APPENDIX C

Warwickshire County Council

PERMISSION WITH CONDITIONS

REF: NW126/01CM013

TOWN AND COUNTRY PLANNING ACT 1990
Town and Country Planning (General Development Procedure) Order 1995
NOTICE OF DECISION OF COUNTY PLANNING AUTHORITY

To: SLR Consulting Limited, Wheeley Ridge, Wheeley Road Alvechurch Worcestershire B48 7DD

The **WARWICKSHIRE COUNTY COUNCIL**, having considered the application for permission Environment Act 1995 – Review of Mineral Planning Permission of 152 Hectares of land at Jees & Boons Quarries, Nuneaton Road Hartshill Nuneaton Warwickshire, [Grid ref: 335.943] made by you on behalf of Midland Quarry Products, Leicester Road Whitwick Leicestershire LE67 5GR and deposited with the County Council on 31st May 2001.

HEREBY GIVE YOU NOTICE that **PERMISSION** is **GRANTED** for the review pursuant to Environmental Act 1995 of mineral planning permissions dated, 1949, 1969, 1975 and 1985 respectively, subject to the following conditions:-

APPROVED PLANS

1. Unless otherwise approved in writing by the Mineral Planning Authority, the development hereby permitted shall not be carried out other than in accordance with the submitted application, environmental statement, plans ref: JBQ 2/1, JBQ 2/2, JBQ 2/3, JBQ 3/1, JBQ 4/1, JBQ 4/2, JBQ 4/3, JBQ 4/4 & JBQ 5/1.

DURATION OF PERMISSION

2. The winning and working of mineral and the deposit of mineral waste and colliery spoil at the site shall cease on or before the 21st February 2042.

PRE RE-COMMENCEMENT CONDITIONS

3. Mineral extraction shall not be re-commenced until a scheme of blast monitoring by the operator has been submitted to the MPA for approval. The scheme shall include the frequency and location of monitoring and the equipment to be used. Following written approval the scheme shall be implemented in accordance with the approved details.

4. Prior to the re-commencement of mineral extraction, signs will be erected at the entrance to the site advising hauliers to leave the site in a westerly direction, and to follow the route to the A5(T) via Nuneaton Road and Woodford Lane, except where deliveries are being made in the Nuneaton area. The signs will also request hauliers to follow the same route when approaching the quarry

HOURS OF OPERATION

5. Except in emergencies to maintain safe quarry working (which shall be notified to the MPA on the next working day), or with the prior written consent of the MPA, no operations or uses permitted or required, shall be carried out except during the following times:

Mineral extraction, processing, servicing, maintenance or testing of plant and restoration works:-

0700 – 1800 Mondays to Fridays
0700 – 1300 Saturdays

Construction of overburden mounds and stockpiles and during the excavation of overburden:-

0800 – 1800 Mondays to Fridays
0800 – 1300 Saturdays

Blasting operations:-

1130 – 1230 & 1400 - 1500 Mondays to Fridays

and normally at, or as near as practicable to, a fixed time which shall be made known locally.

None of these operations shall be carried out on Sundays, Bank or Public Holidays.

NOISE

6. At the receptor sites listed below the noise levels arising from the development, shall not exceed the specified levels, when measured at or recalculated at a height of 1.2 metres above ground level and 3.6 metres from the façade of any residential property or occupied building. Notwithstanding the above, these levels may be exceeded, for a maximum of 8 weeks per annum during the construction of overburden mounds and stockpiles and during the excavation of overburden from the peripheral parts of the site (Such periods shall be notified to the MPA prior to work commencing). During such periods noise levels shall not exceed 70 dB $L_{eq,1h}$.

Receptor	Maximum Noise Level/$L_{eq,1h}$
149 Nuneaton Road	55
Berrington Road	52
Church Close	51
Farragh	52
Anchor Inn	55
Castle View	51

7. All vehicles, plant and machinery operated within the site shall be maintained in accordance with the manufacturer's specification at all times, and shall be fitted with and use effective silencers.

8. Reversing alarms shall not be used unless they are of a bell tone type or are of the directional type or capable of adjusting their noise level automatically to 5dB(A) above the ambient noise level or are of a type otherwise approved in writing by the MPA.

BLASTING

9. No blasting operations shall be undertaken unless an audible warning has been sounded.

10. Blasting operations shall be carried out in such a manner that vibration, noise and air overpressure are minimised. The peak particle velocity attributable at any blast, measured at a point immediately adjacent to any occupied dwelling outside the boundary of the site shall not exceed 6mm/sec in 95% of all blasts and no blast should exceed 12mm/sec (Peak particle velocity shall be measured as the maximum of mutually perpendicular directions taken at ground surface).

DUST

11. In order to minimise the raising of dust, the following steps shall be taken:

    i) the use of water bowsers on haul roads and other operational areas of the site.

    ii) the use of water sprays or other methods of controlling dust from mineral extraction.

    iii) the suspension of overburden removal operations during dry and windy conditions which could give rise to wind bourne dust being carried beyond the site boundary; and

    iv) the compaction, profiling and damping of stored materials.

12. Drilling rigs used on the site shall be fitted, and operated, with dust containment bags.

POLLUTION CONTROL

13. There shall be no discharge of foul or contaminated drainage (including trade effluent) from the site into either groundwater or any surface waters, whether direct or via soakaways unless subject to a discharge consent.

14. Any facilities for the storage of oils, fuels or chemicals shall be located on an impervious base surrounded by oil and fuel tight bunded walls. The bunded volume shall be capable of containing 110% of the tank's volume and shall enclose all filling points, vents, gauges, sight glasses and drain pipes. The drainage system of the bund shall be sealed with no discharge of any watercourse, land or underground strata. Associated pipework shall be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets shall be detailed to discharge downwards into the bund. If there is multiple tankage the volume of the bunded area shall be capable of containing the volume of the largest tank plus 10%.

15. No extraction, tipping or temporary storage of materials shall take place within 5 metres of any watercourse.

ACCESS

16. The site access road shall be maintained in macadam or other suitable hard bound material to the reasonable satisfaction of the MPA.

17. Before any vehicle leaves the site it shall be sufficiently clean to prevent it from depositing deleterious material on the public highway. If necessary to comply with this requirement, wheel cleaning facilities of a type approved in writing by the MPA shall be installed at the site and used as required.

18. When necessary, a mechanical brush shall be used to keep the hard surfaced internal roads and access areas clean to ensure that no mud or other debris is deposited on the public highway.

19. No loaded lorries shall enter or leave the site unless sheeted, or their loads are otherwise appropriately secured.

20. Prior to the commencement of operations to the east of the B4111, a detailed scheme for the transfer of quarry waste and quarry traffic across the B4111 shall be submitted to the MPA for approval. Following approval in writing by the MPA the scheme shall be implemented accordingly.

21. Prior to the construction of the silt lagoons to the east of the Coventry Canal, a detailed scheme of access arrangements for quarry waste and quarry traffic shall be submitted to the MPA for approval. Following approval in writing by the MPA the scheme shall be implemented accordingly.

Note

The Regulatory Committee expressed that, best endeavours should be used to transfer quarry waste across the B4111 by means of an overhead conveyor or a conveyor below the ground.

CONSTRUCTION OF SILT LAGOONS

22. Prior to the construction of the silt lagoons to the east of the Coventry Canal, a detailed scheme of construction and operational details (including amongst other things method of keying into the existing ground profile, proximity of the lagoon to the railway, provision for surface run-off, overflow discharge to adequate watercourse, undisturbed margins and the route of the silt pipe to the lagoons) shall be submitted to the MPA for approval. Following approval in writing by the MPA the scheme shall be implemented accordingly.

23. Unless otherwise agreed in writing by the MPA, the outer slopes of the silt lagoons shall not have gradients in excess of 1 in 3, and the elevation of the crest of the of the bunds shall not exceed 100 metres above Ordnance Datum.

GENERAL OPERATIONS

24. Notwithstanding the provisions of the Town and Country Planning (General Permitted Development) Order 1995 (or any Order amending, replacing or re-enacting that Order) no buildings, fixed plant or machinery shall be erected or otherwise brought onto the site unless permission has been obtained in writing from the MPA.

25. Throughout the duration of operations at the site the operator will facilitate the operation of a Liaison Committee through attendance at regular meetings.

SOIL STRIPPING, HANDLING AND STORAGE

26. Before the construction of the silt lagoons and prior to the deposit of quarry waste, topsoil and subsoil shall be stripped handled and stockpiled in accordance with a scheme to be agreed in writing with the MPA. Following approval the scheme shall be implemented accordingly.

27. All topsoil and subsoil shall be permanently retained on site and stored in such a manner as to preserve its texture so that it is available, if necessary, to be used for restoration at a future date.

28. No plant or vehicles shall cross any area of unstripped topsoil or subsoil except where such trafficking is essential and unavoidable for purposes of undertaking permitted operations.

29. No movement of soils shall take place accept when the full depth of soil to be stripped or otherwise transported is in a suitable dry and friable condition. Conditions shall be sufficiently dry for the top soil to be separated from the subsoil without difficulty.

30. All areas of the site left undisturbed and all topsoil, subsoil and overburden mounds shall be kept free from notifiable weeds. Any steps deemed necessary to destroy notifiable weeds should be taken only after consultation with an ecologist.

ECOLOGY

31. Mineral extraction shall not proceed beyond Phase 1 until a phased scheme which identifies notable habitat areas and notable and protected species on site, (namely plants, bats, badgers, water voles, birds, reptiles, amphibians and notable invertebrates – including White-clawed Crayfish), has been drawn up by suitably qualified Ecological Consultants. The scheme to be based on comprehensive survey data, to include adequate mitigation measures shall be submitted to the MPA for approval. Following approval in writing the scheme shall be implemented accordingly.

ARCHAEOLOGY

32. Prior to the construction of the silt lagoons to the east of the Coventry Canal, a programme of archaeological work, in accordance with a written scheme of investigation, which has first been submitted to and approved in writing by the MPA, shall be secured.

Following approval by the MPA the scheme shall be implemented accordingly.

40. Unless otherwise agreed in writing by the MPA, restoration of the site shall be completed within 24 months of the permanent cessation of working in accordance with the approved restoration scheme.

41. At the cessation of mineral workings or sooner as may be agreed with the MPA, all buildings, fixed plant and machinery associated with the development, shall be removed from the site and all concrete and other hard standings which would impede the restoration of the site shall be broken out and similarly removed from the site, or used in the restoration of the site.

AFTERCARE

42. Unless otherwise agreed in writing by the MPA, 3 months prior to completion of the restoration of the site, an aftercare scheme for the site requiring such steps as may be required to bring the land to the required standard in accordance with the scheme of restoration shall be submitted to the MPA for approval. The scheme shall specify the steps to be taken over a five year period and detail arrangements for aftercare meetings. Following approval in writing by the MPA the scheme shall be implemented accordingly.

43. Before the 31st January and every subsequent anniversary the MPA shall be provided with the following:

a) a record of aftercare operations carried out on the land during the previous 12 months.
b) proposals for managing the land for the forthcoming 12 months.

Following approval by the MPA the proposals shall be carried out accordingly.

Reasons

1. To comply with Section 91 of the Town and Country Planning Act 1990.

2. To afford the Mineral Planning Authority proper control over operations on site.

2. To protect the amenity of the area and local residents, including visual impact, noise and dust.

3. To protect the environment from pollution.

4. To ensure the satisfactory and early restoration and aftercare of the site.

5. To protect highway safety and prevent the deposit of waste and mud and other material on the carriageway.

6. To protect and record features of archaeological importance.

7. To protect and record features of geological importance.

Development Plan Policies Relevant to this Decision

a) Warwickshire Structure Plan – Alterations 1989 – 2001 – Policies G5, G7, E4.1, E6, IC23 and IC27

b) Warwickshire Structure Plan – Deposit Draft (as proposed to be modified) – Policies GD1, GD.2, GD4, ER.1, ER.2, ER.4 and ER.5

c) North Warwickshire Local Plan adopted May 1995 – Policies ENV4, ENV6, ENV14, ENV24 and IMP4

d) Minerals Local Plan for Warwickshire adopted February 1995 – Policies M5, M6, M7 and M9

DATED 19th September 2001

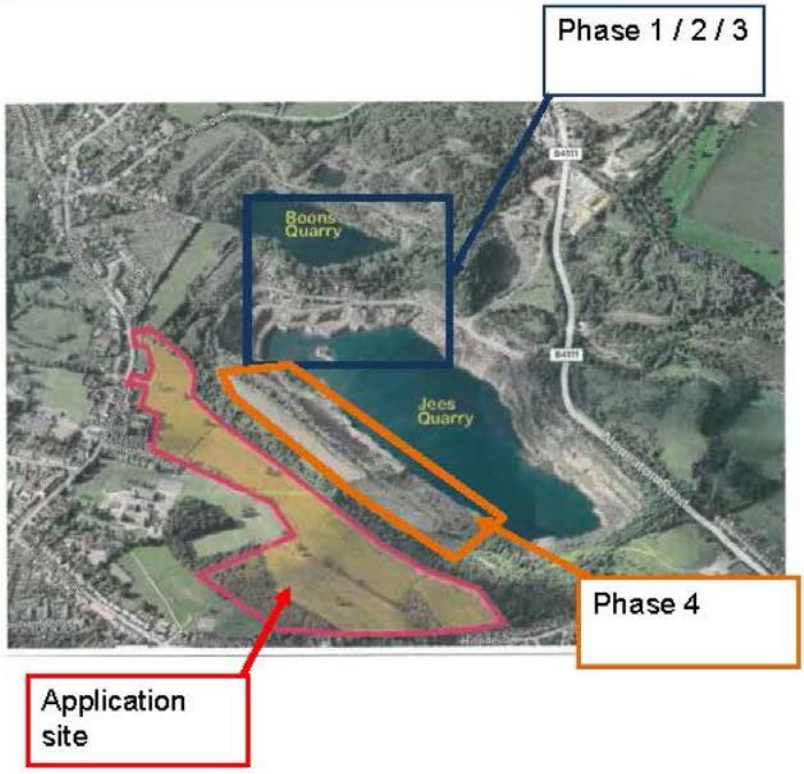
Ian Caldwell
Clerk of the Council

Shire Hall
Warwick
CV34 4RR

IT IS IMPORTANT THAT YOU READ THE NOTES AT THE END OF THIS NOTICE

APPENDIX D

Indicative Plan of Works – Hartshill Quarry



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APPENDIX D

Planning and Development Board

8 July 2019

SUPPLEMENTARY REPORT

PAP/2018/0140

Land East of Castle Road and North of Camp Hill Road, Hartshill and Nuneaton

Outline application for mixed development including the erection of to 382 houses for

Tarmac Trading Limited

Introduction

Members will have received the papers for this case with the agenda for the July Board meeting.

Just after its publication, a further letter was received from the representative of the quarry owner. This is attached at Appendix A.

This supplementary report has been prepared to respond to the letter.

The Letter

The first two or three paragraphs of the letter reiterate the concern that the Board treats the impact of the proposed residential development on the legitimate operation of the quarry as a material planning consideration. The report explicitly does so in a complete section on pages 5/8 to 5/12. Paragraph 182 is the source of this consideration and it is copied in full within that section.

The next few paragraphs refer to the need to explicitly draw attention to the view that there would be an additional 400 "receptors" in the locality of the "live" quarry and thus that there is a likelihood for a greater propensity for complaints to be made. The recent issue of a Planning Contravention Notice is cited, in that that led the operator to "engage in additional survey work, time and resources to disprove the allegation that a breach of control has occurred". The report explicitly recognises that the likelihood of complaint may increase - the bullet point at the top of page 5/11.

The letter then refers to the phasing of the quarry operations. The report explicitly describes this in the background section on page 5/9 and there is an illustration of that phasing at Appendix D. This background paragraph explicitly refers to "the southwest wall of that larger quarry would extend towards the site boundary. This is the part of the quarry closest to the application site".

The letter continues by outlining advice that the operator has received on how the "operation of the site might need to change to accommodate the proposed development". The County Council as the Minerals Planning Authority has responded to this – see Appendix B.

There is then reference to the para 182 issue that the residential development should mitigate any future impacts.

The letter then indicates that the operator does not consider that the possibility of including an "Informative" on any Decision Notice would provide a resolution of the matter. This expresses his current position.

The letter concludes by reference to the Minerals Local Plan. This is covered in the report with an update on the Development Plan – page 5/4 – and further comments in the bullet points on page 5/11.

Observations

Much of what is raised by the letter in respect of omissions is covered above, but other responses are also needed.

Firstly, Members should be aware that the likelihood of a greater number of complaints is a material consideration. The issue is what weight is given to that. The report indicates that several matters mitigate the degree of that weight. Most notably the operator already has to monitor operations through the different legislative regimes he operates under. He will thus have the ability through normal practice to respond to complaints. There are established procedures in respect of alleged breaches of planning control as well as under the Environmental Protection Act 1990 if there is an alleged statutory nuisance due to the likes of noise, vibration and dust. There may well indeed be more complaints. Whilst it is not considered that the proposed development would introduce any material change in the nature of the complaints, there may be more related to vibration because of the matter mentioned below. The weight given to this matter is however still considered to be limited.

Secondly, the County Council acting as the Minerals Planning Authority has been asked to comment on the suggested changes to quarry operations. This in general terms indicates the suggested changes would not result in an overhaul of the quarry planning permission and indeed perhaps not any need to vary the conditions. There may be a need to submit a revised monitoring scheme. However if the changes are introduced then there could be more, but smaller blasts and it might be prudent to add new monitoring locations. There is no evidence submitted to support the quarry owner's submission that this change would lead to a decline in productivity or indeed in the scale of that decline.

Thirdly, there is the matter of the current applicant proposing "mitigation measures". These would apply if, in the terms of Para 182 of the NPPF, the "operation of an existing business could have a significant adverse effect on new development". The applicant considers that it would not, provided that the quarry operates within its planning conditions. The County Council has neither suggested mitigation measures throughout the planning process here – the allocation; the Examination in Public, the application and indeed in response to the latest letter.

Conclusions

Members have now received a number of reports which deal with the paragraph 182 matter and been reminded that this is a material planning consideration that has to be weighed in the final planning balance. Without it, it is considered that the balance would weigh in favour of the grant of a planning permission. The issue is whether or not it is of such weight to overturn this conclusion.

In looking at para 182 Members need to reach a conclusion on:

- whether the residential development would place unreasonable restrictions on the quarry operations and
- whether the quarry could have a significant adverse effect on the residential development.

In respect of the former, then Members will have the seen the evidence set out on pages 5/10 and 5/11 of the 8th July report together with that now provided in Appendix B from the Minerals Planning Authority. Officers consider that this shows that any restrictions placed on the quarry would not be "unreasonable".

In respect of the second, then Members will have seen the evidence as set out above; that set out in the initial April report and the evidence submitted by the applicant in respect of this matter. Officers consider that this shows that any impacts arising from the quarry would not be significantly adverse.

The Board will need to reach its own conclusions on these two matters.

Recommendation

This remains unaltered from that printed in the July Board report.

APPENDIX E

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HARTSHILL QUARRY - POTENTIAL IMPACTS ON BLASTING PRACTICES OF A PROPOSED HOUSING DEVELOPMENT

For

CROWN AGGREGATES LIMITED

July 2019

GWP Consultants LLP
Registered No. OC326183
Registered Office: Upton House, Market Street, Charlbury, Oxfordshire, OX7 3PJ, UK

Report Title:	**Hartshill Quarry - Potential Impacts on Blasting Practices of a Proposed Housing Development**
Client:	**Crown Aggregates Limited**

Job:	HARTSHIL
Report Number:	190622
Version:	v.02
Issue Status:	Final
Issue Date:	5th July 2019

Prepared by: Ben Mason

Approved by: Alan Cobb Date: 05/07/19 Signature:

Issue History:

Issue No.	Issue Date	Description	Prepared	Checked	Approved
v.01	24/06/19	Report issued to Client	BM	CL	AEC
v.02	05/07/19	Minor amendments to report text. Issued as final.	BM	CL	AEC

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Table 2 Example of adjusted blast design to meet existing vibration constraints
Table 3 Example adjusted blast designs to meet vibration constraints due to proposed development

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HARTSHIL1906-1 Estimated impact of proposed development on blasting practice
HARTSHIL1906-2 Blast vibration regression line

APPENDICES

Appendix 1 Extracted Quarry Development Proposals
Appendix 2 Hartshill Quarry Blast Monitoring Scheme (Report No. 180216v.03)

HARTSHILL QUARRY - POTENTIAL IMPACTS ON BLASTING PRACTICES OF A PROPOSED HOUSING DEVELOPMENT

1. INTRODUCTION

1.1 The proposed development

A Planning Application (no. PAP/2018/0140) has been made for a proposed residential development at land east of Castle Road and north of Camp Hill Road, Hartshill. The proposed development lies immediately adjacent to the south-western boundary of Hartshill Quarry, operated by Crown Aggregates Limited. The approximate boundary of the proposed development is shown in relation to Hartshill Quarry in Drawing No. HARTSHIL1906-1.

The proposed development will include approximately 400 homes. The boundary of the proposed development is between 70m and 135m from the expected limit of rock extraction by drill and blast methods along the south-western boundary of the quarry.

1.2 Summary of permitted quarry development

Hartshill Quarry is currently owned and operated by Crown Aggregates Limited (Crown). Crown acquired the site in early 2016, with the intention of reworking historical tips and recommencing quarrying operations to produce crushed rock aggregates. Hartshill Quarry has been subject to extensive historical working.

The permitted quarry development plans, extracted from Midland Quarry Products (MQP) documents, are provided in Appendix 1 for reference. In the initial development phase, drill and blast excavations to remove Boons' Pillar will join the former Boons and Jees quarry voids into one continuous excavation. In subsequent phases, the south-west faces will be progressively worked in a south-easterly direction in conjunction with deepening of the quarry void to 10mAOD.

1.3 Blasting practices

The current blasting scheme is described in the Blast Monitoring Scheme (Report No. 180216v.03), included in Appendix 2 for reference. All blasts will be designed such that the blast vibrations remain below the required limits as specified by Condition 10 of the Planning Consent, which states that:

"Blasting operations shall be carried out in such a manner that vibration, noise and air overpressure are minimised. The peak particle velocity attributable at any blast, measured at a point immediately adjacent to any occupied dwelling outside the dwelling outside the boundary of the site shall not exceed 6mm/sec in 95% of all blasts and no blast should exceed 12mm/sec (Peak particle velocity shall be measured as the maximum of mutually perpendicular directions taken at ground surface)."

Whilst limits are given for ground borne vibration, there is no constraint on the air overpressure, other than it should be kept as low as possible.

As described in the Blast Monitoring Scheme, to meet the 6mm/s limit on Peak Particle Velocity (PPV) the Maximum Instantaneous Charge (MIC) for each blast is determined using the site specific vibration-scale distance regression line reproduced in Drawing No. HARTSHIL1906-2. To comply the scale distance should be greater than 27.4m/kg^{½} to any inhabited property.

It should be noted that, blast vibrations with a PPV of above 3mm/s will generally be perceptible to people and many people can detect vibration at considerably lower values.

The proximity of existing housing near the north-western and south-eastern boundaries of the quarry create restrictions on MIC, which is mitigated for by adjusting the blast design (e.g. decking shots and/or reducing blast hole diameter and spacings).

The proposed development would create a new set of sensitive receptors along the immediate south western boundary of the site. This would require the alteration of blast designs to reduce PPV for a larger volume of the remaining mineral resource and has the potential to reduce the efficiency and profitability of the quarrying operation.

2. EFFECTS OF DEVELOPMENT ON BLASTING PRACTICES

2.1 Assumptions

To estimate the impact of the proposed development on blasting the constraints required to control vibration along the south-western boundary of the site have been compared to a reference blast design. The reference blast design, detailed in Table 1, is based on accepted rules of thumb[1,2].

A number of assumptions have been made for the purposes of the following analyses.

- The radial distance to the proposed development boundary (as shown on Drawing No. HARTSHIL1906-1) approximates the distance to the new receptors.
- Mancetter Road (B4112) has been considered a sensitive receptor (likely contains buried services).
- Production blasting will produce 7.5m high temporary advancing benches (*e.g.* half of full 15m final face height).
- Blast hole patterns will be rectangular.
- The bulk blasting agent will be 100% relative weight strength ammonium nitrate and fuel oil (ANFO).

2.2 Reference blast design

A reference blast design for a 7.5m high temporary advancing bench based on accepted rules of thumb has been developed as a basis for determining the effects of the proposed development. The reference blast design is summarised in Table 1 and constitutes a rectangular pattern of single delay nominal 95mm diameter blast holes at burdens and spacing of 2.5m and 2.9m respectively.

This design generally conforms with observed practices at the quarry and is within the capabilities of the available blast hole rig (FlexiROC T405).

2.3 Existing constraints on blasting

The proximity of existing sensitive receptors to some areas of the quarry (particularly the Boons excavation, the north-west and south-east faces) already requires a reduced MIC to ensure that blasting operations do not exceed a PPV of 6mm/s.

In these cases, the reference blast design is adjusted by:

Blast design adjustment	Impact on quarrying operations
Decking the shot *(two smaller charges on separate delays each of which do not exceed MIC)*	Additional time and expense wiring two charges per blast hole.
Reducing blast hole diameter *(to reduce charge weight per blast hole)*	Reduced burden and spacing leading to increased number of blast holes per unit volume of rock – increased drilling and charging costs.
Reducing burden and spacing ratios *(to maintain acceptable fragmentation)*	As above. If burdens and spacings not adjusted to maintain appropriate powder factor then poorer fragmentation of the rock may lead to increased secondary breakage and crushing costs.

For those areas constrained by existing receptors the adjusted blast designs lead to increased drill and blast costs per unit volume (30m face length by 10m free face by 7.5m face height) of rock. For

[1]Wylie and Mah, 2004. *Rock slope engineering: civil and mining – 4th edition.*

[2] Dyno Nobel, 2010. *Blasting and Explosives Quick Reference Guide.*

a scaled distance of approximately 100m (see Table 2), there is a *c.* 25% increase in the number of blast holes required per unit volume compared to the reference blast design.

2.4 Constraints due to the proposed development

2.4.1 Effect of proposed development on MIC

By constructing a large number of houses a short distance behind the south western quarry rim, the proposed development will significantly reduce the distance between production blasting along the south-western slopes of the quarry and sensitive receptors. To ensure that PPV at these new receptors does not exceed 6mm/s and to minimise the air overpressure, the MIC per delay would need to be reduced for a large proportion of the remaining mineral resource compared to what would be necessary without the new houses.

Post-development MICs are compared with the maximum allowable MIC (based on the scaled distance relationship) in Drawing No. HARTSHIL1906-1. Reductions in MIC of up to 80% would be required along the south-western faces. Total reductions in MIC would range between 10 and 180kg depending on proximity to the south-western boundary.

Compared with the reference blast design (MIC 39.5kg) post-development reductions in MIC are lower, at between 35% and 75%. The area requiring deviation from the reference blast design would extend between 40-100m from the limit of excavation. Depending on the scale of the MIC reduction compared to the reference blast, adjustments will be required to blast designs as described in the above table.

Adjusted blast designs to meet MIC constraints will generally lead to declines in the productivity and efficiency of the drill and blasting operations compared to a scenario without the proposed development.

2.4.2 Adjustments to blasting due to the proposed development

The reference blast design (see Table 1) has been used as the reference point for determining the adjustments which may be required to blasting practices due to the proposed housing development.

It should be noted that where pre-development allowable MICs exceed the reference design (*e.g.* >39.5kg), the impacts of the proposed development may be greater than shown. Should larger, more efficient blasting patterns have been proposed for these areas (*e.g.* quarry floor) then the reduction in allowable MICs may lead to more dramatic reductions in drill and blast efficiencies.

Where post-development reduced MICs match or exceed the reference blast design (MIC 39.5kg) it has been assumed that no adjustment would be required to blasting practices. Adjustments to the reference blast design due to the constraints of the proposed development fall into four general categories:

Adjustment category	Description
1	No adjustment required – as reference design (MIC 39.5kg).
2	As reference blast design – but charge split into two smaller delays, each less than or equal to the allowable MIC.
3	Blast hole diameter reduced, burden and spacing reduced to maintain acceptable rock fragmentation. Charge split into two smaller delays, each less than or equal to the allowable MIC.
4	As 3, but burden constrained by requirements for adequate confinement to prevent flyrock etc. Poor rock fragmentation.

The approximate areas of each blast design adjustment category, based on the reference design, are illustrated on Drawing No. HARTSHIL1906-1.

Category 1 areas, requiring no adjustments to the reference blast design, will generally be greater than 170m (MIC ~39.5kg) from the boundary of the proposed development. Adjustments to the reference blast design will generally be required within 170m of the proposed development boundary (also dependant on existing constraints).

Category 2 areas, are based on the reference design, but require blast holes to be decked to reduce MIC, leading to increased blast hole charging and wiring costs.

Category 3 areas would require a reduction in blast hole diameters, burdens and spacings in addition to decking to reduce the MIC. These adjustments to the reference design would lead to a ~25-33% increase in the number of blast holes required per unit volume of rock.

Category 4 adjustments to the reference design would also require a large increase in the number of blast holes per unit volume of rock and associated downstream costs with poorer fragmentation e.g. increased secondary breakage of boulders or less efficient crushing.

2.5 Air overpressure effects

Whilst there is no limit imposed on air overpressure levels from Hartshill Quarry, the potential effects on future residents (and consequently on the quarry operators) should be considered. Values of 125dB have been measured beyond the quarry boundary from typical blasts. Such pressure levels may cause some vibration of walls and rattling of windows and doors and alarm residents. A potential for cosmetic cracking at junctions between walls and ceilings would exist as both respond to the air pressure wave. Complaints to quarries about blasting vibrations are frequently a consequence of air overpressure rattling walls, rather than from ground borne vibration. It should be noted that air overpressure effects can be worsened by atmospheric conditions, outside the control of the quarry.

3. CONCLUSIONS

3.1 Impact of proposed development on blasting practices

Vibrations from blasting in quarries are controlled by planning constraints. The proposed development along the south-western boundary of the quarry will require the adoption of adjusted blast designs, similar to those required in areas where existing receptors impact on the quarry due to their proximity.

Due to the location and proximity of the proposed development the proportion of the remaining mineral resource constrained and impacted by greater drill and blast costs is greatly increased compared to the current situation. Careful design may be able to mitigate some of the financial and efficiency costs of these constraints, however the overall effect will still be to reduce the efficiency and profitability of quarrying operations at Hartshill Quarry.

A conservative approach has been taken where the reference blast design has a relatively low MIC (39.5kg) compared to the potential MIC in some areas (*e.g.* quarry floor). Blasts within the lower south-western benches and the floor of the quarry would have a higher allowable pre-development MIC which in turn would allow (to a certain limit) larger blast hole diameters, larger spacings and burdens and therefore reduced drilling and blasting costs per unit volume of rock. As such, the potential effects of constraints due to the proposed development in these areas may be much greater than illustrated.

Whilst the quarry endeavours to keep air overpressure to a minimum through the control of blasting practices, the proposed development will greatly widen the arc from the blast point over which air overpressure may impact on inhabited houses. Consequently air overpressure will need to be controlled over a significantly wider area than previously has been the case.

3.2 Impacts of blasting practices on the proposed development

Setting aside the potential efficiency and financial implications of reducing MIC for a large proportion of the remaining mineral resource, it is technically feasible to ensure that PPV does not exceed 6mm/s along the south-western boundary of the quarry.

However, the maximum PPV level (stipulated by Planning Condition 10 for the quarry) will, based on current experience, lead to complaints and dubious assertions of blast damage to property from many future residents of the proposed development.

Future residents will also perceive the air overpressure wave, which is likely to cause rattling of doors and windows, as well as additional vibration of walls and ceilings, leading to further complaints. Because of the greatly increased number of affected dwellings, the quarry operator would probably be obliged to monitor vibration from each blast at far more locations than currently required, adding to the expense of blasting.

A PPV of 6mm/s will not cause any structural damage to even poorly constructed or historic buildings, but is above the lower threshold of human perception. Published peak particle velocity thresholds are presented below for illustration.

Peak particle velocity threshold damage levels (from Wylie and Mah, 2004)

Velocity (mm/s)	Effect/damage
3-5	Vibrations perceptible to humans.
10	Approximate limit for poorly constructed and historic buildings.
33-50	Vibrations objectionable to humans.
50	Limit below which risk of damage to structures is very slight (less than 5%).
125	Minor damage, cracking of plaster, serious complaints.
230	Cracks in concrete blocks.

The residents of the proposed development will likely be able to perceive the vibrations from blasting. As a result, despite the quarry operators meeting the constraints of their planning conditions, it is probable that there will be ongoing tensions between the residents of the proposed development and the quarry operator.

The developer of the proposed housing would in effect be burdening the existing quarry operator with additional operating costs and costs for managing relations with approximately 400 additional households which were not present when quarrying operations recommenced. Complaints to the County Council about the quarries activities will inevitably rise, in spite of the quarry abiding by the conditions of its planning consent.

In addition, the developer would be burdening the residents of the proposed development to living adjacent to an active quarry, which although operating correctly and considerately, may still cause the residents' concerns (unfounded or otherwise).

GWP CONSULTANTS
JULY 2019

Table 1 – Reference blast design

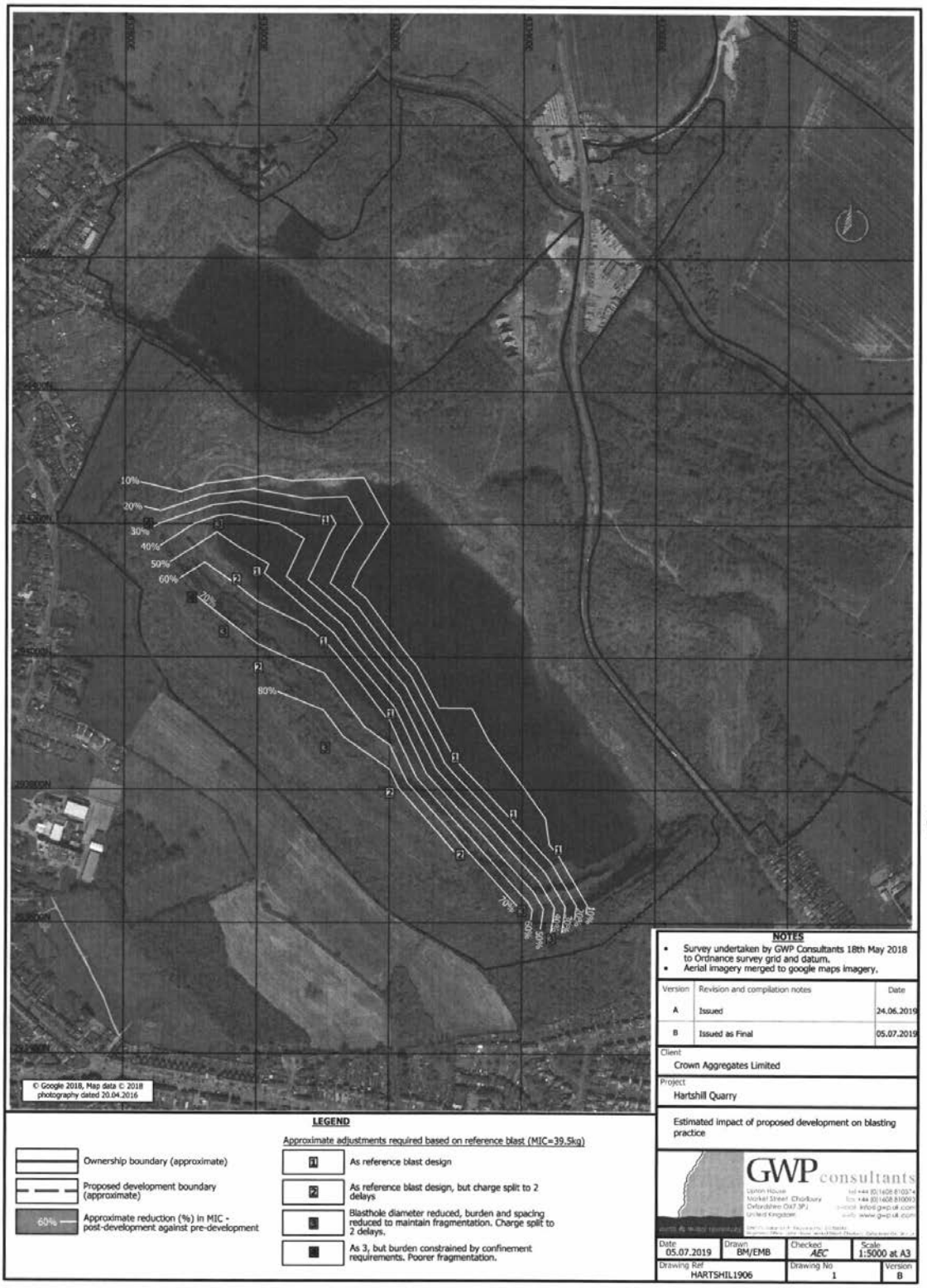
Design Parameter	Symbol	Value	Unit	Comment/Source
Bench height	h	7.5	m	Temporary advancing face – half 15m final face.
Burden	b	2.50	m	Wylie and Mah, 2004. Chapter 11. pp250. Recommended stiffness ratio 3-4 for good confinement.
Spacing	s	2.90	m	Assumed 1.15b. Rectangular pattern
Sub-drill	sd	0.75	m	Recommended sub-drill length for good subgrade 0.3b. Wylie and Mah, 2004. Chapter 11. pp252.
Blast hole length	l_{bh}	8.25	m	
Stemming length	l_{st}	1.75	m	Wylie and Mah, 2004. Chapter 11. pp253. Stemming length 0.7b.
Charge length	l_c	6.50	m	Single delay column.
ANFO density	γ_{ANFO}	840	kg/m^3	Wylie and Mah, 2004. Chapter 11. pp259.
Rock density	γ_{rock}	2500	kg/m^3	Assumed
Blast hole diameter	$\emptyset_{bh}$	95	mm	Within diameter range FlexiROC T405.
Charge Weight	Cw	39.45	kg	Based on 100% relative weight strength ANFO
Powder Factor	PF	0.73	kg/m^3	Quartzite (50-100+MPa) – hard rock requiring powder factor 0.7-0.8kg/m^3 for good fragmentation

Table 2 – Example of adjusted blast design to meet existing vibration constraints

Constraints	Symbol	Value	Unit	Comment/Source
Radial distance to property	*rd*	98	m	
MIC for PPV <6mm/s	MIC	13	kg	
Design Parameters	**Symbol**	**Value**	**Unit**	**Comment/Source**
Bench height	*h*	7.5	m	Temporary advancing face – half 15m final face.
Burden	*b*	**2.00**	m	Wylie and Mah, 2004. Chapter 11. pp250. Recommended stiffness ratio 3-4 for good confinement.
Spacing	*s*	**2.30**	m	Assumed 1.15b. Rectangular pattern
Sub-drill	*sd*	0.75	m	Recommended subdrill length for good subgrade 0.3b. Wylie and Mah, 2004. Chapter 11. pp252.
Blast hole length	l_{bh}	8.25	m	
Stemming length	l_{st}	1.75	m	Wylie and Mah, 2004. Chapter 11. pp253. Stemming length 0.7b.
Inter-deck stemming	l_{idst}	0.50	m	6 times hole diameter
Charge length	l_c	6.50	m	Single delay column.
ANFO density	γ_{ANFO}	840	kg/m^3	Wylie and Mah, 2004. Chapter 11. pp259.
Rock density	γ_{rock}	2500	kg/m^3	Assumed.
Blast hole diameter	$Ø_{bh}$	**80**	mm	Within diameter range FlexiROC T405.
Total Charge Weight	*Cw*	25.33	kg	Based on 100% ANFO
Delay Charge Weight	*Cwd*	**12.67**	Kg	
Powder Factor	*PF*	**0.73**	kg/m^3	Quartzite (50-100+MPa) – hard rock requiring powder factor 0.7-0.8kg/m^3 for good fragmentation

Table 3 – Example adjusted blast designs to meet vibration constraints due to proposed development

Constraints on Blast Design				Adjusted Blast Design Parameters							
Pre-development radial distance (m) to sensitive receptor	Pre-development MIC (kg)	Post-development radial distance (m) to sensitive receptor	Post-development MIC (kg)	Hole diameter (mm)	Burden (m)	Spacing (m)	Interdeck stemming (m)	Charge weight – Total (kg)	Charge weight – per delay (kg)	Powder factor – per delay (kg/m³)	Adjustment Category
159	33	85	9	65	2	2	0.4	17.00	8.50	0.57	4
300	120	99	13	80	2	2.5	0.5	25.33	12.67	0.68	3
395	208	126	21	95	2.5	2.9	0.55	35.13	17.56	0.65	2
273	99	187	47	1 (as reference design)							



LEGEND

Ownership boundary (approximate)

Proposed development boundary (approximate)

60% — Approximate reduction (%) in MIC - post-development against pre-development

Approximate adjustments required based on reference blast (MIC=39.5kg)

F1 — As reference blast design

F2 — As reference blast design, but charge split to 2 delays

3 — Blasthole diameter reduced, burden and spacing reduced to maintain fragmentation. Charge split to 2 delays.

■ — As 3, but burden constrained by confinement requirements. Poorer fragmentation.

NOTES

- Survey undertaken by GWP Consultants 18th May 2018 to Ordnance survey grid and datum.
- Aerial imagery merged to google maps imagery.

Version	Revision and compilation notes	Date
A	Issued	24.06.2019
B	Issued as Final	05.07.2019

Client: Crown Aggregates Limited

Project: Hartshill Quarry

Estimated impact of proposed development on blasting practice

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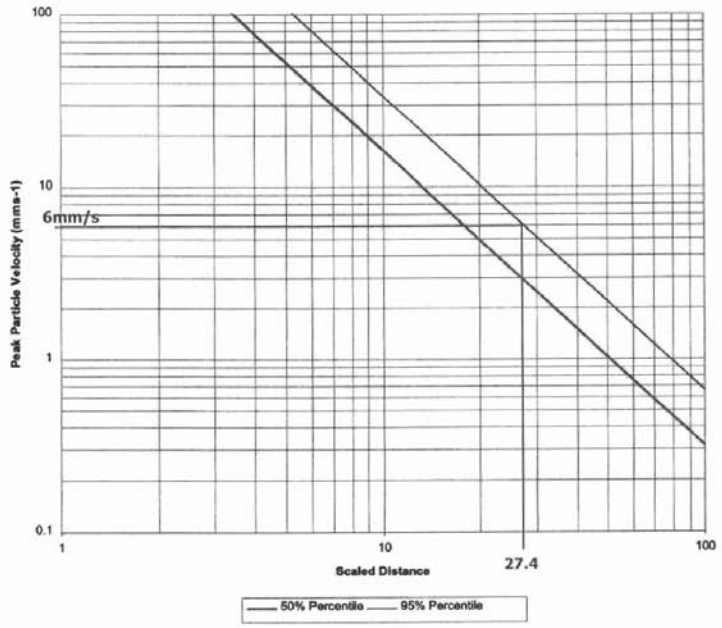
Date	Drawn	Checked	Scale
05.07.2019	BM/EMB	AEC	1:5000 at A3

Drawing Ref	Drawing No	Version
HARTSHIL1906	1	B

Quartzite Sandstone Regression Line



Note: Regression line from MQP Drawing JBQ12/1 for Jess and Boons review of minerals permission.

Minimum permissible Scaled Distance at any inhabited property = 27.4m/√kg

Distance (m)	Maximum instantanous charge (kg)
100	13
110	16
125	21
150	30
175	41
200	53
250	83
300	120

Version	Revision and compilation notes	Date
A	Issued	24.06.2019
B	Issued as Final	05.07.2019

Client: Crown Aggregates Limited

Project: Hartshill Quarry

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Blast vibration regression line

Date	Drawn	Checked	Scale
05.07.2019	BM/EMB	AEC	NTS at A4

Drawing Ref	Drawing No	Version
HARTSHIL1906	2	B

APPENDIX 1

Extracted quarry development proposals

LEGEND:
APPLICATION SITE BOUNDARY
END OF PHASE CONTOURS
EXCAVATION AREA
EXPOSED QUARRY FACE
ACCESS TO EXCAVATION
OVERBURDEN DISPOSAL AREA
WATER AREA
LEVEL /mAOD
90.0
REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE, CROWN COPYRIGHT. LICENCE NUMBER AL100017231.
Midland Quarry Products
JEES & BOONS QUARRY
PERIODIC REVIEW OF MINERALS PERMISSIONS
DEVELOPMENT PROPOSALS
PHASE 1
JBQ 4/1
SLR
PROJECT No. 4D-323-001
FILE No. JBQ4-1
SCALE: 1:7,500
434500
434000
433500
433000
432500
295000
294500
294000
293500
72.0
58.0
90.0
100.0
112.0
124.0
Hurstwell

LEGEND:
APPLICATION SITE BOUNDARY
END OF PHASE CONTOURS
EXCAVATION AREA
EXPOSED QUARRY FACE
ACCESS TO EXCAVATION
OVERBURDEN DISPOSAL AREA
WATER AREA
LEVEL /mOD
90.0
REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE, CROWN COPYRIGHT. LICENCE NUMBER AL100012293.
Midland Quarry Products
JEES & BOONS QUARRY
PERIODIC REVIEW OF MINERALS PERMISSIONS
DEVELOPMENT PROPOSALS
PHASE 2
JBQ 4/2
SLR
PROJECT No. 4D-323-001
FILE No. JBQ4-2
SCALE: 1:7,500
SETTLEMENT POND
NEW ACCESS TO WESTERN FACES
RECONTOURED WESTERN MOUND
58.0
72.0
78.0
92.0
100.0
434500
434000
433500
433000
432500
294500
295000
294000
293500

LEGEND:
APPLICATION SITE BOUNDARY
END OF PHASE CONTOURS
EXCAVATION AREA
EXPOSED QUARRY FACE
ACCESS TO EXCAVATION
OVERBURDEN DISPOSAL AREA
WATER AREA
LEVEL /mAOD
REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE, CROWN COPYRIGHT, LICENCE NUMBER AL100017233.
Midland Quarry Products
JEES & BOONS QUARRY
PERIODIC REVIEW OF MINERALS PERMISSIONS
DEVELOPMENT PROPOSALS
PHASE 3
JBQ 4/3
SLR
PROJECT No. 4D-323-001
FILE No. JBQ4-3
SCALE: 1:7,500
SILT LAGOON No. 1
SETTLEMENT POND
72.0
58.0
50.0
60.0
434500
434000
433500
433000
432500
295000
294500
294000
293500
Horsehill

LEGEND:
APPLICATION SITE BOUNDARY
END OF PHASE CONTOURS
EXCAVATION AREA
EXPOSED QUARRY FACE
ACCESS TO EXCAVATION
OVERBURDEN DISPOSAL AREA
WATER AREA
LEVEL /mOD
42.0
REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE, CROWN COPYRIGHT, LICENCE NUMBER AL100012293.
Midland Quarry Products
JEES & BOONS QUARRY
PERIODIC REVIEW OF MINERALS PERMISSIONS
DEVELOPMENT PROPOSALS
PHASE 4
JBQ 4/4
SLR
PROJECT No. 4D-323-001
FILE No. JBQ4-4
SCALE: 1:7,500
SILT LAGOON No. 1 CAPPED AND RESTORED
SILT LAGOON No. 2 (PRIOR TO CAPPING)
50.0
42.0
22.0
10.0
434500
434000
433500
433000
432500
294500
295000
294000
293500

APPENDIX 2

Hartshill Quarry Blast Monitoring Scheme (GWP Report No. 180216 v.03)

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HARTSHILL QUARRY BLAST MONITORING SCHEME

For

CROWN WASTE MANAGEMENT

October 2018

GWP Consultants LLP
Registered No. OC326183
Registered Office: Upton House, Market Street, Charlbury, Oxfordshire, OX7 3PJ, UK

Report Title: **Hartshill Quarry Blast Monitoring scheme**
Client: **Crown Waste Management**

Job: HARTSHIL
Report Number: 180216
Version: v.03
Issue Status: Final
Issue Date: 11th October 2018

Prepared by: Alan Cobb
Approved by: Jeremy Baldock Date: 11/10/18

Signature:

Issue History:

Issue No.	Issue Date	Description	Prepared	Checked	Approved
v.01	22/02/18	Draft report issued to Client	AEC	CL	JCB
v.02	09/10/18	Minor amendments made, Report issued as Final	AEC	GM	JCB
v.03	11/10/18	Further amendments required to text. Final report issued.	AEC	GM	JCB

This document is based on GWP report template v1.04 and Normal template v3.09 03/01/18

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2.1	General requirements	1
2.2	Blasting protocol	1
2.3	Blast monitoring protocol	2
2.3.1	*Monitoring locations*	*2*
2.3.2	*Monitoring equipment*	*2*
2.3.3	*Recording and analysis of results*	*2*

TABLES

Table 1	Blast Monitoring locations

DRAWINGS

HARTSHIL1802-1	Blast Monitoring plan
HARTSHIL1802-2	Blast vibration regression line

APPENDICES

Appendix 1	Blast vibration record form
Appendix 2	Blast vibration monitoring equipment specification

HARTSHILL QUARRY BLAST MONITORING SCHEME

1. INTRODUCTION

This scheme has been prepared to comply with pre-commencement Condition 3 for the Hartshill Quarry, Warwickshire (Planning Ref NW126/01CM013) which requires the submission of a scheme of blast monitoring for the quarry. The location of the quarry and proposed monitoring locations are shown on Drawing No. HARTSHIL1802-1.

Condition 10 of the Planning Consent requires that peak particle velocity (ppv) generated by blasting as measured at any sensitive structure be below 12mm/s at all times and 95% of instances should be below 6mm/s. The intention behind this scheme is to minimise the potential blast vibration and consequent impact at local sensitive structures and enable compliance with Condition 10 of the Planning Consent to be demonstrated.

2. BLASTING SCHEME

2.1 General requirements

Blasting practices in the Hartshill Quarry will abide by the Quarries Regulations 1999 Approved Code of Practice. Consequently, a blast design will be drawn up for each blast, taking into account the rock face profile and rock condition. All blasts will be designed by a competent person, holding the necessary Explosive Supervisor qualifications and who has been appointed as Explosives Supervisor for the Quarry. The shotfirer will also have the necessary Shotfirer qualifications, as required by the Quarries Regulations, 1999.

All blasts will abide by the shot firing rules, blast specification and all other articles regarding blast practice within the Quarries Regulations 1999 or any superseding legislation. As required by these Regulations, all blasts will be designed to give optimum results and to minimise ground vibration, air overpressure and the risk of flyrock.

All blasts will be designed such that the blast vibrations will remain below the required limits as specified by Condition 10 of the Planning Consent, which states that:

"Blasting operations shall be carried out in such a manner that vibration, noise and air overpressure are minimised. The peak particle velocity attributable at any blast, measured at a point immediately adjacent to any occupied dwelling outside the boundary of the site shall not exceed 6mm/sec in 95% of all blasts and no blast should exceed 12mm/sec (Peak particle velocity shall be measured as the maximum of mutually perpendicular directions taken at ground surface)."

The three mutually perpendicular directions are longitudinal (L), transverse (T) and vertical (V) with respect to the horizontal line connecting the plan positions of the blast and the relevant building.

2.2 Blasting protocol

The blasting protocols detailed below shall be followed in order to gain the maximum consistent control and to minimise ground vibration when blasting. These shall be followed in association with the blast monitoring protocol, detailed in Section 2.3 below.

The Maximum Instantaneous Charge (MIC) for each blast will be determined by the distance of the blast from the nearest vibration sensitive properties. The MIC will be set such that there will be 95% confidence that the ppv will be below 6mm/s at all properties. This will be determined by use of the vibration – scale distance regression line for the site. The current regression curve is shown on Drawing No. HARTSHIL1802-2 (reproduced from the data supplied by MQP in their planning application) and requires that the scale distance be greater than 27.4m/√kg.

A table of appropriate MIC's for various distances is given on Drawing No. HARTSHIL1802-2. This curve and the table shown on the drawing will be used for the design of the initial 6 blasts. Subsequently, it will be supplemented or replaced by a curve derived from analysis of the data from the current operation. As required by Condition 10, the measurement of ground vibration employed will be the maximum of the three values measured in mutually perpendicular directions (longitudinal, transverse and vertical) at the monitoring locations.

As required by Condition 5, blasting operations shall only be permitted between 1130-1230 hours and 1400-1500 hours Mondays to Fridays and normally at, or as near as practicable to, a fixed time

which shall be made known locally. No blasting operations shall be carried out on Saturdays, Sundays, Bank or Public Holidays.

As agreed at least 7 calendar days' notice of blasting will be given to the Parish Council, County Councillor, EHO at North Warwickshire Borough Council and Planning officers at Warwickshire County Council.

Where possible, blast faces shall be pre-profiled and the blast holes positioned to optimise the burden. Before charging, all blast holes will be surveyed for their precise location, straightness and orientation. The rock face in front and to the side of the blast will be surveyed (post profiled) and the actual burden in front of each hole determined. The charging plan will be adjusted where necessary to accommodate the actual burden. All holes will then be charged according to the charging plan.

In difficult ground conditions, measures will be taken to regulate the exact amount of charge weight loaded.

The initiation system shall be in-hole detonation and at least two detonators will always be placed within each single deck of explosive. Surface detonating cord will not be employed. All surface connections will be checked immediately before the blast to check the integrity of the system. No blasting operations shall be undertaken unless the agreed audible warning system has been sounded.

No secondary blasting will be permitted.

Following each blast a monitoring report in the format agreed (see Section 2.3.3) shall be compiled and will be provided to the relevant authorities within 14 calendar days. No further blasts shall be permitted until receipt of the monitoring report has been acknowledged. The results of blast monitoring will also be input into a site specific scaled distance regression model, in order to refine acceptable MIC weights against distance for future blasts. This updated information will be used in the design of subsequent blasts once sufficient data have been recorded to enable a valid regression curve to be calculated.

2.3 Blast monitoring protocol

2.3.1 Monitoring locations

The 10 No. locations of the vibration monitoring sites are shown on Drawing No. HARTSHIL1802-1. A list of these monitoring locations with their National Grid coordinates are given in Table 1. These locations have been selected as being closest to the various parts of the quarry where blasting may occur. Where practically possible, the monitoring location is situated on land accessible to quarry staff between the sensitive location and the quarry. Elsewhere, they are situated on a public road as near to the property as possible. Unless otherwise agreed in writing with the Mineral Planning Authority, monitoring will take place at all 10 No. locations, as listed in the submitted scheme.

2.3.2 Monitoring equipment

The required minimum specification for the vibration monitoring equipment is given in Appendix 2. The equipment must always have a valid calibration certificate.

The equipment is to be set up on level ground, spiked into the earth where possible, or tamped with sandbags when set up on a hard surface. The instrument is to be aligned such that the longitudinal axis points to the blast location and the vertical axis is vertical. A maximum trigger level of 0.5mm/s should be set unless there is extraneous vibration noise (*e.g.* road traffic) which requires a higher trigger level. Once installed and set up, the equipment is to be tested by striking the ground nearby to ensure the monitor is registering vibration.

2.3.3 Recording and analysis of results

Following any blast a monitoring report in the format agreed shall be prepared and submitted to the relevant authorities within 14 calendar days. The initial blast monitoring data shall be recorded on the form provided in Appendix 1, and shall be included as an annex to the monitoring report. The monitoring report will include (as a minimum) the following information:

- Plan of the blast, showing number and spacing of holes
- Date of the blast

- Amount of Explosive (Total and maximum charge per delay (MIC) kg)
- Blast location (Easting and Northing)
- Monitoring method
- Monitoring locations (Address, Distance and Predicted ppv)
- Monitoring results (Recorded ppv)
- Air overpressure (dB)
- Analysis of results and conclusions

All vibration monitoring results will be input into a site specific scaled distance regression model for analysis in order to refine acceptable MIC weights against distance for future blasts. Once sufficient data is available an updated regression curve shall be calculated for subsequent blasts.

The model will be updated on a blast by blast basis with the results from the preceding blast being used to verify or adjust as necessary the regression curve and permitted table of charge weights for the subsequent blast. Regular updated blast performance reports including the updated charge weight table will be generated and submitted.

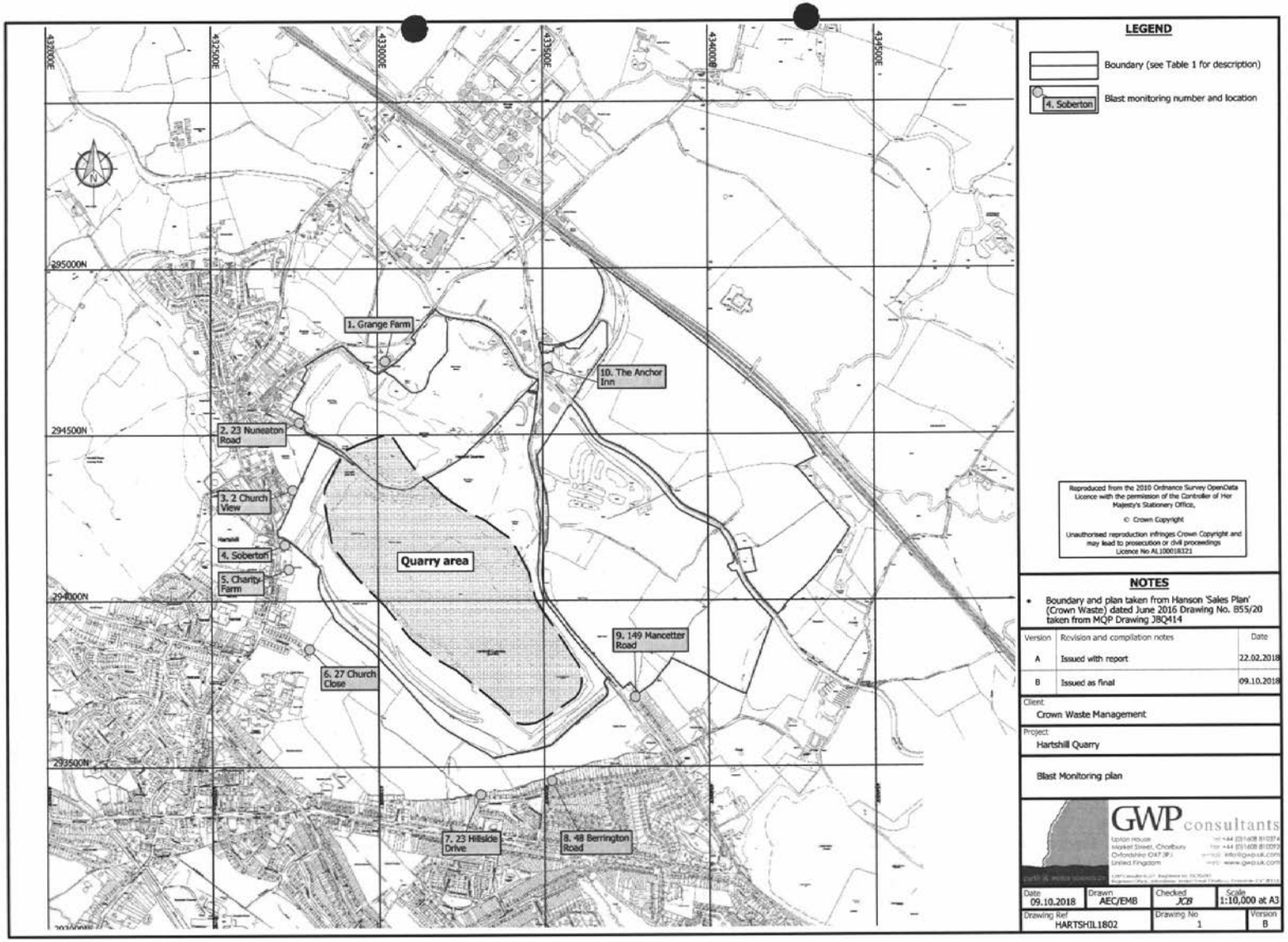
The vibration data record will be available for inspection at any reasonable time to demonstrate that the requirements of Condition 10 are being complied with.

GWP CONSULTANTS
OCTOBER 2018

Table 1
Blast Monitoring locations

No.	Address	Location	Coordinates	
			Easting	Northing
1	Hartshill Grange Farm	On footpath to south	433019	294699
2	23, Nuneaton Rd	On road outside	432767	294519
3	2, Castle View	On footpath to east	432753	294312
4	Soberton	On footpath to north	432726	294187
5	Charity Farm	On pavement outside	432703	294101
6	27, Church Close	On pavement outside	432774	293856
7	23, Hillside Drive	On pavement outside	433311	293396
8	48, Berrington Rd	On pavement outside	433535	293431
9	149, Mancetter Rd	On grass verge outside	433766	293693
10	The Anchor Inn	On grass verge outside	433499	294695

J:\Crown Waste\HARTSHIL Hartshill Quarry\Reports\Table 1 Monitoring locations.xlsx


LEGEND
Boundary (see Table 1 for description)
4. Soberton
Blast monitoring number and location
1. Grange Farm
2. 23 Nuneaton Road
3. 2 Church View
4. Soberton
5. Charity Farm
6. 27 Church Close
7. 23 Hillside Drive
8. 48 Berrington Road
9. 149 Mancetter Road
10. The Anchor Inn
Quarry area
295000N
294500N
294000N
293500N
432000E
432500E
433000E
433500E
434000E
434500E
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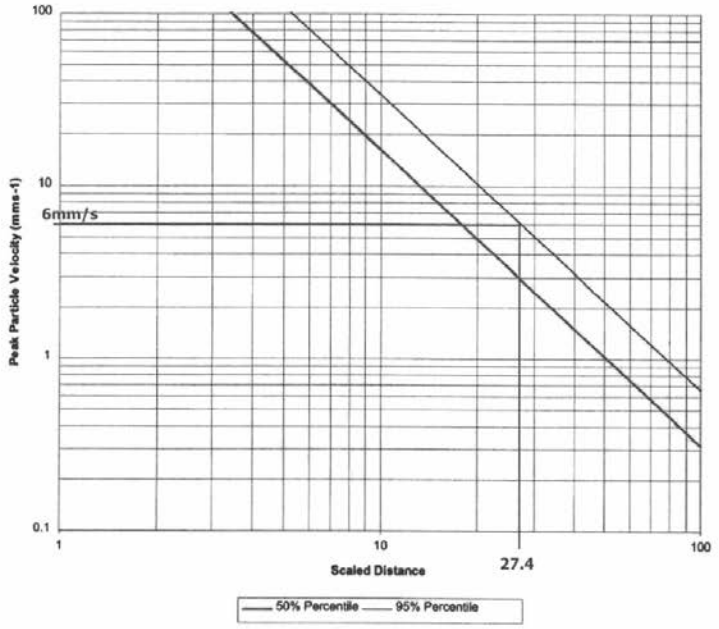
NOTES
* Boundary and plan taken from Hanson 'Sales Plan' (Crown Waste) dated June 2016 Drawing No. B55/20 taken from MQP Drawing JBQ414
Version
Revision and compilation notes
Date
A
Issued with report
22.02.2018
B
Issued as final
09.10.2018
Client
Crown Waste Management
Project
Hartshill Quarry
Blast Monitoring plan
GWP consultants
Date
09.10.2018
Drawn
AEC/EMB
Checked
JCB
Scale
1:10,000 at A3
Drawing Ref
HARTSHIL1802
Drawing No
1
Version
B

Quartzite Sandstone Regression Line



Note: Regression line from MQP Drawing JBQ12/1 for Jess and Boons review of minerals permission.

Minimum permissible Scaled Distance at any inhabited property = 27.4m/√kg

Distance (m)	Maximum instantanous charge (kg)
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300	120

Version	Revision and compilation notes	Date
A	Issued with report	22.02.2018
B	Issued as final	09.10.2018

Client: Crown Waste Management

Project: Hartshill Quarry

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web www.gwp.uk.com
earth & water resources

Blast vibration regression line

Date	Drawn	Checked	Scale
09.10.2018	AEC/EMB	JCB	NTS at A4

Drawing Ref	Drawing No	Version
HARTSHIL1802	2	B

APPENDIX 1

Blast vibration record form

Blast vibration monitoring record for Hartshill Quarry

Blast No.	Date	No. of holes	Total charge kg	MIC kg	Blast location		Monitoring location								Remarks
					Easting	Northing	Address	Distance m	Predicted ppv (mm/s)	Recorded ppv L (mm/s)	T (mm/s)	V (mm/s)	R (mm/s)	Air overpressure dB	

APPENDIX 2

Blast vibration monitoring equipment specification

Appendix 2

Specifications for blast monitoring equipment

Data Recorded	One (1) acoustic and three (3) orthogonal seismic channels.
Frequency Response	2 to 250 Hz.
Resolution	0.125mm/s.
Accuracy	±1% at 15Hz.
Clock	24 hour clock to maintain date and time, accurate to within 1 minute.
Waveform Data	The full waveform signature to be stored in solid state memory.
Sample Rate	2048 samples per second per channel.
Recording Units	Metric.
Recording Ranges:	
Seismic	0.25 to 127 mm/s.
Acoustic	100 to 142 dB.
Trigger Levels:	
Seismic	0.25mm/s.
Record Duration:	4 seconds at a sample rate of 2048 samples per second