Lower Thames Crossing

# 9.152 Responses to the Examining Authority's ExQ2 Appendix E – 9. Noise & Vibration

Infrastructure Planning (Examination Procedure) Rules 2010

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# Lower Thames Crossing

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# 1 Introduction

## 1.1 Introduction

1.1.1 This document has been prepared by the Applicant to set out its responses to the ExQ2 - Examining Authority's (ExA's) written questions and requests for information (ExQ2) [**PD-040**].

1.1.2 These can be found in Tables set out under the following headings:

a. Climate Change and carbon emissions (Found in Appendix A)

b. Traffic and transportation (Found in Appendix B)

c. Air quality (Found in Appendix C)

d. Geology and soils (Found in Appendix D)

e. Tunnelling considerations (Found in Appendix D)

f. Waste and materials (Found in Appendix D)

g. Noise and vibration (Found in Appendix E)

h. Road Drainage, water environment and flooding (Found in Appendix F)

i. Biodiversity (Found in Appendix G)

j. Physical effects of development and operation (Found in Appendix H)

k. Social, economic and land-use considerations (Found in Appendix I)

l. The acquisition and temporary possession of land and rights (Found in Appendix J)

m. General overarching questions (Found in Appendix J)

# 2 Responses to the Examining Authority's ExQ2 9

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| ExQ2_Q9.1.2 | Applicant, Local Planning | **Noise Insulation Regulations**<br>Should the commitment in NV018 of the Code of Construction Practice [**REP5-049**] be updated to provide a positive commitment to secure the provision of noise insulation in the event that any property/ies are found to be eligible? |
| | | **Response:**<br>Commitment NV018 of the Code of Construction Practice [**REP5-049**] was added at Deadline 5 to ensure that undertaking calculations to determine eligibility under The Noise Insulation Regulations 1975 was secured through the draft Development Consent Order [**REP5-024**]. The Applicant does not consider that commitment NV018 needs to be updated to provide a positive commitment. The wording of Regulation 3 within The Noise Insulation Regulations 1975 is such that providing insulation is a duty of the Applicant, should any properties be eligible. This wording is considered to be sufficient to ensure this is a positive commitment that will be undertaken. |
| ExQ2_Q9.1.6 | Applicant only | **Construction vibration monitoring: heritage assets**<br>With reference to the matter raised in Q9.1.5 above:<br>• Please provide details of any heritage assets which you consider need to be specifically considered.<br>• Please provide details of how mitigation/avoidance of harm would be carried out in the event that monitoring indicated a potential unacceptable impact was likely to occur.<br>• Please set out any particular monitoring and mitigation for vibration effects that would take place to avoid harm to the gate arch structure at Grove Barn House, South Ockendon (close to The Wilderness). |
| | | **Response:**<br>The Applicant has not identified any buried archaeological remains which have the potential to be affected by vibration. For clarity any archaeological remains close enough to piling activities to be impacted will have been removed as part of the programme of archaeological mitigation.<br>The Applicant has identified 25 listed buildings and 17 non-designated structures that have the potential to be affected by vibration during construction, including movements along haul roads and accessing the Project. These assets are set out in Table 1 and Table 2 below. |

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**Table 1: Designated assets**

| Project ID | Name | Grade | List entry | Potential source of vibration |
|---|---|---|---|---|
| LB205 | Church of St Mary | I | 1111576 | 30m from utilities online access route on Chadwell Hill and 23m from utility diversion works for multi-utility networks |
| LB306 | Church of St Peter and St Paul | II* | 1341484 | 22m north of Short Term Online Main Construction Access Route |
| LB109 | Barn and Stable Block to the North of Broadfields Farmhouse | II | 1358548 | Near M25. 20m from utility works, 60m from Mains Works Area. |
| LB190 | Rose Cottage | II | 1095057 | 15m from utility diversion works in Cobham |
| LB211 | Chadwell House | II | 1166282 | 11m from utilities online access route on Chadwell Hill and 6m from utility diversion works for multi-utility networks |
| LB213 | Sleepers Farmhouse | II | 1337061 | 15m from utilities online access and 10m from utility diversion works for multi-utility networks |
| LB254 | Church of St Mary (Roman Catholic) | II | 1089037 | 8m from Short Term Online Main Construction Access Route |
| LB321 | Barrelled Lock Chamber, Sea Walls, Swing Bridge, Locks and Canal Basin | II | 1393973 | Immediately adjacent to Short Term Online Main Construction Access Route |
| LB326 | Milton War Memorial | II | 1441607 | Immediately adjacent to Short Term Online Main Construction Access Route |
| LB37 | Whitecrofts Farmhouse | II | 1111566 | Immediately adjacent to Mains Works Area |
| LB40 | Heath Cottage | II | 1111574 | Immediately adjacent to utility diversions for multi-utility networks |
| LB41 | Heath Place | II | 1111575 | 20m from utility diversions for multi-utility networks |
| LB45 | Slades Hold Cottages | II | 1111608 | Asset is located immediately adjacent to utility diversions for multi-utility networks and utilities online access route |
| LB48 | Polwicks | II | 1111623 | 23m from utility diversions for multi-utility networks and Secondary Access Mains Works Construction Access Route. |

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| LB49 | Walnut Tree Cottage | II | 1111624 | 20m from utility diversions for multi-utility networks and Secondary Access Mains Works Construction Access Route. |
| LB5 | Kilbro | II | 1079868 | Immediately adjacent to utility diversions for multi-utility networks and Short Term Online Main Works Construction Access Route |
| LB53 | The Wilderness | II | 1111631 | Asset is located immediately adjacent to utility diversions for multi-utility networks and utilities online access route |
| LB56 | Mill House | II | 1111642 | Asset is located immediately adjacent to utility diversions for multi-utility networks and utilities online access route |
| LB6 | Russell Cottage | II | 1079869 | c.10m east of utility diversion works for multi-utility networks and Short Term Online Man Works Construction Access Route |
| LB60 | Whitfields | II | 1146709 | Asset is located c.15m west of utility diversions for multi-utility networks and utilities online access route |
| LB61 | Poplars Farmhouse | II | 1146717 | 20m from utility diversions for multi-utility networks and utilities online access route |
| LB64 | Former Gateway at Groves Barns | II | 1147431 | Immediately adjacent to Mains Works Area, utility diversions for multi-utility networks and Secondary Access Mains Works Construction Access Route. |
| LB66 | Buckland | II | 1147796 | 35m away from Mains Works Area |
| LB7 | The Forge | II | 1079870 | Immediately adjacent to utility diversions for multi-utility networks and Short Term Online Main Works Construction Access Route |
| LB8 | Castle Cottages | II | 1079871 | Immediately adjacent to utility diversions for multi-utility networks and Short Term Online Main Works Construction Access Route |

**Table 2: Non-designated assets**

| Project ID | Name | Potential source of vibration |
|---|---|---|
| 1435 | 'Polperro' Second World War, anti-aircraft headquarters, Rochester Road, Chalk | Within 15m of Mains Works Area, earthworks and southern tunnel entrance compound |
| 3448 | Early 19th century Wash House, Rose Cottage, Cobham | 25m south-west of utility diversion for multi-utility networks |

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| 4158 | Bankes House, Ockendon Road, Upminster, RM14 3QJ | Immediately adjacent to utility diversion for multi-utility networks and Short Term Online Mains Works Construction Access Route |
| 4160 | Marling Manor, Watling Street, Gravesend, DA12 5UD | Gas diversion within grounds of house and Mains Works Area c.10m to south |
| 4161 | Boughurst Cottage, Brewers Road, Shorne, Gravesend, DA12 3HD | Asset within c.12m of Mains Works Area and Gas Network diversions |
| 4163 | Brook Farm, Linford, Orsett, Grays, RM16 3DT | Multiple activities immediately adjacent to asset |
| 4164 | Hobletts Farm, Green Lane, Orsett, Grays, RM16 3AN | 27m from multi-network utility diversions |
| 4165 | Manor Farm, including buildings adjoining farmhouse, Ockendon Road, Upminster, RM14 2TZ | Multiple activities immediately adjacent to asset |
| 4349 | Thong Mead | 27m from multi-network utility diversions |
| 57 | Linford Pumping Station | Asset immediately adjacent to multi-network utility works and utilities online access route |
| 116 | Orsett Post Mill Round House | Adjacent to utilities online access route |
| 1561 | Homes for Heroes | Immediately adjacent to multiple activities |
| 4597 | Homes for Heroes | Within 25m of multiple activities |
| 4598 | Homes for Heroes | Within 25m of multiple activities |
| 4406 | Homes for Heroes | Within 25m of utility diversions |
| 4606 | Homes for Heroes | Within 25m of utility diversions |
| 1874 | WWII Air Raid Shelter | Immediately adjacent to utility diversions |

In the event of a potential unacceptable impact, work would be stopped at the earliest reasonably practicable opportunity and the cause of the vibration investigated, this would be actioned under the Register of Environmental Actions and Commitments (REAC) commitments made in NV009 relating to monitoring of vibration and NV015 and NV017 for control measures. Steps would be taken to reduce the level of vibration from the activity. If this is not possible then an alternative method to undertake the work would be investigated. Should an alternative method of construction not be possible then the Applicant would look to provide mitigation to the structure, e.g. supporting the structure with scaffolding.

There is no particular monitoring or mitigation identified for the gate arch structure at Grove Barn House. Monitoring will be considered as with other locations, as described in NV009 of the REAC, within the Code of Construction Practice [**REP5-048**]. In terms of mitigation if vibration effects are identified, the actions outlined

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| | | in the response to the second part of this question would be followed. This structure is over 250metres from any piling or earthworks activities associated with the building of the Lower Thames Crossing alignment, and so no vibration impacts would be expected from these activities. However, with the structure being alongside a haulage route using the existing road, that is due to be used during Phase 1 of construction (month 1 to month 8), there could be vibration generated by large vehicles passing the gate arch structure.<br>The specific measures outlined in NV010 of the REAC [**REP5-048**] for the use of haulage routes would therefore be applicable to this location and minimise the generation of vibration by the removal of surface irregularities such as potholes. In addition, the imposition of a lower speed limit for construction traffic passing the gate arch structure could be considered under the same REAC commitment. |
| ExQ2_Q9.1.7 | Applicant only | **Whitecroft Care Home: construction noise**<br>What additional measures do you consider could/should be put in place to minimise the impact of construction noise on the care home residents? In responding please:<br>• Have specific regard to the submissions from Whitecroft Care Home (including [REP4-382]).<br>• Have regard to any potential negative effects of mitigation methods on the residents, such as the physical effect of acoustic screening.<br>Set out how any additional monitoring and mitigation could/would be secured (ie via the Code of Construction Practice). |
| | | **Response:**<br>Following the representations and comments made by those with an interest in the care home, additional discussion and consideration has been given to the specific measures of Best Practicable Means (BPM) that could be implemented to reduce noise at the care home. These discussions involved consideration with the construction team of all of the main activities in the vicinity of the care home and how noise could be reduced using BPM, with the construction team confirming these were realistic and reasonable provisions.<br>The implementation of BPM is secured under commitment NV007 of the Register of Environmental Actions and Commitments (REAC), within the Code of Construction Practice [**REP5-048**], with actions necessary as a result of any exceedance of agreed limits monitored under NV009 and actioned through NV015 in consultation with the relevant Local Authorities or other Statutory Consultees.<br>Within the scope of Environmental Statement (ES) Chapter 12: Noise and Vibration [**APP-150**], the assessment and consideration of construction noise was undertaken on the basis of a reasonable worst case with regard to plant complement, activity levels and locations, with calculations of unmitigated |

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| | | construction noise levels presented and realistic assumptions regarding the effectiveness of BPM being made which would reduce the unmitigated predicted levels and provide lower construction noise levels.<br>Further consideration of the main activities within the area of the care home have resulted in the conclusions below. The effectiveness of these measures has been considered fully in additional noise modelling undertaken for the care home and are presented below, with the effectiveness of proposed BPM measures predicted, rather than estimated.<br>Consideration and analysis of the construction noise assessment for the care home presented in ES Chapter 12: Noise and Vibration [**APP-150**] concluded the following construction activities would result in significant effects at the care home. These relate to all works in the area covering daytime, evening and overnight activities.<br>• Utilities Works MU46 – Trenchless crossing of A13<br>• Utilities Works MUT13 – Trenchless crossing of A1013<br>• Utilities works OHT 4-7 – Temporary installation of Towers and cables, works to be removed as part of the permanent works<br>• Utilities works OH6 – Installation of a new 400kv network south-west and west of the A13 LTC junction<br>• Bridge Works BRN0000046 – A13 Westbound to LTC Northbound Viaduct works<br>• Bridge Works BRN0000042 – A1013 over A1089<br>• Bridge Works BRE0012830 – Existing Bridge Demolition<br>• Earthworks construction of the permanent bund to the west of the care home<br>• Realignment of Stanford Road including overnight tie in works, to the north of the care home<br>Further detailed consideration of the possible BPM measures associated with these works has been undertaken in consultation with the construction team. These measures would be implemented through REAC commitment NV007 by the Contractors and considered under REAC commitments NV002 and NV004. REAC commitments NV009 and NV015 would enable policing and variations to these measures where necessary.<br>The measures detailed below have been incorporated into the ES noise model to predict a 'mitigated scenario' level at the care home. |

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| | | **Utilities Works MU46 – Trenchless crossing of A13**<br>The following BPM could be implemented in the works and the validity of these measures as an option has been discussed and agreed with the construction team. Acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented:<br>• Replacement of the diesel drill considered in the ES with an electric alternative reducing the noise level for the horizontal directional drilling (HDD) by 10dB.<br>• Launch of the drill and positioning of the HDD rig to the north of the A13 (assumed to the south in the ES), increasing the separation distance and providing screening by the A13 from the care home.<br>• Positioning of the HDD rig in a shallow pit (2 metres deep) to reduce the height of the source thus increasing the performance of screening provision.<br>• Enclosure of the HDD rig in a 4-metre-high temporary acoustic enclosure.<br>• Restriction of night time activities associated with MU46 to only the electric HDD rig with no other plant or deliveries occurring. All associated works and materials would be organised during the daytime period to allow night-time activities to occur.<br>• As these measures are limited to the work site, and are significantly removed from the care home facility, they are not considered to have any detrimental physical effects on the residents.<br>In addition, in the submitted DCO assessment the HDD rig and the drill are assumed to be working overnight for 18 months. Following further review the construction team has advised the overnight activities of the drilling would only need to be 24/7 for the period of drilling under the A13 and 13 metres either side as a result of the road operator's requirements, meaning that the 24hr drilling is only required for approximately four weeks to complete the four drills required by the Project (assuming 100 metres of progress per drill per week). Additionally, this would not be a continuous four-week period but split into two two-week periods. The overnight impacts would not therefore occur for the entire 18-month period that the works are in the programme, as had been reflected in the ES noise assessments for the care home.<br>**Utilities Works MUT13 – Trenchless crossing of A1013**<br>Whilst the submitted DCO assessment assumes this activity to occur 24/7, it has now been confirmed by the construction team that these utilities works could be satisfactorily delivered with a restriction to only daytime works. As such these works can be removed from the overnight noise models in all months and would result in no overnight noise impacts.<br>In addition to this the following BPM could be implemented in the works, and acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented. |

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| | | • Replacement of the diesel drill considered in the ES with an electric alternative or a small electric Impact Mole positioned in the bottom of a 2 metre trench reducing the noise level for the drill rig by 10dB<br>• Launch of the drill and positioning of the HDD rig to the north of the A1013 (assumed to the south in the ES), increasing the separation distance from the care home<br>• Positioning of the HDD rig/electric Impact Mole in a shallow pit (2 metres deep) to reduce the height of the source thus increasing the performance of screening provision<br>• Enclosure of the HDD rig/electric Impact Mole in a 4-metre-high temporary acoustic enclosure<br>As these measures are limited to the work site, and are significantly removed from the care home facility, they are not considered to have any detrimental physical effects on the residents.<br>**Bridge Works BRN0000046**<br>Whilst these works are represented in the submitted DCO assessment as occurring during the night-time concurrently with other activities in the area overnight for the full month, following further review the construction team has confirmed these activities to only occur for three 48hr weekend night-time possessions for surfacing and tie in works. As such the assessment of the impact of the works is precautionary in the submitted DCO assessment, and the majority of the works can be limited to daytime activities.<br>In addition to this, the following BPM could be implemented in the works, and acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented, presented below.<br>• Replacement of the diesel plant considered in the ES with electric alternatives reducing the noise levels generated by the plant.<br>• Where electric plant options are not available, provision of the quietest plant available to undertake the works.<br>• Provision of local temporary acoustic screens of 4 metre height between the activity and the care home. The screens would be relocated as necessary to screen works.<br>As these measures are limited to the work site, and are significantly removed from the care home facility, they are not considered to have any detrimental physical effects on the residents.<br>**Bridge Works BRN0000042**<br>Whilst these works are represented in the submitted DCO assessment as occurring during the night-time concurrently with other activities in the area overnight for the full month, following further review the construction team has confirmed these activities to only occur for three 48hr weekend night-time possessions for surfacing and tie in works. As such the assessment of the impact of the works is |

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| | | precautionary in the submitted DCO assessment and the majority of the works can be limited to daytime activities.<br>In addition to this the following BPM could be implemented in the works, and acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented, presented below.<br>• Replacement of the diesel plant considered in the ES with electric alternatives reducing the noise levels generated by the plant.<br>• Where electric plant options are not available provision of the quietest plant available to undertake the works.<br>• Provision of local temporary acoustic screens of 4 metre height between the activity and the care home. The screens would be relocated as necessary to screen works.<br>As these measures are limited to the work site, and are significantly removed from the care home facility, they are not considered to have any detrimental physical effects on the residents.<br>**Bridge Works BRE0012830**<br>Whilst these works are represented in the submitted DCO assessment as occurring during the night-time concurrently with other activities in the area overnight for the full month, following further review the construction team has confirmed these activities to only occur for one 48hr weekend night-time possession for demolition works. As such the assessment of the impact of the works is precautionary in the submitted DCO assessment and the majority of the works can be limited to daytime activities.<br>In addition to this the following BPM could be implemented in the works, and acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented.<br>• Replacement of the diesel plant considered in the ES with electric alternatives reducing the noise levels generated by the plant.<br>• Where electric plant options are not available provision of the quietest plant available to undertake the works.<br>• Use of hydraulic concrete shears as opposed to percussive breaking methods.<br>• Provision of local temporary acoustic screens of 4 metre height between the activity and the care home. The screens would be relocated as necessary to screen works.<br>As these measures are limited to the work site, and are significantly removed from the care home facility, they are not considered to have any detrimental physical effects on the residents. |

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| | | **Utilities works OHT 4-7 and OH 6**<br>Whilst the noise model assumes this activity to occur in totality 24/7 for 11 months, it has now been confirmed by the construction team that information supplied by National Grid indicates only limited activities would occur during the overnight, and not the full works as assumed in the ES reasonable worst-case noise model. In addition, the information from National Grid confirmed that, within the total 18 months assumed for these works in the ES noise model, the 24/7 activities would likely not exceed 11 weeks for each set of works.<br>Predominantly the works associated with OHT 4-7 and OH 6 would be during the core daytime hours, with the night-time activities limited to:<br>• Infrequent oversized and abnormal deliveries that cannot be accommodated during daytime hours<br>• Positioning of protective netting over roads (it is noted that the supporting scaffolding works would be limited to daytime activities)<br>• Commissioning and tensioning.<br>In addition to this the following BPM could be implemented in the works, and acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented, presented below.<br>• The overhead line hydraulic tensioning plant could be located at more remote tower locations, thus increasing the separation distance to the care home. However, this has not been assumed in the modelling as it cannot be confirmed at this point with other issues needing to be considered aside from noise.<br>• The tensioning rig enclosed in a 4-metre-high enclosure.<br>• Limiting of the operational plant overnight to only that required to support the tensioning works.<br>As these measures are limited to the work site, and are significantly removed from the care home facility they are not considered to have any detrimental physical effects on the residents.<br>**Earthworks construction of the permanent bund to the west of the care home**<br>As this activity is noted as earthworks it would fall under the Project commitment to undertake no earthworks activities within 300 metres of any sensitive receptor during the evening or overnight periods (as set out in Table 6.1: Working hours of control document ES Appendix 2.2: Code of Construction Practice [**REP5-048**], which will be secured by Environmental Management Plan 2 (EMP2)). As such this activity would not occur outside of core daytime hours.<br>In addition to this the following BPM could be implemented in the works, and acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented, presented below. |

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| | | • Replacement of the diesel plant considered in the ES with electric alternatives reducing the noise levels generated by the plant.<br>• Where electric plant options are not available provision of the quietest plant available to undertake the works.<br>• Commitment to undertake no earthworks activities within 300 metres of any sensitive receptors during daytime and evening periods.<br>• Provision of local temporary acoustic screens of 4 metre height between the activity and the care home. The screens would be relocated as necessary to screen works.<br>• A 4m temporary acoustic fence along the western boundary of the care home site and within the Order Limits on the northern side of the A1013 Stanford Road.<br>• Construction of the bund in such a way as to build an initial bund quickly and then work behind the bund.<br>As the majority of these measures are limited to the work site, and are significantly removed from the care home facility, they are not considered to have any detrimental physical effects on the residents. While the screening measures proposed in the vicinity of the care home would not alter the operation or quality of care at the facility, there is the potential for a perceptible change for existing residents and from the user experience for new residents.<br>The mitigation is therefore designed to minimise disruption, but to also minimise imposing or intrusive perceptions that might modify resident behaviours or use of amenities at the care home. Please note that the most significant change will be the temporary acoustic barrier to the west of the care home, which runs parallel to a small number of bedrooms (3No. defined from schematic plans supplied by the care home) with westerly facing windows, and a corridor that serves 7 additional ground floor bedrooms, all with windows that face into the courtyard and no direct westerly views. This limits any potential impact from the proposed mitigation to a temporary perceptible change in 3 bedrooms (when in use), and for users of the corridor. This is not of a nature or magnitude sufficient to alter behaviours or use, or result in any impact to the range and quality of care, which would result in any measurable adverse health effect.<br>In addition, consideration could be given to the potential for bringing the bund, or part of the bund, earlier in the programme subject to material availability; this would allow the bund to act as a significant screening feature for the care home for all following construction activities to the west including the main line works. However, this has not been considered in this study and is still being considered by the construction team.<br>The proposed bund to the north of the facility is required to mitigate against operational noise, and runs behind the screening of the existing tree /shrub line and Stanford Road opposite the care home. The mitigation again has no impact on the operation of the facility, and perceptible changes from the adjacent |

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| | | bedrooms overlooking Stanford Road (Potentially 2 on the ground floor and 4 on the first floor, with the two bedrooms on that west annex are blocked by an existing tree, so not included) are limited due to the existing road and natural screening that will be retained. This again limits any potential impact from the proposed mitigation to a perceptible change in those bedrooms (when in use). However, this is not of a nature or magnitude sufficient to alter behaviours, use or result in any impact to the range and quality of care; or result in any measurable adverse health effect.<br>We recognise the sensitivity of the facility and its residents, which underpins the extensive and ongoing engagement with the care home to tailor mitigation and support accordingly. Subject to consent, ongoing engagement with the care home and its residents will continue to raise awareness to any particularly disruptive activities, to test the effectiveness of the mitigation, but to also identify any unforeseen or unanticipated issues from the mitigation itself and refine accordingly.<br>**Realignment of Stanford Road**<br>Whilst these works are represented in the submitted DCO assessment as occurring during the night-time concurrently with other activities in the area overnight for the full month, following further review the construction team has confirmed these activities to only occur for two 48hr weekend night-time possessions for resurfacing and tie in activities at each end of the new road. As such the assessment of the impact of the works is precautionary in the submitted DCO assessment and the majority of the works can be limited to daytime activities.<br>In addition to this the following BPM could be implemented in the works, and acoustic modelling has been undertaken to predict the noise levels at the care home with these measures implemented.<br>• Replacement of the diesel plant considered in the ES with electric alternatives reducing the noise levels generated by the plant.<br>• Where electric plant options are not available provision of the quietest plant available to undertake the works.<br>• Provision of local temporary acoustic screens of 4 metre height between the activity and the care home. The screens would be relocated as necessary to screen works.<br>As the majority of these measures are limited to the work site, and are significantly removed from the care home facility, they are not considered to have any detrimental physical effects on the residents. With regard to the proposed screen adjacent to the works and care home we would revert to the information presented above (within the section entitled “Earthworks construction of the permanent bund to the west of the care home”) regarding the potential for physical effects of this measure on the care home. |

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| | | General consideration of all daytime construction activities that result in the significant effects at the care home in collaboration with the Construction team has concluded the following BPM measures are practical, and are representative of the measures that will be implemented through the implementation of the existing REAC commitments.<br>• Replacement of the diesel plant considered in the ES with electric alternatives reducing the noise levels generated by the plant.<br>• Where electric plant options are not available provision of the quietest plant available to undertake the works.<br>• Commitment to undertake no earthworks activities within 300 metres of any sensitive receptors during daytime and evening periods.<br>• Provision of local temporary acoustic screens of 4 metre height adjacent to works and positioned between the activity and the care home. The screens would be relocated as necessary as works progress to screen works.<br>• Provision of a 4-metre temporary acoustic fence or barrier within the Order Limits on the opposite side of Stanford Road with a lateral length of approximately 250m, required for the duration of the works on Stanford Road and until the new A1013 is tied into the old A1013 alignment and the new alignment is open to traffic, removed around Month 46. As approximately detailed on Plate 1.<br>• Provision of a 4-metre temporary acoustic fence or barrier within the Order Limits on the western boundary of the care home site.<br>As the majority of these measures are limited to the work site, and are significantly removed from the care home facility they are not considered to have any detrimental physical effects on the residents. With regard to the proposed screens adjacent to the works and care home we would revert to the information presented above (within the section entitled “Earthworks construction of the permanent bund to the west of the care home”) regarding the potential for physical effects of this measure on the care home. |

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| | | **Plate 1 Proposed temporary acoustic fencing/barriers at Whitecroft Care Home**<br>  <br>**Assessment of effectiveness of** BPM measures<br>Reassessment of the construction noise impacts presented in the ES, including the effectiveness of all of these measures, is discussed below. On the basis of the nature of the receptor this has been undertaken at the façades of the sensitive rooms during the overnight and in external spaces during the daytime, relative to the construction noise limits proposed and discussed in ES Chapter 12: Noise and Vibration [**APP-150**].<br>*(i)Night-time* |

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| | | With the implementation of the above-noted BPM measures for the night-time in the noise model, the following façade construction noise levels are predicted across the care home. The night-time period has been considered on a room-by-room basis as a result of the concerns raised by the operator relating to night-time construction noise impacts.<br>It is noted that the performance of temporary acoustic barriers has been modelled within the software.<br>The information presented in Plates 2 and 3 below relates to the worst-case prediction for any month in the 60-month programme at the identified façade. It is noted that this level is not what the façade would be exposed to for the entire construction programme only in the worst-case month; all other months would present lower construction façade noise levels. Where there is a breach of the 45dB Night-time SOAEL, as defined in the DCO application, this is discussed in more detail below.<br>Plate 2 relates to the ground floor and Plate 3 to the first floor. Where the façade noise level is identified in yellow this denotes a breach of the 45dB criteria at that façade. |

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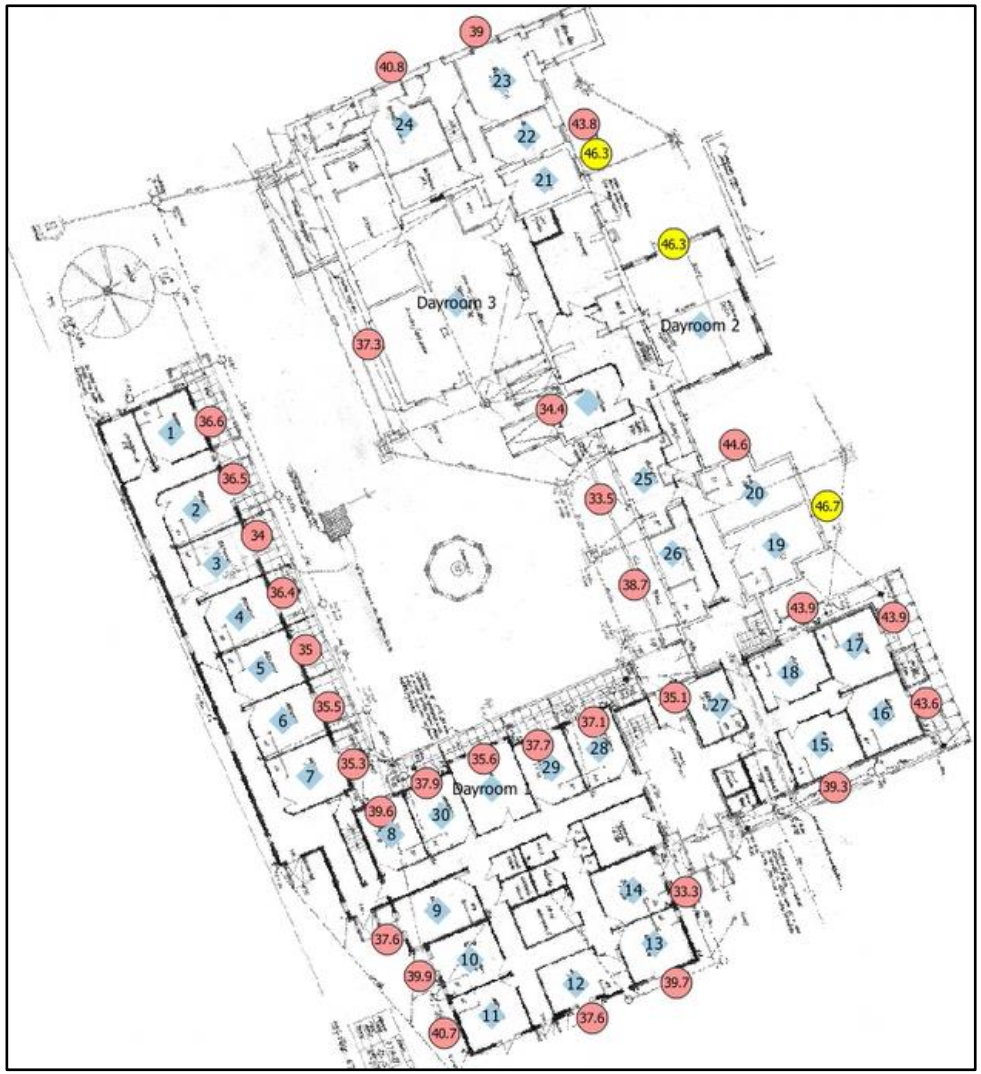
| | | **Plate 2 Ground floor – calculated night-time BPM construction**   |

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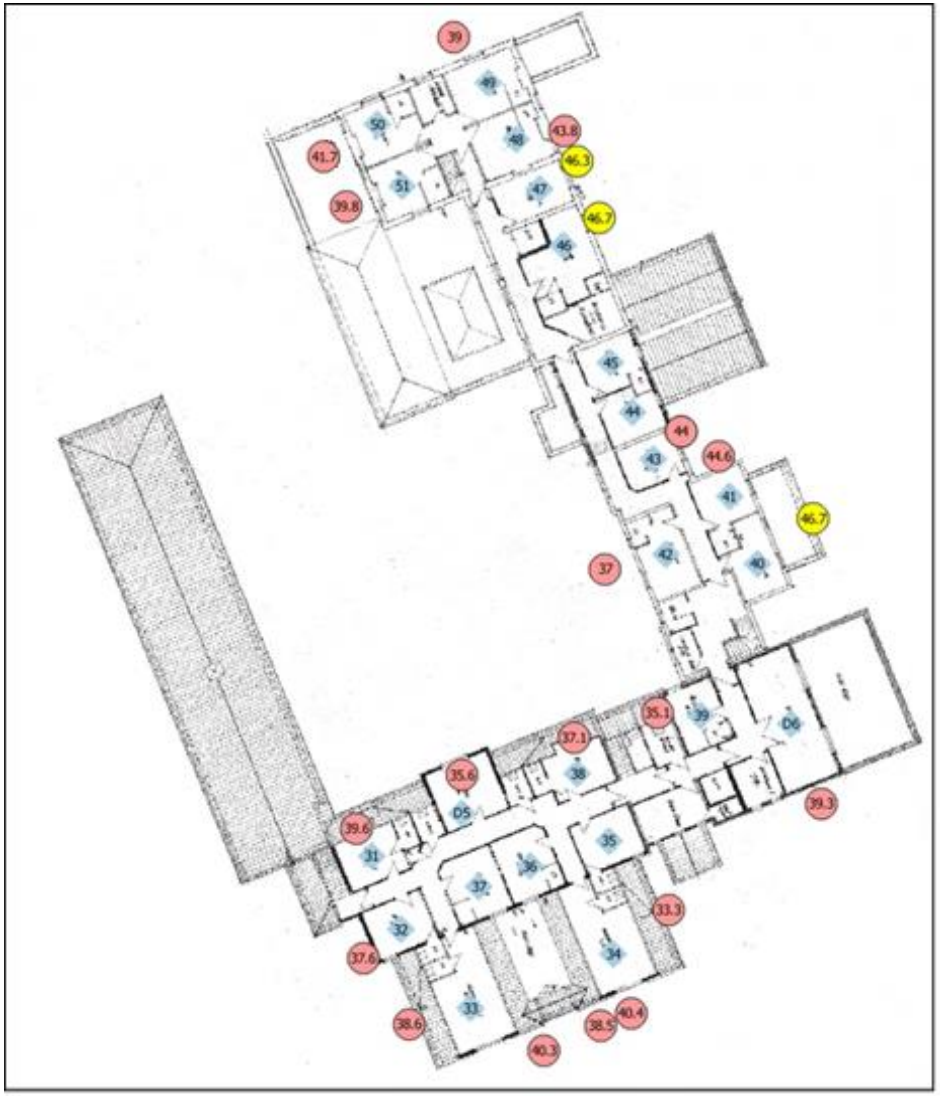
| | | **Plate 3 First floor – calculated night-time BPM construction**  |

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| | | Consideration of the information within Plates 2 and 3 above, produced by detailed consideration and modelling of the proposed BPM measures, concludes that:<br>• Only ground floor and first floor façades on the eastern elevation of the care home have the potential to breach the 45dB threshold for night-time activities.<br>• Analysis of the information on a month-by-month basis concludes that the 45dB criteria is only breached in one month during the five-year construction period, when the eastern tie in works on the A1013 are undertaken. Other than this the construction noise assessed on the care home is below the 45dB criteria as a result of the mitigation proposed:<br>– Month 46 when the A1013 tie in works are undertaken. These are required to be undertaken at night to minimise traffic disruptions but would be for only '*1No. 48hr weekend possession*'.<br>– **As such these breaches are predicted to only actually occur for two nights in the five-year construction programme.**<br>• No other breaches of the 45dB criteria are predicted in the mitigated scenario at the care home due to other night-time activities as a result of the BPM measures implemented in the noise model including increases in screening and separation distances.<br>Consideration of the information presented in Plates 2 and 3 above concludes that, subject to the mitigation measures presented in this response, construction noise is predicted to be below 45dB on all façades of the care home for 59 of the 60 months of the construction programme.<br>*(ii) Day-time*<br>With the implementation of the above BPM measures for the daytime works in the noise model the following construction noise levels are predicted at the care home.<br>It is specifically noted that in the modelling where temporary acoustic fencing/barriers are proposed these have been included within the noise model and the performance of such calculated by the software in accordance with appropriate methodologies.<br>Details of the monthly daytime construction noise levels at the care home including the consideration of the prescribed mitigation measures are presented in Plate 4 below, along with a green line which represents the 55dB upper daytime health effect criteria from the World Health Organization (WHO) as advocated by the Acoustic Consultant acting on behalf of the care home, and a red line which represents the appropriate BS5228[1] construction noise limit for this receptor advocated by the applicant. |

[1] British Standards Institution (2009). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

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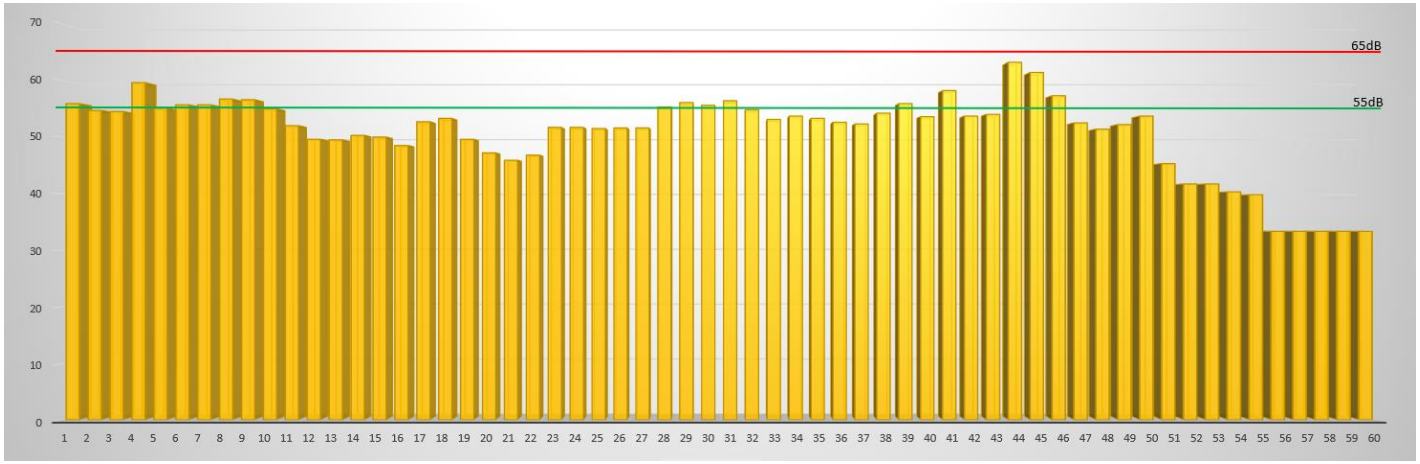
**Plate 4 Daytime construction noise with BPM**




Consideration of the information presented above against the reasonable worst-case information presented for CN 85 in ES Appendix 12.4: Construction Noise and Vibration Assessment [**REP1-169**] concludes:

- The implementation of the BPM mitigation specified in the section above relating to plant and screening has afforded a maximum calculated reduction in construction noise, occurring as a result of measures implemented during the daytime, at the care home of up to **12.3dB attributable to the implementation of BPM measures**.
- With the implementation of the BPM, daytime construction noise levels are predicted to be below 65dB in all cases, which is the limit proposed for the care home in accordance with BS5228.
- Further consideration details that:
  - For 58 months of the 60 month construction programme the predicted mitigated construction noise at the care home is predicted to be below 60dB.
  - For 43 months of the 60 month construction programme the predicted mitigated construction noise at the care home is predicted to be below 55dB.

In addition, it is noted that with regard to the setting of construction noise thresholds for the care home, the ES presents a case for the use of BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control

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| | | on construction and open sites – Part 1: Noise in line with the guidance of the Design Manual for Roads and Bridges LA 111[2].<br>Within Annex E of BS 5228-1:2009+A1:2014, relating to 'Buildings in health and/or community use' it is stated:<br>**E.3.3 Example method 2 – 5 dB(A) change**<br>A1 Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,\,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect. A1<br>These evaluative criteria are generally applicable to the following resources:<br>• residential A1 buildings A1;<br>• hotels and hostels;<br>• buildings in religious use;<br>• buildings in educational use;<br>• buildings in health and/or community use.<br>As such it is concluded by the Applicant that both the guidance and the criteria specified within the ES is wholly appropriate for the consideration of temporary construction noise impacts on healthcare facilities.<br>In addition, it is noted that the limit derived for the care home was based upon a noise measurement undertaken at monitoring position A-NML 15 presented on Plate 5, located at the rear of the care home facility and significantly screened from the main existing noise sources of the area, namely the A1013 and the A13; therefore, it is not fully representative of the noise climate of the whole site, being located in the quietest part of the care home. |

[2] Highways England (2020). Design Manual for Roads and Bridges LA 111 – Noise and vibration.

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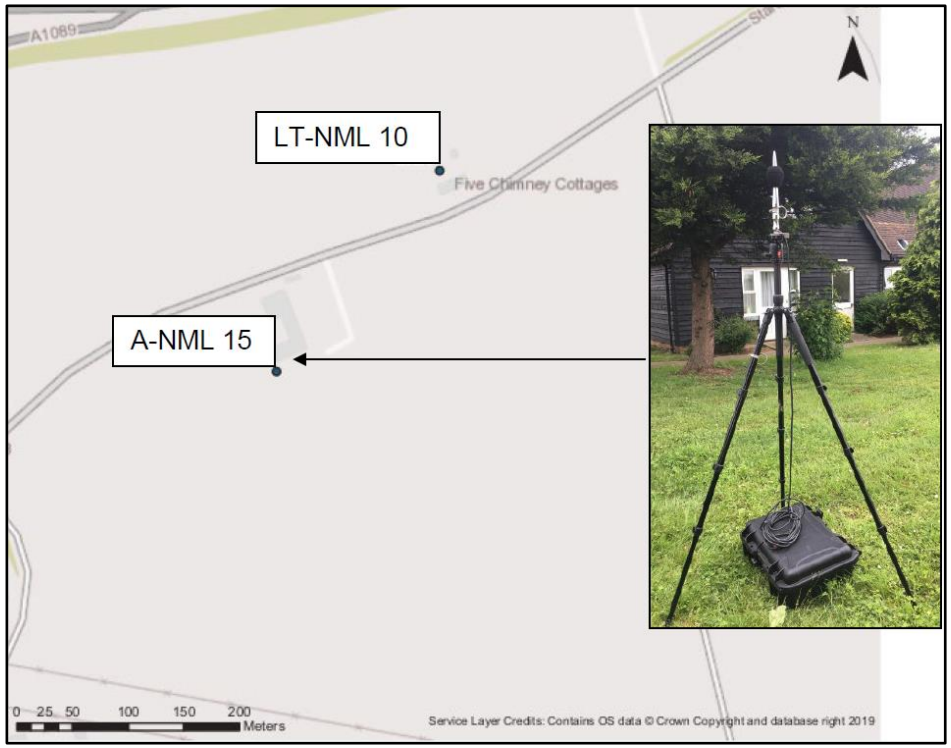
| | | **Plate 5 Monitoring position at A-NML 15**<br>  <br>The baseline noise monitoring data at A-NML 15 is approximately 55dB $L_{Aeq, T}$, resulting in a daytime BS5228 construction noise limit of 65dB(A), defined by the lower cut off value of the methodology. Within the ES, as the monitoring at the care home was undertaken only during the daytime, a worst-case assumption of the lower night-time cut off limit of 45dB $L_{Aeq,T}$ was assumed. Consideration of the data presented for LT-NML 10 where night-time levels were monitored, details a variation of only 2dB between daytime (55dB $L_{Aeq}$) and night-time (53dB $L_{Aeq}$) and a night-time noise climate considerably above the 45dB limit proposed for the care home.<br>Additional long term monitoring is currently being undertaken by the Applicant at the care home to accord with REAC commitment NV005. This monitoring has been undertaken since February 2023 and is still ongoing. The monitoring position is on the front façade of the care home in a much more exposed position to |

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| | | the noise sources of the A1013 and A13 than A-NML 15 as presented on Plate 6, with no screening by the building.<br><br>**Plate 6 Updated monitoring position (blue marker)**<br><br>  <br><br>The average daytime $L_{Aeq,T}$ at the front façade of the care home is showing a level of closer to 65 to 70dB as a result of the exposure to noise from the A1013 and A13. This would result in a BS5228 construction noise limit at the front of the care home site of closer to 70dB to 75dB, rather than the 65dB assumed for the whole site in the ES.<br><br>As the current monitoring is being undertaken on the basis of continuous 24/7 survey since February 2023, night-time levels at the front of the care home have been quantified. This monitoring details a typical night-time noise climate closer to 60–65dB, meaning a significantly higher construction noise limit than the 45dB assumed in the ES. |

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| | | As such the Applicant would conclude, and has clearly justified and demonstrated, that the construction noise limits presented in the ES for daytime and night-time activities, are extremely conservative based upon the current quantified noise climate of the care home site.<br>In addition, the Acoustic Consultant acting on behalf of Whitecroft Care Home has presented a case for the use of more stringent limits to those quoted above as a result of the sensitivities of the residents of the care home, citing the use of daytime limits in accordance with the World Health Organisation [**REP1-367**]. The Applicant notes in response to this that consideration of the current noise climate in the area surrounding the care home as presented and discussed above, including short term surveys and long term surveys, demonstrates the noise climate in the area around the care home to potentially already be in excess of the 55dB daytime and 40dB night-time WHO levels. |
| ExQ2_Q9.1.8 | Applicant only | **Whitecroft Care Home: operational noise**<br>The submissions from Whitecroft Care Home (including [REP4-382]) indicates that operational noise levels may increase beyond those currently experienced, particularly in respect of the south façade of the building. Please provide commentary on this matter and indicate how monitoring and mitigation could be put in place to avoid this? |
| | | **Response:**<br>Within the scope of Environmental Statement (ES) Chapter 12: Noise and Vibration [**APP-150**] the Whitecroft Care Home was not reported to experience a significant effect during operation, and as such no specific consideration in the text of the chapter was necessary, with only significant effects discussed. Further detailed analysis of the noise model outputs conclude that the assessments actually presented a short-term **Minor Beneficial Impact** below a Significant Observed Adverse Effect Level (SOAEL), which as reported in the ES would not be considered a significant effect as a result of the implementation of the mitigation specified in Section 12.5 of Chapter 12.<br>Further consideration of operational road traffic noise levels at the care home has been undertaken on a façade by façade basis, which demonstrates the following.<br>• **Northern façade on Stanford Road:** represents the largest change in the noise evident at the care home, as a **Moderate Beneficial** short-term change above a SOAEL. However, this was not reported in the ES as a result of adjustments made under LA111 relating to acoustic context in determining final operational significance on noise sensitive buildings<br>• **Eastern façade of the care home:** demonstrates a **Minor Beneficial** short-term change below a SOAEL. |

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| | | • **Southern façade of the care home:** demonstrates a **Minor Beneficial** short-term change below a SOAEL; however, due to localised reflection effects in the model a **Negligible** effect (less than 1dB change) is also predicted on the eastern end of this façade.<br>• **Western façade of the care home:** at the closest approach of this façade to Stanford Road (northern end) the predictions demonstrate a **Moderate Beneficial** short-term change below a SOAEL as a result of the realignment of Stanford Road. This changes to a **Minor Beneficial** short-term change below a SOAEL with progression along the façade toward the south (away from Stanford Road).<br>Whilst a Negligible effect was predicted on the southern façade of the care home and Moderate Beneficial effects predicted on the Stanford Road façade of the care home, as a result of adjustments made under LA111 relating to acoustic context in determining final operational significance on noise sensitive buildings a Minor Beneficial effect was reported as this was predicted across a wider aspect of the care home.<br>As stipulated in the ES, as a result of the implementation of the mitigation set out in Section 12.5 of ES Chapter 12 [**APP-150**] and secured within the scope of the draft Development Consent Order (DCO) [**REP5-024**], no additional mitigation for operational noise would be required at the care home above than that already inherent within the design. The monitoring of the implementation of these mitigation effects would be as specified within Section 12.8 of ES Chapter 12 [**APP-150**]. |
| ExQ2_Q9.1.9 | Applicant, Whitecroft Care Home (Kathryn Homes Ltd, Runwood Homes Ltd and Runwood Properties Ltd) | **Whitecroft Care Home: construction vibration**<br>Can these parties liaise together to provide details of additional information that could/should be provided to inform vibration mitigation and how this could/would be secured in the Code of Construction Practice (or other control document)? |
| | | **Response:**<br>Following Compulsory Acquisition Hearing 2, the Applicant has sought to arrange a meeting with the agent representing Kathryn Homes Limited, Runwood Homes Limited and Runwood Properties Limited. A request for a meeting to discuss matters further was sent on 4 October 2023 and a meeting was held on 23 October.<br>The existing measures proposed by the Applicant to monitor and mitigate impacts from vibration are contained within the Register of Environmental Actions and Commitments (REAC), commitments NV002, NV009 and NV017 of the Code of Construction Practice (CoCP) [**REP5-048**], with actions necessary as a result of any exceedance of agreed limits specified in NV015.<br>Furthermore, additional liaison would be required under NV008 which commits the Project to open communication with the communities around the Project on an ongoing basis during the construction period. Additionally, consultation would form part of the works for the s61 works required under NV004, the Noise |

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| | | and Vibration Management Plans under NV002 and the reassessments undertaken by the Contractor under NV001.<br>At the meeting on 23 October, the Applicant requested additional information to understand if there are any rooms that are highly vulnerable to vibration in terms of sensitive equipment, if there are any facades of the building that are structurally unsound, and details of any structural condition surveys previously undertaken. The Applicant will continue to liaise with the agent representing Kathryn Homes Limited, Runwood Homes Limited and Runwood Properties Limited on the additional information that could be used to inform further discussions on vibration mitigation and the REAC commitments.<br>In response to general construction vibration concerns raised by Whitecroft Care Home and other local authorities at ISH8, the Applicant has subsequently agreed to amend the wording of REAC commitment NV017 to cover controls from construction vibration activities and NV015 to cover actions in the event of a noise and vibration monitoring exceedance. This update will be submitted at Deadline 6 as part of the REAC within the CoCP [**Document Reference 6.3 Appendix 2.2 (6)**]. |

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