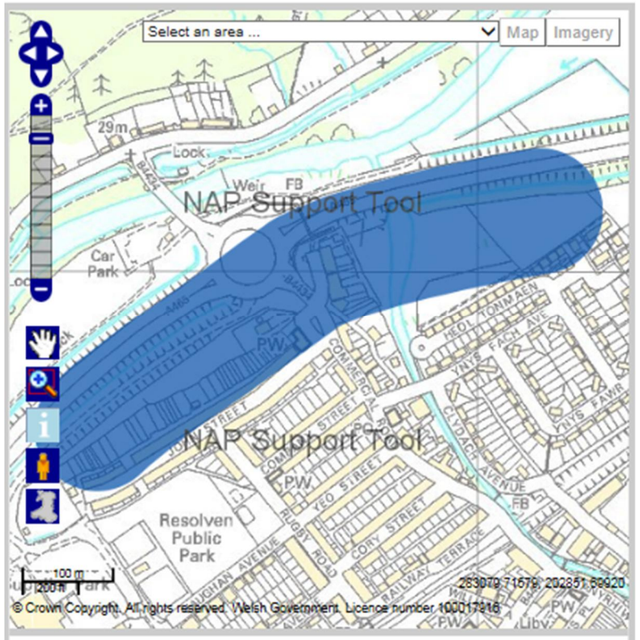
Acoustic Notes:

-HRA surface
-Multiple receptors
-Full study recommended

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	352	Area Type	Trunk Road	Area Name	A465(T)



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details): - Yellow bar markings present		
Carriageway Surfacing Condition		
Pot Holes		
Warn	✓	
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)	✓	
Overbridge	✓	
Other (give details): Pedestrian footbridge present on the westbound approach to the roundabout.		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers	✓	
Lack of Width		
Other (give details): Signs, bollards and footbridge are potential causes of obstruction.		
Affected Properties Within Priority Area		
Domestic Residential	✓	
Non- Domestic Residential		
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment	✓	
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details: -		

Date of Assessment:
18/12/2014
Name of Assessor:
Omar Talat

Notes:

This section of the A465 is concrete carriageway which would produce higher noise levels. In addition, on both approaches to the roundabout yellow bar markings are present which exacerbates the noise levels.

Noise has previously been identified as an issue. There are records of complaints due to noise at this location.

On both approaches to the roundabout, a 30mph speed limit is enforced at a close distance to the give way lines.

Properties adjacent to the westbound approach to the roundabout are closer to the trunk road than properties on the eastbound approach to the roundabout.

According to the request for information on candidate priority areas, there is a quiet road surfacing at part of this location.

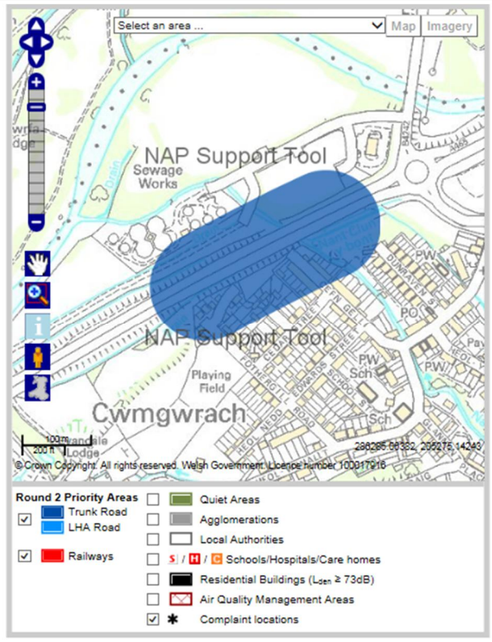
Acoustic Notes:

- Concrete Road
- Multiple receptors
- Full study recommended

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	357	Area Type	Trunk Road	Area Name	A465(T)



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details): -		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)	✓	
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers	✓	
Lack of Width		
Other (give details): Signs and underbridge are potential causes of obstruction.		
Affected Properties Within Priority Area		
Domestic Residential	✓	
Non- Domestic Residential		
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment	✓	
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details: -		

Date of Assessment:
18/12/2014
Name of Assessor:
Omar Talat

Notes:

This section of the A465 is concrete carriageway in and would produce higher noise levels.

An under bridge and signs limits the space availability on the verge. Safety barriers only at the proximity of the bridge.

Properties to the south of the A465 are affected.

To the east of the area the A465 intersects with the B4242 on a roundabout.

According to the request for information on candidate priority areas, noise barrier has been installed in 2014.

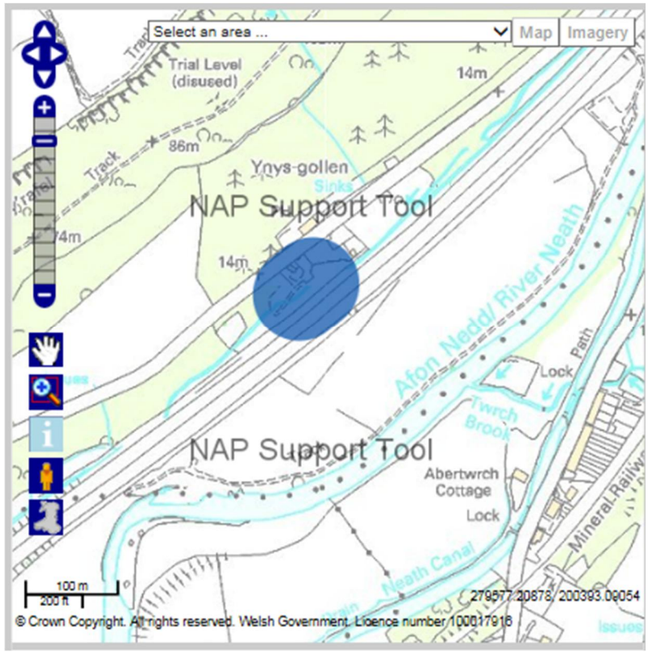
Acoustic Notes:

- Multiple receptors
- Concrete Road
- LNS and barriers possible
- Existing barrier installed 2014

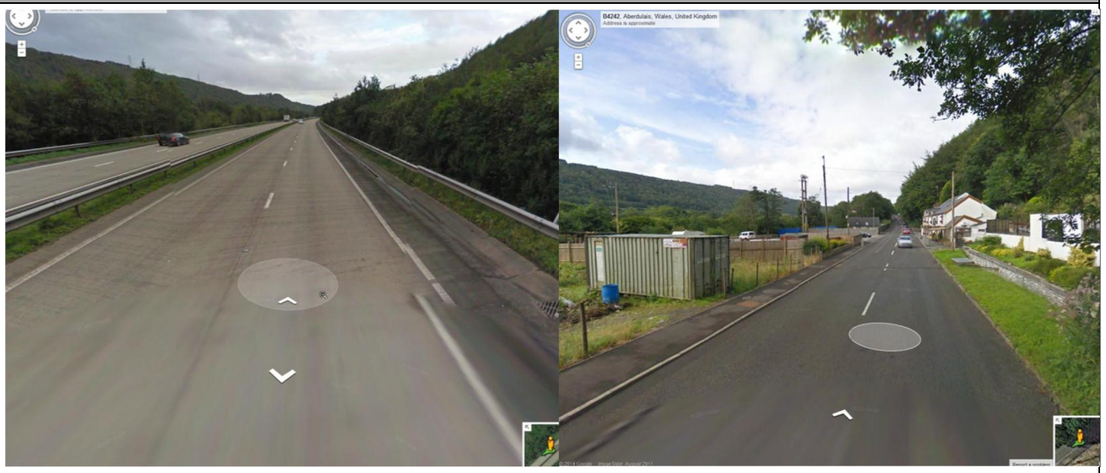
Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	425	Area Type	Trunk road and local authority road	Area Name	A465(T) near Clyne & B4242



Priority Area Map Extract



Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details): -		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture		
Safety Barriers	✓	
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment	✓	
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details: -		

Date of Assessment:
19/12/2014
Name of Assessor:
Omar Talat

Notes:

This section of the A465 is concrete carriageway and would produce higher noise levels.

The Rock & Fountain Inn is located approximately 65m to the north of the A465 on the B4242. The B4242 itself appears to be HRA surfaced, which is quieter than concrete.

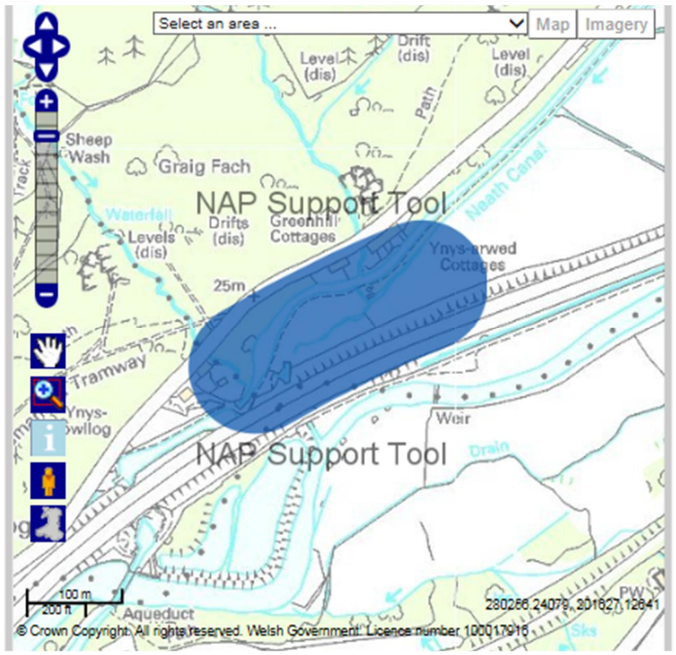
Acoustic Notes:

- Concrete Road
- One receptor (pub)
- LNS obvious choice

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	426	Area Type	Trunk road and local authority road	Area Name	A465(T) near Clyne & B4242



Priority Area Map Extract

Road Level Screen Shot		
* If applicable insert [✓]	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details): -		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)	✓	
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture		
Safety Barriers	✓	
Lack of Width	✓	
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential	✓	
Non- Domestic Residential		
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment	✓	
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details: -		

Date of Assessment:
19/12/2014
Name of Assessor:
Omar Talat

Notes:

This section of the A465 is concrete carriageway and would produce higher noise levels.

The closest property to the carriageway is located to the north of the carriageway between River Neath and B4242. Other properties located further north-east, however they appear to be on higher elevation and at a greater distance from the A465.

Safety barriers and vegetation limit the verge width available in the area.

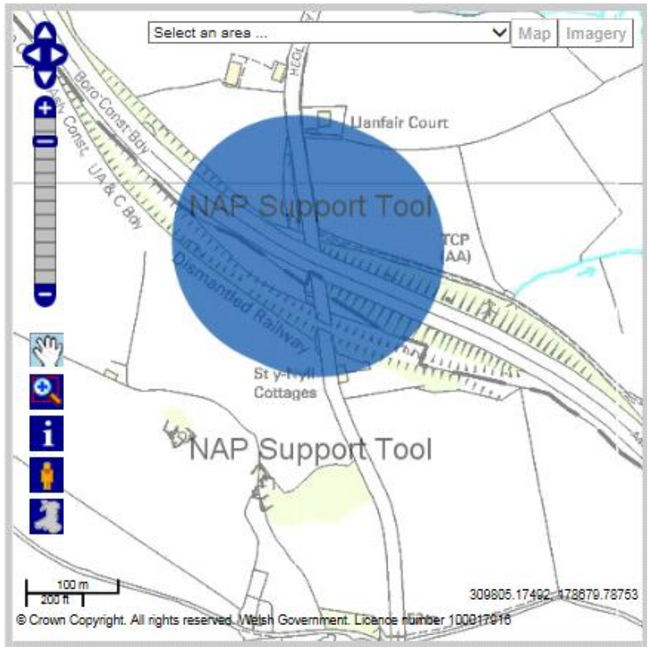
Acoustic Notes:

- Concrete Road
- LNS obvious choice
- Several receptors
- Bridge

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	427	Area Type	Trunk road and local authority road	Area Name	A4232 Heol St Y Nyll



Priority Area Map Extract

Road Level Screen Shot		
* If applicable insert [✓]	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt	✓	
Other (give details): -		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge	✓	
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers	✓	
Lack of Width	✓	
Other (give details): Safety barrier, signs and vegetation present.		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment	✓	
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details: -		

Date of Assessment:
19/12/2014
Name of Assessor:
Omar Talat

Notes:

This section of the A4232 is concrete except at the underbridge location where the surfacing changes to HRA. The road underneath the A4232 is Heol St Y Nyll.

No properties on the north side of the A4232. A couple of cottages appear to be located on the south side at approximately 100m from the A4232.

Safety barriers and vegetation limit the verge width available on the southern side.

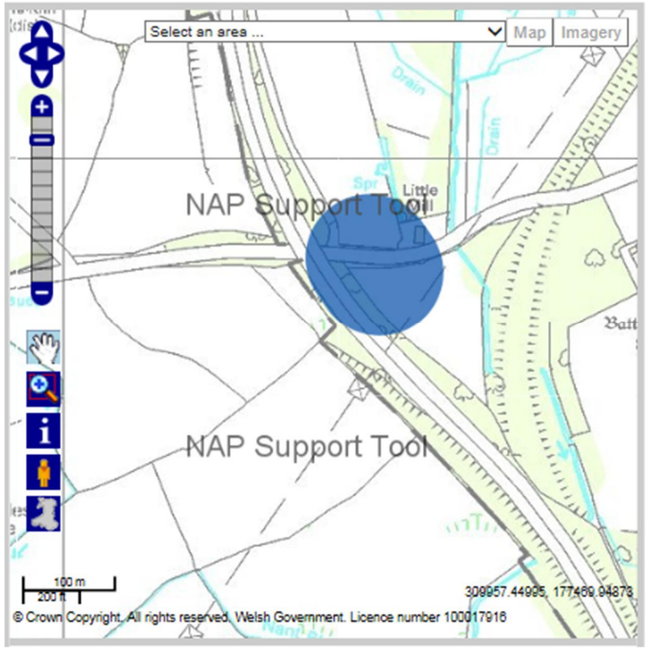
Acoustic Notes:

- Concrete Road
- Several Receptors
- Not concrete on bridge

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	428	Area Type	Trunk road and local authority road	Area Name	A4232 St Brides Road



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt	✓	
Other (give details): -		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge	✓	
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture		
Safety Barriers	✓	
Lack of Width	✓	
Other (give details): Overhead cables present on the north-westbound direction towards the underbeidge. These cables extend towards the south-west side of St. Brides Road as well.		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment	✓	
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details: -		

Date of Assessment:
19/12/2014
Name of Assessor:
Omar Talat

Notes:

This section of the A4232 is concrete except at the underbridge location where the surfacing changes to HRA. The road underneath the A4232 is St Brides Road. St Brides Road is made from asphaltic material, which is in average condition.

No properties on the west side of the A4232. Only one cottage appears to be located on the eastern side at approximately 100m from the A4232.

Safety barriers and vegetation limit the verge width available on the western side of the area. Overhead cables are also present in the vicinity of the area.

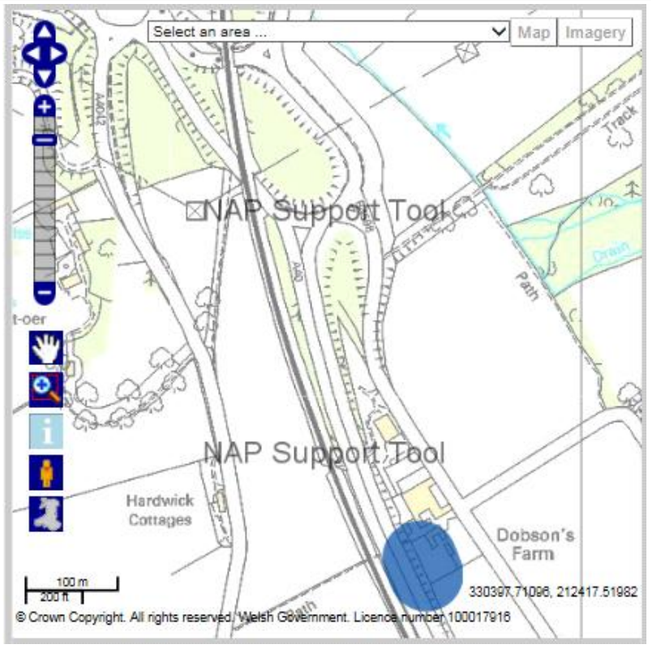
Acoustic Notes:

- Several receptors
- Distant
- LNS obvious choice
- Concrete Road

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	429	Area Type	Trunk road	Area Name	A40



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details): Yellow bar markings on the northbound carriageway		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers		
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting	✓	
Carriageway on Embankment		
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details:		

Date of Assessment:

Name of Assessor:

Notes:

A couple of properties are located on the north side of the A40 and appear to be farmhouses accessed from the adjacent B4598.

Trees are present on both sides of A40, but relatively sparse.

A railway track is present on the south side of the A40.

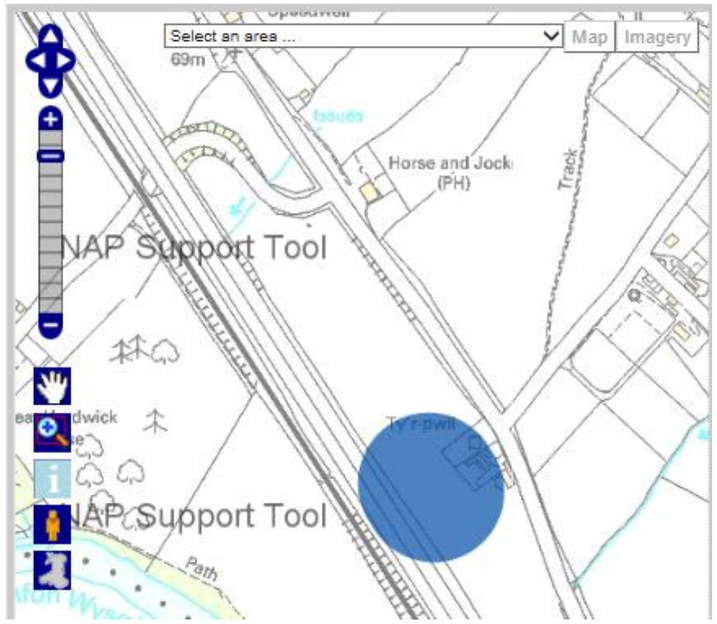
Acoustic Notes:

- One property (farm)
- Concrete Road – Close to roundabout
- Existing Bund ~ 3m high – High density of trees on top of bund – Clearing could have ecological implications
- Barriers – difficult
- LNS obvious choice
- Likely to be low Cost Benefit Analysis

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	430	Area Type	Trunk road	Area Name	A40



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers	✓	
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential	✓	
Non- Domestic Residential		
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting	✓	
Carriageway on Embankment		
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details:		

Date of Assessment:

Name of Assessor:

Notes:

A couple of properties are located on the north side of the A40 and appear to be residential properties accessed from the adjacent B4598.

Trees are present on both sides of A40, but relatively sparse.

Safety barrier is present on the south side of the A40, and beyond that a railway track.

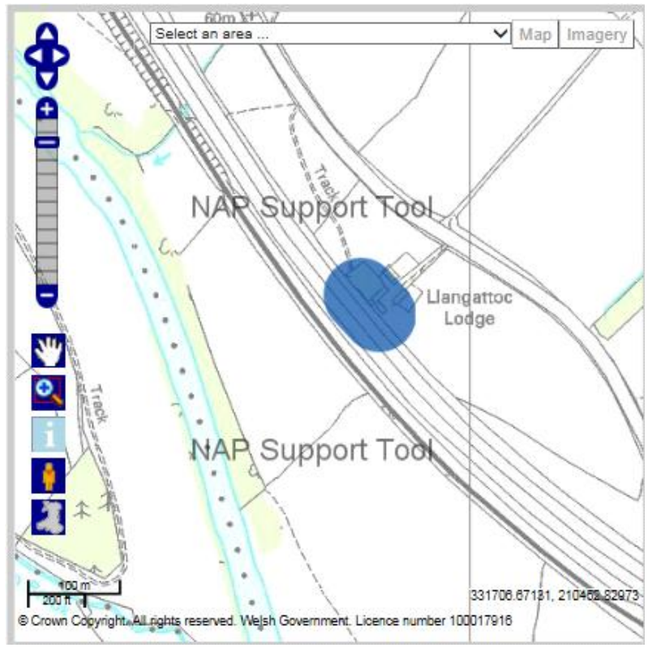
Acoustic Notes:

- 2-4 properties well setp back from road ~ 90m
- Concrete carriageway – full line speed
- 1.5m bund with trees on top adjacent to carriageway
- Barriers – difficult
- LNS obvious choice
- Likely to be low CBA

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	431	Area Type	Trunk road	Area Name	A40



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge		
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers		
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential	✓	
Non- Domestic Residential		
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment		
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details:		

Date of Assessment:

Name of Assessor:

Notes:

The nearest property is on the north side of the A40 and appears to be a residential property accessed from the adjacent B4598.

Trees are present on both sides of A40, although the density varies.

The grounds on both sides of the carriageway are only slightly raised compared to the carriageway.

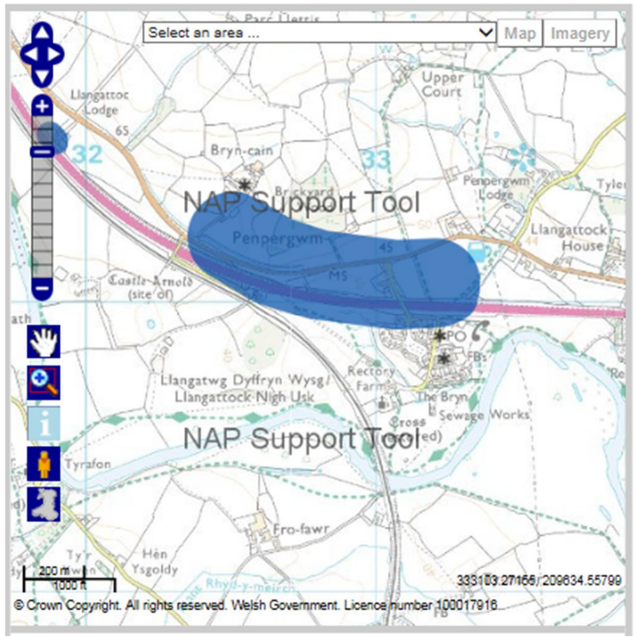
Acoustic Notes:

- 2 properties
- Dense vegetation
- Concrete Road
- Full line speed
- Barriers – Difficult
- LNS obvious choice
- Low CBA

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	432	Area Type	Trunk road and local authority road	Area Name	A40 & B4598



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge	✓	
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers	✓	
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting	✓	
Carriageway on Embankment		
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details: Trees and earthwork bund		

Date of Assessment:

Name of Assessor:

Notes:

The B4598 runs parallel to the A40 on the north. There is also an unnamed local road running parallel to the A40 on the south.

Penpergym House is a care home located on the north side of A40. On the south side another property exists and appears to be a farmhouse.

Trees are present on both sides of A40, although the density varies.

Safety barriers are only present in the proximity of the overbridges.

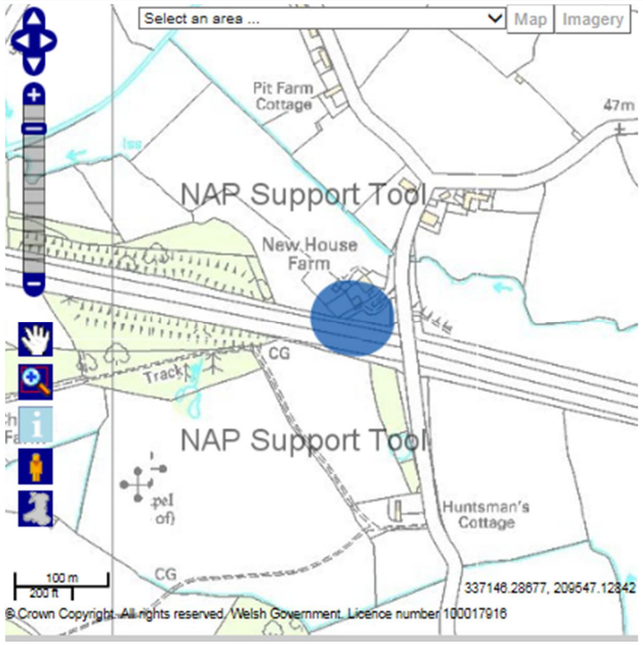
Acoustic Notes:

- Several properties
- 1.3 km in in length
- Concrete Road
- Full line speed
- NSR positions raised
- LNS – Barriers possible in parts
- 6m earth bund to east end of scheme

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	433	Area Type	Trunk road and local authority road	Area Name	A40 & New House Farm



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge	✓	
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture		
Safety Barriers	✓	
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting	✓	
Carriageway on Embankment		
Carriageway at Level		
Existing Acoustic Insulation/Barriers		
Give Details: Trees and earthwork bund		

Date of Assessment:

Name of Assessor:

Notes:

New House Farm appears to be a farmhouse on the north of A40.

Trees are on the earthwork bunds present on both sides of A40, although the density varies.

Safety barriers are only present in the proximity of the overbridge.

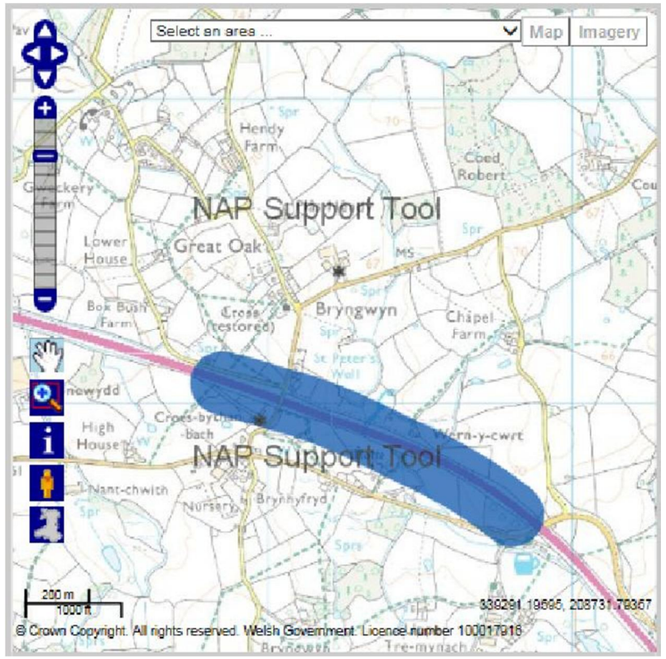
Acoustic Notes:

- One property
- Concrete Road
- Full line speed
- Dense vegetation in close proximity
- No mitigation
- LNS obvious choice
- Barriers may be possible

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	434	Area Type	Trunk road and local authority road	Area Name	A40 & Great oak Farm Cottages



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details):		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge	✓	
Underpass (Culvert, subway, cattle creep)		
Overbridge	✓	
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers	✓	
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential	✓	
Non- Domestic Residential		
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting	✓	
Carriageway on Embankment	✓	
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details: Trees and earthwork cutting		

Date of Assessment:

Name of Assessor:

Notes:

Topography varies along the length of this part of A40. Great Oak Farm Cottages is a road running parallel to the A40 on the north.

There is a single property on the north side of A40 which appears to be a residential property.

Trees are present on both sides of A40, although the density varies.

Underbridge located at east end of site.

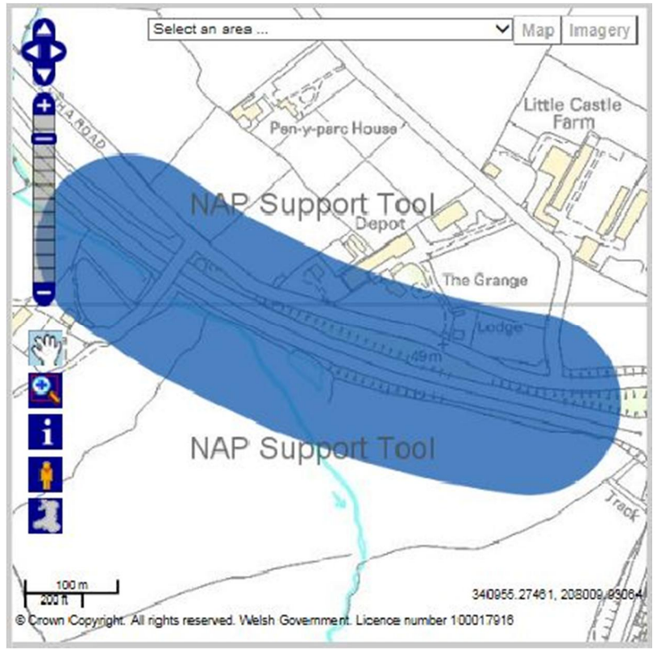
Acoustic Notes:

- 1.3 km of road
- Concrete
- ~10 properties
- Full study recommended

Traffic Speeds:

Traffic Flows and %HGV:

NAPPA Priority Site Audit Sheet					
Area ID	435	Area Type	Trunk road and local authority road	Area Name	A40 & Clytha Road



Priority Area Map Extract

Road Level Screen Shot

* If applicable insert [✓]

	Desktop*	Site*
Carriageway Surfacing		
Concrete	✓	
Thin Surface Course		
Surface Dressing		
Hot Rolled Asphalt		
Other (give details): Yellow bar markings on the eastbound carriageway		
Carriageway Surfacing Condition		
Pot Holes		
Warn		
Chip Loss		
Other (give details):		
Structures		
Underbridge		
Underpass (Culvert, subway, cattle creep)		
Overbridge	✓	
Other (give details):		
Verges – Potential Obstructions to Acoustic Fencing Provision		
Street Furniture	✓	
Safety Barriers	✓	
Lack of Width		
Other (give details):		
Affected Properties Within Priority Area		
Domestic Residential		
Non- Domestic Residential	✓	
Commercial		
High Rise (4+ Storeys)		
Public Buildings (Schools, libraries, etc)		
Topography		
Carriageway in Cutting		
Carriageway on Embankment	✓	
Carriageway at Level	✓	
Existing Acoustic Insulation/Barriers		
Give Details: Trees and earthwork bund		

Date of Assessment:

Name of Assessor:

Notes:

Clytha Road runs parallel to the A40 on the north. There is only one small area with multiple buildings on Clytha Road. The buildings appear to be farmhouses.

Yellow bar markings are present in the eastbound direction on A40 as it approaches a roundabout east of the site.

Trees are present on both sides of A40, although the density varies.

Acoustic Notes:

- Few properties
- Concrete Road
- Full line speed to roundabout at east of scheme
- LNS and Barriers possible
- Full study recommended

Traffic Speeds:

Traffic Flows and %HGV:

Appendix C – Noise Barrier Locations

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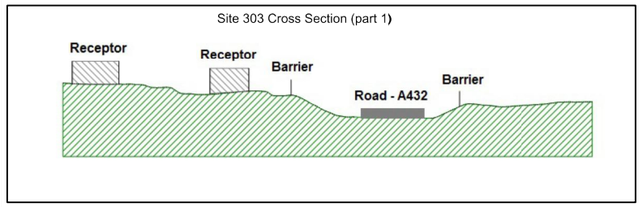
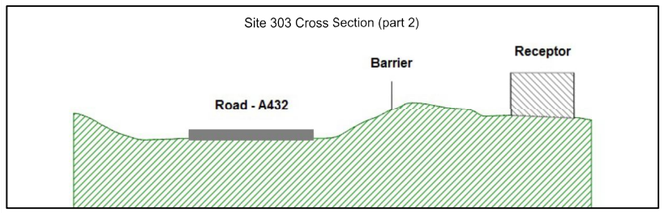
Drawing No. 3512209HQ - HHC

PRIORITY 1 NAPPA SITES STUDY

Project



NTS SECTION A - A



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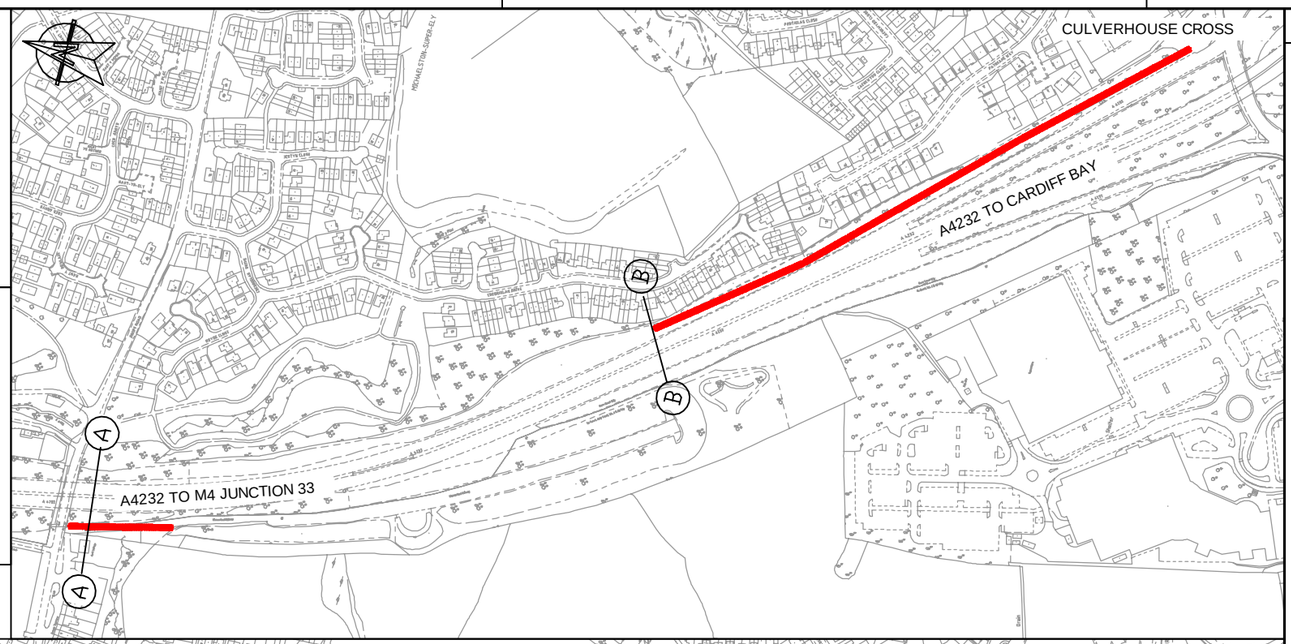

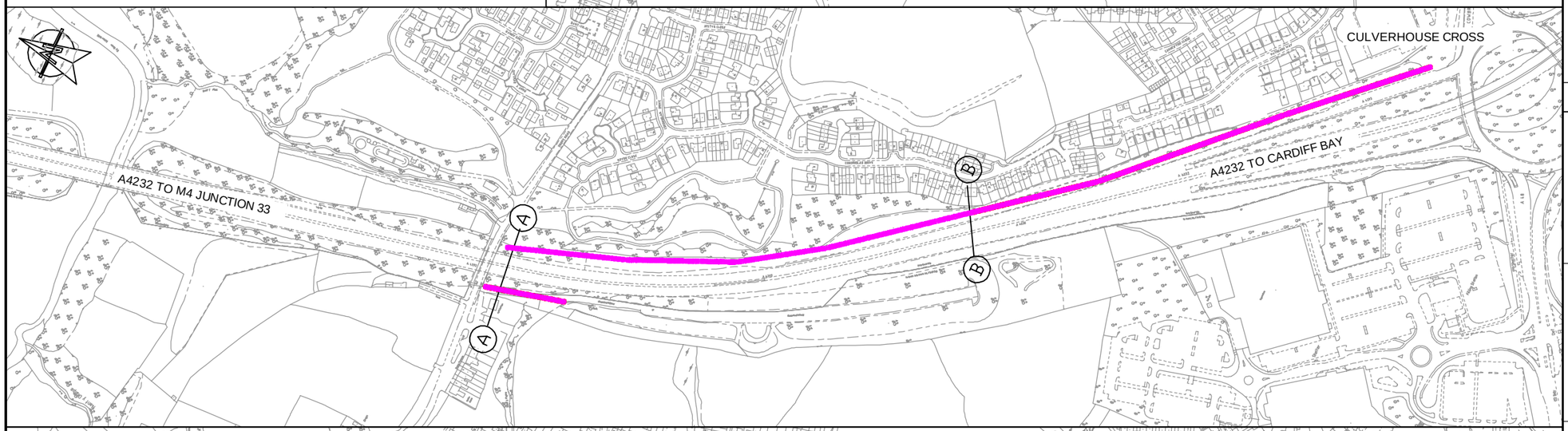

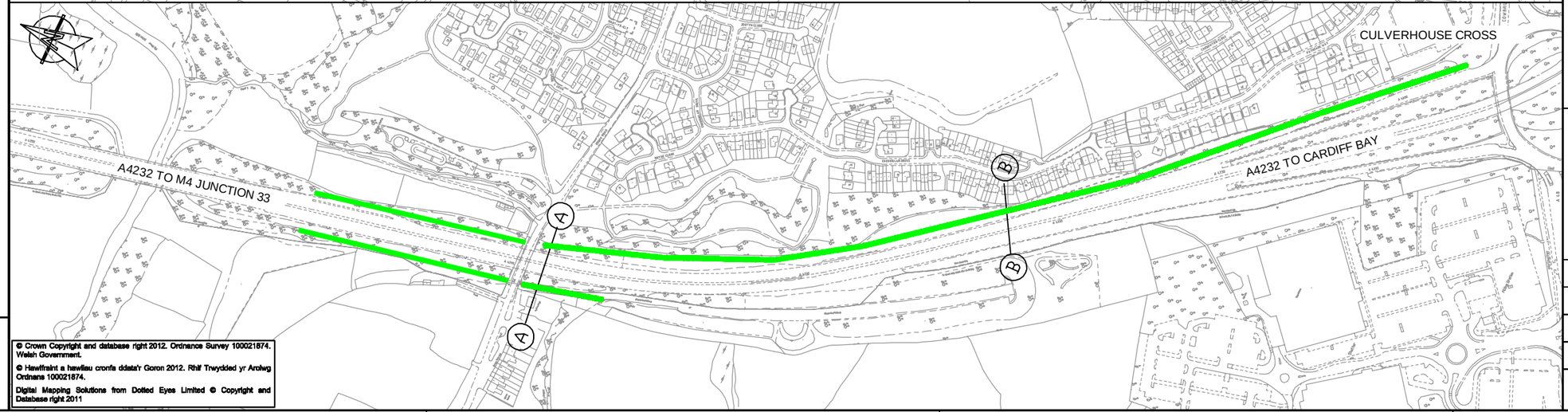

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KEY

OPTIONS 1, 4 AND 7

OPTIONS 2, 5 AND 8

OPTIONS 3, 6 AND 9

Rev	Details	Dr	Ch	Ap	Date

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

South Wales Trunk Road Agency
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Cardiff
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Fax: 44-(0)29-2082-7001

Project

PRIORITY 1 NAPPA SITES STUDY SITE 303 - A4232 CULVERHOUSE CROSS

NOISE BARRIER OPTIONS

File No.		Financial Code No. 14144185			
Drawn	GS	Checked	TJ	Approved	AGH
Date	31/03/15	Date	31/03/15	Date	31/03/15
Scales	1:5000				
Drawing No.	3512209HQ / FIG.1				-

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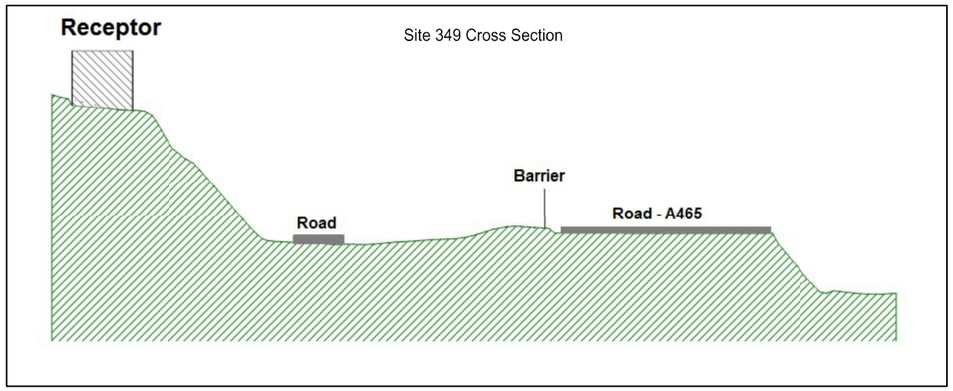
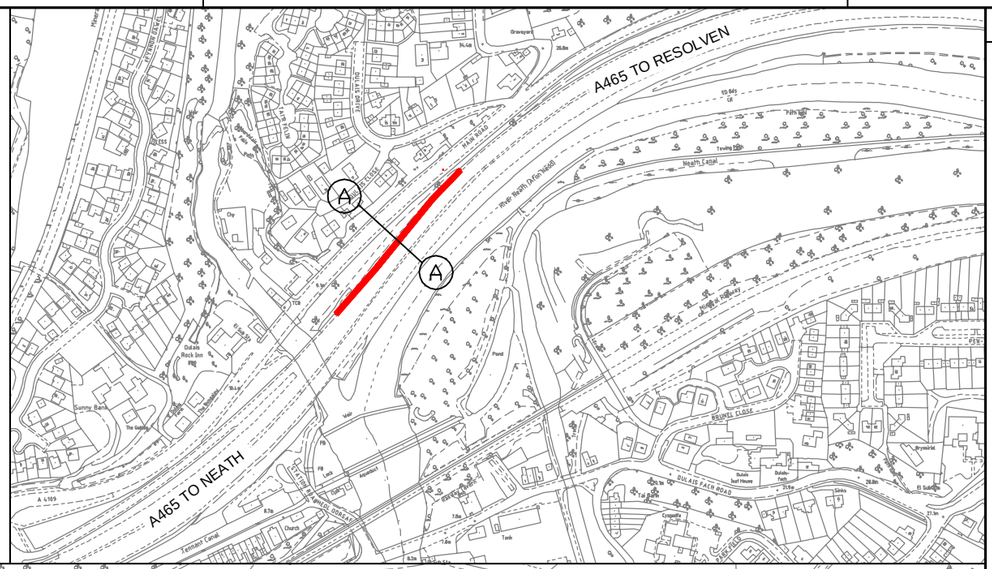
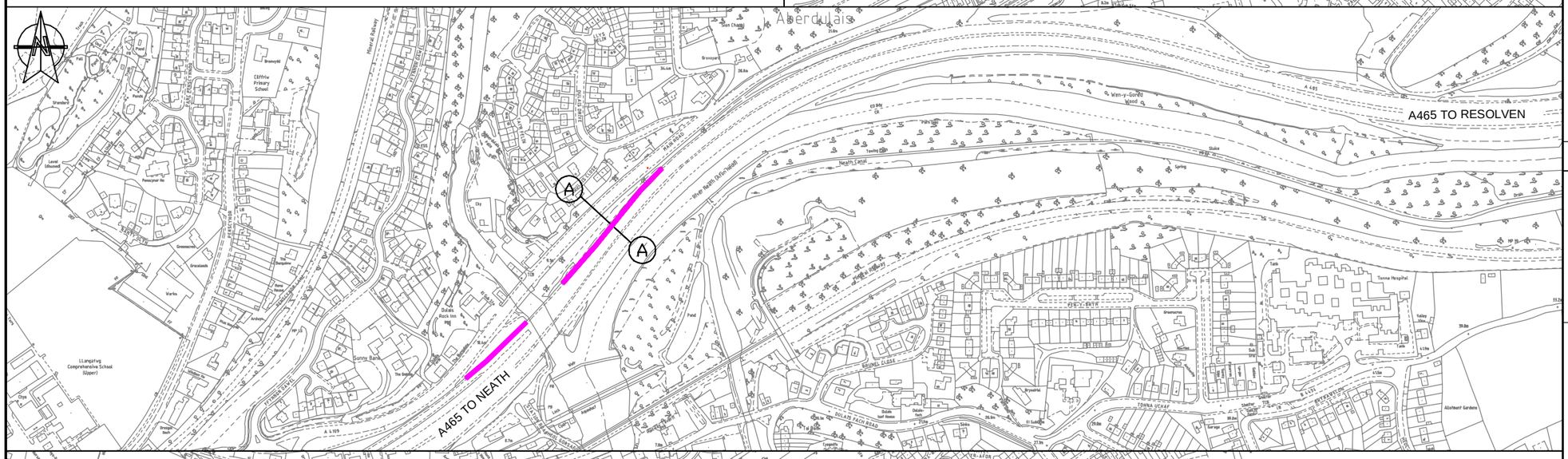
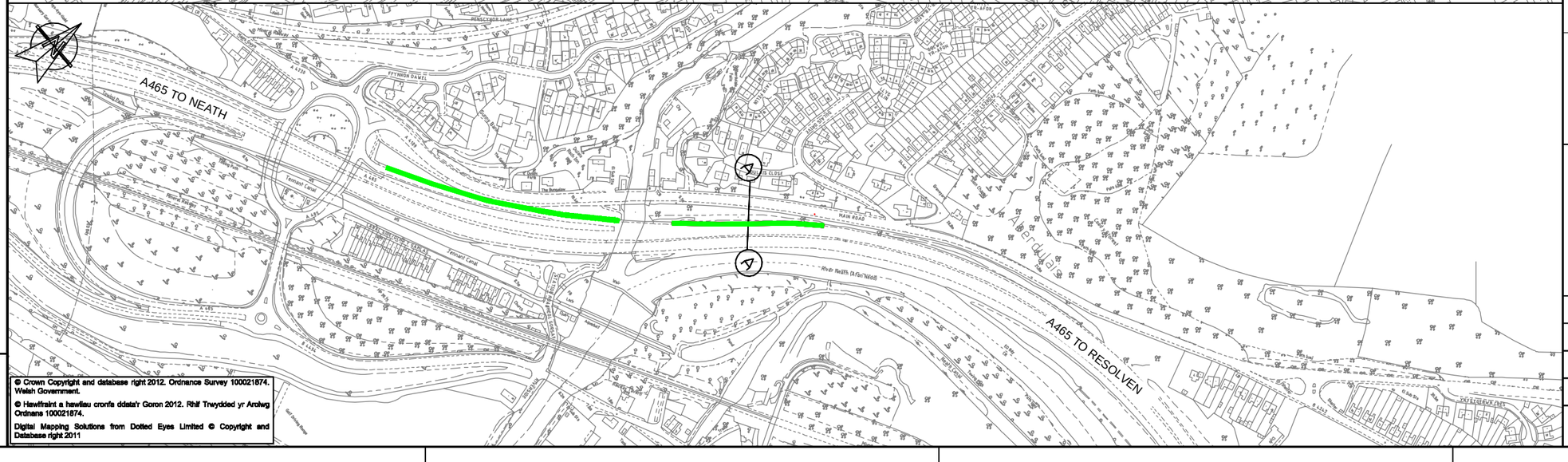


SECTION A-A
NTS







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PRIORITY 1 NAPPA SITES STUDY

Drawing No.
3512209HQ-HHC

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KEY

- OPTIONS 1, 4 AND 7
- OPTIONS 2, 5 AND 8
- OPTIONS 3, 6 AND 9

Rev	Details	Dr	Ch	Ap	Date

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

South Wales Trunk Road Agency
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Project
PRIORITY 1 NAPPA SITES STUDY
SITE 349 - A465
ABERDULAIS (LLANGATWG)

NOISE BARRIER
OPTIONS

File No.		Financial Code No. 14144185			
Drawn	GS	Checked	TJ	Approved	AGH
Date	31/03/15	Date	31/03/15	Date	31/03/15
Scales	1:5000				
Drawing No.	3512209HQ /FIG.2				-

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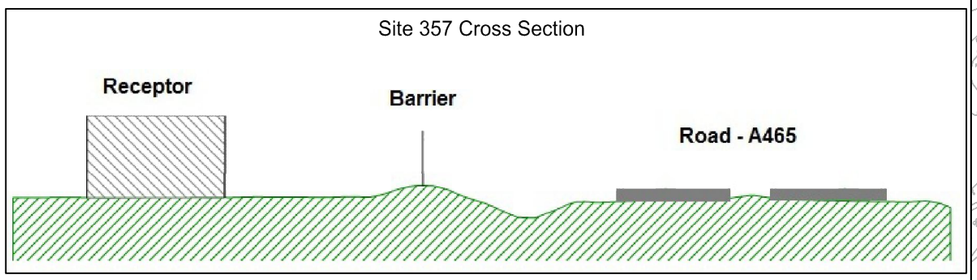
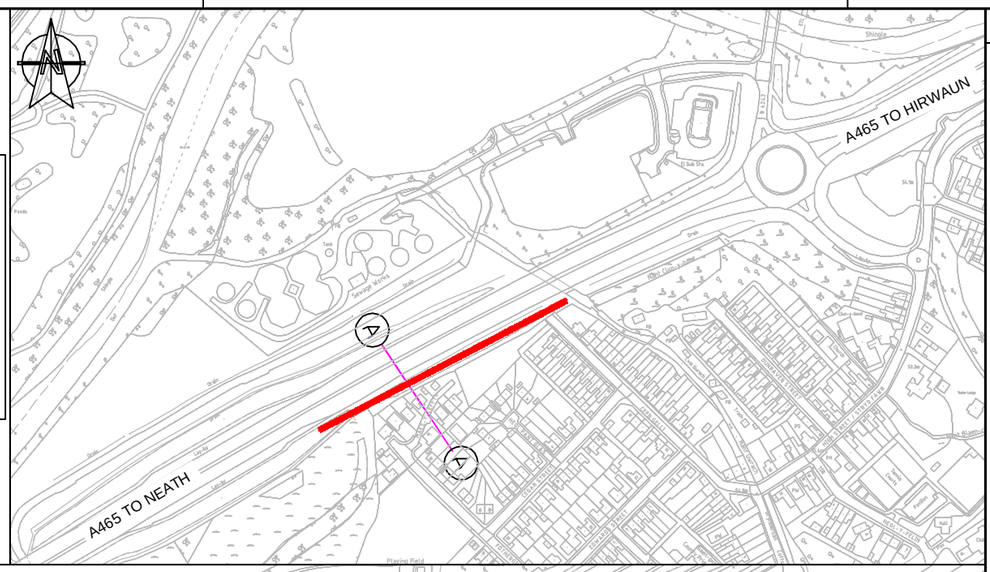
Drawing No. 3512209HQ-HHC

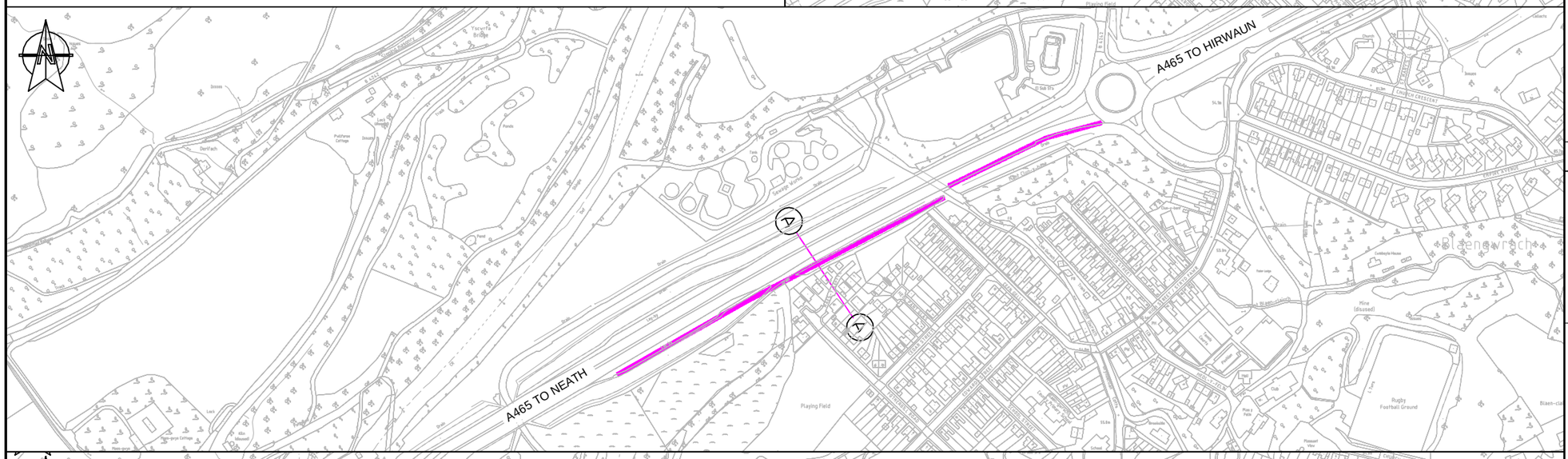
PRIORITY 1 NAPPA SITES STUDY

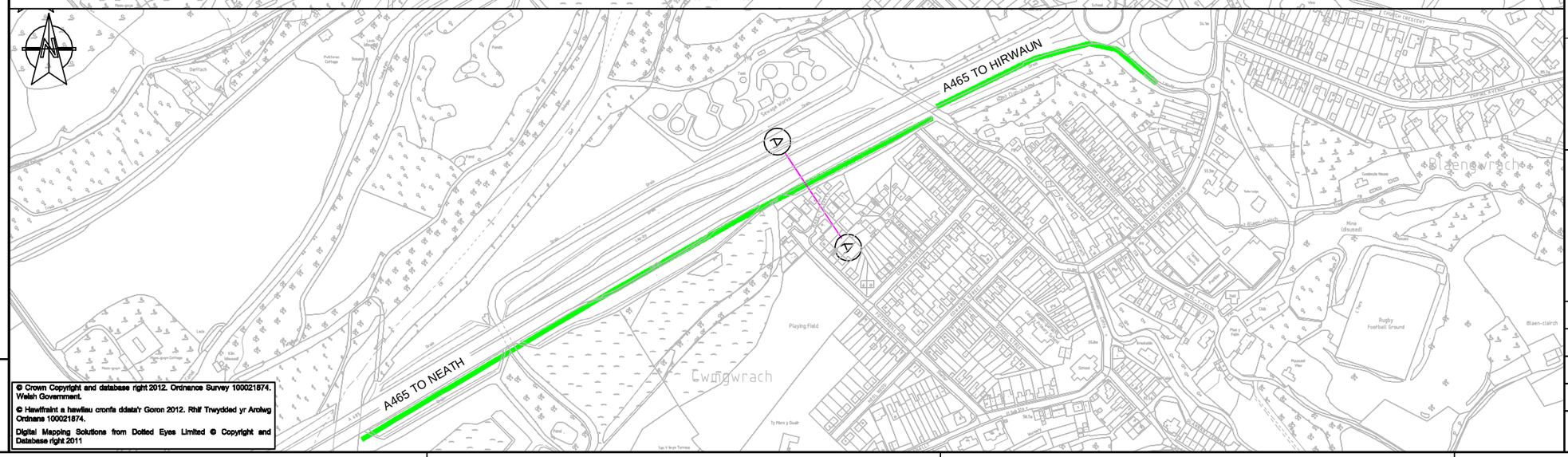
Project



SECTION A-A
NTS







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KEY

- OPTIONS 1, 4 AND 7
- OPTIONS 2, 5 AND 8
- OPTIONS 3, 6 AND 9

Rev	Details	Dr	Ch	Ap	Date

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Welsh Assembly Government

South Wales Trunk Road Agency
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Richard Jones
Head of Trunk Road Agency

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PARSONS BRINCKERHOFF

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Tel: 44-(0)29-2082-7000
Fax: 44-(0)29-2082-7001

Project

PRIORITY 1 NAPPA SITES STUDY
SITE 357 - A465 BLAENGWRACH

NOISE BARRIER OPTIONS

File No.		Financial Code No. 14144185			
Drawn	GS	Checked	TJ	Approved	AGH
Date	31/03/15	Date	31/03/15	Date	31/03/15
Scales	1:5000				
Drawing No.	3512209HQ / FIG.3				-

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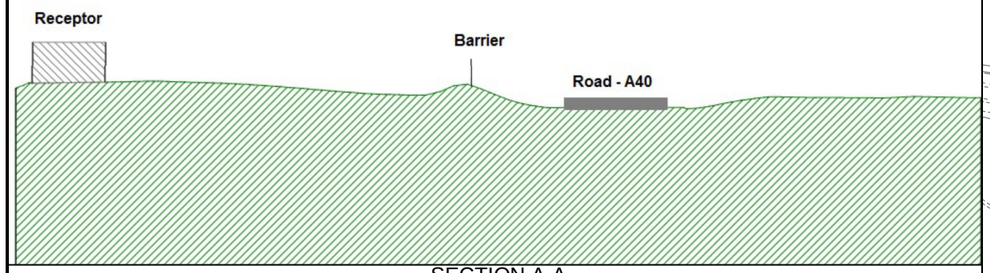
Drawing No. 3512209HQ-HHC

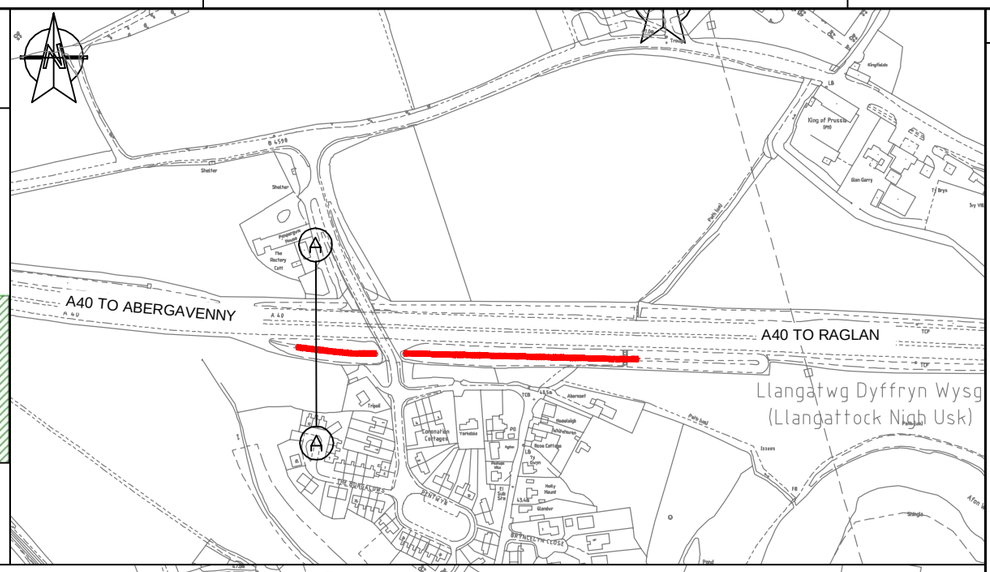
PRIORITY 1 NAPPA SITES STUDY

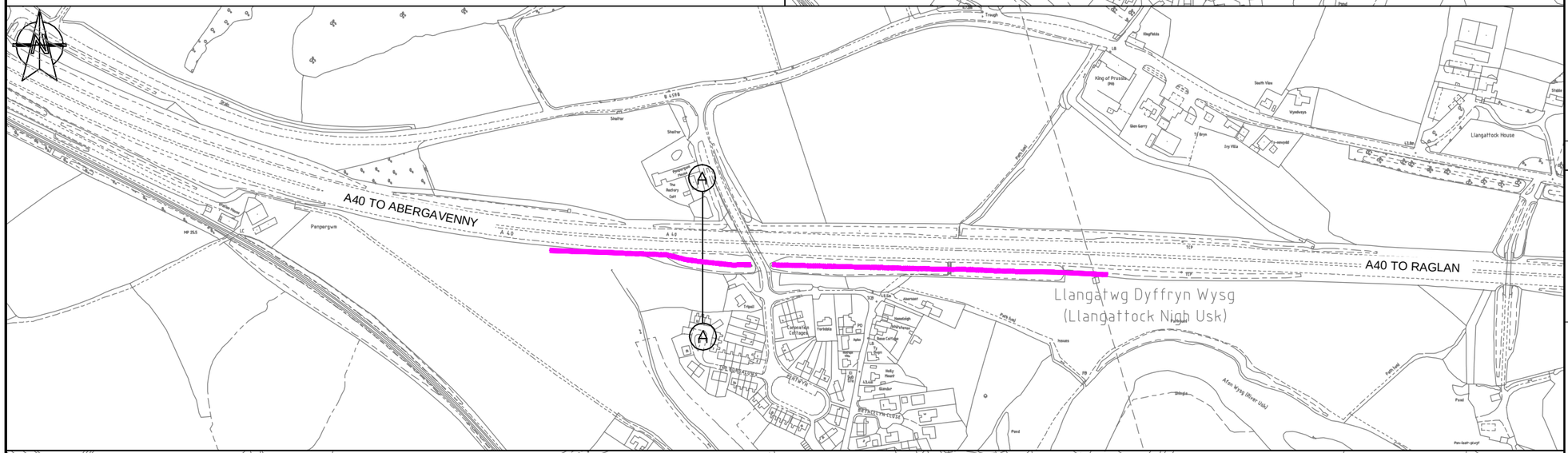
Project

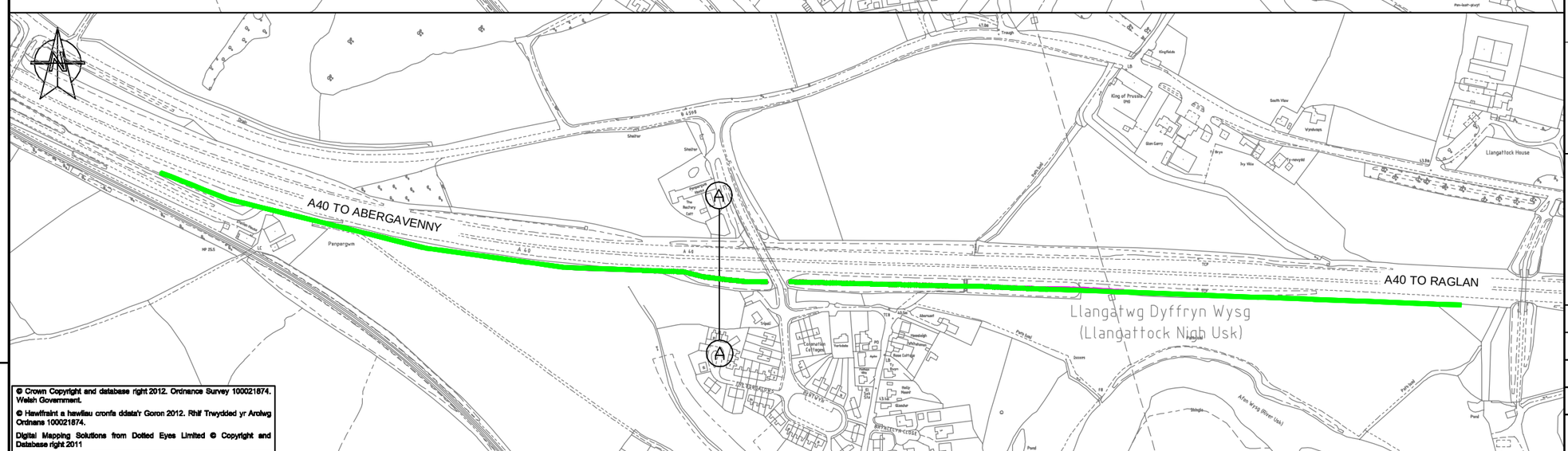
Site 432 Cross Section



SECTION A-A
NTS







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KEY

- OPTIONS 1, 4 AND 7
- OPTIONS 2, 5 AND 8
- OPTIONS 3, 6 AND 9

Rev	Details	Dr	Ch	Ap	Date

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Welsh Assembly Government

South Wales Trunk Road Agency
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Project

PRIORITY 1 NAPPA SITES STUDY SITE 432 - A40 LLANGATTOCK

NOISE BARRIER OPTIONS

File No.		Financial Code No. 14144185			
Drawn	GS	Checked	TJ	Approved	AGH
Date	31/03/15	Date	31/03/15	Date	31/03/15
Scales	1:5000				
Drawing No.	3512209HQ / FIG.4				-

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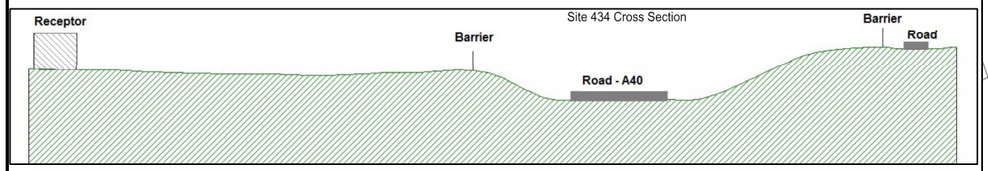
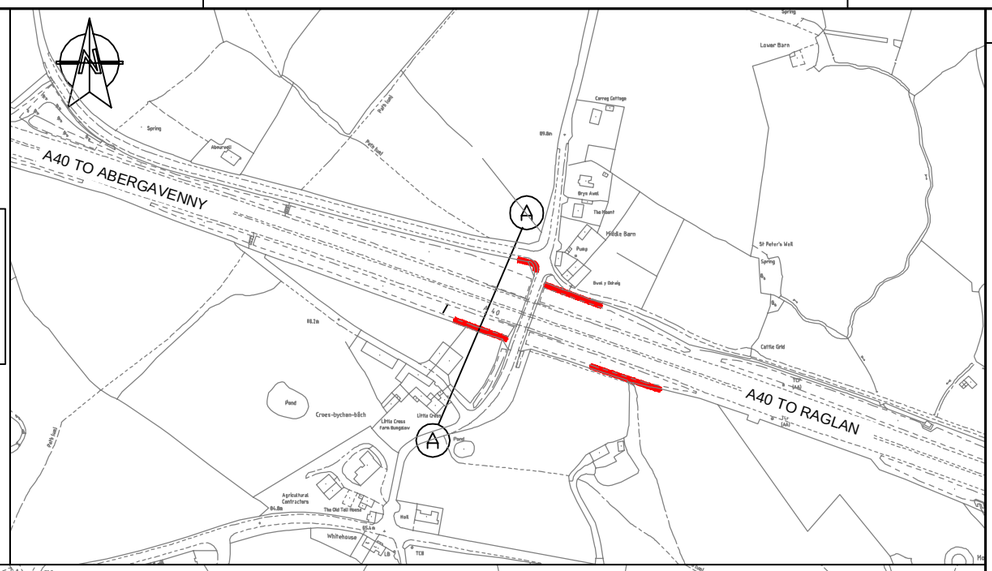
Drawing No. 3512209HQ -HHC

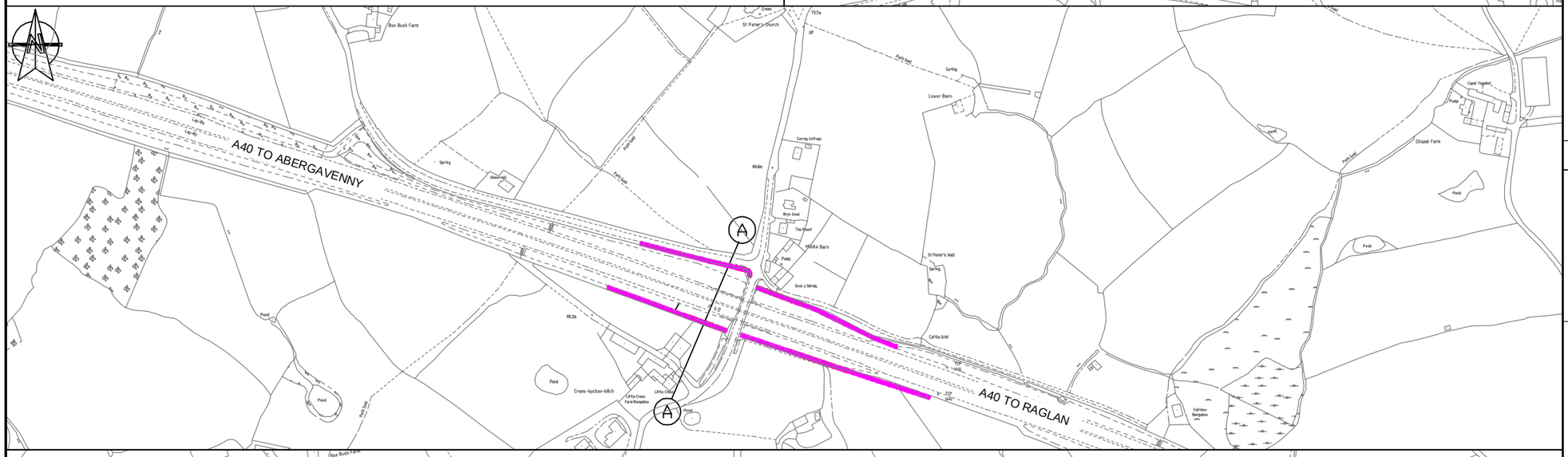
PRIORITY 1 NAPPA SITES STUDY

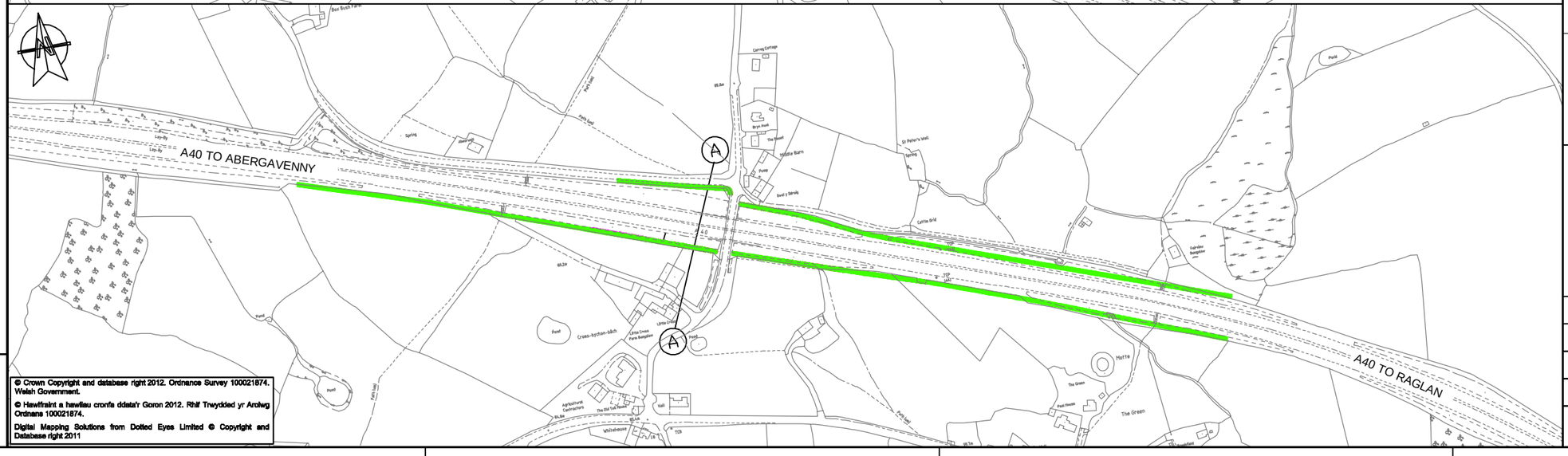
Project



SECTION A-A
NTS







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NOTES A3

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2. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.

KEY

- OPTIONS 1, 4 AND 7
- OPTIONS 2, 5 AND 8
- OPTIONS 3, 6 AND 9

Rev	Details	Dr	Ch	Ap	Date

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

South Wales Trunk Road Agency
Asiantaeth Cefnffyrdd De Cymru

Richard Jones
Head of Trunk Road Agency

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Project

PRIORITY 1 NAPPA SITES STUDY
SITE 434 - A40 BRYNGWYN

NOISE BARRIER OPTIONS

File No.		Financial Code No. 14144185			
Drawn	GS	Checked	TJ	Approved	AGH
Date	31/03/15	Date	31/03/15	Date	31/03/15
Scales	1:5000				
Drawing No.	3512209HQ / FIG.5				-

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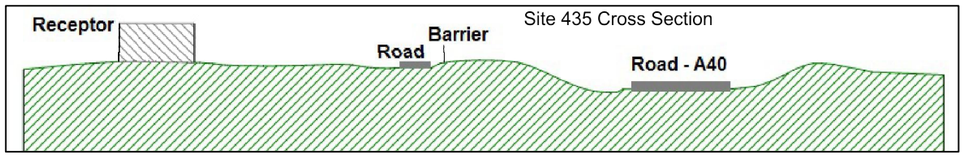
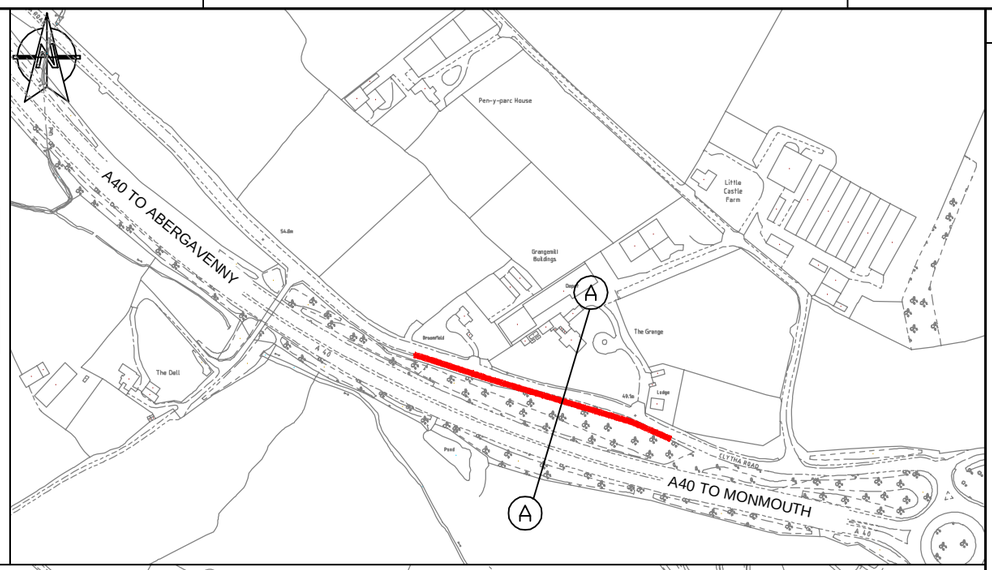
Drawing No. 3512209HQ-HHC

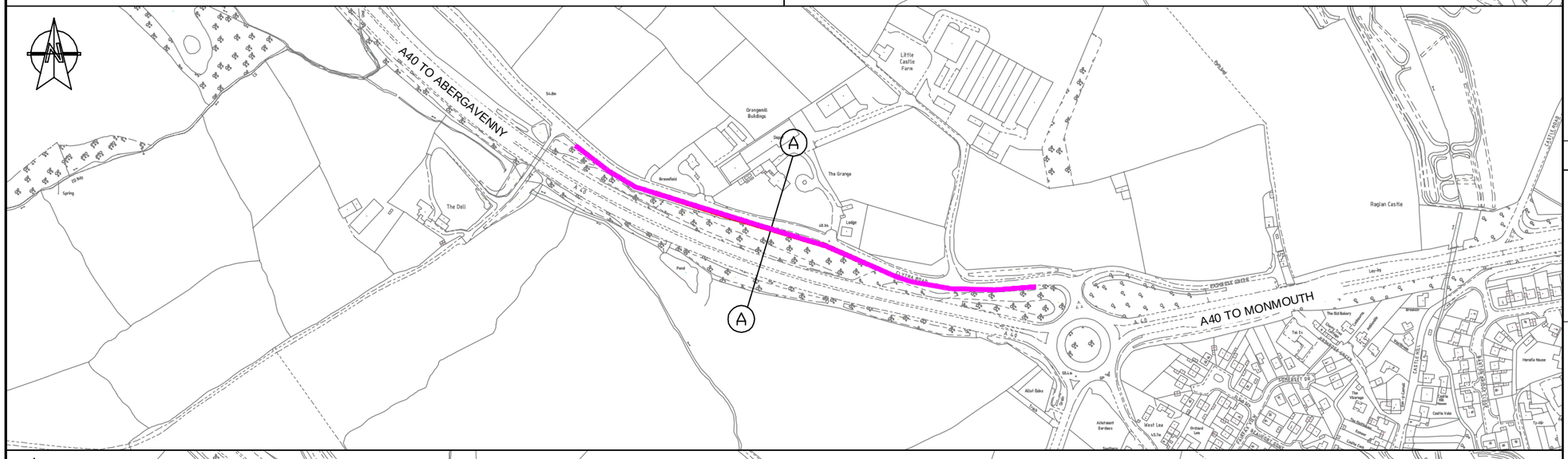
PRIORITY 1 NAPPA SITES STUDY

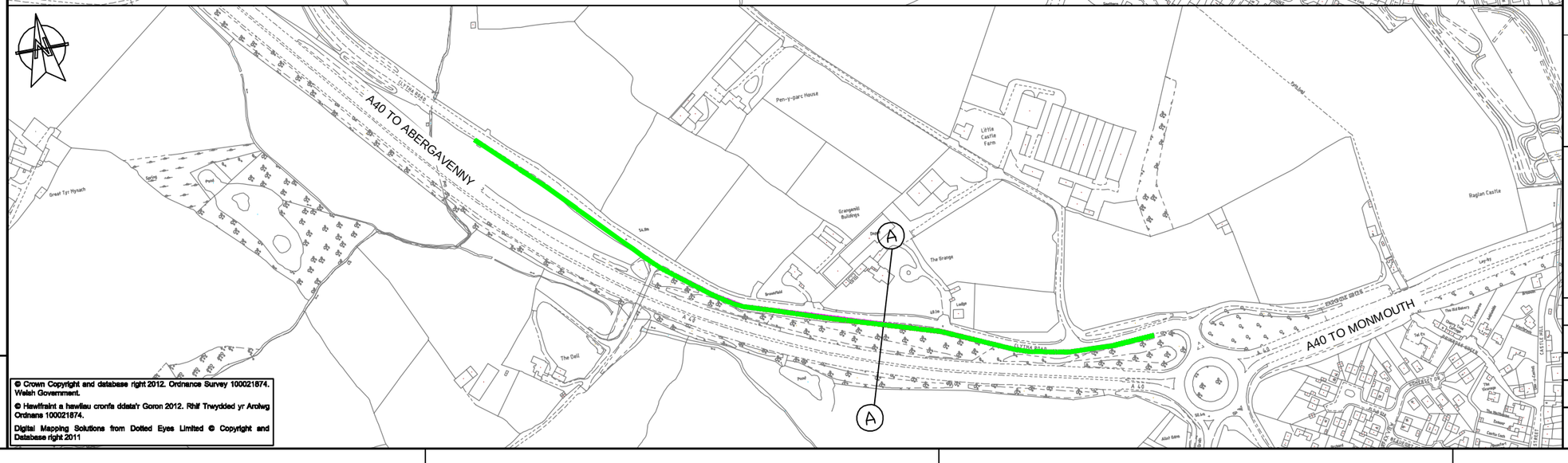
Project



SECTION A-A
NTS







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KEY

- OPTIONS 1, 4 AND 7
- OPTIONS 2, 5 AND 8
- OPTIONS 3, 6 AND 9

Rev	Details	Dr	Ch	Ap	Date

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

South Wales Trunk Road Agency
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Richard Jones
Head of Trunk Road Agency

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Project

PRIORITY 1 NAPPA SITES STUDY SITE 435 - A40 CLYTHA (RAGLAN ROUNDABOUT)

NOISE BARRIER OPTIONS

File No.		Financial Code No. 14144185			
Drawn	GS	Checked	TJ	Approved	AGH
Date	31/03/15	Date	31/03/15	Date	31/03/15
Scales	1:5000				
Drawing No.	3512209HQ/FIG.6				-

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Appendix D – WelTAG Sheets

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SITE 303 - Option 1

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	89	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	10	231	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	12	147	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	3	94	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	2	68	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	9	24	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	1	0	10	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	1	1	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	1	6	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	99	243	150	96	78	25	12	9	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £62,813 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 2

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	89	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	26	215	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	16	143	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	5	92	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	6	64	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	2	15	16	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	1	1	9	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	1	1	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	1	6	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	115	231	148	100	80	18	11	9	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £100,600 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 3

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	1	88	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	27	214	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	18	141	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	6	91	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	6	64	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	2	17	14	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	1	9	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	1	1	3	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	1	6	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	115	232	147	99	82	16	11	9	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £107,545 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 4

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	89	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	18	223	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	14	145	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	5	92	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	7	63	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	9	24	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	1	0	10	0	0	0	0	0
69-71.9		0	0	0	0	0	0	1	1	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	7	0	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	107	237	150	99	74	25	17	3	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £93,544 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 5

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	2	87	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	43	198	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	26	133	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	9	88	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	12	58	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	5	12	16	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	1	1	9	0	0	0	0	0
69-71.9		0	0	0	0	0	0	1	1	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	7	0	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	2	130	224	142	105	72	18	16	3	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £152,297 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 6

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	2	87	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	46	195	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	34	125	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	9	88	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	15	55	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	5	15	13	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	1	4	6	0	0	0	0	0
69-71.9		0	0	0	0	0	0	1	1	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	7	0	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	2	133	229	134	108	72	18	13	3	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £174,929 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 7

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	89	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	26	215	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	23	136	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	5	92	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	12	58	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	1	8	24	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	0	10	0	0	0	0	0
69-71.9	0	0	0	0	0	0	1	1	0	3	0	0	0	0
72-74.9	0	0	0	0	0	0	0	5	2	0	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	115	238	141	105	68	30	12	3	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £123,099 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 8

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	2	87	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	56	185	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	39	120	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	9	88	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	17	53	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	8	9	16	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	1	1	9	0	0	0	0	0
69-71.9		0	0	0	0	0	0	1	1	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	5	2	0	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	2	143	224	129	113	64	23	11	3	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £191,147 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 9

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	3	86	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	58	183	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	47	112	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	13	84	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	21	49	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	9	11	13	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	1	4	6	0	0	0	0	0
69-71.9		0	0	0	0	0	0	1	1	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	5	2	0	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	3	144	230	125	114	62	23	8	3	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £220,524 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 1

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	33	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	58	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	0	103	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	0	194	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	0	240	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	0	13	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	9	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	4	3	33	58	103	194	240	49	13	13	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £17,600 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 2

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	33	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	58	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	103	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	3	191	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	0	240	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	13	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	4	3	33	58	106	191	240	49	13	13	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £21,529 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 3

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	1	32	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	58	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	1	102	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	5	189	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	2	238	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	3	10	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	1	1	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	4	4	32	59	107	191	238	53	11	11	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £41,233 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 4

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	1	32	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	1	57	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	2	101	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	1	193	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	0	240	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	0	13	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	9	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	4	4	33	59	102	193	240	49	13	13	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £22,592 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	1	32	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	1	57	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	2	101	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	6	188	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	239	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	13	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	4	4	33	59	107	189	239	49	13	13	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £30,671 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 6

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	1	32	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	1	57	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	3	100	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	2	9	183	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	4	236	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	3	10	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	2	0	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	4	4	33	62	109	187	236	54	10	11	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £59,340 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 7

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	2	31	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	1	57	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	4	99	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	4	190	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	0	240	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	13	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	4	5	32	61	103	190	240	49	13	13	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £29,338 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 8

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	2	31	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	2	56	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	4	99	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	10	184	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	1	239	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	0	13	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	9	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	4	5	33	60	109	185	239	49	13	13	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £39,591 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 349 - Option 9

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		1	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	4	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	3	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	2	31	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	4	54	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	9	94	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	3	11	180	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	6	234	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	49	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	3	10	0	0	0	0
72-74.9		0	0	0	0	0	0	0	1	1	0	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	1	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	3	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	4	5	35	66	105	186	235	53	10	11	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £78,931 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 303 - Option 1

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	25	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	88	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	3	129	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	0	90	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	4	143	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	14	93	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	8	2	54	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	1	1	31	0	0	0	0
72-74.9		0	0	0	0	0	0	0	1	5	0	8	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	2	1	2	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	2	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	6	25	91	129	94	165	97	60	33	11	2	0	0

Net Present Value of Noise of Proposal (60 Year Period) £113,309 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 2

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	25	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	1	87	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	23	109	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	5	85	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	22	125	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	29	78	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	10	11	43	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	1	1	31	0	0	0	0
72-74.9		0	0	0	0	0	0	0	1	5	1	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	3	2	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	2	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	6	26	110	114	107	164	91	49	35	11	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £214,807 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 3

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	25	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	1	87	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	23	109	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	5	85	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	23	124	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	1	32	74	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	10	11	43	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	1	1	31	0	0	0	0
72-74.9		0	0	0	0	0	0	0	1	5	1	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	3	2	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	2	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	6	26	110	114	109	166	87	49	35	11	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £223,552 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 4

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	25	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	1	87	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	4	128	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	1	89	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	4	143	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	1	14	92	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	9	2	53	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	2	0	31	0	0	0	0
72-74.9		0	0	0	0	0	0	0	5	1	1	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	1	1	2	1	0	0
78-80.9		0	0	0	0	0	0	0	0	0	1	1	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	6	26	91	129	94	166	101	55	34	10	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £139,582 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 5

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	2	23	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	5	83	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	26	106	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	8	82	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	33	114	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	2	35	70	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	11	10	43	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	2	0	31	0	0	0	0
72-74.9		0	0	0	0	0	0	0	5	2	0	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	2	2	1	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	2	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	8	28	109	114	117	160	87	47	35	8	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £276,165 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 6

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	2	23	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	5	83	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	27	105	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	8	82	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	1	34	112	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	3	35	69	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	11	10	43	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	2	0	31	0	0	0	0
72-74.9		0	0	0	0	0	0	0	5	2	0	7	0	0	0
75-77.9		0	0	0	0	0	0	0	0	2	2	1	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	2	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	8	28	110	114	119	158	86	47	35	8	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £283,577 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 7

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	25	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	1	87	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	5	127	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	2	88	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	13	134	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	2	14	91	0	0	0	0	0	0
66-68.9	0	0	0	0	0	1	8	2	53	0	0	0	0	0
69-71.9	0	0	0	0	0	0	1	1	0	31	0	0	0	0
72-74.9	0	0	0	0	0	0	2	4	0	1	7	0	0	0
75-77.9	0	0	0	0	0	0	0	0	2	1	1	1	0	0
78-80.9	0	0	0	0	0	0	0	0	0	2	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	6	26	92	129	104	159	98	55	35	8	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £170,185 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 8

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	5	20	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	9	79	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	31	101	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	21	69	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	2	46	99	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	9	31	67	0	0	0	0	0	0
66-68.9		0	0	0	0	0	4	7	10	43	0	0	0	0	0
69-71.9		0	0	0	0	0	0	1	1	0	31	0	0	0	0
72-74.9		0	0	0	0	0	0	4	2	1	0	7	0	0	0
75-77.9		0	0	0	0	0	0	0	2	1	1	1	0	0	0
78-80.9		0	0	0	0	0	0	0	0	2	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	11	29	110	124	128	142	82	47	32	8	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £358,113 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 357 - Option 9

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	6	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	5	20	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	9	79	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	33	99	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	23	67	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	4	48	95	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	11	34	62	0	0	0	0	0	0
66-68.9		0	0	0	0	0	4	8	10	42	0	0	0	0	0
69-71.9		0	0	0	0	0	0	1	1	0	31	0	0	0	0
72-74.9		0	0	0	0	0	0	4	2	1	0	7	0	0	0
75-77.9		0	0	0	0	0	0	0	2	1	1	1	0	0	0
78-80.9		0	0	0	0	0	0	0	0	2	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	11	29	112	126	130	142	77	46	32	8	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £382,988 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

SITE 432 - Option 1

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	4	22	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	13	28	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	4	15	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	4	9	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	1	4	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	9	35	33	20	13	5	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £49,421 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 2

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	4	22	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	22	19	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	1	7	11	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	3	3	8	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	5	3	2	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	9	45	29	19	11	2	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £86,394 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 3

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	6	20	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	25	16	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	1	9	9	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	3	3	8	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	6	2	2	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	1	0	0	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	11	46	28	18	11	2	0	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £101,483 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 4

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	5	21	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	15	26	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	4	15	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	2	3	9	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	2	3	5	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	1	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	10	36	32	20	12	5	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £56,411 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 5

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	8	18	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	25	16	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	1	7	11	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	4	2	8	0	0	0	0	0
69-71.9	0	0	0	0	0	0	2	3	3	2	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	13	44	29	16	11	2	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £99,264 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 6

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	9	17	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	1	32	8	0	0	0	0	0	0	0
63-65.9		0	0	0	0	1	3	7	8	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	4	2	8	0	0	0	0	0
69-71.9		0	0	0	0	0	0	3	5	0	2	0	0	0	0
72-74.9		0	0	0	0	0	0	0	1	0	0	0	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	16	52	22	16	8	2	0	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £134,238 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 7

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	6	20	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	17	24	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	1	3	15	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	3	2	9	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	3	2	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	11	38	30	20	11	5	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £64,711 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 8

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	8	18	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	29	12	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	3	7	9	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	4	2	8	0	0	0	0	0
69-71.9	0	0	0	0	0	0	2	6	0	2	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	13	50	25	17	8	2	1	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £115,443 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 432 - Option 9

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	5	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	1	8	17	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	1	36	4	0	0	0	0	0	0	0
63-65.9	0	0	0	0	1	8	2	8	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	5	1	8	0	0	0	0	0
69-71.9	0	0	0	0	0	0	5	3	0	2	0	0	0	0
72-74.9	0	0	0	0	0	0	0	1	0	0	0	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	15	61	16	13	8	2	0	0	0	0

Net Present Value of Noise of Proposal (60 Year Period) £151,483 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 1

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	0	19	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	1	8	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	9	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	2	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	3	19	8	8	9	4	2	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £6,147 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 2

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	19	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	3	6	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	2	6	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	3	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	2	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	3	19	11	8	6	4	2	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £16,000 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 3

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	6	13	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	5	4	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	4	4	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	1	2	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	1	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	9	13	13	8	5	4	1	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £33,261 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 4

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	0	19	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	1	8	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	9	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	2	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	3	19	8	8	9	4	2	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £6,147 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 5

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	19	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	3	6	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	3	5	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	3	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	2	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	3	19	11	9	5	4	2	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £17,753 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 6

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	7	12	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	1	7	1	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	4	4	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	2	1	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	1	0	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	10	13	15	5	7	2	1	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £44,201 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 7

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	0	19	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	1	8	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	0	9	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	0	3	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	0	2	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	3	19	8	8	9	4	2	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £6,147 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 8

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	1	18	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	7	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	3	6	0	0	0	0	0	0
66-68.9	0	0	0	0	0	1	0	3	5	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	3	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	0	2	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	1	0	1	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	4	19	10	9	5	4	2	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £20,150 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 434 - Option 9

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	3	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	1	9	9	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	2	5	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	2	6	1	0	0	0	0	0	0
66-68.9	0	0	0	0	0	1	2	4	2	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	1	1	1	0	0	0	0
72-74.9	0	0	0	0	0	0	0	1	0	0	1	0	0	0
75-77.9	0	0	0	0	0	0	0	0	1	0	0	1	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	12	14	13	7	4	1	1	1	0	0

Net Present Value of Noise of Proposal (60 Year Period) £65,615 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 1

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

	With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Without Scheme															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	0	166	0	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	2	13	0	0	0	0	0
69-71.9		0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9		0	0	0	0	0	0	0	0	0	1	9	0	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	16	249	167	30	13	6	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £7,234 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 2

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	166	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	2	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	1	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	249	167	30	13	6	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £7,234 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 3

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	1	165	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	2	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	1	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	250	166	30	13	6	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £8,544 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 4

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	166	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	2	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	1	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	249	167	30	13	6	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £7,234 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 5

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	2	164	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	2	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	1	0	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	251	165	30	14	5	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £11,828 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 6

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	2	164	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	2	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	1	0	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	251	165	30	14	5	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £11,828 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 7

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	0	166	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	2	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	1	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	249	167	30	13	6	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £7,234 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 8

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	3	163	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	1	1	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	1	0	0	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	252	165	30	13	5	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £16,422 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

SITE 435 - Option 9

APPRAISAL - NOISE POLLUTION

Current Appraisal Year: 2015

Proposal Opening Year: 2017

Average Household Size: 2.36

Project (Road or Rail): Road

No. of households experiencing 'Without Scheme' & 'With Scheme' noise levels (given in dB_{Leq}) in Opening Year

Without Scheme \ With Scheme	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	16	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	249	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	4	162	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	1	28	0	0	0	0	0	0
66-68.9	0	0	0	0	0	0	2	0	13	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	0	5	0	0	0	0
72-74.9	0	0	0	0	0	0	0	1	0	0	9	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	0	4	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	2	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	16	253	165	29	13	5	9	4	2	0

Net Present Value of Noise of Proposal (60 Year Period) £19,263 *positive value reflects a **net benefit** (i.e. noise reduction)

Estimated Population Annoyed (Without Scheme): 0

Estimated Population Annoyed (With Scheme): 0

Net Noise Annoyance Change in 15th Year After Opening (no. of people): 0 *positive value reflects an **increase** in people annoyed by noise

Appendix E – Cost / Benefit Analysis

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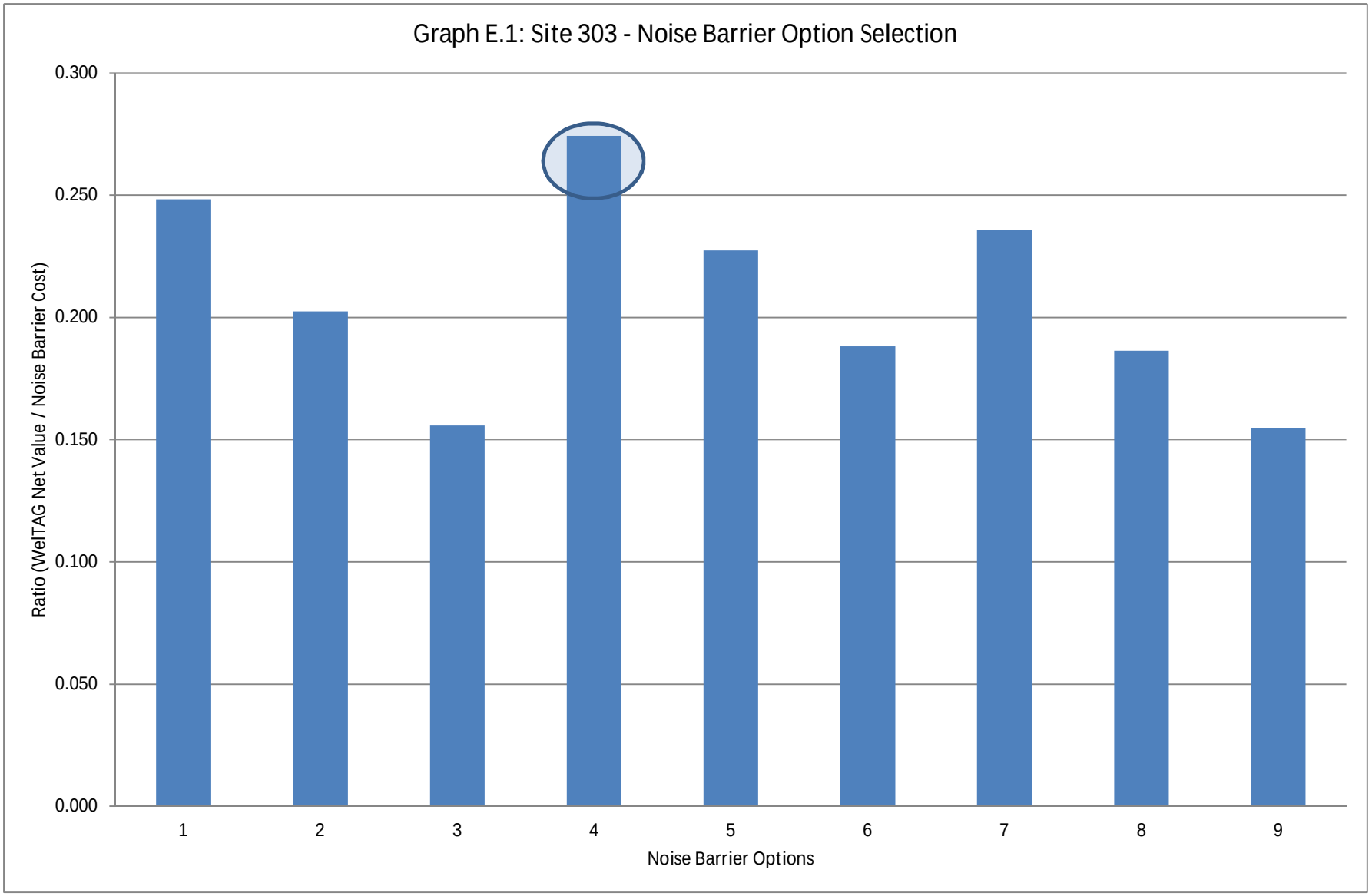
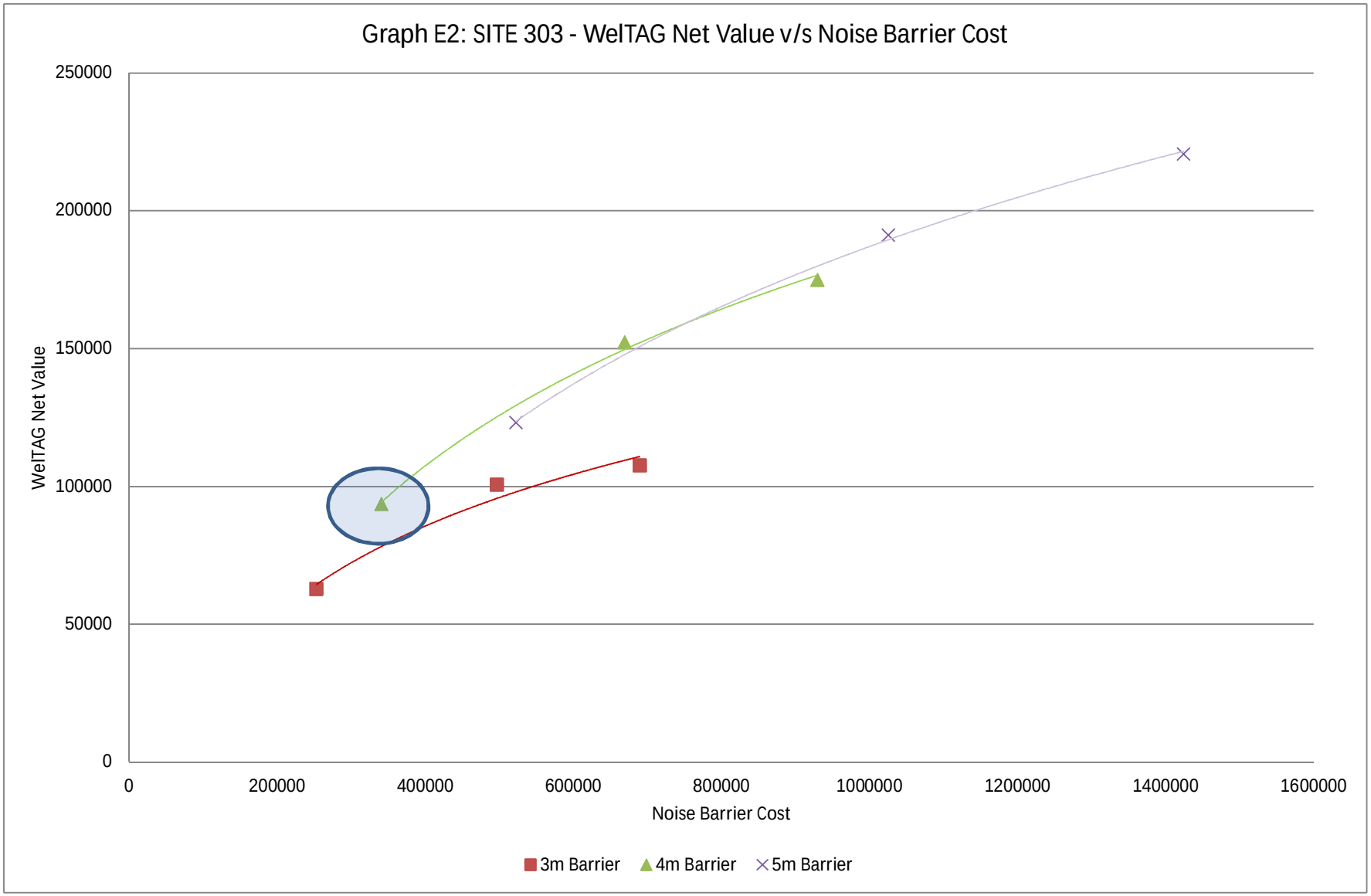
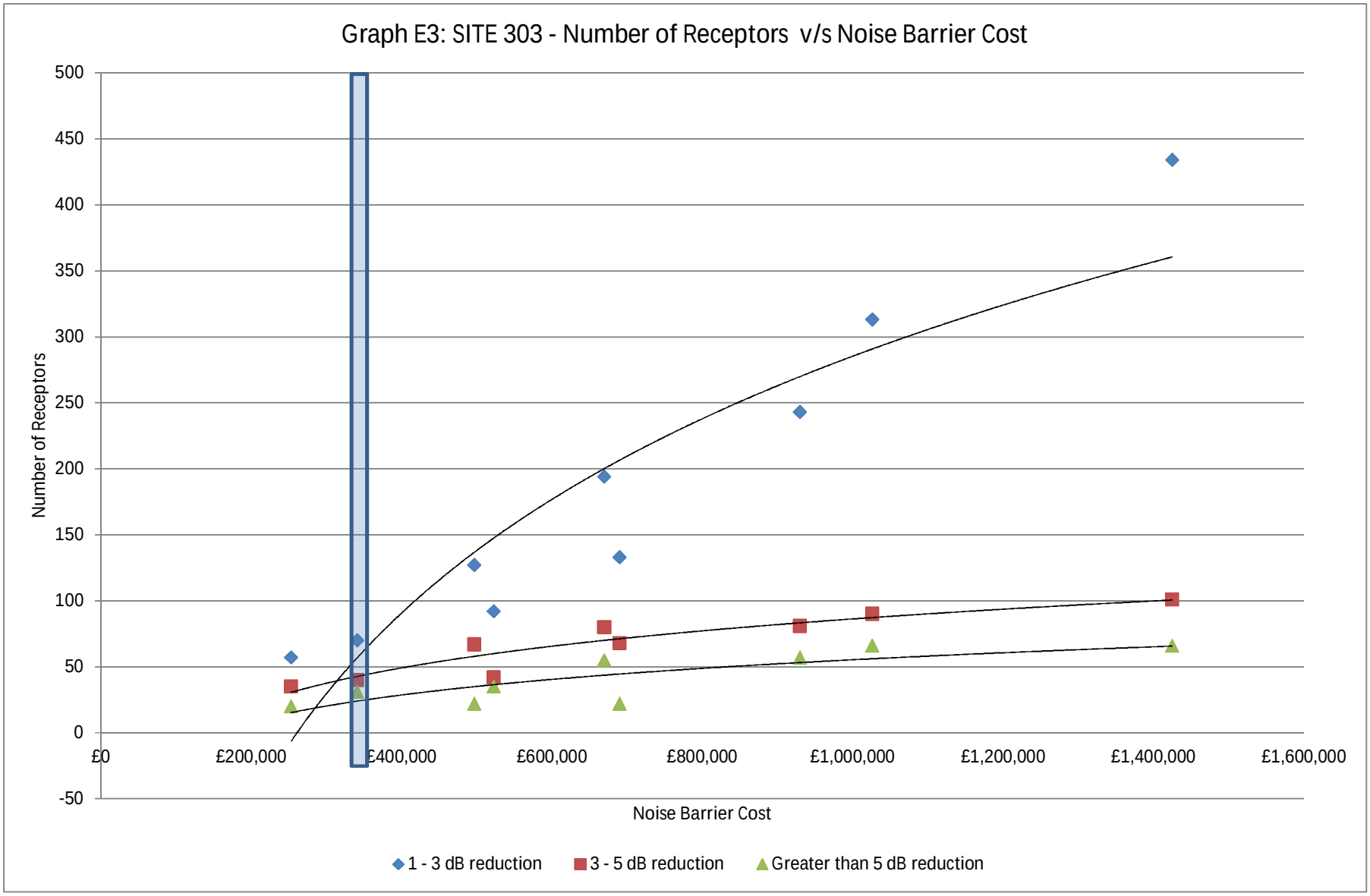
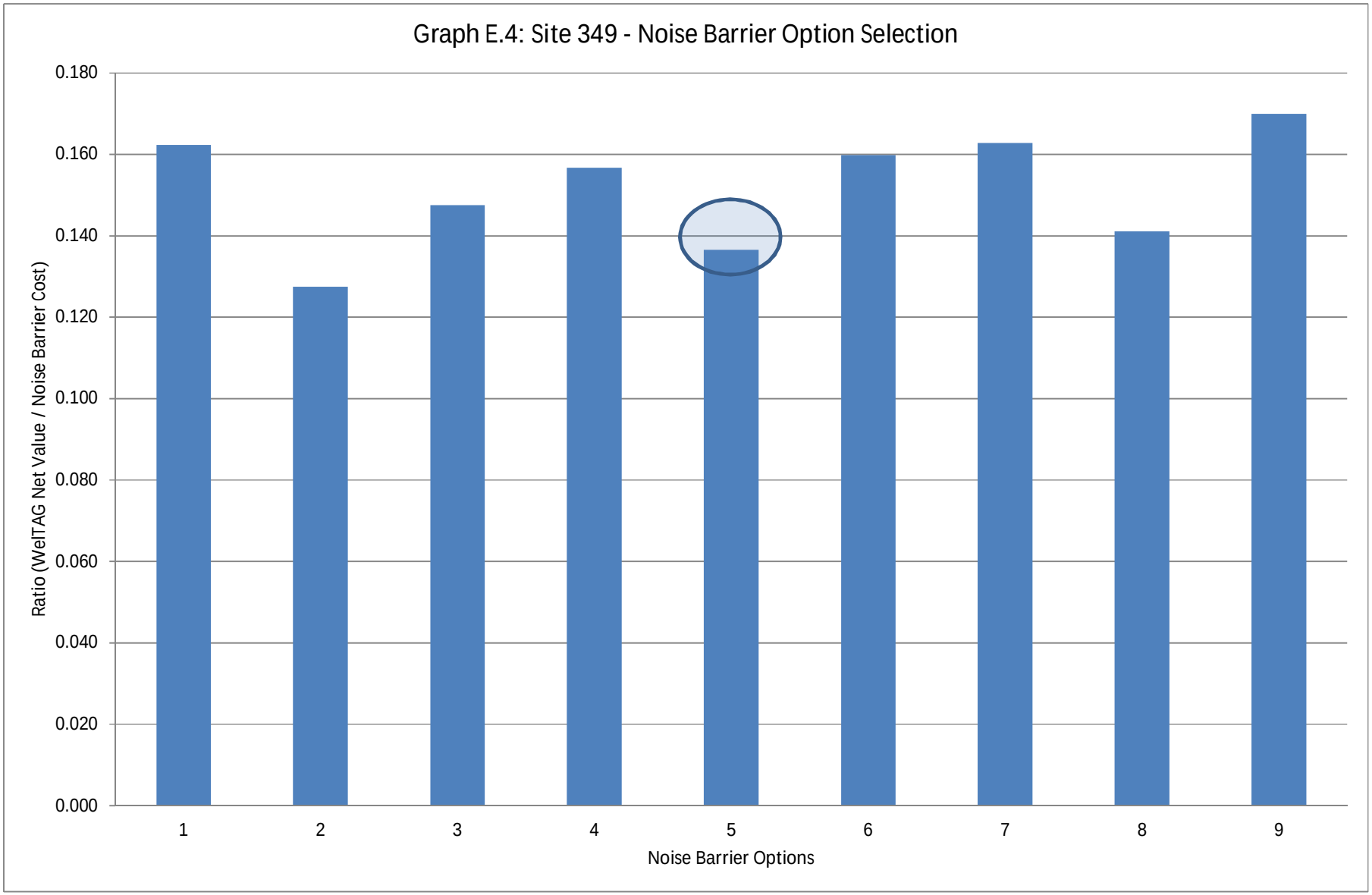
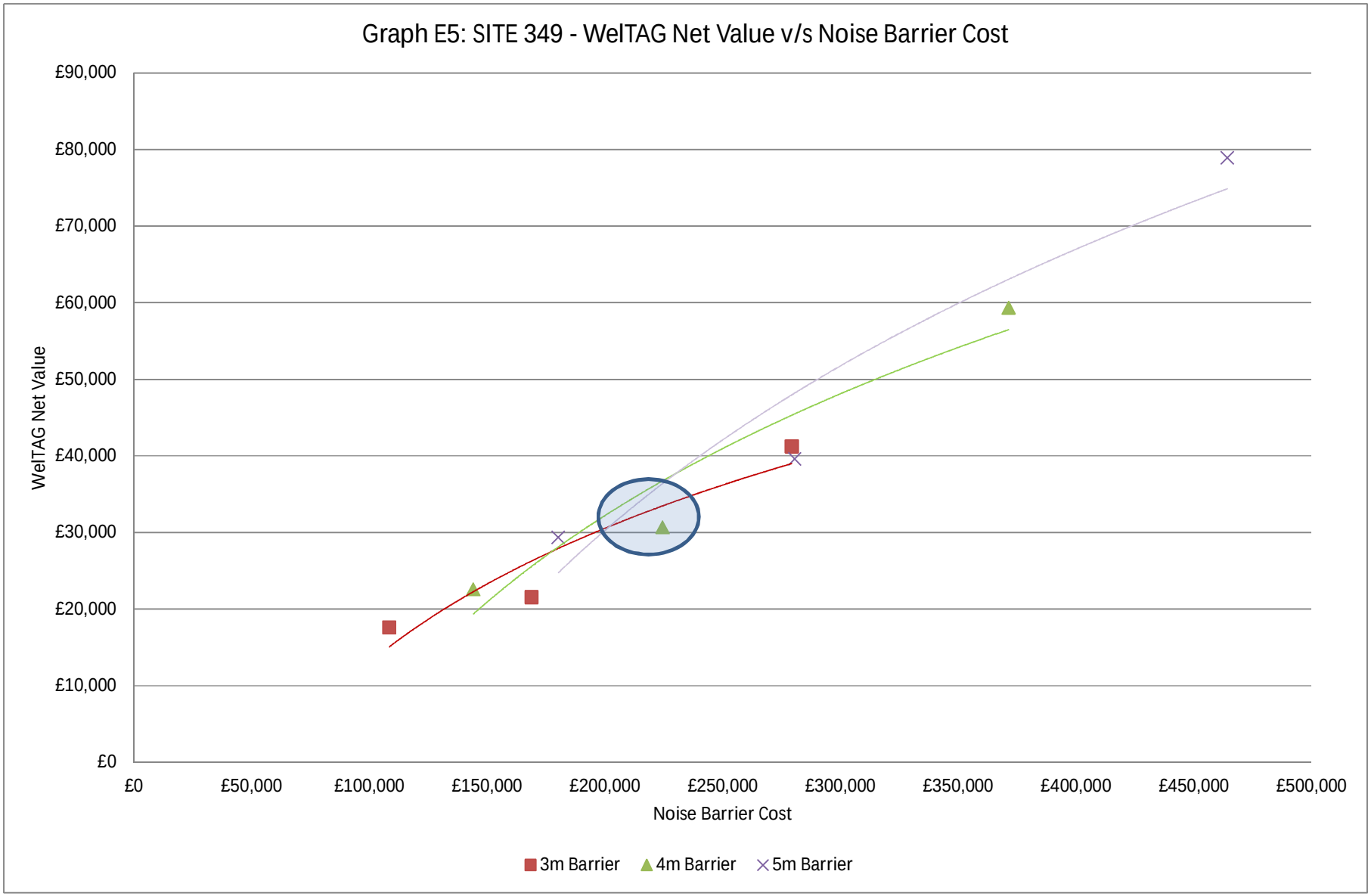
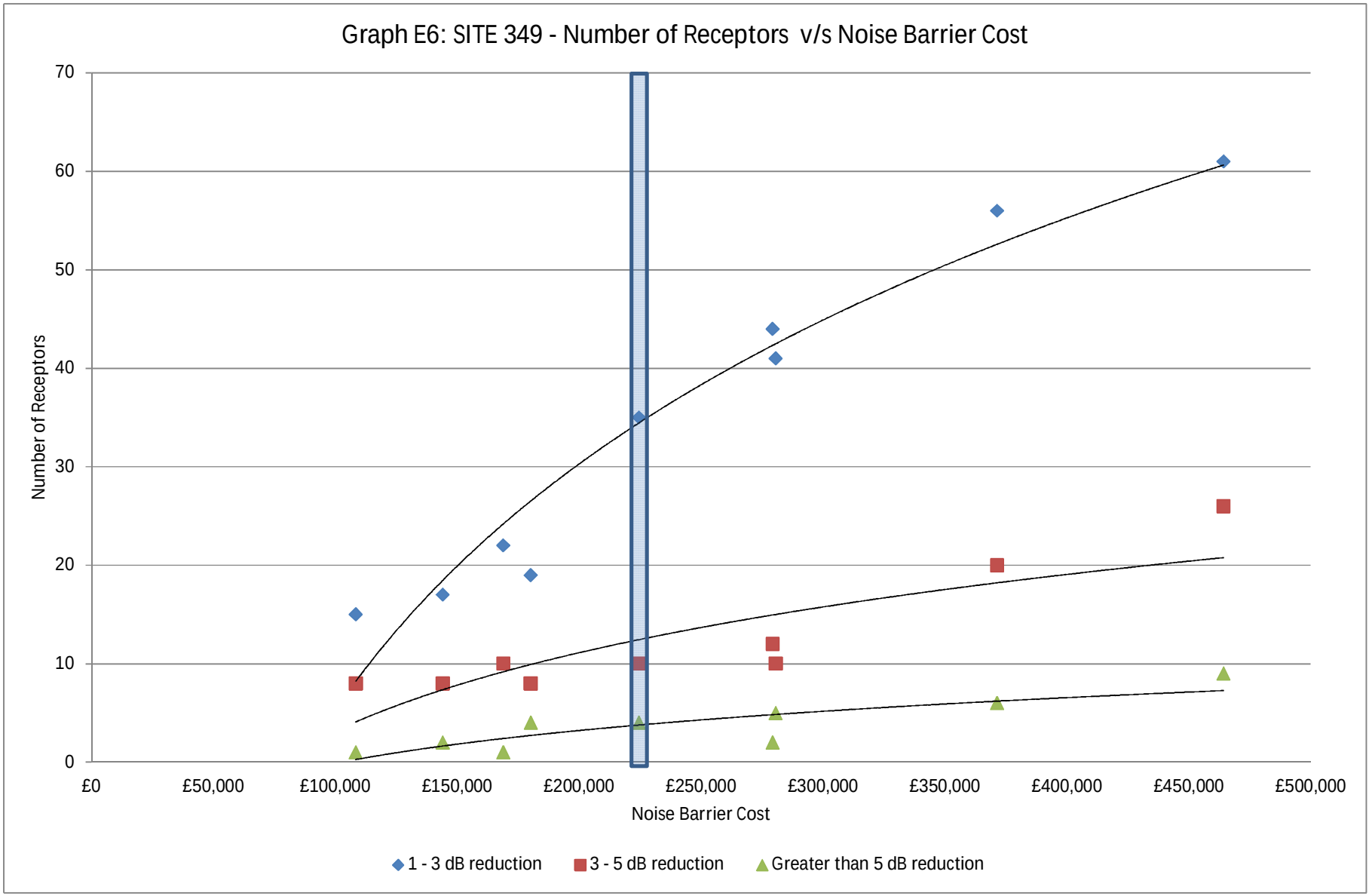

Graph E.1: Site 303 - Noise Barrier Option Selection
Ratio (WelTAG Net Value / Noise Barrier Cost)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
1
2
3
4
5
6
7
8
9
Noise Barrier Options

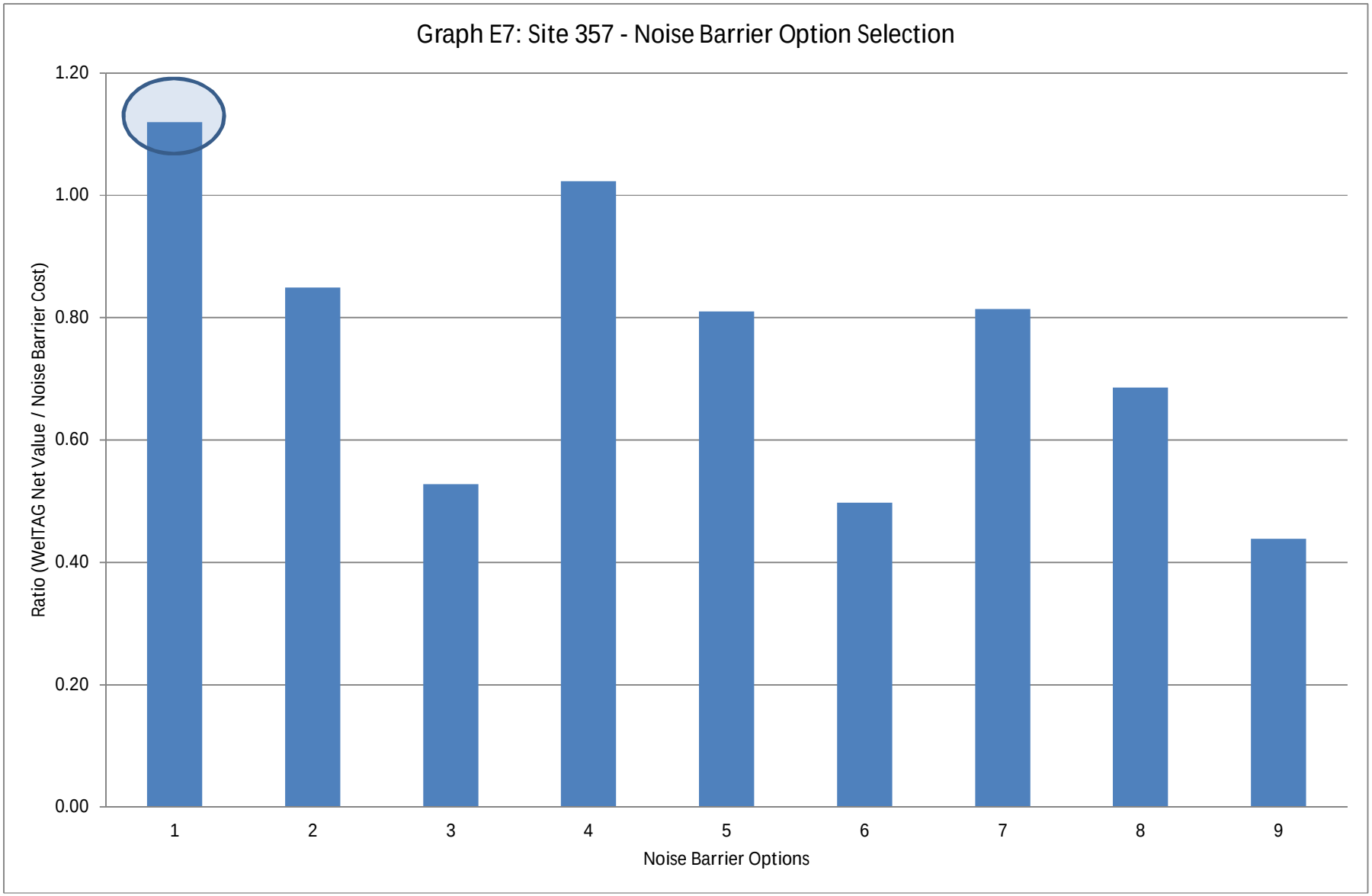

Graph E2: SITE 303 - WelTAG Net Value v/s Noise Barrier Cost
250000
200000
150000
100000
50000
0
WelTAG Net Value
0
200000
400000
600000
800000
1000000
1200000
1400000
1600000
Noise Barrier Cost
3m Barrier
4m Barrier
5m Barrier

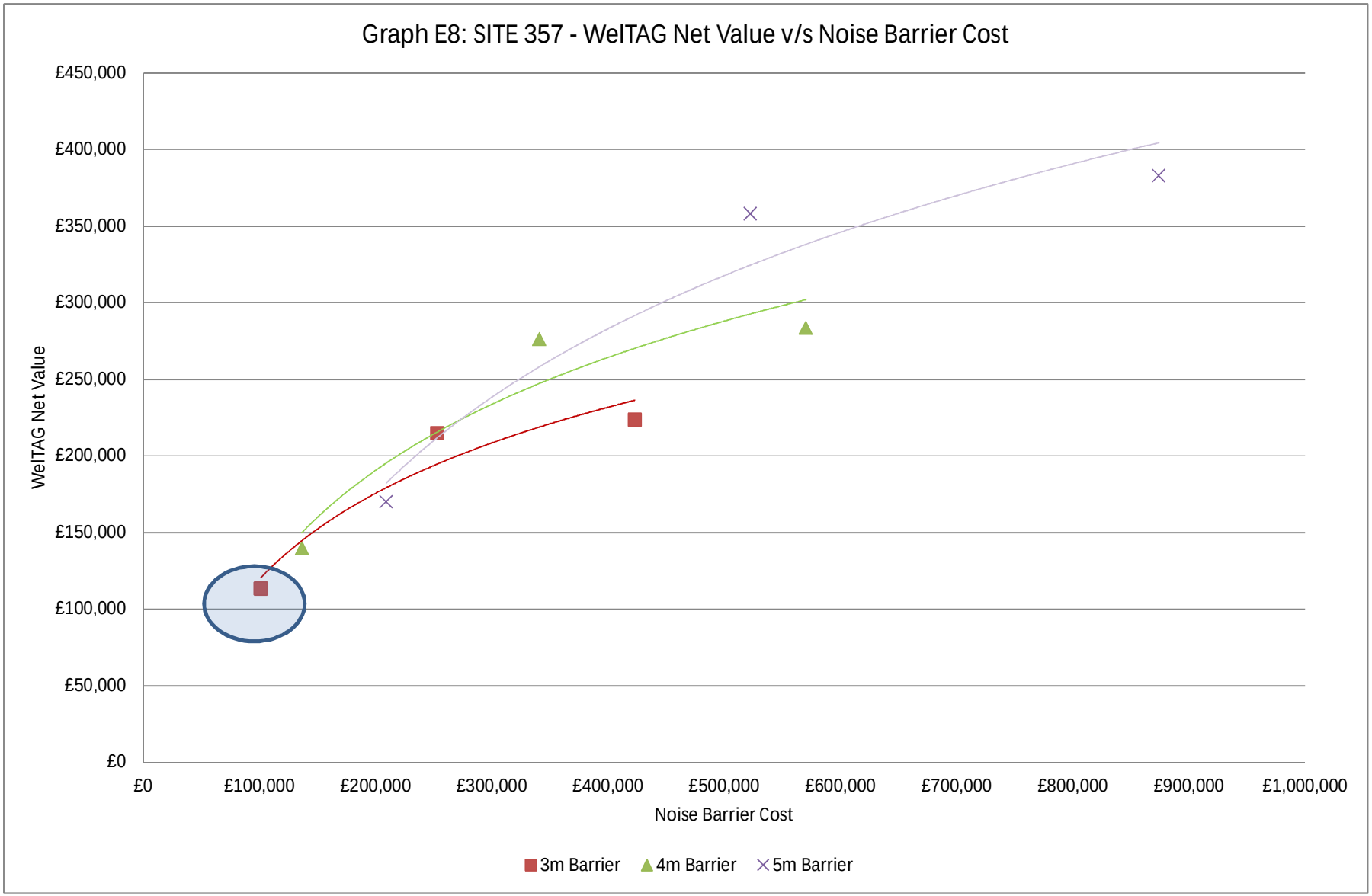

Graph E3: SITE 303 - Number of Receptors v/s Noise Barrier Cost
500
450
400
350
300
250
200
150
100
50
0
-50
Number of Receptors
£0
£200,000
£400,000
£600,000
£800,000
£1,000,000
£1,200,000
£1,400,000
£1,600,000
Noise Barrier Cost
1 - 3 dB reduction
3 - 5 dB reduction
Greater than 5 dB reduction

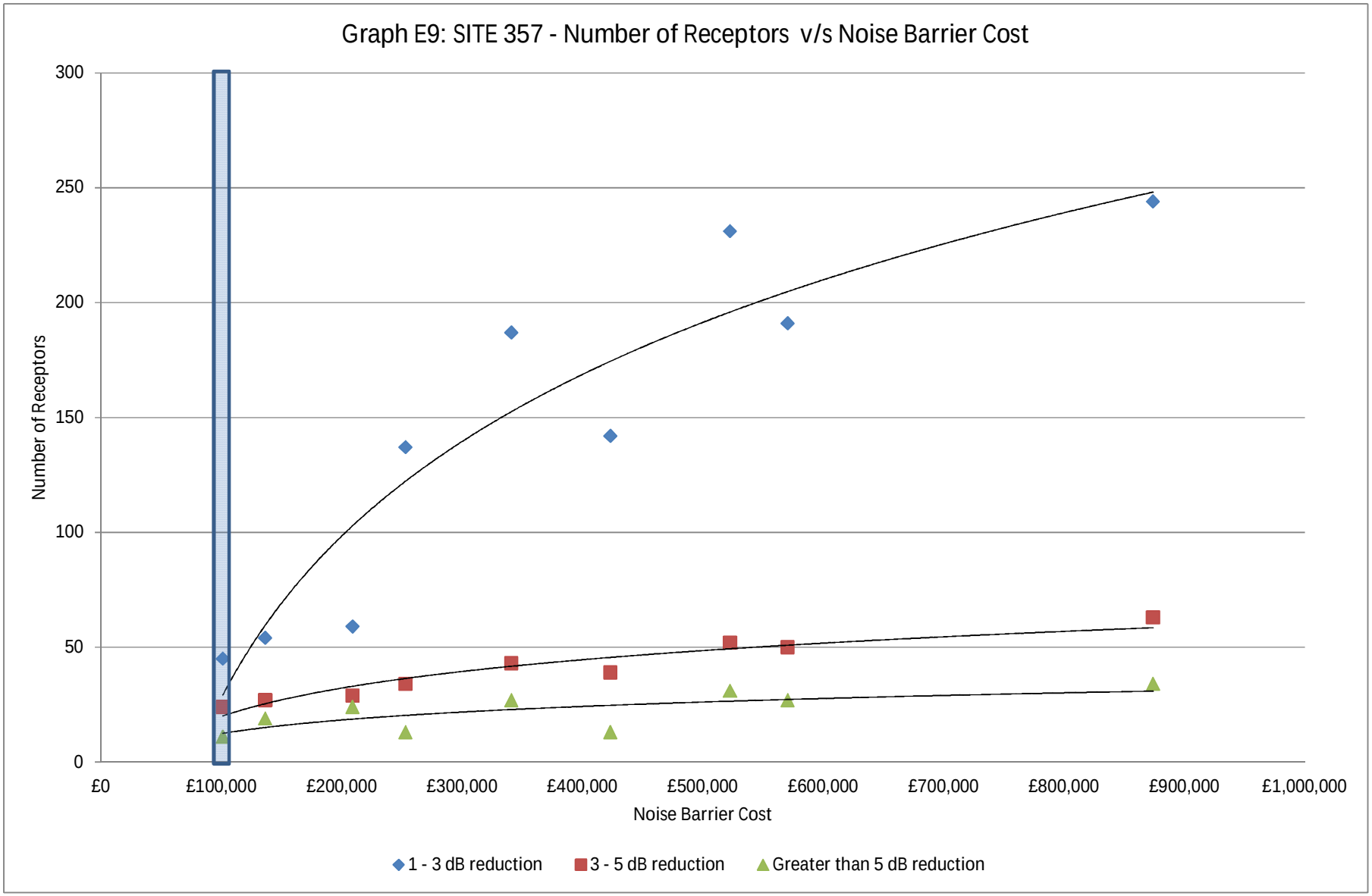

Graph E.4: Site 349 - Noise Barrier Option Selection
Ratio (WelTAG Net Value / Noise Barrier Cost)
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
1
2
3
4
5
6
7
8
9
Noise Barrier Options

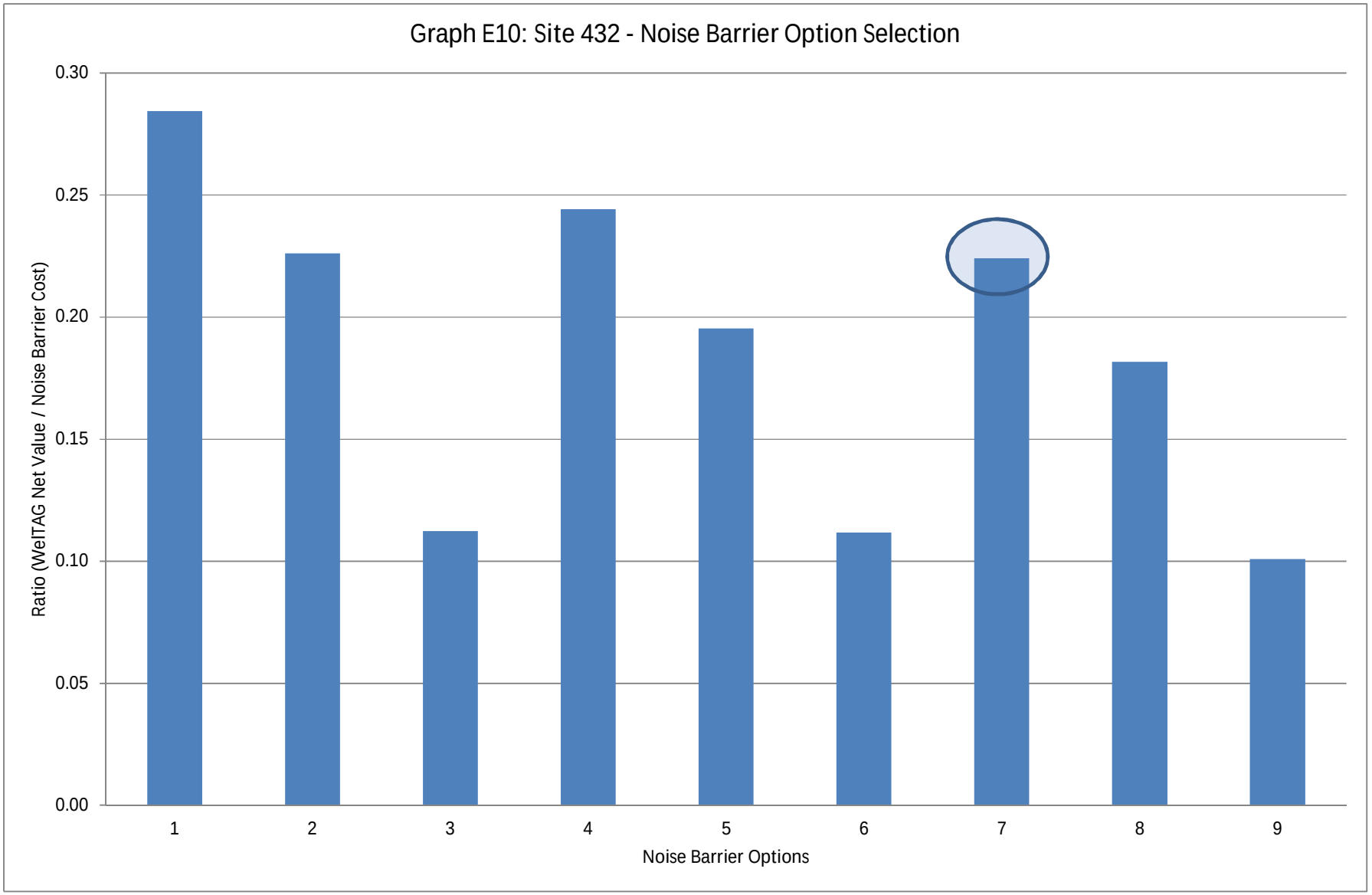

Graph E5: SITE 349 - WelTAG Net Value v/s Noise Barrier Cost
£90,000
£80,000
£70,000
£60,000
£50,000
£40,000
£30,000
£20,000
£10,000
£0
WelTAG Net Value
£0
£50,000
£100,000
£150,000
£200,000
£250,000
£300,000
£350,000
£400,000
£450,000
£500,000
Noise Barrier Cost
3m Barrier
4m Barrier
5m Barrier

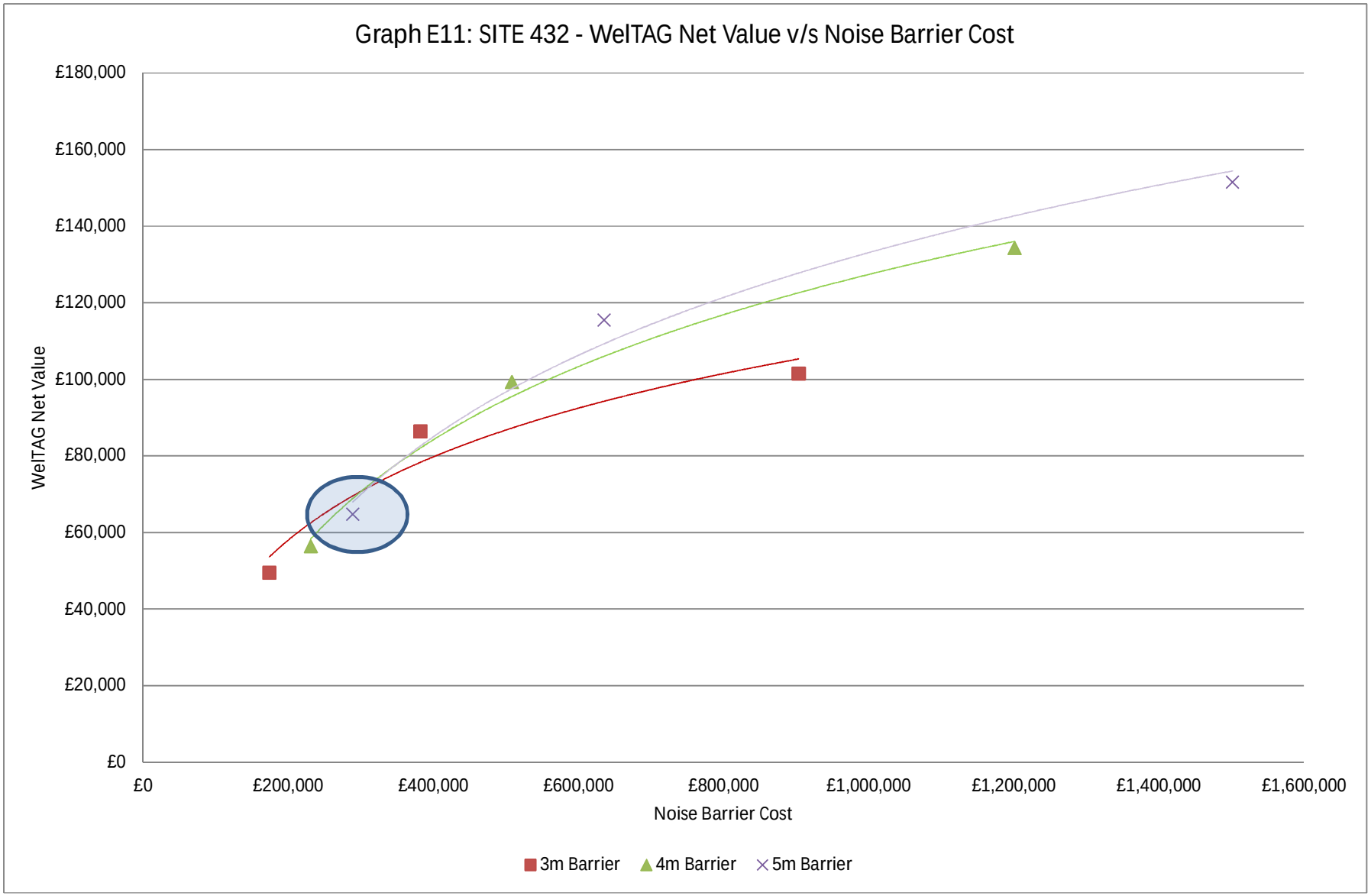

Graph E6: SITE 349 - Number of Receptors v/s Noise Barrier Cost
Number of Receptors
0
10
20
30
40
50
60
70
£0
£50,000
£100,000
£150,000
£200,000
£250,000
£300,000
£350,000
£400,000
£450,000
£500,000
Noise Barrier Cost
1 - 3 dB reduction
3 - 5 dB reduction
Greater than 5 dB reduction

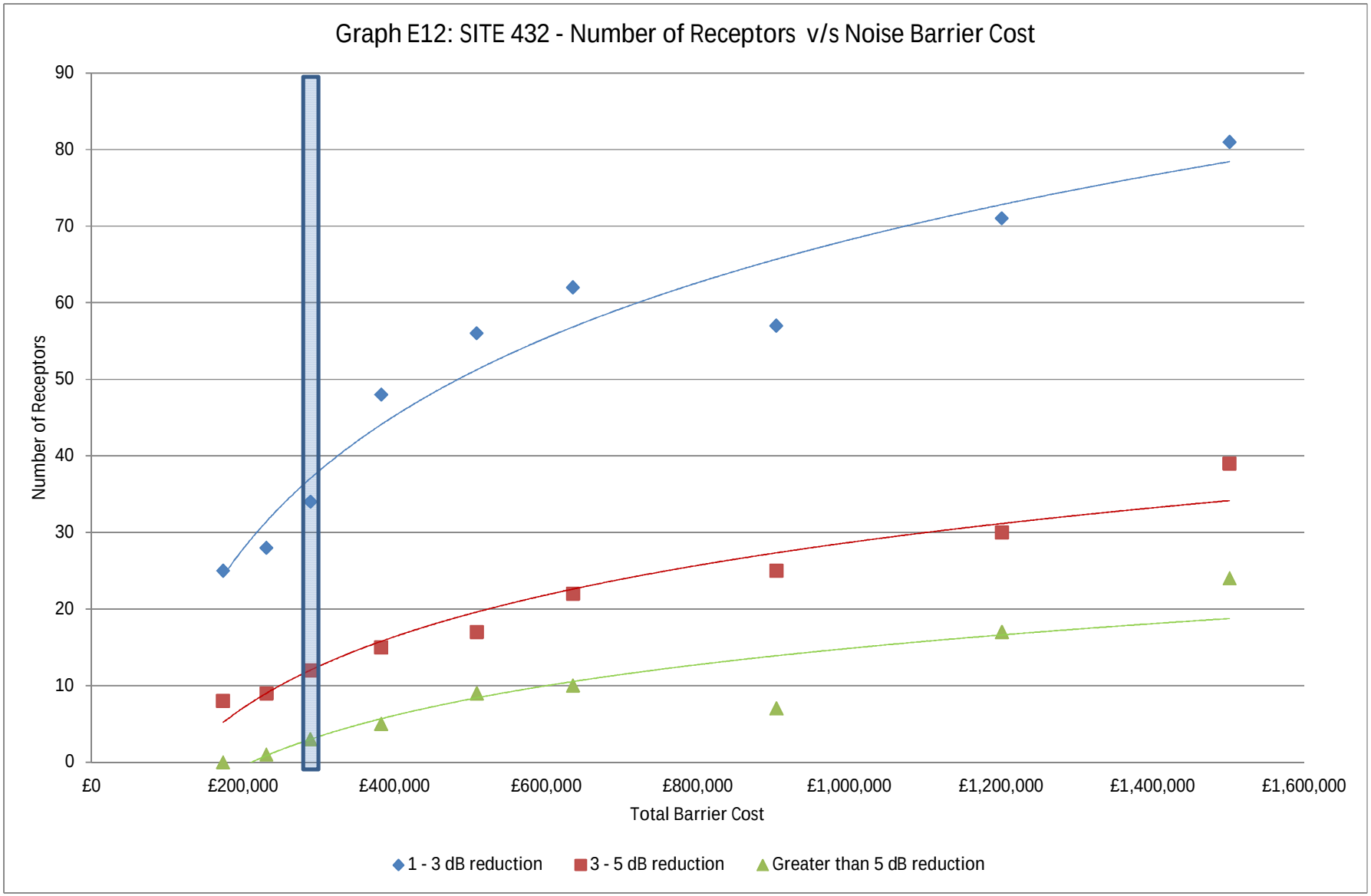

Graph E7: Site 357 - Noise Barrier Option Selection
Ratio (WelTAG Net Value / Noise Barrier Cost)
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1
2
3
4
5
6
7
8
9
Noise Barrier Options

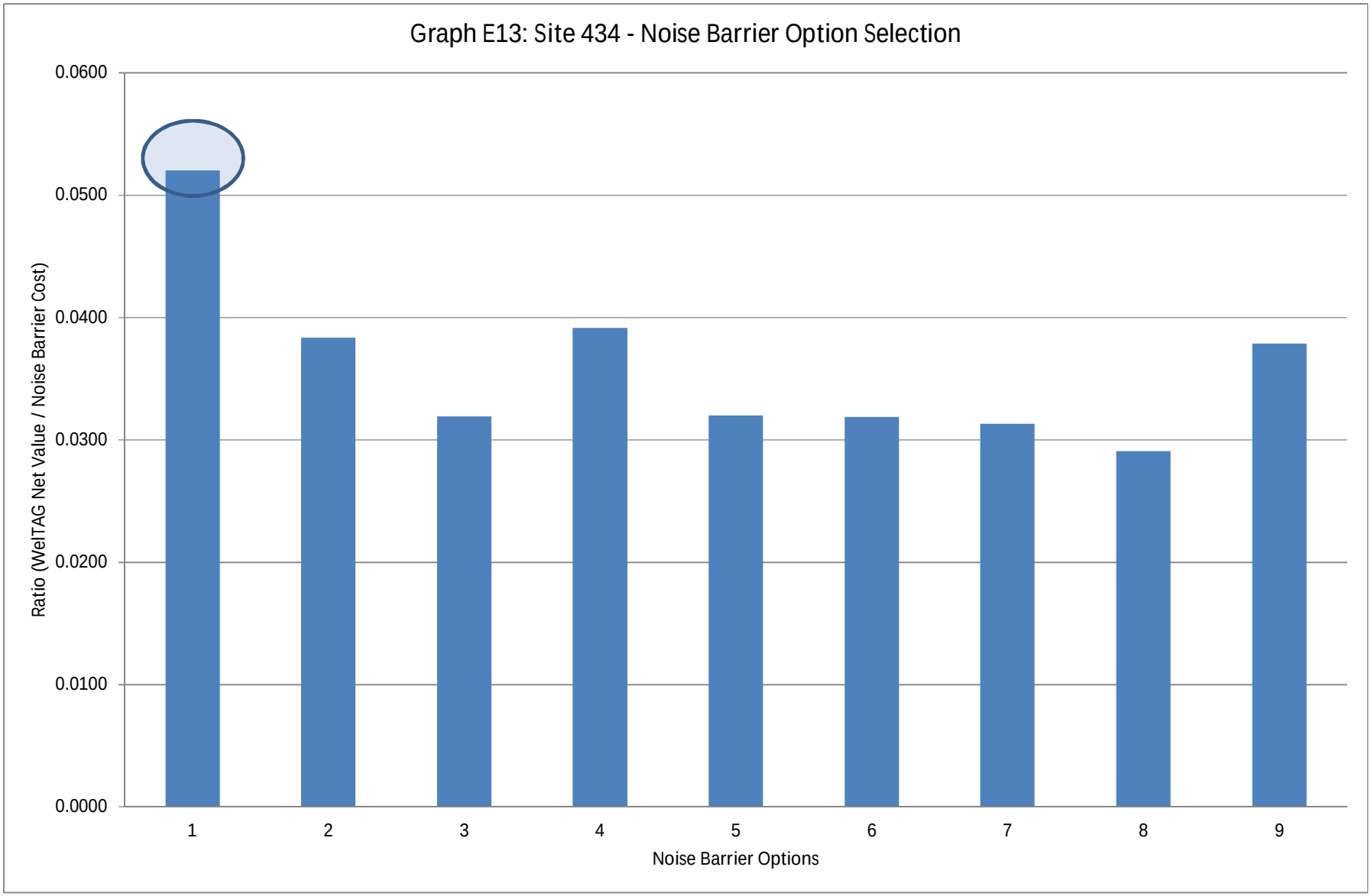

Graph E8: SITE 357 - WelTAG Net Value v/s Noise Barrier Cost
£450,000
£400,000
£350,000
£300,000
£250,000
£200,000
£150,000
£100,000
£50,000
£0
WelTAG Net Value
£0
£100,000
£200,000
£300,000
£400,000
£500,000
£600,000
£700,000
£800,000
£900,000
£1,000,000
Noise Barrier Cost
3m Barrier
4m Barrier
5m Barrier

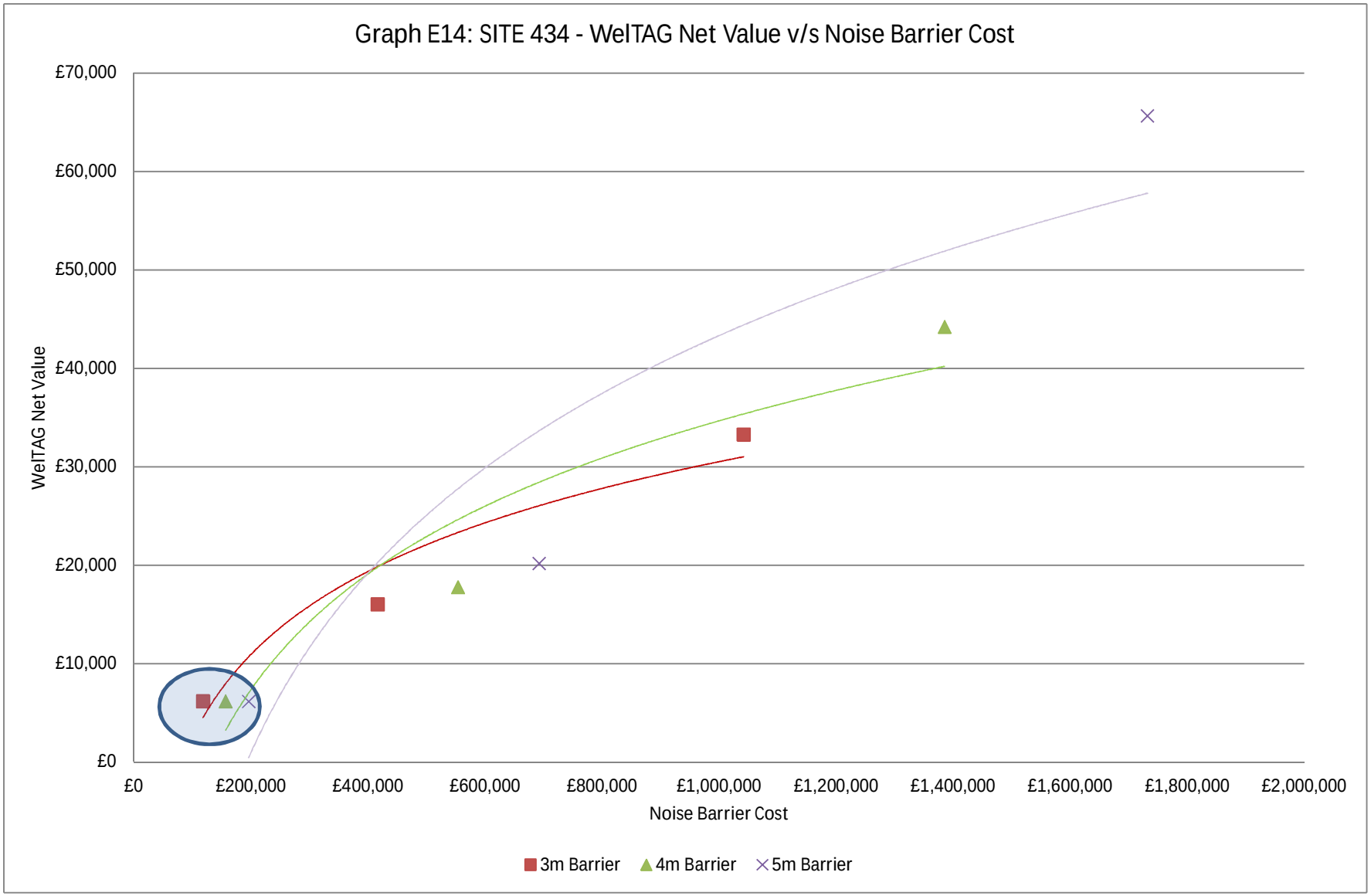

Graph E9: SITE 357 - Number of Receptors v/s Noise Barrier Cost
Number of Receptors
300
250
200
150
100
50
0
£0
£100,000
£200,000
£300,000
£400,000
£500,000
£600,000
£700,000
£800,000
£900,000
£1,000,000
Noise Barrier Cost
1 - 3 dB reduction
3 - 5 dB reduction
Greater than 5 dB reduction

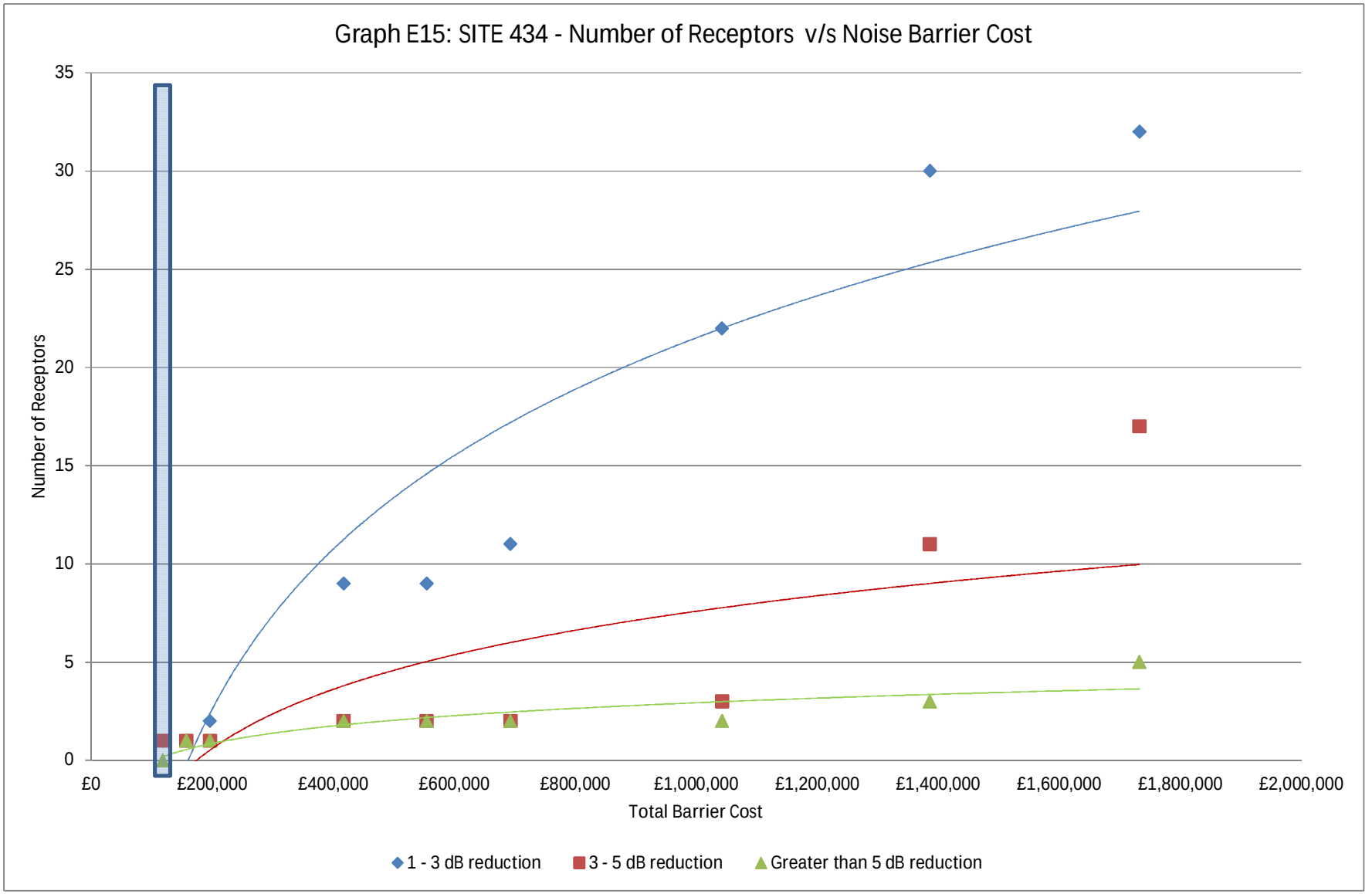

Graph E10: Site 432 - Noise Barrier Option Selection
Ratio (WelTAG Net Value / Noise Barrier Cost)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1
2
3
4
5
6
7
8
9
Noise Barrier Options

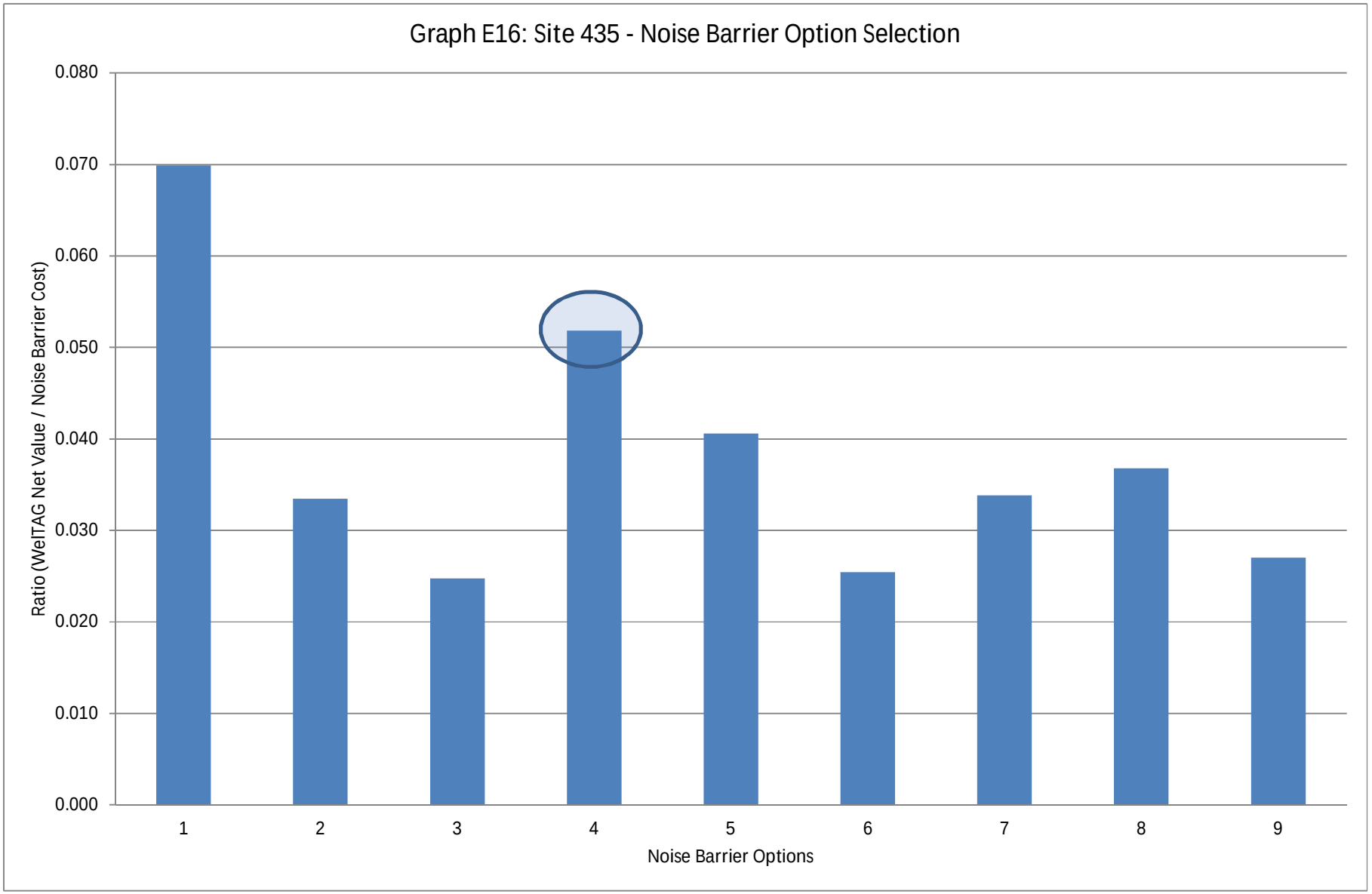

Graph E11: SITE 432 - WelTAG Net Value v/s Noise Barrier Cost
£180,000
£160,000
£140,000
£120,000
£100,000
£80,000
£60,000
£40,000
£20,000
£0
WelTAG Net Value
£0
£200,000
£400,000
£600,000
£800,000
£1,000,000
£1,200,000
£1,400,000
£1,600,000
Noise Barrier Cost
3m Barrier
4m Barrier
5m Barrier

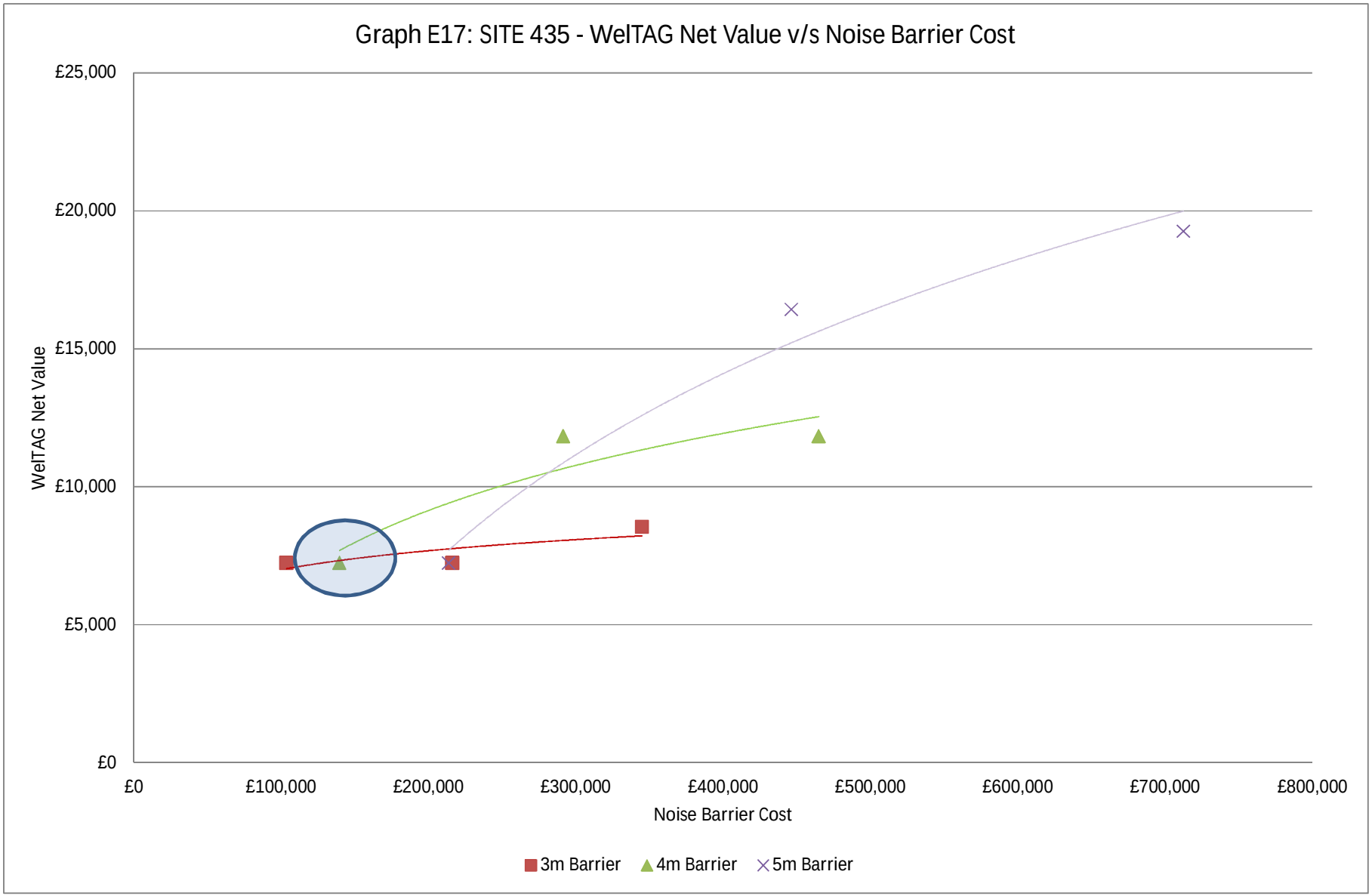

Graph E12: SITE 432 - Number of Receptors v/s Noise Barrier Cost
Number of Receptors
0
10
20
30
40
50
60
70
80
90
£0
£200,000
£400,000
£600,000
£800,000
£1,000,000
£1,200,000
£1,400,000
£1,600,000
Total Barrier Cost
1 - 3 dB reduction
3 - 5 dB reduction
Greater than 5 dB reduction

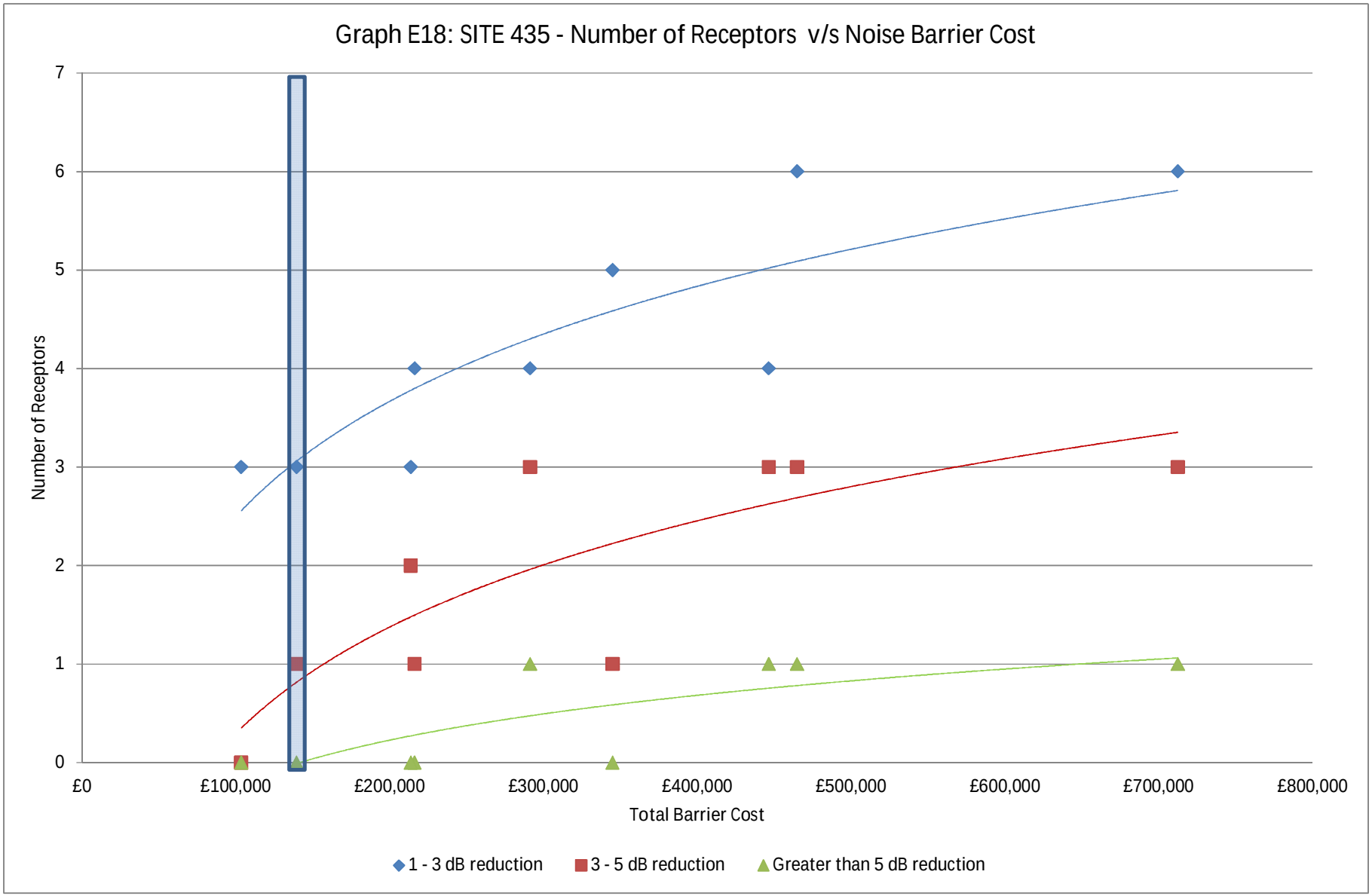

Graph E13: Site 434 - Noise Barrier Option Selection
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
Ratio (WelTAG Net Value / Noise Barrier Cost)
1
2
3
4
5
6
7
8
9
Noise Barrier Options


Graph E14: SITE 434 - WelTAG Net Value v/s Noise Barrier Cost
£70,000
£60,000
£50,000
£40,000
£30,000
£20,000
£10,000
£0
WelTAG Net Value
£0
£200,000
£400,000
£600,000
£800,000
£1,000,000
£1,200,000
£1,400,000
£1,600,000
£1,800,000
£2,000,000
Noise Barrier Cost
3m Barrier
4m Barrier
5m Barrier


Graph E15: SITE 434 - Number of Receptors v/s Noise Barrier Cost
Number of Receptors
0
5
10
15
20
25
30
35
£0
£200,000
£400,000
£600,000
£800,000
£1,000,000
£1,200,000
£1,400,000
£1,600,000
£1,800,000
£2,000,000
Total Barrier Cost
1 - 3 dB reduction
3 - 5 dB reduction
Greater than 5 dB reduction

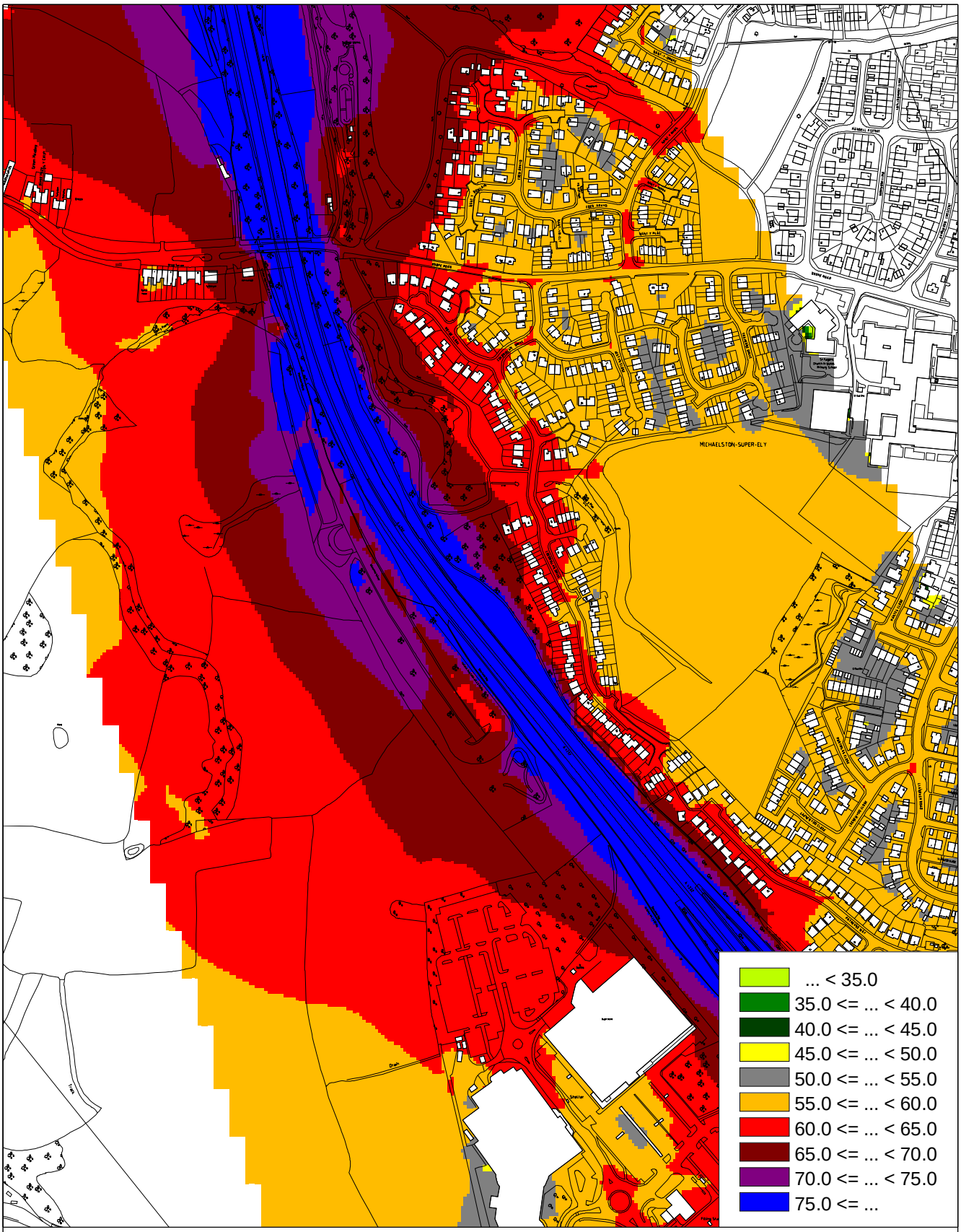

Graph E16: Site 435 - Noise Barrier Option Selection
Ratio (WelTAG Net Value / Noise Barrier Cost)
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
1
2
3
4
5
6
7
8
9
Noise Barrier Options


Graph E17: SITE 435 - WelTAG Net Value v/s Noise Barrier Cost
£25,000
£20,000
£15,000
£10,000
£5,000
£0
WelTAG Net Value
£0
£100,000
£200,000
£300,000
£400,000
£500,000
£600,000
£700,000
£800,000
Noise Barrier Cost
3m Barrier
4m Barrier
5m Barrier


Graph E18: SITE 435 - Number of Receptors v/s Noise Barrier Cost
Number of Receptors
0
1
2
3
4
5
6
7
£0
£100,000
£200,000
£300,000
£400,000
£500,000
£600,000
£700,000
£800,000
Total Barrier Cost
1 - 3 dB reduction
3 - 5 dB reduction
Greater than 5 dB reduction

Appendix F – Noise Contours

Left blank intentionally



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Fax: 44-(0)1179-306-200

Client / Project:

SWTRA - Site 303 - A4232

Title:

Option 4

Absolute Noise Level - LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15	Scale: NTS	A4	Sheet: 1 of 1
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 7**		1

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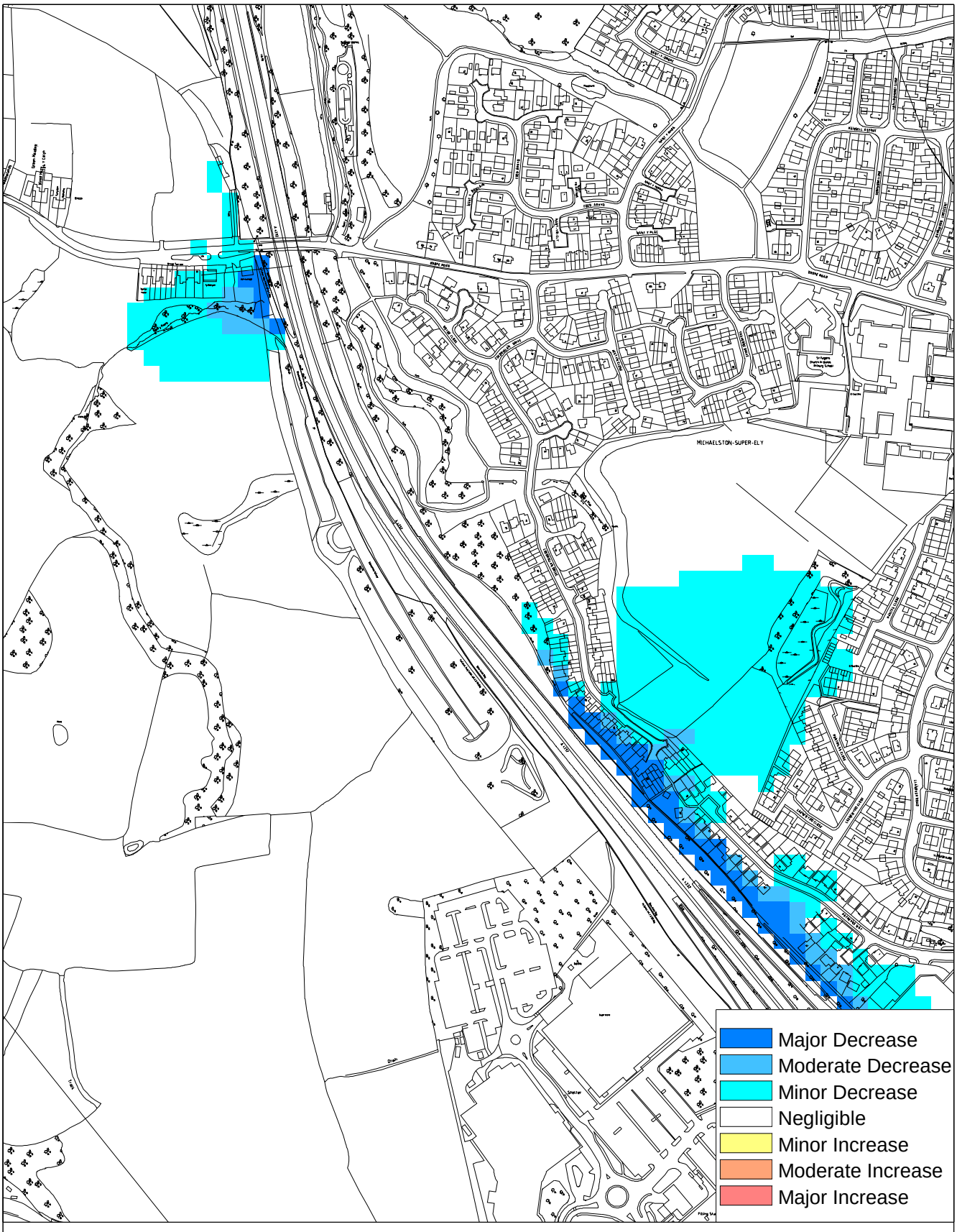

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Client / Project:

SWTRA - Site 303 - A4232

Title:

Option 4

Noise level change - LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15	Scale: NTS	A4	Sheet: 1 of 1
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 8**		1

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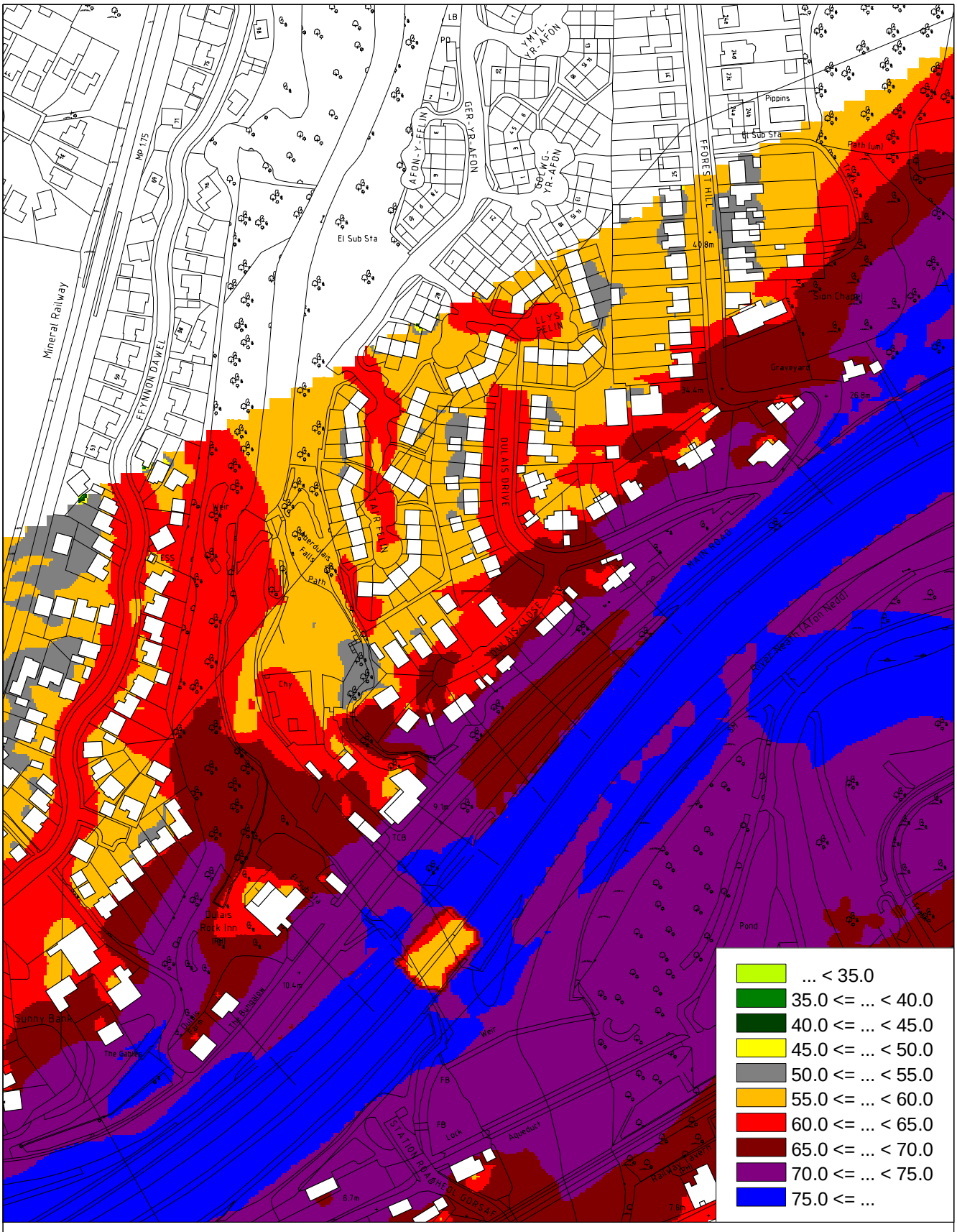

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Project:

SWTRA - Site 349 - A465

Title:

Option 5
Absolute Noise Level LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 9**		1

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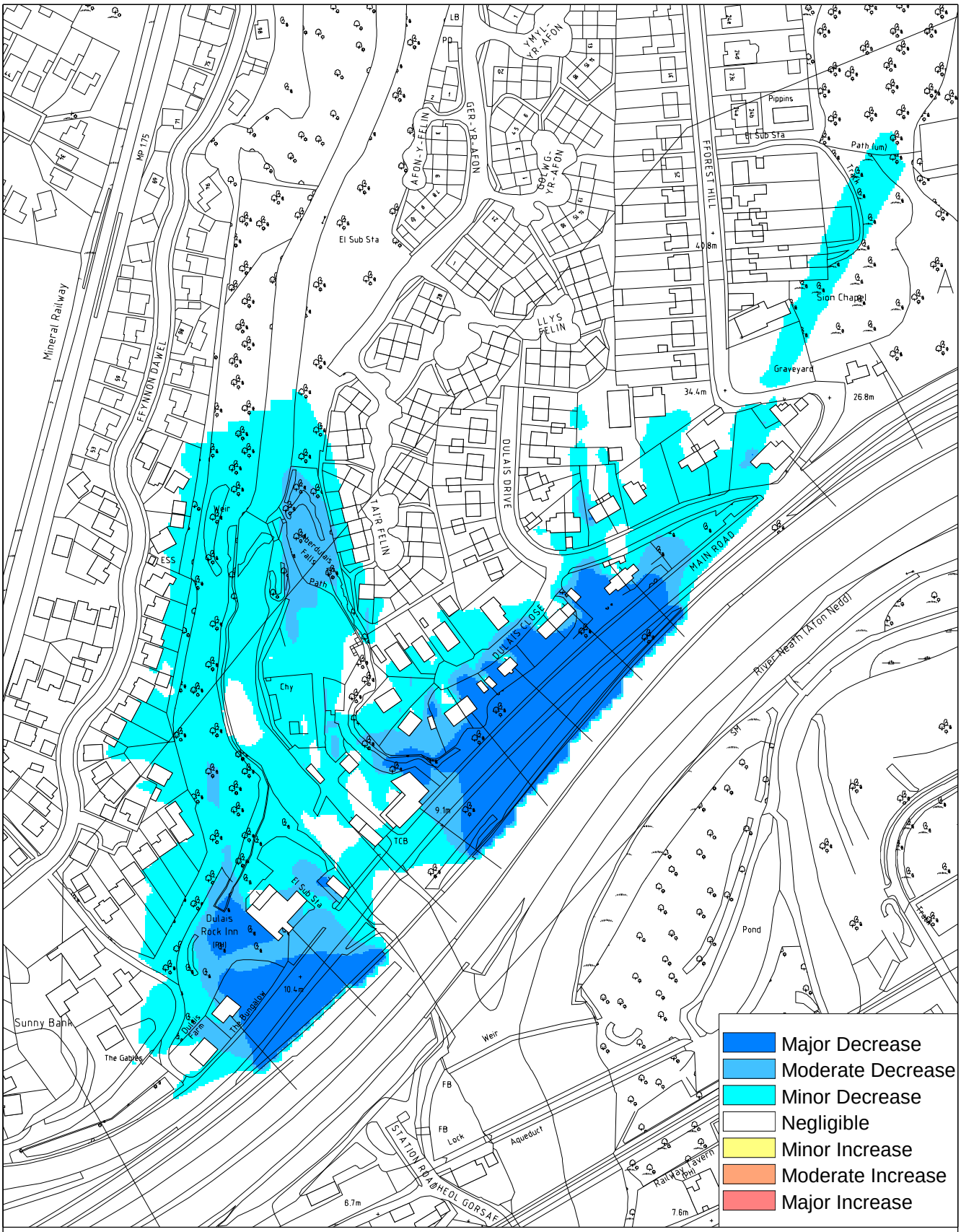

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Project:

SWTRA - Site 349 - A465

Title:

Option 5
Noise Level Change LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 10**		1

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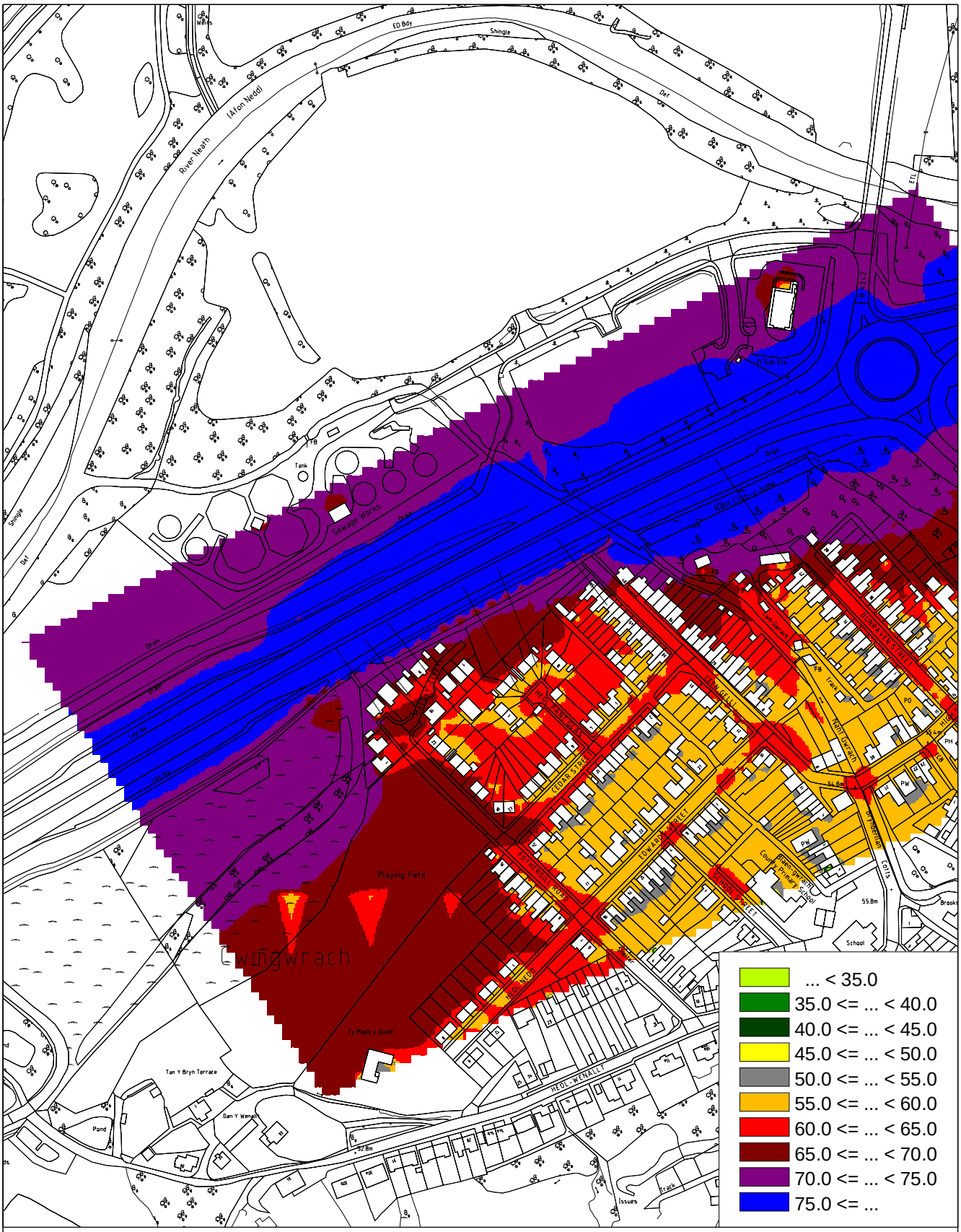

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Project:

SWTRA - Site 357 - A465

Title:

Option 1
Absolute Noise Level LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 11**		1

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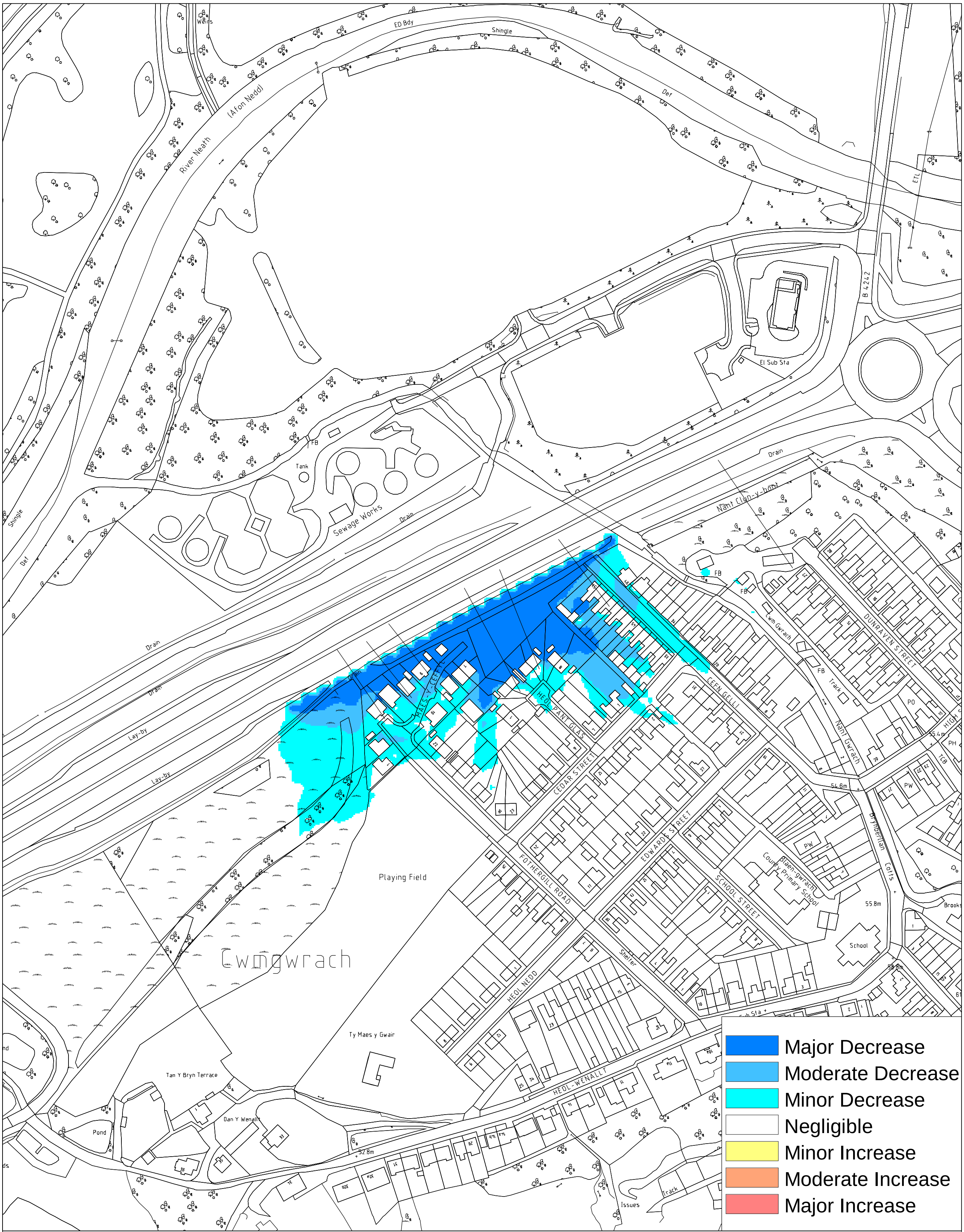

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Project:

SWTRA - Site 357 - A465

Title:

Option 1
Noise Level Change LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number: 3512209HQ	Drawing Number Figure 12		Revision: 1

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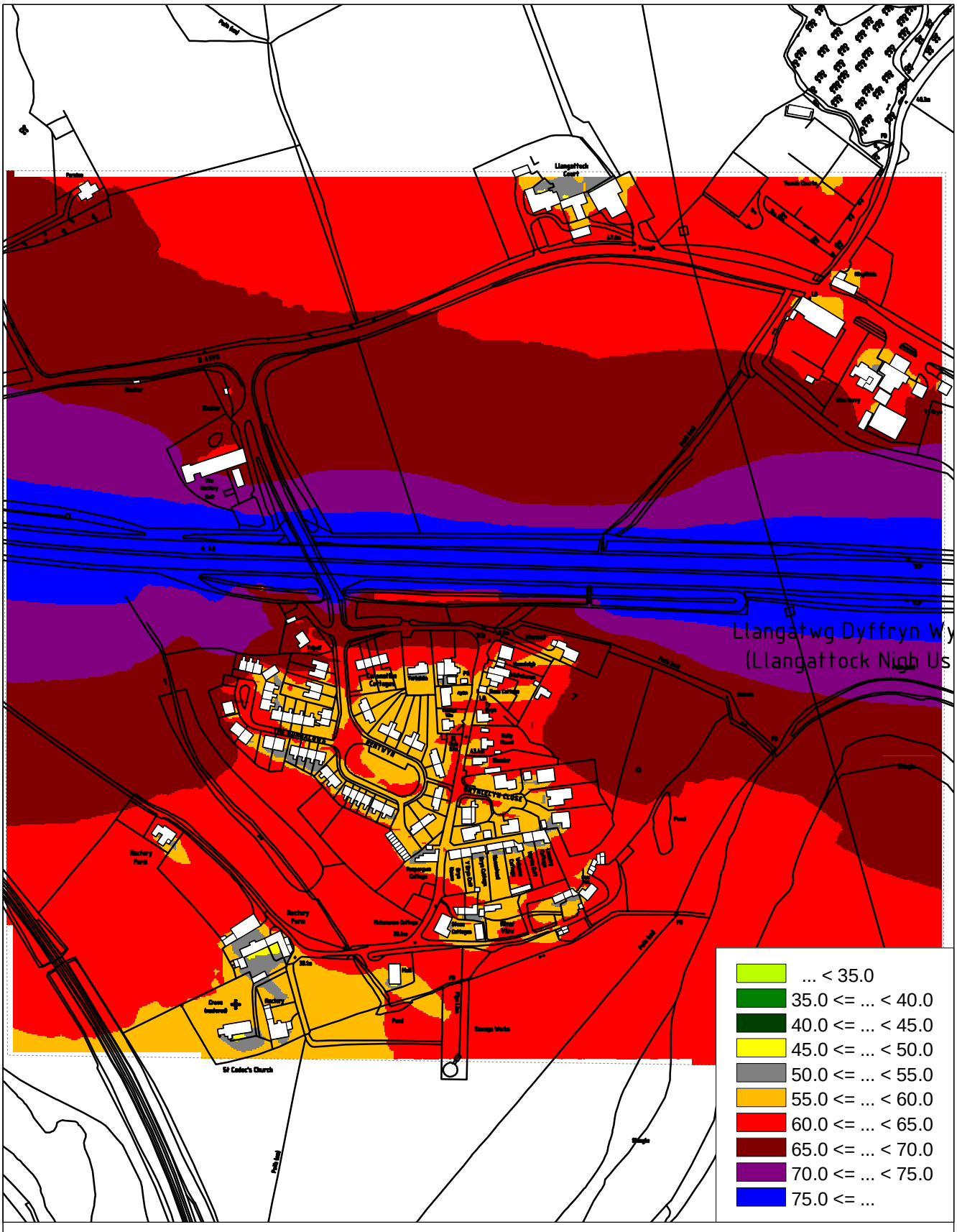

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Project:

SWTRA - Site 432 - A40

Title:

Option 7
Absolute Noise Level LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 13**		1

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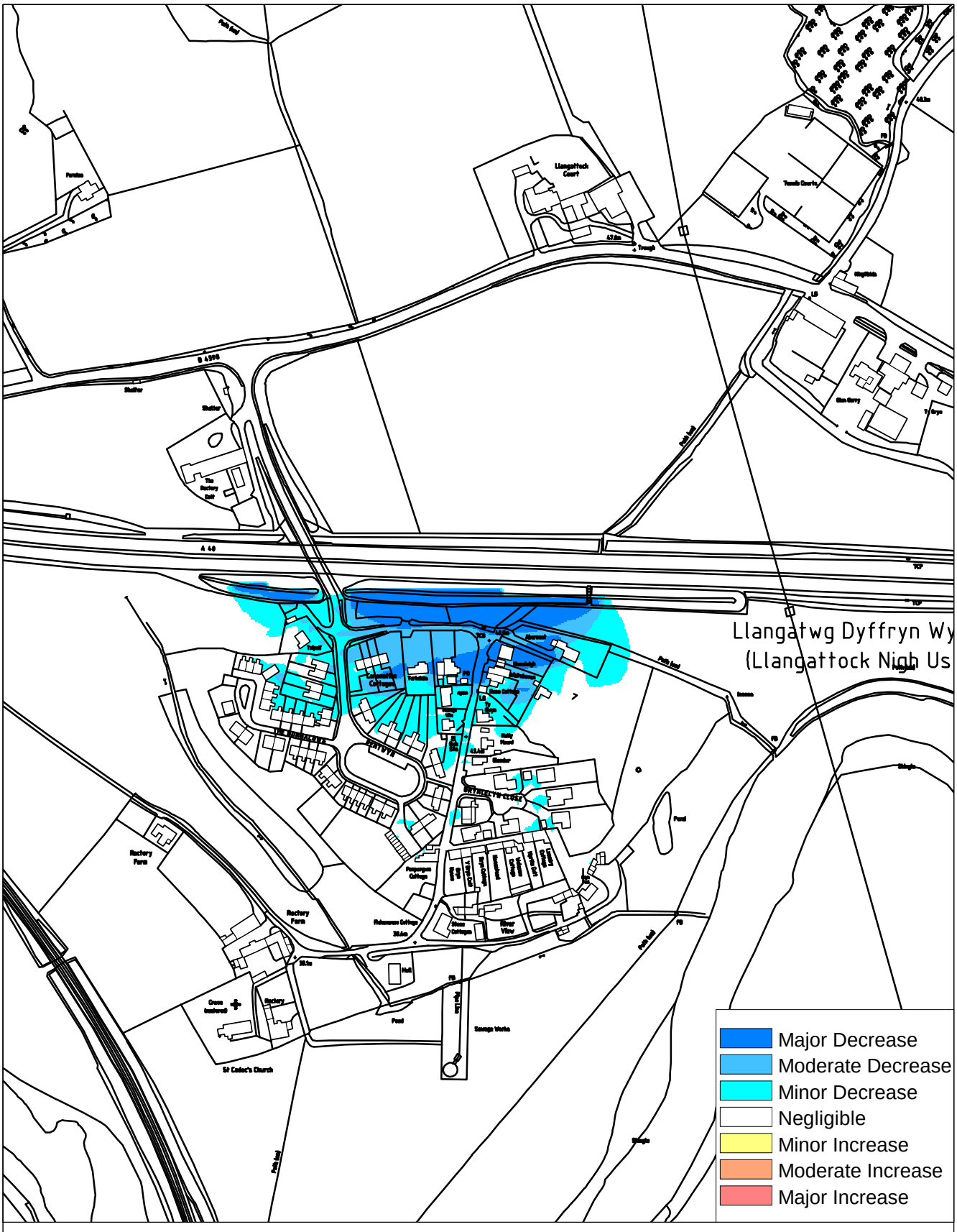

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Project:

SWTRA - Site 432 - A40

Title:

Option 7
Noise Level Change LA10,18h dB

Drawn:	MM	Checked	EO
Methodology:	CRTN	Height:	1.5m
Date:	22/04/15	Scale:	NTS

Project Number:	Drawing Number	Revision:
3512209HQ	**Figure 14**	1

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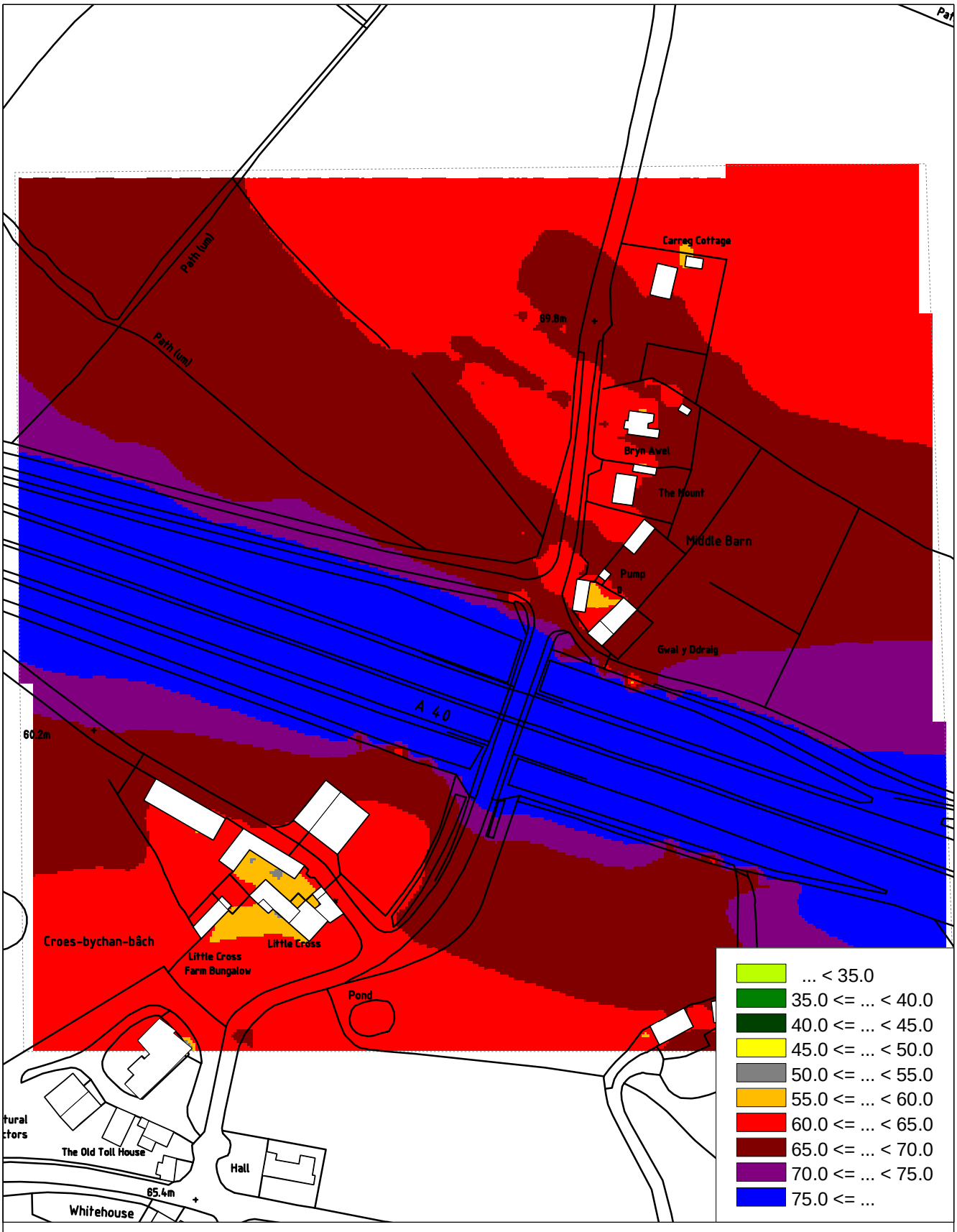

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Project:

SWTRA - Site 434 - A40

Title:

Option 1
Absolute Noise Level LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 15**		1

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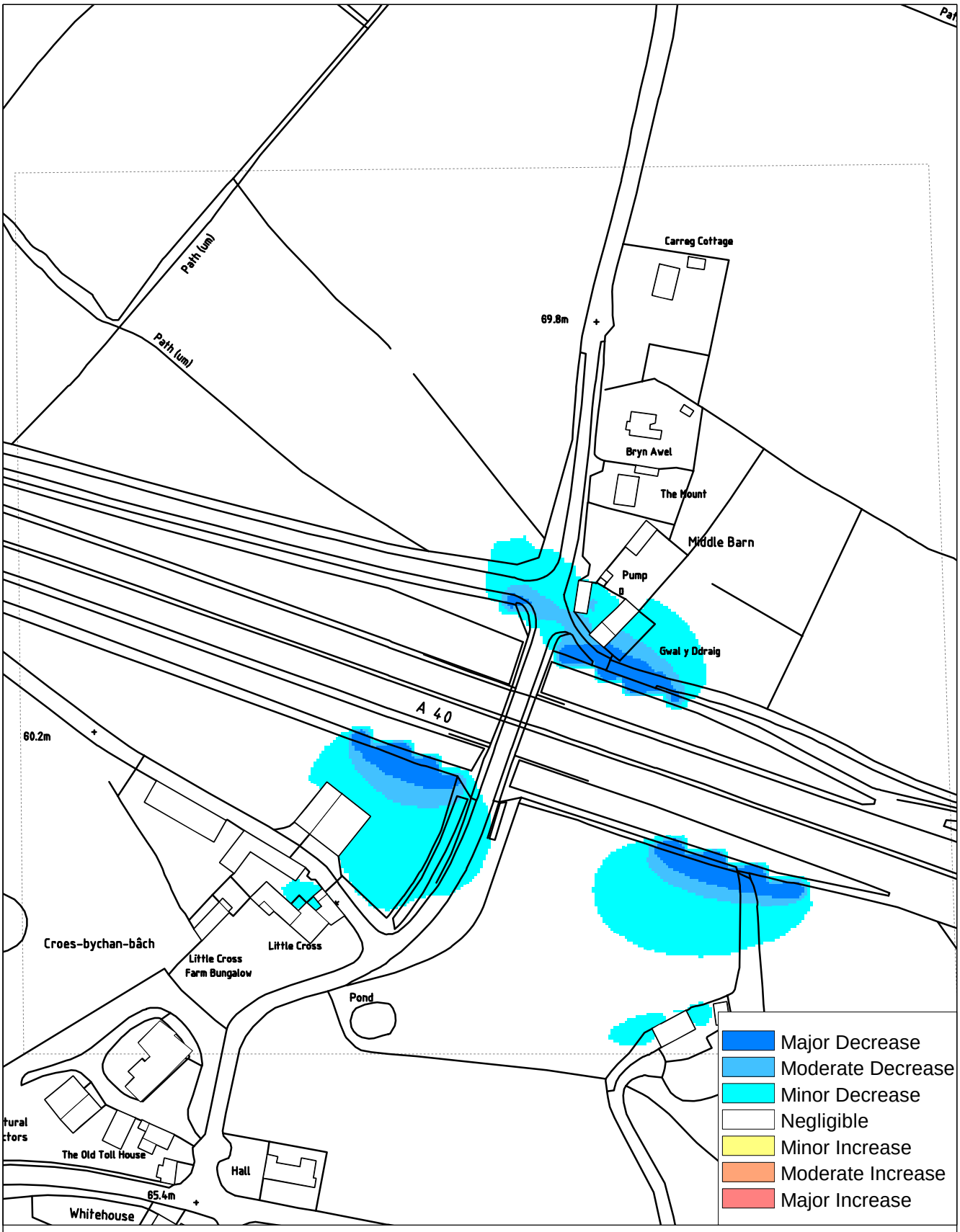

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SWTRA - Site 434 - A40

Title:

Option 1
Noise Level Change LA10,18h dB

Drawn:	MM	Checked	EO
Methodology:	CRTN	Height:	1.5m
Date:	22/04/15	Scale:	NTS

Project Number:	Drawing Number	Revision:
3512209HQ	**Figure 16**	1

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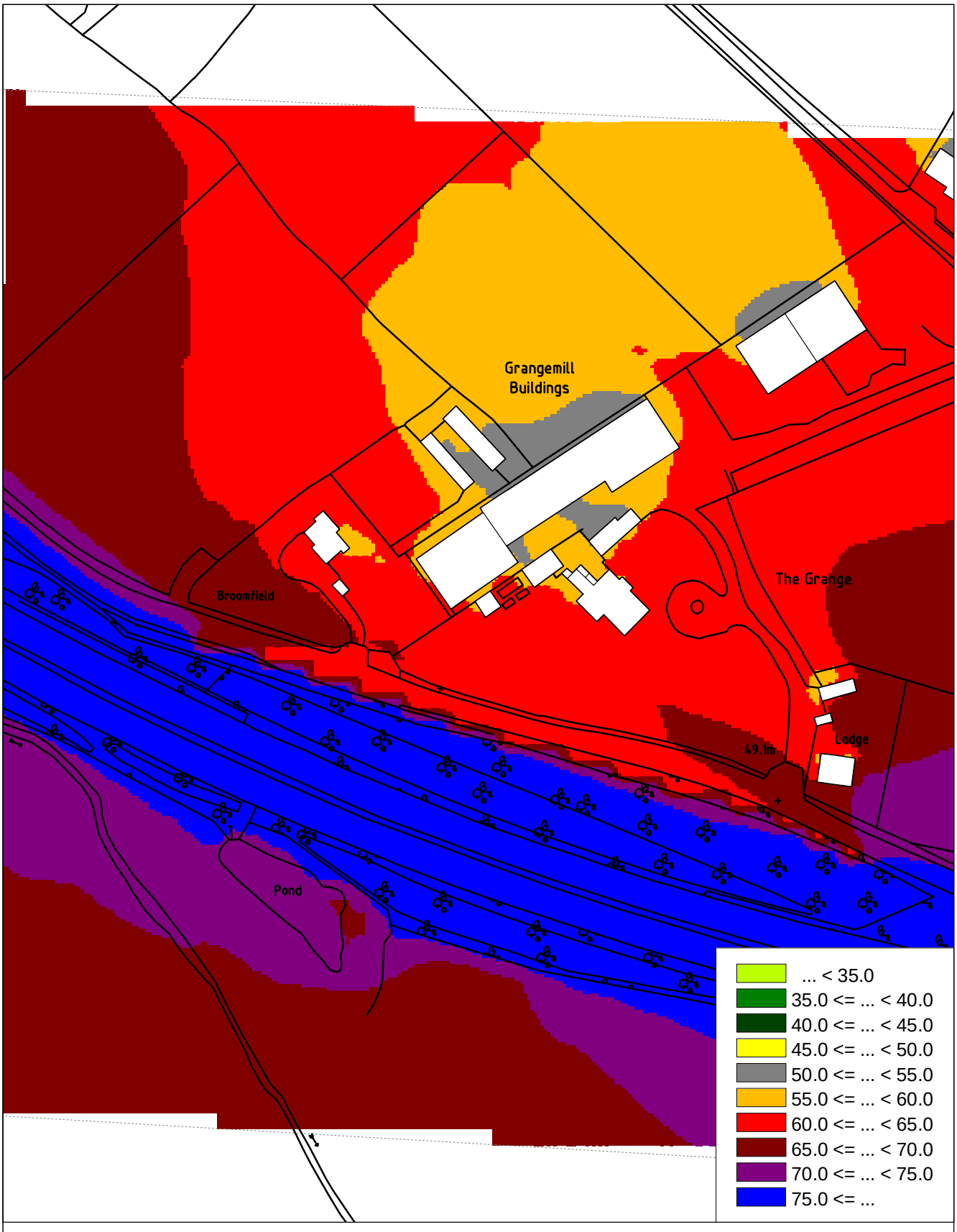

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Project:

SWTRA - Site 435 - A40

Title:

Option 4
Absolute Noise Level LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 17**		1

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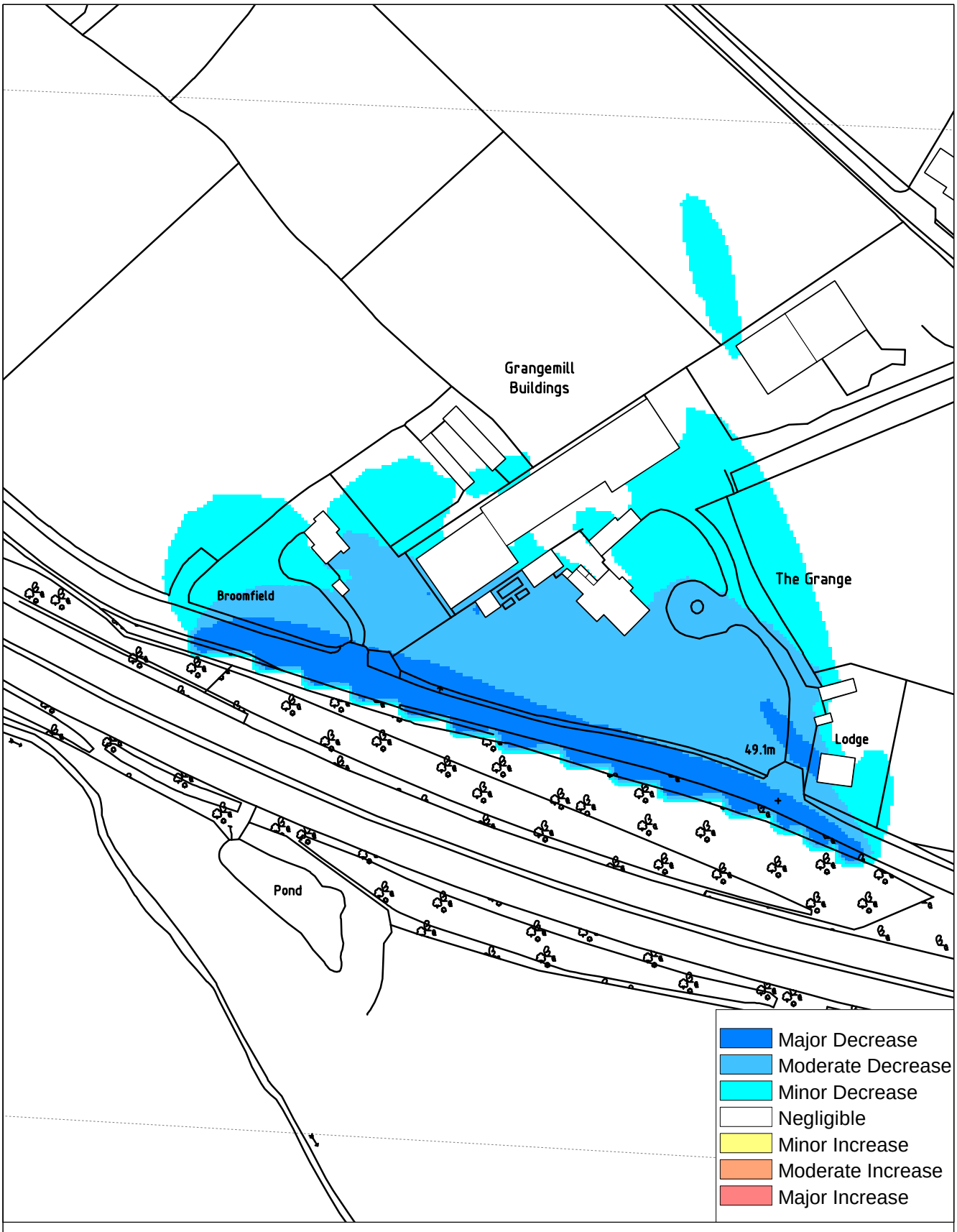

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Title:

Option 4
Noise Level Change LA10,18h dB

Drawn: MM		Checked EO	
Methodology: CRTN		Height: 1.5m	
Date: 22/04/15		Scale: NTS	
Project Number:	Drawing Number		Revision:
3512209HQ	**Figure 18**		1

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