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Regulation 25
Town and Country Planning
(Environmental Impact Assessment) Regulations 2017
Request for Further Information

Noise & Vibration Impact Assessment for Proposed Sand & Gravel Quarry at

Land at Bow Farm
Bow Lane
Twyning
Tewkesbury
Gloucestershire

for

M.C. Cullimore (Gravels) Ltd

Application Number: 19/0081/TWMAJM (District Ref: 19/1231/CM)

Undertaken by:

Noise & Vibration Consultants Ltd

Member of Institute of Acoustics
Member of Association of Noise Consultants
Member of Academy of Experts

Consultant: D.R. Kettlewell MSc MIOA MAE I.Eng

Report No.: R18.1004/Reg25/Add1/DRK

Report prepared by:
D R Kettlewell MSc MIOA MAE I.Eng – Principal Consultant:
[redacted]

Date: 16th December 2020

Further Information Request under Regulation 25 of the Town & Country Planning (Environmental Impact Assessment) Regulations 2017:

Responses:

Noise and Vibration

Gloucestershire County Council & Worcestershire County Council – Regulation 25 Further Information Request (dated 30th November 2020)

Q1.

Cultural Heritage

"Malvern Hills District Council in their comments dated 22 October 2020 states the following in respect of impacts upon built heritage impacts:

The District Council notes that a further assessment has been submitted which assesses the vibration impacts upon sensitive receptors, in particular the Grade II Listed Puck Cottage. The main source of concern relating to the built designated and non-designated heritage assets is the lack of clear information about the impact of vibration on the structures over time.

The Archaeological Desk Based Assessment only briefly assesses the impact of the proposals on the setting of the listed building, Puck Cottage. The assessment does not consider the significance of the heritage asset in any depth nor does it consider the impact of the proposals on that significance or what change there might be on experiencing the asset with all the senses, i.e. visually, aurally, vibrationally. The submitted Noise and Vibration Assessment and the subsequent response to the Regulation 25 Request concentrate on the noise levels resulting from operation on site, but only briefly mentions vibrations and how they would impact on the surrounding built environment.

The response to the Regulation 25 Request focusses on the perceptible vibration at a distance of 50 metres from the vibration source. It does not explain whether vibrations at a lower level, but over a long time could produce damaging effects on the structure of the buildings, in particular the Grade II listed Puck Cottage. Vibrations experienced by the timber-frame cottage at ground level could be amplified by the structure potentially causing structural movement. This possibility has not been clearly addressed by the application submission.

The reliance on perceptibility is considered to be potentially erroneous. The ground movements that cause subsidence are not perceptible, but their effects on a building are obvious. In the same way ground vibrations caused by operations and vehicles on the application site could cause movement effects on the heritage asset of Puck Cottage in particular. If this is not the case, then this needs to be addressed and explained. Consequently, there remains doubt about the level of impact that the proposal would have directly on the structure of the heritage asset, Puck Cottage, and indirectly on the asset's setting.

As a result of the above, the District Council conclude that the proposal would fail to "conserve and enhance" the historic environment as required by Policies SWDP 6 and SWDP 24 of the South Worcestershire Development Plan. It would potentially have a direct and adverse impact on the structure of Puck Cottage, although the harm would be "less than substantial". The level of harm could be minor to moderate. Similarly, the indirect impact could also be adverse, though potentially of a minor less than substantial level. Further, more detailed assessment should be carried out. This should concentrate on the specifics of vibration in relation to the timber-framed structure and infill panels of Puck Cottage.

In view of the above comments, the MPA requests further information assessing the impact of the proposal in terms of vibration impacts upon heritage assets, in particular the Grade II Listed Puck Cottage. This assessment should assess the potential long-term impacts of vibration upon heritage assets and risk of subsidence."

Response Q1.

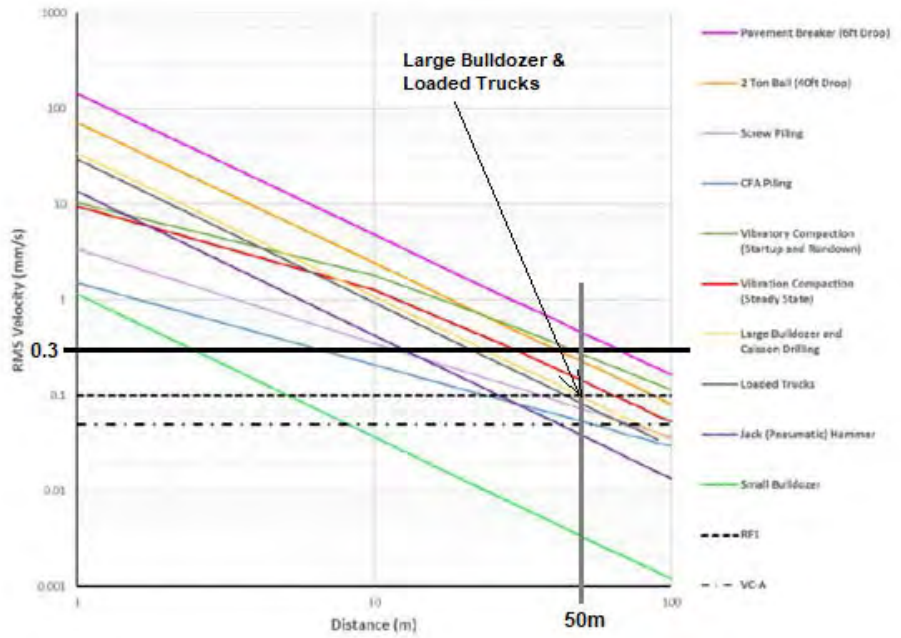
NVC has already provided further information on the effects from vibration specifically on Puck Cottage in the Regulation 25 response of 22nd July 2020. This has included a graph of measured vibration levels from mobile plant including a large bulldozer and loaded trucks, which would represent the largest likely vibratory source at a sand and gravel site.

A peak particle velocity (PPV) of 1mm/s represents the threshold of a moderate significance of effect at a residential heritage asset having a high sensitivity. The threshold of a minor significance of effect is 0.3 mm/s PPV.

Sand and gravel quarries use direct extraction methods using mobile plant rather than blasting techniques as a means of surface mineral extraction and therefore do not normally generate levels of vibration which are perceptible by occupants of residential property unless the plant is working within separation distances of circa 20m to 25m, which is not the case at this site.

The closest likely stand-off distance from Puck Cottage is circa 50m. Temporary operations such as bund formation works will necessitate the use of mobile plant such as a dozer, excavator or dump truck operating at this distance for short term periods.

The graph showing typical vibration levels provided in the Regulation 25 response to a request for further information (NVC ref. R18.1004/Reg25/DRK dated 22nd July 2020) in response Q1 shows a maximum vibration PPV level of 0.1mm/sec. The graph is provided below for ease of reference.



Furthermore, a case study published on 26th February 2016 by Crossrail Ltd, which relates to vibration management measures undertaken on the Paddington Station works. This was undertaken to protect the Grade I listed MacMillan House from vibration arising from major civil construction activity. The risk of damage was assessed to be high given the frailty of MacMillan House and its proximity to the works (i.e. within 5-10 metres of construction works).

Crossrail imposed a precautionary vibration limit of 3mm/sec PPV for heritage buildings. As stated in the case study "*This limit is consistent with the guidance given by the ANC and available British and European Standards at the time the criterion was written. A precautionary measure can also be considered appropriate, given the breadth of building categories that this criterion was intended to apply to.*"

The main source of vibration that was being considered involved the use of an excavator with a hydraulic breaker (i.e. significantly higher levels of vibration than that proposed for the sand and gravel site development). Following vibration risk assessment and trials prior to the main construction works at the site, the team established, for example, that vibration levels from a 20t Excavator at 7.6 metres would be 2.37mm/sec, which is comparable with the graph presented above for a large bulldozer with drill.

The study used the results of the trial to define safe working distances at which different sizes of hydraulic breakers could operate with a low risk of exceeding the 3mm/sec limit.

The table showed that for a 3t Excavator & Breaker the safe working distance would be 3 metres and for a 20t Excavator & Breaker a distance of 8 metres.

The information presented in terms of empirical measured data and the case study provides clear evidence that the long-term effect on the Grade II Listed Puck Cottage or any other residential dwelling from vibration would be insignificant based on the type of plant that would be used at the site and separation distance for the following reasons:

a) Vibratory source would be temporary in nature at the closest approach to sensitive buildings, for example during the construction of bund formation works and local extraction of minerals, and therefore comments about long-term exposure to vibration is incorrect.

b) The type of plant used at sand and gravel sites do not inherently generate any significant vibration even when measuring at close range. If this was the case then buildings at construction sites all over the country would be in constant danger of cosmetic or structural damage.

c) The separation distance from vibratory the source and receptor are relatively large and as such provides attenuation of any low-level vibration from source position to receptor location.

d) Empirical data obtained from typical plant used at sand and gravel quarries shows no significant vibration likely to occur.

e) Case studies set against heritage assets show levels of vibration up to 3mm/sec are safe and ensure protection of the asset against cosmetic damage.

f) There is no known evidence of likely vibration damage to heritage assets occurring from the operation of mobile or fixed plant at the relevant separation distances, such as that used at a typical sand and gravel quarry.

g) Studies undertaken by NVC from the movement of HGVs on local roads passing in close-proximity to residential properties has concluded that trigger levels are sufficiently low enough to ensure effects from ground borne vibration are insignificant and unlikely to cause cosmetic damage. This supports the conclusion drawn above in respect of mobile plant effects.

h) Monitoring of vibration can be undertaken at site, to show that the vibration levels at relevant distance are insignificant.

The conclusion that there would be a **negligible impact** from vibratory sources used at the Proposed Development therefore remains correct and unchanged in our expert opinion.

Q2.

"Noise

Worcestershire Regulatory Services (Noise) in their comments dated 1 October 2020 in response to letters of representation state:

"Worcestershire Regulatory Services understand that the sound pressure levels used within the noise assessment are actual measured levels as opposed to predicted

sound power levels based on the BS5228 reference tables and, therefore, should be more accurate, ***the applicant's acoustician should confirm this****".*

Response Q2.

In respect of the assumed noise levels from the associated plant, the use of measured data from similar sites in the UK will always be more accurate than reference to standards due to the fact that the monitoring conditions, location, plant loading and method used to determine the sound pressure level within the Standard, is unknown.

The levels utilised in the noise assessment are based on empirical data from our technical library of similar plant taken from other sand and gravel sites in the UK and therefore representative and accurate. The other point to be made is that the different plant noise sources within the noise prediction model is assumed to be operating for 100% of the operating time and sources operating together at the same time. This provides a pessimistic view of typical site operations and unlikely to occur in practice (i.e. the noise predictions are robust).

Q3.

"In terms of the points raised regarding the receptor positions chosen (S3 b. i. ii. & iii.), ***can the applicant's acoustician please respond to these points for further comment*** *although they appear to have been partially answered within the applicant's responses to some of the Reg25 questions".*

These points are re-iterated by Tewkesbury Borough Council in their comments, dated 10 November 2020.

The MPA requests that further clarification is provided in relation to the above matters."

"b) Noise at sensitive receptors.
Firstly the receptor positions chosen are not worse case, (or even a realistic case), in terms of the destruction of amenity value. The wording by the Applicant is misleading.

We believe there are three scenarios that should be investigated:

i) Puck Cottage during temporary operations and extraction in phase 4 - where the operations are at the closest point not an average for the whole site during a typical phase as appears to be presented.

ii) Puckrup Hall Hotel at the edge of the golf course closest to the concrete batching plant whilst the latter is in operation in addition to the other process plant - with simultaneously a loaded HGV passing by up the gradient of the hill' plus Phase 9 extraction and any Flexible working A etc. Not a value at the hotel complex buildings.

iii) *As above at the north western boundary of Church End Nurseries. None of these situations are included in the analysis when the data presented is closely scrutinised - only an unrealistic best case is presented.*

c) The various noise values in NVC/8 on page 17 are, we believe, from the Applicant's consultants' library and appear to be very unrealistic. The data presented is not correct and underestimates the actual predicted noise values."

Response Q3:

In response to queries raised by the Local Authority relating to public response for further information, we provide our response below:

b) General Comment:

The receptor positions chosen for the noise assessment relate to the nearest residential dwellings to the site activities. These are likely to be the most sensitive to site generated noise. As explained in the previous Regulation 25 response document, any other receptors at greater distance will be subject to lower levels of noise than the

closest in the relevant direction and therefore any subsequent impact will be similar or lower.

The protection of amenity is covered by the site-specific noise guidance and/or standard, which in this case, relates to noise limits provided under the provisions of Planning Policy Guidance on Mineral Workings. The limits take into account the type of activity, the nature of the noise source, the operating times, the absolute noise level, the level relative to background and the national policy and the safeguarding of mineral resources locally and nationally. The limits are therefore reasonable and appropriate to protect amenity not to destroy it, as suggested by the above comment. For example, the maximum level for site operations (i.e. 55dB L_{Aeq}) is the same limit that is adopted for new residential development affected by transportation noise (such as road or rail traffic) to protect amenity.

(i) In terms of the properties off Bow Lane to the northeast boundary of the Site we have undertaken calculations of the nearest receptor point to the activity and as such would not execute noise modelling for every scenario during the life of the development. We expect therefore that the predictions cover the highest likely impact. In terms of predicted noise levels at Puck Cottage, we have re-checked the calculations for the initial temporary operations and phase 4 with the mobile plant at the closest approach to the property. The results show a level of 57dB $L_{Aeq,1hr}$ for the temporary operations and 48dB $L_{Aeq,1hr}$. The cumulative effect of the extraction works and processing works shows a level of 49dB $L_{Aeq,1hr}$. The results are identical to the previous assessment noise models and therefore the assessment is robust.

Refer to noise maps 1 to 3 attached in Appendix NVC/1.

(ii) In relation to the Puckrup Hall golf course, this is a recreational area (rather than a noise-sensitive property as defined by the PPG mineral extraction guidance). The use of the golf course is also temporary and transitional by its nature as members will constantly be moving around the course. This receptor area is therefore much less sensitive than the Hotel buildings and immediate amenity around the Hotel, that has been previously provided. The predicted levels with the scenario suggested above presents a `worst case' and the predicted noise levels at the edge of the golf course with the proposed mitigation measures are predicted to be between 47dB to 57dB $L_{Aeq,1hr}$. This level of noise is not deemed to be significant when considering that existing residual sound levels (i.e. existing noise without the development) typically range between 50dB to 56dB L_{Aeq} as indicated by the baseline study in the residential areas around the golf course. The level of noise is also similar, for example, to that acceptable in planning terms for new residential development affected by road or rail traffic noise to protect residential amenity.

Refer to Q3g Table 1 of Regulation 25 initial responses dated 22nd July 2020 and noise maps 4 and 5 attached in Appendix NVC/1.

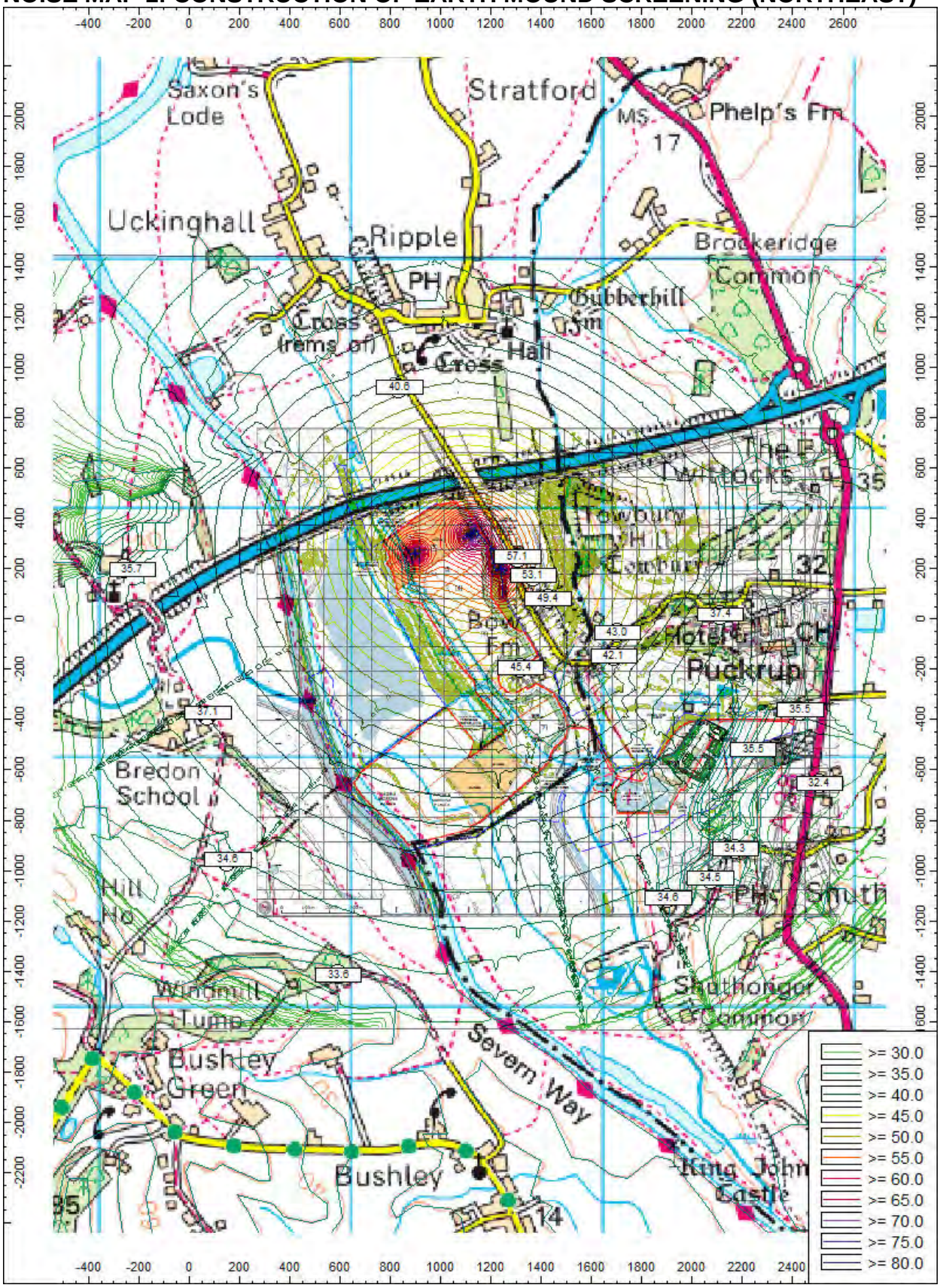
(iii) At the north western boundary of Church End Nurseries, the comparable noise levels for the scenario assessed in (ii) above indicates a noise level of 48dB $L_{Aeq,1hr}$. Refer to noise maps 3 and 4 attached in Appendix NVC/1. There is therefore no evidence of any significant noise and no change in the conclusions provided under the noise impact assessment (ref. R18.1004/DRK dated 5th November 2018) and Regulation 25 request for further information response (ref. R18.1004/Reg25/DRK dated 22nd July 2020) already provided by NVC to support the planning application. No evidence of the suggested approach of an `unrealistic best case' has occurred and therefore this claim is unreasonable and incorrect.

c) Response 2 of this document provides further information on the approach to the use of empirical library data, which in our expert opinion is representative and accurate and the method of calculating the noise levels is robust.

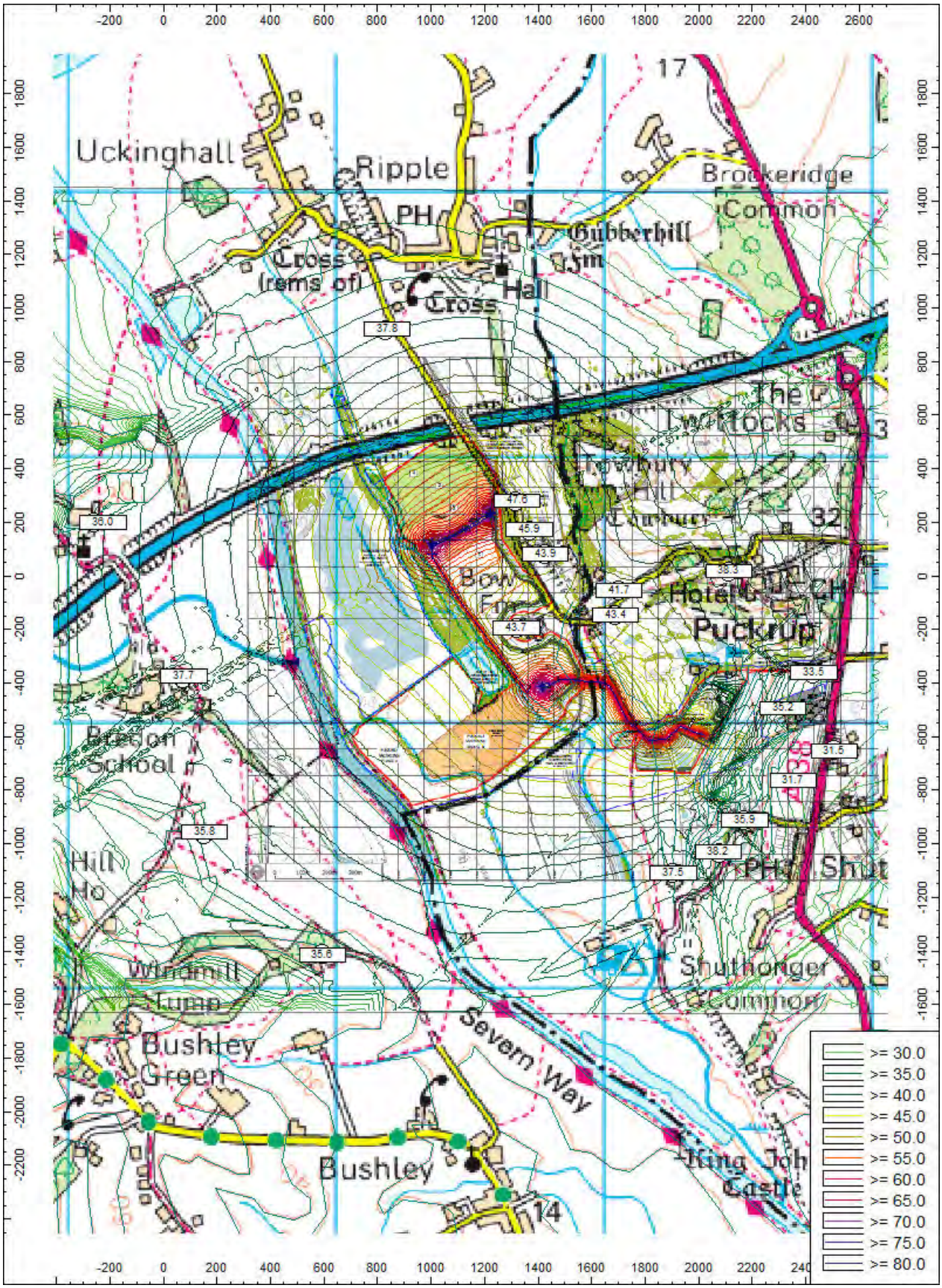
NVC/1

NOISE MAPPING RESULTS

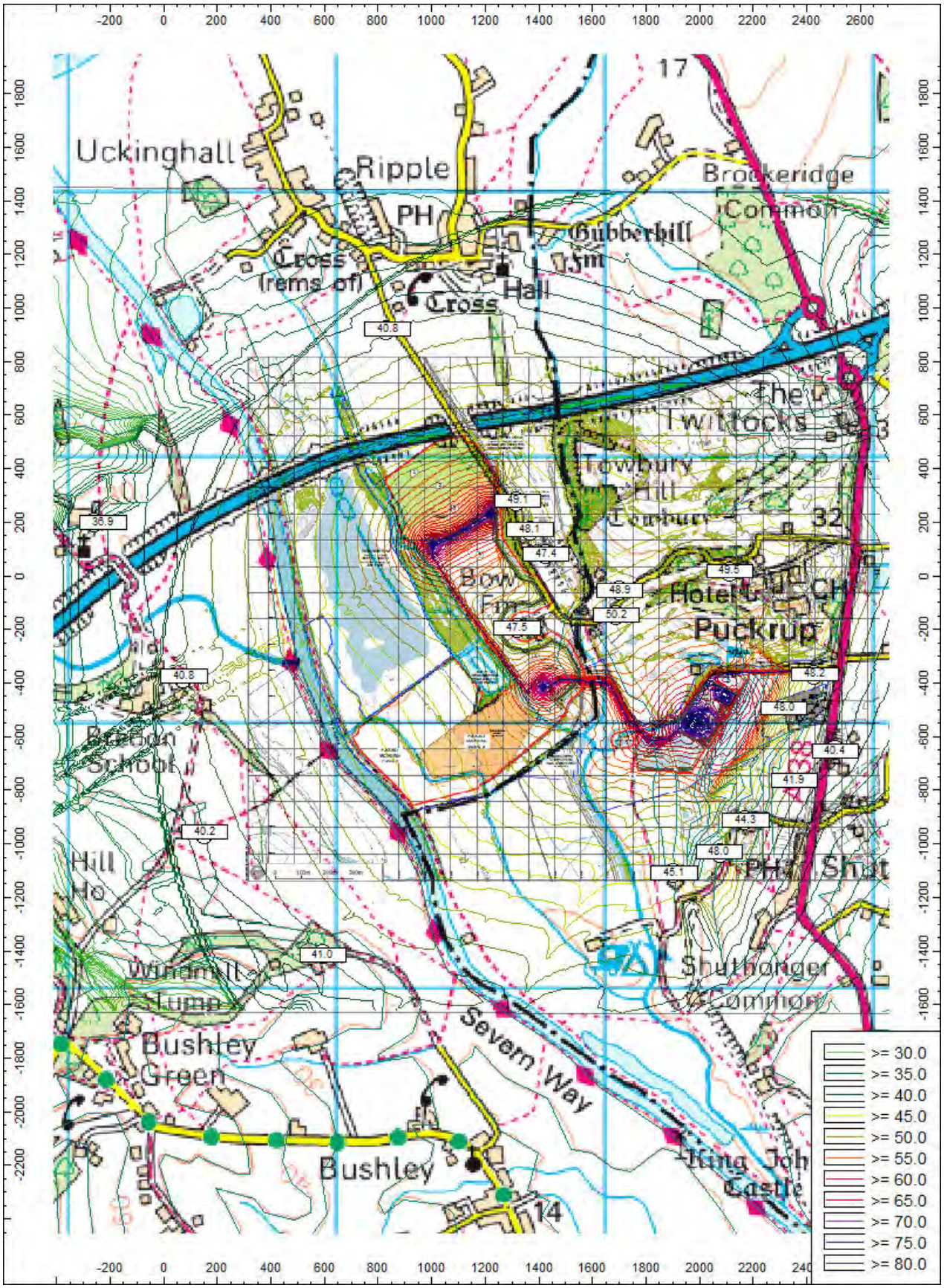
NOISE MAP 1: CONSTRUCTION OF EARTH MOUND SCREENING (NORTHEAST)



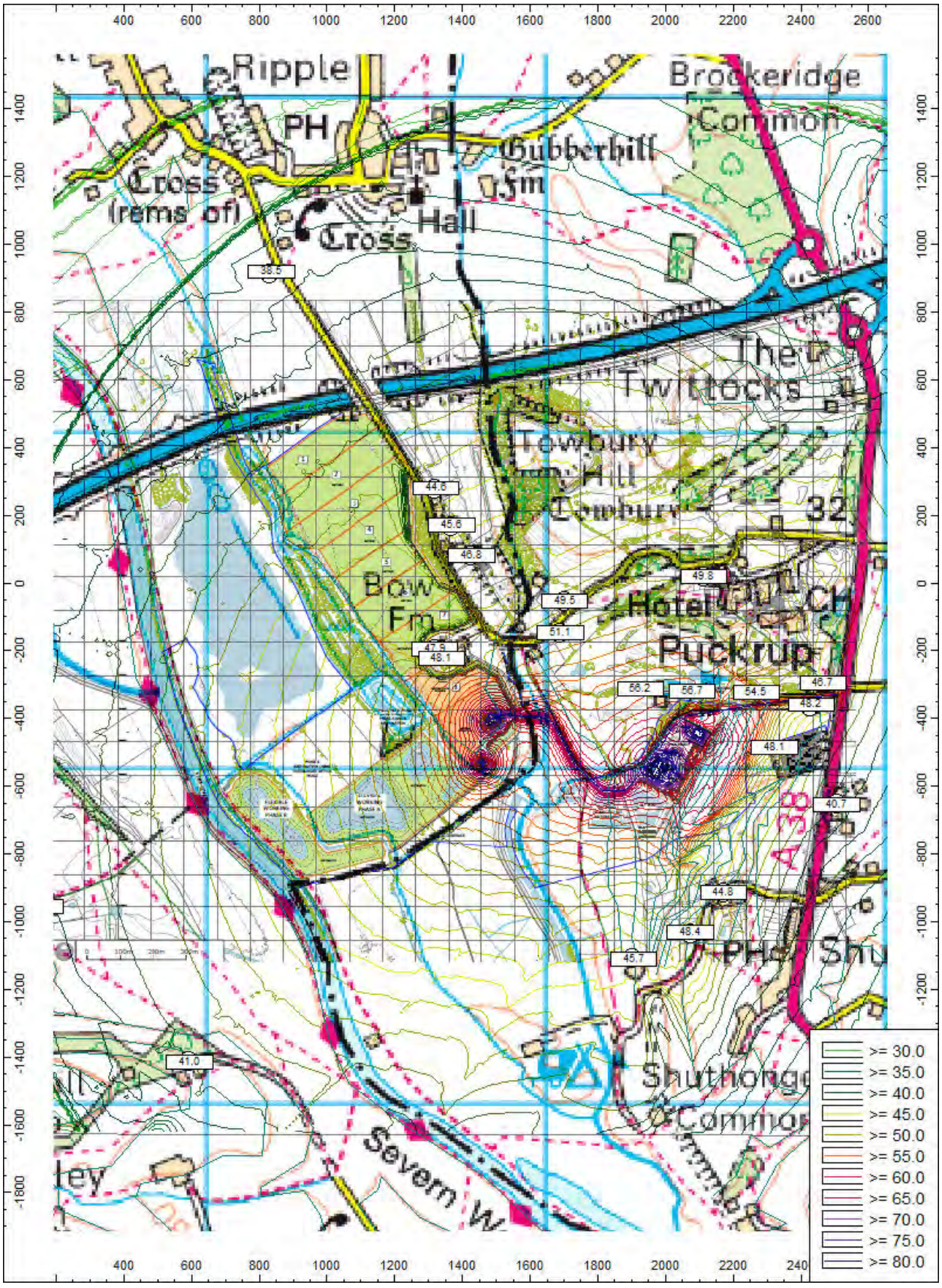
NOISE MAP 2: EXTRACTION ACTIVITIES PHASE 4



NOISE MAP 3: EXTRACTION ACTIVITIES PHASE 4 & PROCESSING ACTIVITIES



NOISE MAP 4: EXTRACTION ACTIVITIES PHASE 9 & PROCESSING ACTIVITIES



NOISE MAP 5: EXTRACTION ACTIVITIES PHASE 9 & PROCESSING ACTIVITIES & FLEX A WORKING