01604 771101 | hq@wbm.co.uk | www.wbm.co.uk
Steepleton Lodge Barn, Long Lane, East Haddon, Northamptonshire, NN6 8DU

WBM ACOUSTIC CONSULTANTS

Paul Cockcroft BEng PhD CEng MIMMM FIOA
Richard Lyons BEng PhD CEng MIOA MCIBSE
Rachel Canham BEng MSc CEng FIOA

Ref **5143 v1**

For **CEMEX UK Materials Limited**
CEMEX House
Evreux Way
Rugby
CV21 2DT

CEMEX Parkfield Road Rugby
Environmental Permit Application for
Infilling of a Quarry Void with Inert Waste
BS4142 Noise Impact Assessment (NIA)
Requested by Environment Agency (EA)

Date 26 March 2021

Author Dr Paul Cockcroft

The Author

Paul Cockcroft BEng PhD CEng MIMMM FIOA (Senior Partner) has been practising in mining engineering and acoustics since 1983. He joined WBM in 1989, became a Partner in 1997 and Senior Partner in 2004. Paul has worked for many of the major mineral extraction and waste disposal companies in the UK and Mineral Planning Authorities on a wide range of surface mineral workings, aggregate related plant sites, waste disposal and recycling projects, including advising safeguarded wharf operators to protect vital industrial operations. He also specialises in the measurement and prediction of environmental, industrial and transportation noise and acoustic aspects of site development, road schemes, rail-linked sites, traincare depots and commercial and other developments. Paul has prepared and presented evidence at planning appeals and for court cases, including Judicial Review applications, Breach of Condition Notices, nuisance cases and is known for his rigorous approach.

WBM

WBM (the trading name of The Walker Beak Mason Partnership) is an acoustic consultancy which has been independent and focused on delivering a first class service for 50 years. WBM specialise in architectural & building acoustics, environmental noise, planning issues and expert work. WBM is a member of the Association of Noise Consultants and is also a Corporate Member of the Institute of Environmental Management & Assessment. The consultants are Members or Fellows of the Institute of Acoustics.

Disclaimer

This Noise Impact Assessment (NIA) Report has been prepared on behalf of CEMEX UK Materials Ltd (CEMEX), following a request by the Environment Agency (in their email from Andrew Cattermole to Gerard Studds dated 15 March 2021), in order for the permit application at Parkfield Road Rugby to be "*duly made*."

The preparation and submission of this NIA report has been undertaken in order that CEMEX meet the ten working day submission limit for the permit application to be duly made (by close of business on 29 March 2021). However, it in no way legitimises the request from the EA.

CEMEX considers that the request for a NIA report is a duplication of regulation and is not necessary for the permit submission. The submission of this NIA report is in no way an acceptance of the need for this report as part of the Environmental Permit Application assessment and will not stop CEMEX from further challenging the legitimacy of the request *or any noise criteria or conditions that would be different from those issued by Warwickshire County Council dated 04 February 2020 for planning permission RBC/18CM017.*

ACOUSTIC CONSULTANTS

Contents

1 Introduction

A study of the noise effects associated with the proposed infilling and revised restoration of the void due to historic quarrying operations in Parkfield Quarry to the east of Parkfield Road in Rugby was undertaken by The Walker Beak Mason Partnership in 2017 and 2018.

A planning application was submitted on behalf of CEMEX to Warwickshire County Council (WCC) for the "*Importation and Deposit of Inert Restoration Material and Implementation of a Comprehensive Restoration Scheme*" at Parkfield Road Rugby. The decision of the WCC Regulatory Committee on 4th February 2020 was to grant planning permission for the development described in the Planning Application (RBC/18CM017).

A permit application has been made to the Environment Agency (EA) and the EA has stated in an email dated 15 March 2021 "*You are required to submit a Noise Impact Assessment (NIA) and Noise and Vibration Management Plan (NMP) for this permit application... The NIA should be based on BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound*'".

This NIA sets out the findings of attended sample noise surveys conducted in April 2017 and July 2017 which included the measurement of background noise levels (dB $L_{A90,\,T}$) in the vicinity of the nearest off-site receiver locations to the proposed infilling area.

This NIA report sets out the calculated noise levels arising from the permitted restoration scheme for those locations assessed in 2017 and 2018 and selects these locations for use in the BS4142:2014+A1:2019 assessment method for the dwellings.

A Noise Management Plan (NMP) has been prepared based on the results of this NIA and is to be submitted along with the NIA to the EA.

To aid comprehension, a glossary of acoustic terms is presented in **Appendix A**.

2 Environment Agency Requirements for the NIA Assessment

The Environment Agency (EA) has sent the following wording, in an email dated 15 March 2021, for their requirements for the permit application for Parkfield Road Rugby:

"You are required to submit a Noise Impact Assessment (NIA) and Noise and Vibration Management Plan (NMP) for this permit application, along with the additional fee as set out in the Charging Scheme (1.19.7 - noise and vibration). This is required as there may be a risk of noise and vibration pollution beyond the site boundary and the proximity of sensitive receptors to site operations.

The NIA should be based on BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound' and contain the following information:

- *Description of site location and layout*
- *Site plan with the permit boundary clearly indicated*
- *Description of proposed activities (clearly stating those that form the basis of the EPR application, and, if applicable, any concurrent non-EA regulated onsite activities)*
- *Description of all noise sources*
- *Description of any noise mitigation measures, e.g. enclosures or barriers*
- *Description and map of sensitive receptor locations*
- *Background monitoring locations and survey data*
- *A BS4142 assessment, i.e. a comparison of the rating level (the predicted specific level of onsite activities, plus any penalties for characteristic sound) against a background level (the LA90 level derived from background monitoring data) at all noise sensitive receptor locations. There must also be a discussion on context (i.e. sound scape).*

You can find guidance on Noise Impact Assessments here https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit#noise-and-vibration-management-plan.

Where your assessment has used calculations or modelling to predict sound pressure levels at receptors, you must follow our guidance on the presentation of your acoustic data: Noise impact assessments involving calculations or modelling. https://www.gov.uk/guidance / noise-impact-assessments-involving-calculations-or-modelling."

3 British Standard 4142: 2014+A1:2019

British Standard (BS) 4142:2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound*" describes methods for assessing the likely effects of sound of an industrial and / or commercial nature on residential properties. It includes the assessment of sound from industrial and manufacturing processes, M&E plant and equipment, loading and unloading of goods and materials, and mobile plant / vehicles on the site. It can be used to assess sound from proposed, new, modified or additional industrial / commercial sources, at existing or new premises used for residential purposes.

The standard describes methods to measure and determine ambient, background and residual sound levels, and the rating levels of industrial / commercial sound.

BS4142:2014+A1:2019 is not intended to be used for the derivation or assessment of internal sound levels, or for the assessment of non-industrial / commercial sources such as recreational activities, motorsport, music and entertainment, shooting grounds, construction and demolition, domestic animals, people, and public address systems for speech.

This standard is not intended to be applied to the rating and assessment of sound from: … "*h) other sources falling within the scopes of other standards or guidance*."

Ambient sound is defined in BS 4142: 2014+A1:2019 as "*totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far*". It comprises the residual sound and the specific sound when present.

Residual sound is defined in BS 4142: 2014+A1:2019 as "*ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound*". The background sound level is the $L_{A90,\,T}$ of the residual sound level, and is the underlying level of sound. Measurements of background sound level should be undertaken at the assessment location where possible or at a comparable location.

The measurement time interval should be sufficient to obtain a representative value (normally not less than 15 minutes) and the monitoring duration should reflect the range of background sound levels across the assessment period. The background sound level used for the assessment should be representative of the period being assessed.

The specific sound level is the $L_{Aeq,Tr}$ of the sound source being assessed over the reference time interval, T_r. BS 4142:2014+A1:2019 advises that T_r should be 1 hour during the day and 15 minutes at night.

The rating level is the specific sound level plus any adjustment for the characteristics of the sound (tone, impulse, intermittent or other acoustic feature). The standard describes subjective and objective methods to establish the appropriate adjustment. The adjustments for the different features and assessment methods are summarised in the table below.

Acoustic Feature	**Adjustment for Acoustic Feature**		
	Subjective Methods	**Objective Methods**	
Tonality	+2 dB if just perceptible +4 dB if clearly perceptible +6 dB if highly perceptible	Third Octave Analysis	Narrow Band Analysis
		+6 dB if tones identified	Sliding scale of 0 to +6 dB depending on audibility of tone
Impulsivity	+3 dB if just perceptible +6 dB if clearly perceptible +9 dB if highly perceptible	Sliding scale of 0 to +9 dB depending on prominence of impulsive sound	
Intermittency	+ 3 dB if intermittency is readily distinctive	n/a	
Other	+ 3 dB if neither tonal nor impulsive, but otherwise readily distinctive	n/a	

Where tonal and impulsive characters are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant, it might be appropriate to apply a single correction. The rating level is equal to the specific sound level if there are no features present.

The level of impact is assessed by comparing the rating level of the specific sound source with the background sound level. Other factors that may require consideration include the absolute level of sound, the character and level of the residual sound compared to the specific sound, and the sensitivity of the receptor and scope for mitigation.

When the rating level is above the background sound level, a difference of around +5 dB is likely to indicate an adverse impact and a difference of around +10 dB or more is likely to indicate a significant adverse impact, depending on the context.

The lower the rating level with respect to the background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

4 Description of Site Location and Layout

The proposed site for the infilling and restoration operation is located to the east of Parkfield Road in Rugby. The CEMEX Rugby Cement Works is located to the west of Parkfield Road.

The site is bounded to the north by the London to Birmingham railway line, to the south by a rail siding beyond which lie residential properties and allotments. To the west of the site is industrial land associated with the Cement Works with industrial or vacant land to the east.

A site plan, with the permit boundary indicated by a green line, is included as **Appendix B**.

The site layout is included as **Appendix C** which shows the Planning Application Site Boundary, the 5 m [high] Screening Bund, the 5 m [high] Acoustic Wall, the 8 m [high] Rail Offloading Acoustic Wall and the Concrete Working Pad.

The trains (locomotive and wagons) would enter and leave the site from the east and the unloading of material would take place on the Concrete Working Pad shielded from the nearest dwellings by the 8 m [high] Rail Offloading Acoustic Wall.

5 Description of Proposed Activities and Noise Sources

The void is currently partially filled with water, which is being pumped out and once filled and restored will provide opportunities for enhanced nature conservation and amenity uses. It is proposed that inert infill material will be imported by rail and deposited into the void over a period of around 4.5 years. The hours permitted / proposed for the infilling operation are 0700 to 1900 Mondays to Fridays and 0700 to 1300 Saturdays.

It is proposed that the void is drained by means of pumping the water to the Sow Brook or indirectly to Sow Brook via the Lodge Farm Pit to allow the infilling works to take place.

Initial temporary works will include the construction of an Acoustic Wall (8 metres in height) for the rail offloading area at the western end of the rail siding, the construction of a 5 metre high bund along the northern side of the siding to provide noise protection for the properties to the south of the site. A 5 metre high acoustic barrier will also be placed at the eastern end of the site, and at the western end of the siding (for the train locomotive) for noise protection purposes.

Following these works a ramp will be constructed on the western side of the site for the longer term operations, i.e. unloading of material from the train and transportation of the material into the void by means of dump trucks and placed/graded/compacted by a dozer.

The level of the infill material will progress raising the ground level within the void eventually forming a larger level area along the southern side of the void as infilling progresses. As the infilling progresses and the workings within the void take place at raised ground level, the 5 metre high bund will be increased to a height of 7 metres above local ground level.

Once the final ground levels across the site have been achieved, the bunding will then be removed and the area restored.

The noise sources used in the site noise calculations for the planning application are:

1 Locomotive - stationary (west of foot bridge)
2 Train movement - to place full wagons in unloading area
3 Wagon unloading (Liebherr LH60 tracked excavators x 2)
4 Material into dump trucks (Liebherr LH60 excavators x 2)
5 Dump truck movements to / from / within infill area
6 Placement / compaction within infill area (dozer / compactor)
7 Diesel powered suction pump for dewatering (68 m AOD)
8 Diesel powered suction pump for dewatering (61 m AOD)
9 Diesel powered suction pump for dewatering (57 m AOD)

Items 3, 4, 5 and 6 are those that form part of the permit application and it is considered that Items 1, 2, 7, 8 and 9 are non-Environment Agency regulated onsite activities.

6 Description of Noise Mitigation Measures

The noise mitigation measures include an 8 metre high Acoustic Wall for the rail offloading area at the western end of the rail siding, the construction of a 5 metre high bund along the northern side of the siding to provide noise protection for the properties to the south of the site. A 5 metre high acoustic barrier will also be placed at the eastern end of the site, and at the western end of the siding (for the train locomotive) for noise protection purposes. As the infilling progresses and the workings within the void take place at raised ground level, the 5 metre high bund will be increased to a height of 7 metres above local ground level.

These mitigation features are shown in more detail on drawing extracts in **Appendix D**.

7 Description and Map of Sensitive Receptor Locations

The site is bounded to the north by the London to Birmingham railway line, to the south by a rail siding beyond which lie residential properties and allotments. To the west of the site is industrial land associated with the Cement Works with industrial or vacant land to the east.

The nearest noise sensitive premises to the site are the residential properties to the south of the rail siding on the southern side of the void from which the imported infill will be unloaded. There are no residential properties within 500 metres to the north, east and west of the site.

The dwellings identified for calculation are those on Lawford Road and Bridle Road, Avenue Road and Jubilee Street, Follager Road and Izod Road and Tank Cottages / Railway Cottages. These calculation locations are shown on a plan in **Appendix E**.

The dwellings on Bridle Road, Avenue Road and Jubilee Street are conventional terraced two-storey properties with living accommodation on the ground floor and sleeping accommodation on the first floor. The dwellings on Follager Road and Izod Road are modern three storey properties with combined living / sleeping accommodation on each floor. Road-side views of these types of properties are included in **Appendix F**.

8 Background Monitoring Locations and Survey Data

The locations at which baseline measurements have been made were chosen as being representative of the nearest properties to the proposed infilling and restoration area.

Baseline noise surveys were conducted on three days at three locations representative of the nearest noise sensitive properties to the site. Eighteen sample measurements were made over the three visits which took place on Thursday 27 April 2017, Tuesday 04 July 2017 and Monday 10 July 2017.

The measurements were undertaken between about 08:45 and 10:45 on Thursday 27 April 2017, between about 11:00 and 13:20 on Tuesday 04 July 2017 and between around 11:30 and 13:40 on Monday 10 July 2017.

The measurements were taken at a microphone height of approximately 1.4 metres above local ground level away from reflecting surfaces other than the ground, with a wind shield used throughout each measurement. The sample measurements were of 15-minute duration. The measurement locations are shown on a plan in **Appendix G**.

The Ove Arup & Partners Ltd Site Operating Plan PRL REP 002 dated 23 December 2020 contains D2 Noise assessment appendices. Appendix 9.3 – "*Instrumentation and Calibration Details*" are contained on pages 5 of 15 to 9 of 15 of D2 for inspection.

Appendix 9.4 – "*Baseline Survey Results*" are contained on pages 10 of 15 to 12 of 15 of D2 and are reproduced in **Appendix H** of this NIA for review.

A summary of the sample measurement results for daytime is tabulated below.

Measurement Location	**Average dB LAeq, 15 mins**	**Average dB LA90, 15 mins**	**Range dB LA90, 15 mins**
1. Recreation Ground	58	49	48 to 50
2. Allotment Entrance	51	47	46 to 48
3. Tank Cottages	51	44	42 to 44

Note: All stated levels are free field.

Daytime noise levels were generally controlled by noise from the CEMEX Rugby Cement Works, distant and local road traffic noise, birdsong, trains and aircraft movements.

The hours permitted / proposed for the infilling operation are 0700 to 1900 Mondays to Fridays and 0700 to 1300 Saturdays. No measurements were made on Saturday mornings. The background levels in the area are controlled by the CEMEX Rugby Cement Works, which is located to the west of Parkfield Road, and the background levels throughout the daytime are stable. Some of these CEMEX operations are continuous for daytime and it is expected therefore that the background levels in the area on a Saturday morning would be essentially the same as on weekdays.

9 Calculated Site Noise Levels for Restoration Scheme

The Planning Practice Guidance does not provide details of noise calculation methods to be used. In the absence of detailed guidance, the calculations are based on the methods contained in BS5228-1: 2009 “Code of practice for noise and vibration control on construction and open sites – Part 1: Noise” as amended BS5228-1:2009+A1:2014.

The noise calculation methods are described in **Appendix I** and summary site noise calculation sheets for the off-site receiver locations are included in **Appendix J** for inspection. The calculated noise levels for the infill and restoration scheme are for the calculation locations shown in **Appendix E.**

The infill material is to be imported by train and unloaded by tracked excavators. The unloaded material will be transported into the void by means of dump trucks and placed/graded/compacted by a dozer. The number of vehicle movements for dump trucks on site is based on projected site activity.

Sound Power Levels of the machinery used on site are based on measurements conducted by WBM of similar plant items in use on sites in Barrington, Cambridgeshire as measured on 06 July 2017 and Stanford-le-Hope in Essex as measured on 25 August 2017. Details results of the plant measurements at Barrington and Stanford-le-Hope are presented in Appendix 9.5 (Page 13 of 15) of the D2 Noise assessment appendices.

The plant items used in the calculations are listed in the table below along with the Sound Power Levels, dB LWA, and on-time percentages used in the calculations.

Ref	Plant Item	Sound Power Level dB LWA	1 Hour on-time %
1	Locomotive - stationary (west of foot bridge)	100	100
2	Train movement - to place full wagons in unloading area	92	3
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	103	97
4	Material into dump trucks (Liebherr LH60 excavators x 2)	103	97
5	Dump truck movements to / from / within infill area	108	100
6	Placement / compaction within infill area (dozer / compactor)	107	100
7	Diesel powered suction pump for dewatering	90	100

The calculated site noise levels for routine infill and restoration operations, with the benefit of barrier attenuation (see Page 157 in Chapter 9 Noise of ES), are:

Site Noise Calculation Receiver Location	**Calculated Site Noise Level dB LAeq, 1 hour**
Lawford Bridge (Bridle Road)	50 (50)
Avenue Road (Jubilee Street)	49 (49)
Follager Road (Ground Floor)	51 (51)
Follager Road (First Floor)	52 (52)
Follager Road (Second Floor)	54 (54)
Izod Road (Ground Floor)	50 (50)
Izod Road (First Floor)	52 (51)
Izod Road (Second Floor)	53 (53)
Tank Cottages (Railway Cottages)	50 (49)

Note: the values in brackets exclude the locomotive, train movement and pump for dewatering (i.e. Items 1, 2, 7, 8 and 9 that are considered to be non-Environment Agency regulated onsite activities).

The calculated site noise levels for bund formation, without barrier attenuation, are:

Site Noise Calculation Receiver Location	**Calculated Site Noise Level dB LAeq, 1 hour**
Lawford Bridge (Bridle Road)	55
Avenue Road (Jubilee Street)	66
Follager Road	70
Izod Road	70
Tank Cottages (Railway Cottages)	69

Appendix K contains a BS4142 Summary Table for the receiver locations listed above, which presents the calculated site noise level (specific level) and compares rating levels with background levels to obtain a 'difference' value for an initial assessment of the impact.

Appendix L and contains additional details related to noise calculation and **Appendix M** construction details for the barriers, as requested by the EA in the Guidance document "*Noise impact assessments involving calculations or modelling*" dated 6 November 2019.

10 BS 4142: 2014+A1:2019 Assessment

The information to be reported, as specified in Section 12 of BS 4142:2014+A1:2019, is set out below where relevant for Tank Cottages (Railway Cottages) for inspection.

10.1 (a) Statement of Qualifications

See details about The Author on page 2 of this report.

10.2 (b) Source Being Assessed

1) Description of the main sound sources and of the specific sound

The main sound sources are those related to the proposed infilling and revised restoration of the void due to historic quarrying operations in Parkfield Quarry. This will involve unloading material from rail wagons into dump trucks with those vehicles transporting and tipping and a dozer grading the material within the infill area. The specific sound will be the unloading, vehicle movements and dozer grading the material as well as the operations of bund formation that are included to reduce the noise arising from the infill area.

2) Hours of operation

The hours permitted / proposed for the infilling operation are 0700 to 1900 Mondays to Fridays and 0700 to 1300 Saturdays.

3) Mode of operation (e.g. continuous, twice a day, only in hot weather)

The infill and restoration operations can be taken as continuous during the daytime hours stated above although this depends on the amount of material brought on to the site each day to be graded by the dozer.

4) Statement of operational rates of the main sound sources (e.g. maximum load setting, 50% max rate, low load setting)

The measurements and assessment have been based on operations taking place for 100% of each hour (apart from when the train is moved) during the daytime periods stated above.

5) Description of premises in which the main sound sources are situated (if applicable).

The restoration area to which the permit application relates is located to the east of Parkfield Road in Rugby, see drawings in **Appendices B** and **C**.

10.3 (c) Subjective Impressions

1) Dominance or audibility of the specific sound

The specific source is not yet in place but it is expected that the specific sound may be audible or clearly audible at times when in operation but that road traffic, rail traffic noise and CEMEX Cement Works would normally be audible for much of the time as well.

2) Main sources contributing to the residual sound.

The noise climate at the measurement location nearest to Tank Cottages was affected by continuous plant from the CEMEX Cement Works, distant road traffic, train movements, birdsong, breeze in trees and industrial activity at times.

10.4 (d) The Existing Context and Sensitivity of Receptor

The existing context is of a location affected by natural sounds and industrial and transportation sources. The sensitivity of the particular receptor (occupants at Tank Cottages) corresponding to the assessment location is not known.

10.5 (e) Measurement Locations and Justification

Measurement locations, their distance from the specific sound source, the topography of the intervening ground and any reflecting surface other than the ground, including a photograph, or a dimensioned sketch with a north marker. A justification for the choice of measurement locations should also be included.

The measurement locations were used to determine the acoustic environment and to measure ambient sound levels and background sound levels in the vicinity of dwellings. The measurement location selected for this assessment was to the south of Tank Cottages on a footpath by disused railway lines (the south eastern corner of the Application Site Boundary) and is shown on the plan in **Appendix G**.

10.6 (f) Sound Measuring Systems, Including Calibrator / Pistonphone

Precision Sound Level Meter

1) *Type*140.

2) *Manufacturer* Norsonic.

3) *Serial number* 1404819.

4) *Details of the latest verification test including dates*

Date of Calibration 11/12/2019 as set out in Campbell Associates Certificate Number 33590 dated 11/12/2019. Correct level with associated calibrator (Norsonic 1251 serial number 33321) is 113.8 dB(A).

10.7 (g) Operational Test

1) *Reference level(s) of calibrator, multi-function calibrator or pistonphone;*
113.8 dB(A).

2) *Meter reading(s) before and after measurements with calibrator, multi-function calibrator or pistonphone applied.*
Before 113.8 dB(A) and after 113.7 dB(A).

10.8 (h) Weather Conditions

1) *Wind speed(s) and direction(s) 0 to* 3 m/s ~ westerly wind.

2) *Presence of conditions likely to lead to temperature inversion (e.g. calm nights with little cloud cover)* None.

3) *Precipitation* None.

4) *Fog* None.

5) *Wet ground* None.

6) *Frozen ground or snow coverage* None.

7) *Temperature* 22 to 24^{o}C.

8) *Cloud Cover* ~ 4 okta.

10.9 (i) Date(s) and Time(s) of Measurements

Monday 10 July 2017: 13:25 to 13:40.

10.10 (j) Measurement Time Intervals

15 minutes.

10.11 (k) Reference Time Interval(s)

The reference time interval is 1 hour for a daytime assessment between 07:00 to 23:00 hours. A period of 15 minutes is applicable between 23:00 and 07:00 hours.

10.12 (l) Measured Sound Levels

1) Residual sound level(s) and method of determination

The residual sound level measured between 13:25 and 13:40 to the south of Tank Cottages on Monday 10 July 2017 was 49 dB $L_{Aeq,\ 15\ minutes,\ free\ field}$.

2) Ambient sound level(s) and method of determination

The ambient sound level measured between 13:25 and 13:40 to the south of Tank Cottages on Monday 10 July 2017 was 49 dB $L_{Aeq,\ 15\ minutes,\ free\ field}$.

For the sample measurement the following "Comments" were made: *"CEMEX site (plant noise, reversing bleepers). Birdsong, Distant road traffic. Distant dog barking. Aircraft. Industrial noise to NW (plant noise, cars, impact noises). Trains and train horns. Distant train horn. Breeze in trees. Chimes at church."*

3) Specific sound level(s) and method of determination

The specific sound level could not be measured but has been determined from calculation.

The specific sound level has been determined from calculation as 50 dB $L_{Aeq,\ 1\ hour,\ free\ field}$ for Tank Cottages (49 dB LAeq, 1 hour, free field excluding the locomotive, train movement and pump for dewatering).

5) Justification of methods

Calculation used as the proposed infill and restoration activities are not yet taking place.

6) Details of any corrections applied

See the Potential Impact of Uncertainty section.

10.13 (m) Background Sound Level(s)

Background sound level(s) and measurement time interval(s) and, in the case of measurements taken at an equivalent location, the reasons for presuming it to be equivalent.

The six 15-minute attended sample measurements undertaken for Tank Cottages have given background sound levels of 42, 44, 44, 44, 44 and 44 dB $L_{A90,\ 15\ minutes,\ free\ field}$ with an average value of 44 dB $L_{A90,\ 15\ minutes,\ free\ field}$.

The background sound level measured between 13:25 and 13:40 to the south of Tank Cottages on Monday 10 July 2017 was 44 dB $L_{Aeq,\ 15\ minutes,\ free\ field}$.

10.14 (n) Rating Level(s)

1) Specific sound level(s)

The specific sound level(s) is stated in 8.12 as 50 dB $L_{Aeq,\ 1\ hour,\ free\ field}$.

2) Any acoustic features of the specific sound

The adjustments for the different features and assessment methods are summarised in the table in Section 3 of this report.

At a distance, noise from machinery used at infill and restoration sites does not usually contain a distinguishable tone nor does it tend to be impulsive. The use of reversing alarms on site plant is a separate matter. CEMEX has a policy that all vehicles and equipment, including contractors, are fitted with white noise reversing alarms. Should reversing alarms used on mobile site plant give rise to noise problems, the use of quieter or silent types of alarm or warning devices that are more environmentally acceptable will be explored.

Based on observations of restoration activities at other sites and with the mitigation measures detailed in Section 6, no requirement for a penalty for tonality, impulsivity or intermittency is expected for the infill and restoration operations at the receiver location.

The nature of a dozer grading material could attract the '*Other*' correction of + 3 dB "*if neither tonal nor impulsive, but otherwise readily distinctive*" if the dozer tracks are worn. This correction is not expected to be required as CEMEX intend to select and use a modern dozer that minimises that effect. However, + 3 dB is added to the specific level.

3) Rating level(s)

The rating level for daytime is therefore 3 dB above the specific (calculated) noise level of 50 dB $L_{Aeq,\ 1\ hour}$ i.e. 53 dB $L_{Ar,\ Tr}$ determined in accordance with BS 4142:2014+A1:2019.

10.15 (o) Excess of the rating level(s) over background sound level(s)

Excess of the rating level(s) over the measured background sound level(s) and the initial estimate of the impacts

The rating level of 53 dB $L_{Ar,\ Tr}$ for restoration operations is 9 dB above the background sound level of 44 dB $L_{A90,\ T}$ for a daytime (weekday) period for Tank Cottages.

When the rating level is above the background sound level, a difference of around +5 dB is likely to indicate an adverse impact and a difference of around +10 dB or more is likely to indicate a significant adverse impact, depending on the context.

10.16 (p) Conclusions of the assessment after taking context into account

The baseline measurements and BS4142 assessment demonstrate a rating level of 53 dB $L_{Ar,\ Tr}$ for the infill and restoration operations that is 9 dB above the background sound level of 44 dB $L_{A90,\ T}$ for a daytime (weekday) period for Tank Cottages. The rating level of 53 dB $L_{Ar,\ Tr}$ at Tank Cottages is for infill and restoration operations and the train movement and dewatering pumping.

In the context of the period of restoration activities at the highest levels within the site when the rating level is 9 dB above the average background noise level, it is concluded that this represents an adverse impact at Tank Cottages and not a significant adverse impact.

For Temporary Operations (bund formation) the calculated site noise level at Tank Cottages is 69 dB LAeq, 1 hour, free field. These activities will be near to Tank Cottages and unscreened. Accordingly a correction of + 6 dB has been applied which results in a rating level of 75 dB LAr, Tr. A rating level of 75 dB LAr, Tr for bund formation is 31 dB above the background sound level of 44 dB $L_{A90,\ T}$ for a daytime (weekday) period for Tank Cottages. This represents a significant adverse impact, depending on the context, for Tank Cottages. Bund formation will be limited to 8 weeks in a 12 month period for the area adjacent to Tank Cottages after which this property will be provided with barrier attenuation for the routine infill and restoration operations.

10.17 (q) The potential impact of uncertainty

Section 10 of BS 4142:2014+A1:2019 states:

"*Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty*."

The largest level of uncertainty is whether the proposed infill and restoration operations gives rise to the calculated noise level at Tank Cottages and whether the proposed restoration operational noise at Tank Cottages attracts acoustic feature corrections.

The site noise calculations use noise levels based on data measured of the similar activities taking place on other sites and includes on-times that represent a realistic scenario.

The calculations and assessment assume that the barriers and enclosures are constructed to a reasonable standard of workmanship and that there will be no obvious acoustic weaknesses due to unintended holes or gaps in the construction.

The calculated noise levels due to train movements will depend on the type of locomotive used. The calculations of train movement noise are based on measurements at a similar site, but if noisier locomotives than those expected or multiple locomotives are used, the calculated noise levels at the dwellings will be higher.

The assessment assumes that the locomotive will not be left idling outside the infill working hours of 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturdays.

No measurements were made on Saturday mornings. The background levels in the area are controlled by the CEMEX Rugby Cement Works and the background levels throughout the daytime are stable. Some of these CEMEX operations are continuous for daytime and it is expected therefore that the background levels in the area on a Saturday morning would be essentially the same as on weekdays.

Warwickshire County Council require that *"Noise levels shall be monitored at key stages of development, to be agreed prior to the first importation of soil, in addition to routine monitoring on three monthly intervals at one of each of the three locations of: 1. The Recreation Ground; 2. Allotment Entrance; 3. Tank Cottages from the date of the commencement of the development. Such monitoring shall be in addition to any monitoring as part of a complaint investigation. The monitoring shall be carried out during a period of normal working activities. The results of the monitoring shall include LA90 and LAeq noise levels, the prevailing weather conditions, details and calibration of the equipment used for measurement and comments on other sources of noise which affect the noise climate. The results of monitoring shall be submitted to the County Planning Authority within one month of the survey being carried out."*

Accordingly, the noise levels associated with the infill and restoration operations are required to be measured directly at the location south of Tank Cottages. The site noise monitoring at this location would minimise the potential impact of uncertainty and allow control over the noise levels from operations associated with routine infill and restoration operations.

11 Summary and Conclusions

A study of the noise effects associated with the proposed infilling and revised restoration of the void due to historic quarrying operations in Parkfield Quarry to the east of Parkfield Road in Rugby was undertaken by The Walker Beak Mason Partnership in 2017 and 2018.

A planning application was submitted on behalf of CEMEX to Warwickshire County Council (WCC) for the "*Importation and Deposit of Inert Restoration Material and Implementation of a Comprehensive Restoration Scheme*" at Parkfield Road Rugby. The decision of the WCC Regulatory Committee on 4th February 2020 was to grant planning permission for the development described in the Planning Application (RBC/18CM017).

A permit application has been made to the Environment Agency (EA) and the EA has stated in an email dated 15 March 2021 "*You are required to submit a Noise Impact Assessment (NIA) and Noise and Vibration Management Plan (NMP) for this permit application... The NIA should be based on BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound*'".

This NIA sets out the findings of attended sample noise surveys conducted in April 2017 and July 2017 which included the measurement of background noise levels (dB $L_{A90, T}$) in the vicinity of the nearest off-site receiver locations to the proposed infilling area.

This NIA report sets out the calculated noise levels arising from the permitted restoration scheme for those locations assessed in 2017 and 2018 and selects these locations for use in the BS4142:2014+A1:2019 assessment method for the dwellings.

The baseline measurements and BS4142 assessment demonstrate a rating level of 53 dB $L_{Ar, Tr}$ for the infill and restoration operations that is 9 dB above the background sound level of 44 dB $L_{A90, T}$ for a daytime (weekday) period for Tank Cottages. The rating level of 53 dB $L_{Ar, Tr}$ at Tank Cottages is for infill and restoration operations and the train movement and dewatering pumping.

In the context of the period of restoration activities at the highest levels within the site when the rating level is 9 dB above the average background noise level, it is concluded that this represents an adverse impact at Tank Cottages and not a significant adverse impact.

For Temporary Operations (bund formation) the calculated site noise level at Tank Cottages is 69 dB LAeq, 1 hour, free field. These activities will be near to Tank Cottages and unscreened. Accordingly a correction of + 6 dB has been applied which results in a rating level of 75 dB LAr, Tr. A rating level of 75 dB LAr, Tr for bund formation is 31 dB above the background sound level of 44 dB $L_{A90, T}$ for a daytime (weekday) period for Tank Cottages. This represents a significant adverse impact, depending on the context, for Tank Cottages. Bund formation will be limited to 8 weeks in a 12 month period for the area adjacent to Tank Cottages after which this property will be provided with barrier attenuation for the routine infill and restoration operations.

Paul Cockcroft
BEng PhD CEng MIMMM FIOA
Senior Partner

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Appendix A – Glossary of Acoustic Terms

General Noise and Acoustics

The following section describes some of the parameters that are used to quantify noise.

Decibels dB

Noise levels are measured in decibels. The decibel is the logarithmic ratio of the sound pressure to a reference pressure ($2x10^{-5}$Pascals). The decibel scale gives a reasonable approximation to the human perception of relative loudness. In terms of human hearing, audible sounds range from the threshold of hearing (0 dB) to the threshold of pain (140 dB).

A-weighted Decibels dB(A)

The 'A'-weighting filter emulates human hearing response for low levels of sound. The filter network is incorporated electronically into sound level meters. Sound pressure levels measured using an 'A'-weighting filter have units of dB(A) which is a single figure value to represent the overall noise level for the entire frequency range.

A change of 3 dB(A) is the smallest change in noise level that is perceptible under normal listening conditions. A change of 10 dB(A) corresponds to a doubling or halving of loudness of the sound. The background noise level in a quiet bedroom may be around 20 –30 dB(A); normal speech conversation around 60 dB(A) at 1 m; noise from a very busy road around 70-80 dB(A) at 10m; the level near a pneumatic drill around 100 dB(A).

Façade Noise Level

Façade noise measurements are those undertaken near to reflective surfaces such as walls, usually at a distance of 1m from the surface. Façade noise levels at 1m from a reflective surface are normally around 3 dB greater than those obtained under freefield conditions.

Freefield Noise Level

Freefield noise measurements are those undertaken away from any reflective surfaces other than the ground

Frequency Hz

The frequency of a noise is the number of pressure variations per second, and relates to the "pitch" of the sound. Hertz (Hz) is the unit of frequency and is the same as cycles per second. Normal, healthy human hearing can detect sounds from around 20 Hz to 20 kHz.

Octave and Third-Octave Bands

Two frequencies are said to be an octave apart if the frequency of one is twice the frequency of the other. The octave bandwidth increases as the centre frequency increases. Each bandwidth is 70% of the band centre frequency.

Two frequencies are said to be a third-octave apart if the frequency of one is 1.26 times the other. The third octave bandwidth is 23% of the band centre frequency.

There are recognised octave band and third octave band centre frequencies. The octave or third-octave band sound pressure level is determined from the energy of the sound which falls within the boundaries of that particular octave of third octave band.

Appendix A (continued)

Equivalent Continuous Sound Pressure Level $L_{Aeq,T}$

The 'A'-weighted equivalent continuous sound pressure level $L_{Aeq,T}$, is a notional steady level which has the same acoustic energy as the actual fluctuating noise over the same time period T. The $L_{Aeq,T}$ unit is dominated by higher noise levels, for example, the $L_{Aeq,T}$ average of two equal time periods at, for example, 70 dB(A) and 50 dB(A) is not 60 dB(A) but 67 dB(A).

The $L_{Aeq,}$ is the chosen unit of BS 7445-1:2003 "Description and Measurement of Environmental noise".

Maximum Sound Pressure Level L_{Amax}

The L_{Amax} value describes the overall maximum 'A'-weighted sound pressure level over the measurement interval. Maximum levels are measured with either a fast or slow time weighted, denoted as $L_{Amax,f}$ or $L_{Amax,s}$ respectively.

Noise Rating NR

The noise rating level is a single figure index obtained from an octave band analysis of a noise. The NR level is obtained by comparing the octave band sound pressure levels to a set of reference curves and the highest NR curve that is intersected by the sound pressure levels gives the NR level.

Sound Exposure Level L_{AE} or SEL

The sound exposure level is a notional level which contains the same acoustic energy in 1 second as a varying 'A'-weighted noise level over a given period of time. It is normally used to quantify short duration noise events such as aircraft flyover or train passes.

Statistical Parameters L_N

In order to cover the time variability aspects, noise can be analysed into various statistical parameters, i.e. the sound level which is exceeded for N% of the time. The most commonly used are the $L_{A01,T}$, $L_{A10,T}$ and the $L_{A90,T}$.

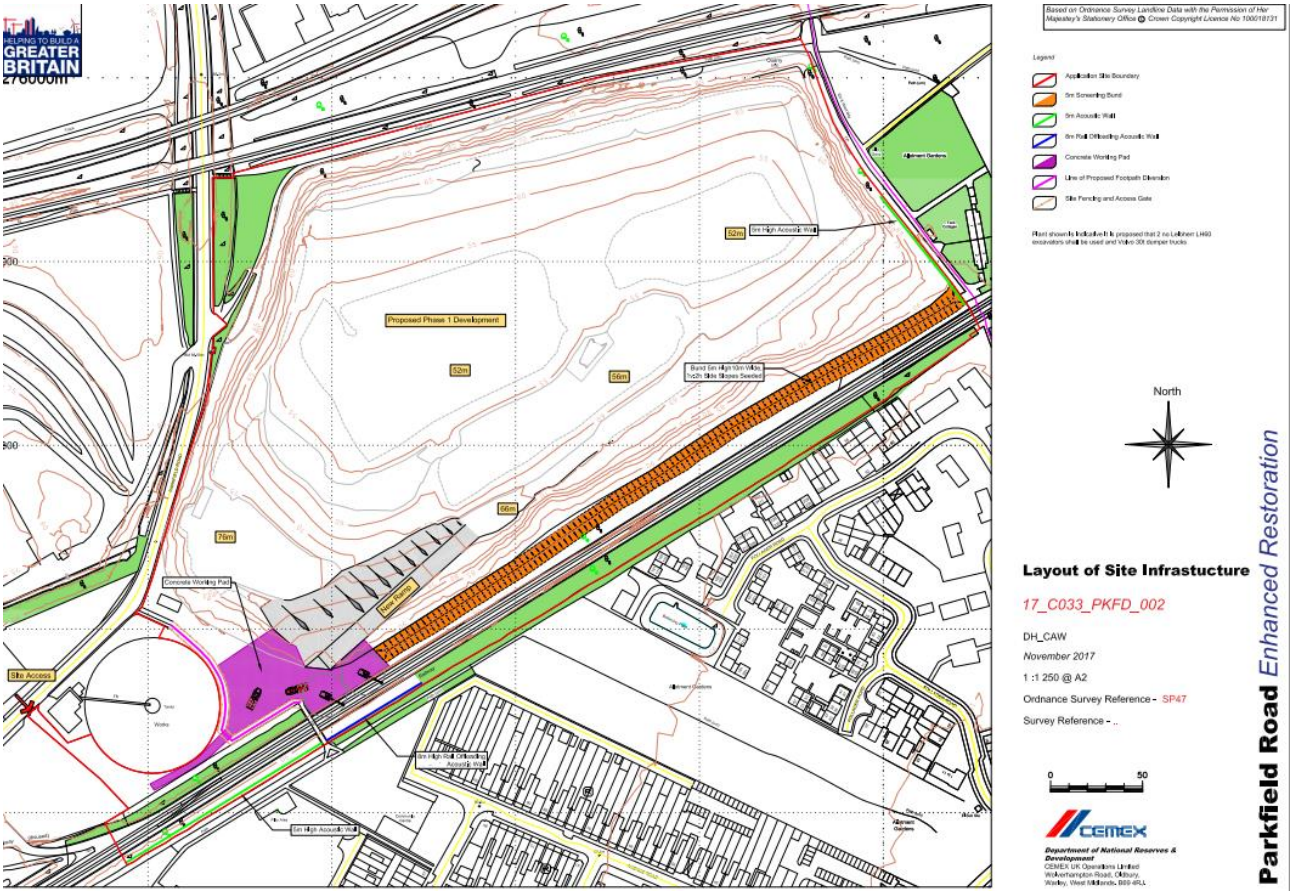
$L_{A01,T}$ is the 'A'-weighted level exceeded for 1% of the time interval T and is often used to gives an indication of the upper maximum level of a fluctuating noise signal.

$L_{A10,T}$ is the 'A'-weighted level exceeded for 10% of the time interval T and is often used to describe road traffic noise. It gives an indication of the upper level of a fluctuating noise signal. For high volumes of continuous traffic, the $L_{A10,T}$ unit is typically 2–3 dB(A) above the $L_{Aeq,T}$ value over the same period.

$L_{A90,T}$ is the 'A'-weighted level exceeded for 90% of the time interval T, and is often used to describe the underlying background noise level.

Appendix B – Environmental Permit Boundary Drawing Extract

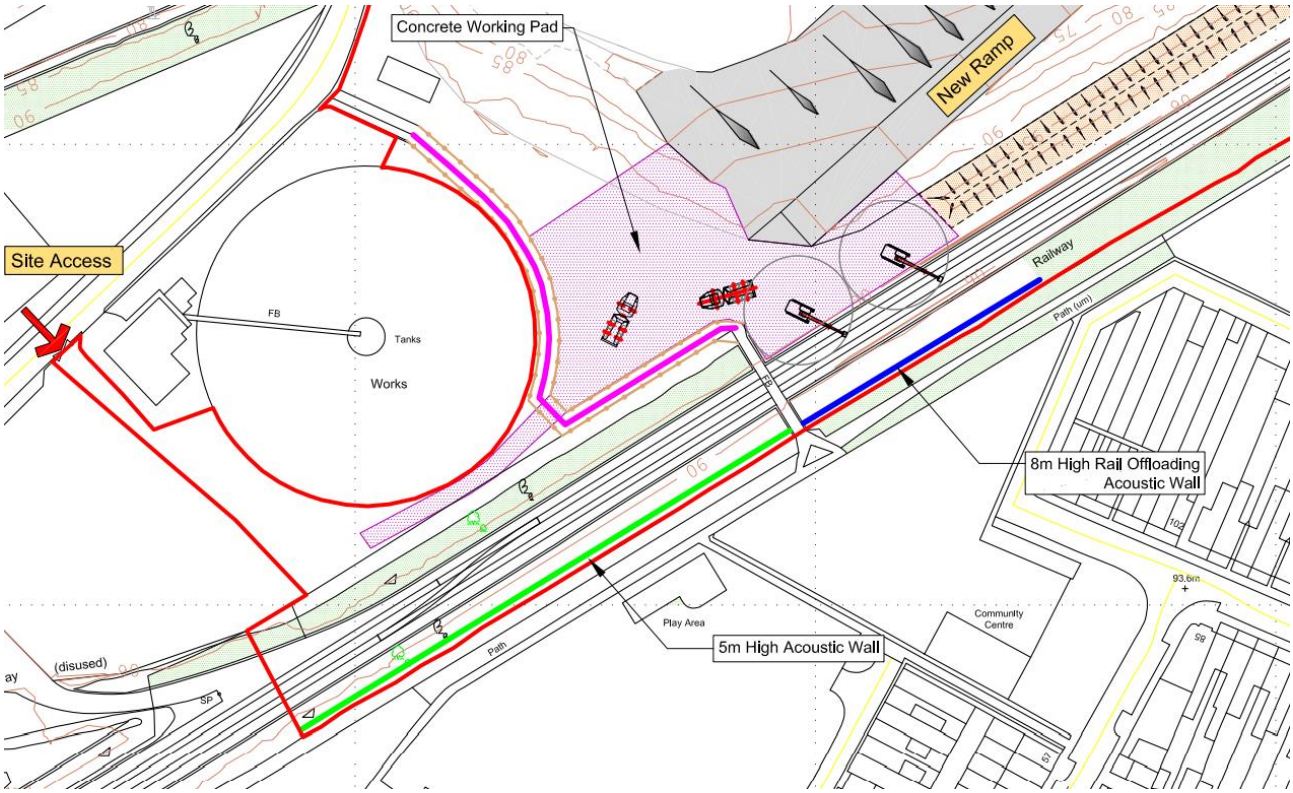
Appendix C – Site Layout Drawing

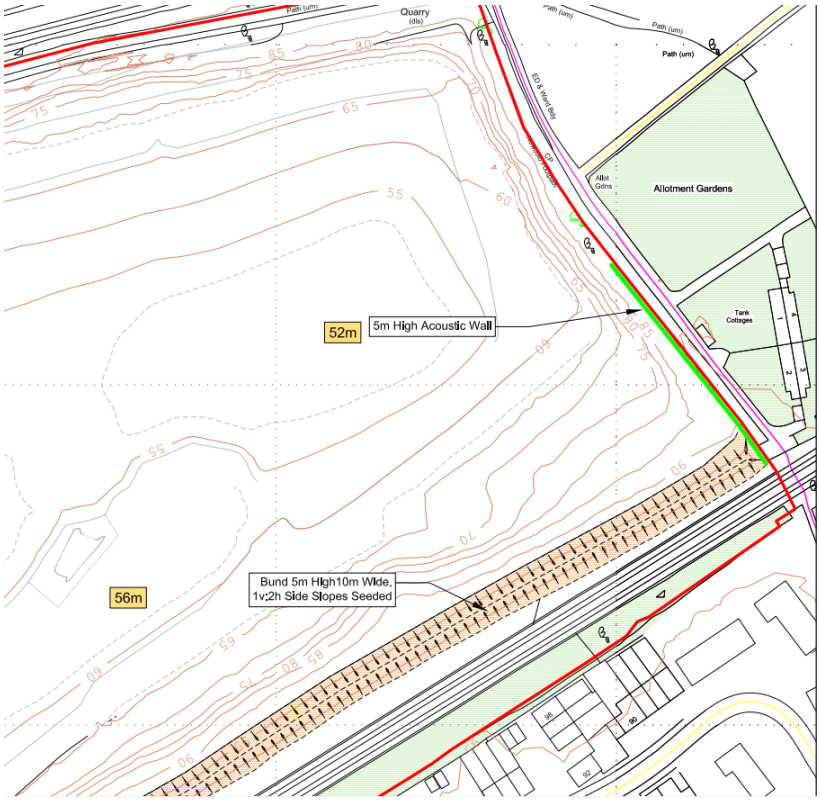


Legend

- Application Site Boundary
- 5m Screening Bund
- 5m Acoustic Wall
- 8m Rail Offloading Acoustic Wall
- Concrete Working Pad
- Line of Proposed Footpath Diversion
- Site Fencing and Access Gate

Appendix D – Site Layout Drawing Extracts (Mitigation Measures)





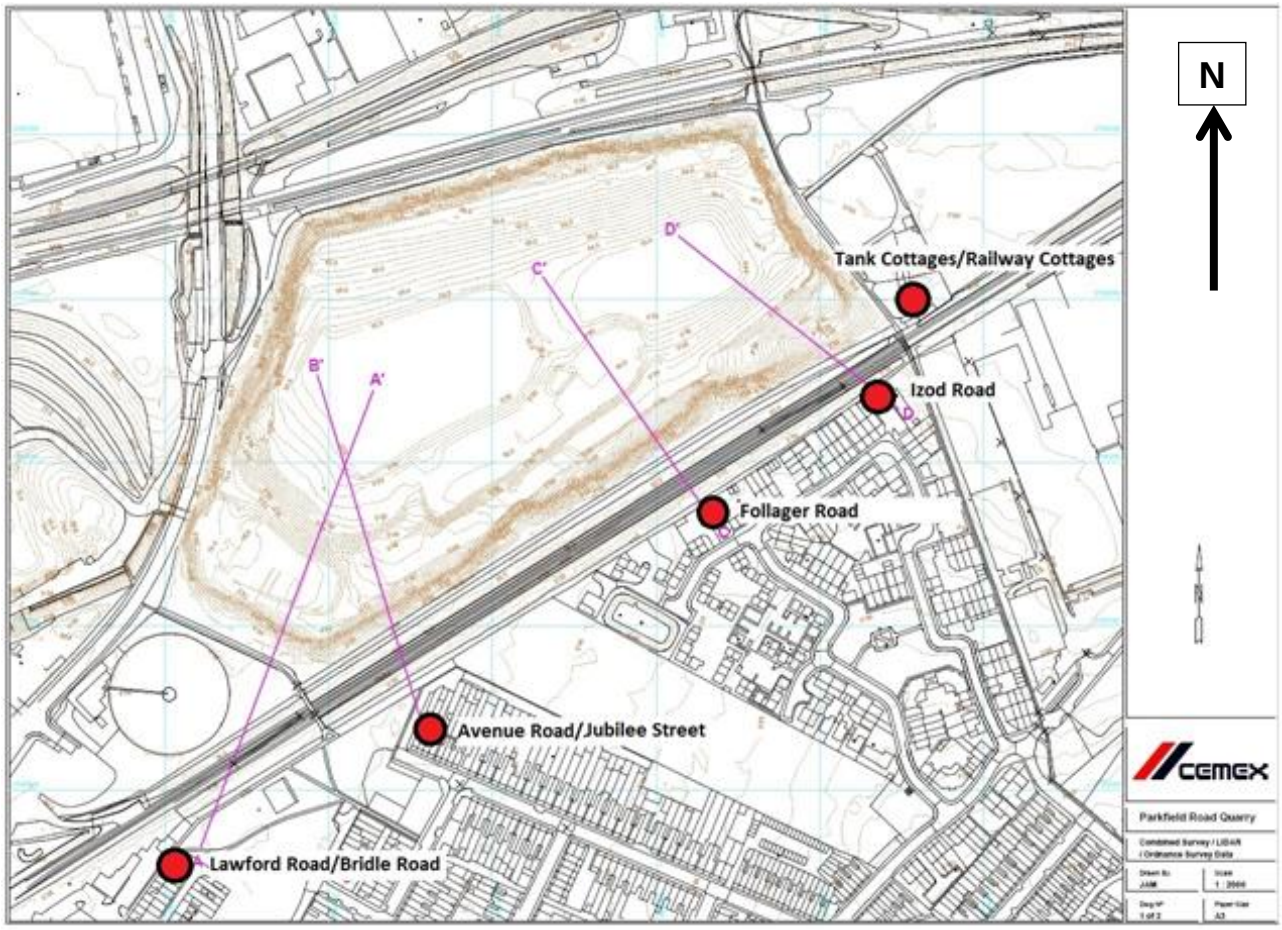
Legend

- Application Site Boundary
- 5m Screening Bund
- 5m Acoustic Wall
- 8m Rail Offloading Acoustic Wall
- Concrete Working Pad
- Line of Proposed Footpath Diversion
- Site Fencing and Access Gate

Plant shown is indicative it is proposed that 2 no Leibherr LH60 excavators shall be used and Volvo 30t dumper trucks

North

Appendix E – Plan with Site Noise Calculation Locations



Approximate positions of site noise calculation locations

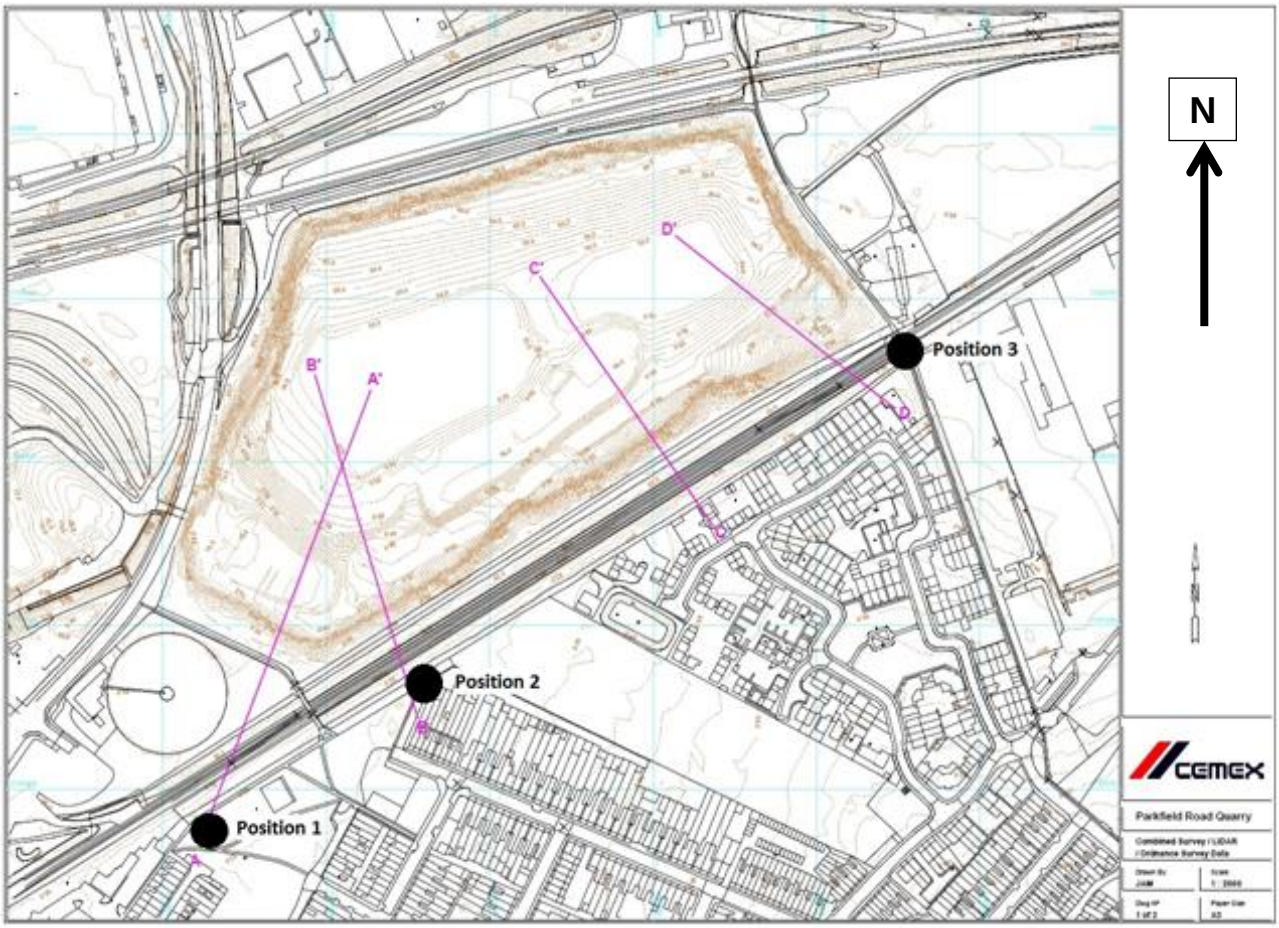
No	Site Noise Calculation Location
1	Lawford Bridge (Bridle Road)
2	Avenue Road (Jubilee Street)
3	Follager Road (Ground Floor)
4	Izod Road (Ground Floor)
5	Tank Cottages (Railway Cottages)
6	Follager Road (First Floor)
7	Izod Road (First Floor)
8	Follager Road (Second Floor)
9	Izod Road (Second Floor)

Appendix F – Road-side Views of Nearest Dwellings

Avenue Road (conventional two-storey terraced dwellings)

Follager Road (modern three-storey dwellings)

Appendix G – Location Plan Showing Noise Measurement Locations



● Approximate positions of baseline noise survey locations

Location	Description
1. Recreation Ground	On recreation ground, 7.5 metres from fence of nearest garden.
2. Allotment Entrance	On path 10 metres from locked gate to allotments.
3. Tank Cottages	On path by disused railway lines.

Appendix H – Baseline Survey Results

Results and Observations

Thursday 27 April 2017, 08:50 to 10:45

Dry, light cloud, northerly wind 1-2 m/s, 6-9°C

Position	Start Time	Results dB (T = 15 minutes)				Comments
		$L_{Aeq,T}$	$L_{Amax,f}$	$L_{A10,T}$	$L_{A90,T}$	
1. Recreation Ground	08:50	50	64	52	47	Road traffic. Birdsong. CEMEX cement plant. Distant train horns.
2. Allotment Entrance	09:08	54	72	57	47	CEMEX cement plant. Birdsong. Trains. Horns. Power tool in garden. Aircraft.
3. Tank Cottages	09:34	52	73	54	44	CEMEX cement plant. Trains. Car turning. Church bells. Birdsong.
3. Tank Cottages	09:50	53	69	58	44	CEMEX cement plant. Birdsong. Vehicle movement/activity at Alstom Limited site. Trains. Aircraft.
2. Allotment Entrance	10:12	52	69	53	47	Cemex cement plant. Birdsong. Distant road traffic. Trains.
1. Recreation Ground	10:30	52	64	54	49	CEMEX cement plant. Parkfield Road traffic. Birdsong.

Appendix H – Baseline Survey Results (continued)

Results and Observations

Tuesday 04 July 2017, 11:05 to 13:20

Dry, overcast, south-westerly wind 1-3 m/s, ~18°C

Position	Start Time	Results dB (T = 15 minutes)				Comments
		$L_{Aeq,T}$	$L_{Amax,f}$	$L_{A10,T}$	$L_{A90,T}$	
1. Recreation Ground	11:05	52	66	55	48	Plant noise and activity from CEMEX site. Road traffic. Birdsong. Some brief plant noise to west. Distant train and horn.
2. Allotment Entrance	11:24	49	64	50	46	Continuous plant noise from CEMEX site. Distant road traffic. Birdsong. Distant train movement.
3. Tank Cottages	11:52	49	76	51	42	Continuous plant noise from CEMEX site. Distant road traffic. Train passes to north. Birdsong. Breeze in trees. Some brief hammering noises to SE at derelict site.
1. Recreation Ground	12:16	51	59	52	50	Constant plant noise from CEMEX site. Sound of water pouring into open tank to west. Birdsong. Road traffic.
2. Allotment Entrance	12:37	50	67	52	48	Continuous plant noise from CEMEX site, including water noise from tank. Passing trains. Birdsong. Light aircraft. Occasional car on local road.
3. Tank Cottages	13:01	49	64	51	44	Continuous plant noise from CEMEX site. Passing trains to north. Birdsong. Distant road traffic.

Appendix H – Baseline Survey Results (continued)

Results and Observations

Monday 10 July 2017, 11:30 to 13:40

Dry, cloudy, westerly wind 0-3 m/s, 22-24°C

Position	Start Time	Results dB (T = 15 minutes)				Comments
		$L_{Aeq,T}$	$L_{Amax,f}$	$L_{A10,T}$	$L_{A90,T}$	
1. Recreation Ground	11:32	52	65	54	50	CEMEX site (plant noise, impact noises, horn). Birdsong. Breeze in trees. Low light aircraft. Trains and train horns. Distant road traffic. Loud motorbike on residential street. Distant car horn.
2. Allotment Entrance	11:49	51	65	53	48	CEMEX site (plant noise). Breeze in trees. Birdsong. Distant road traffic. Voice of resident. Low light aircraft. Trains and train horns.
3. Tank Cottages	12:12	49	63	52	44	CEMEX site (plant noise, reversing bleepers, impact noise). Distant road traffic. Birdsong. Train and train horn. Voice of cyclist. Breeze in trees. Industrial noise to NW (cutting/welding, impact noise.) Chimes at church.
1. Recreation Ground	12:35	64	94	53	50	CEMEX site (plant noise, impact noises, horn). Distant road traffic. Birdsong. Breeze in trees. Voice of dog walker. Dog barking. Trains. Aircraft.
2. Allotment Entrance	13:04	50	69	51	47	CEMEX site (plant noise, impact noises). Distant road traffic. Birdsong. Breeze in trees. Trains and train horns. Aircraft. Distant car horns.
3. Tank Cottages	13:25	49	66	52	44	CEMEX site (plant noise, reversing bleepers). Birdsong, Distant road traffic. Distant dog barking. Aircraft. Industrial noise to NW (plant noise, cars, impact noises). Trains and train horns. Distant train horn. Breeze in trees. Chimes at church.

Appendix I – Noise Calculation Methods

Specific noise levels are predicted or measured in terms of the Equivalent Continuous Noise Level, $L_{Aeq,T}$ over a given reference time interval, T. In BS4142:2014+A1:2019 the reference time interval is 1 hour for daytime and 15 minutes for night-time.

The calculation method for any plant which is relatively fixed in location is that set out in BS 5228-1: 2009 + A1: 2014, Annex F, and is the "*Method for activity L_{Aeq}*" described in section F.2.2 or the "*Method for plant sound power level*" described in section F.2.3.

The calculation method for site mobile plant such as lorries and dump trucks is that set out in BS 5228-1: 2009 + A1: 2014, Annex F, and is the "*Method for mobile plant using a regular well defined route (e. g. haul roads)*" described in section F. 2. 5.

Ground Absorption has been calculated using the technique set out in BS 5228-1: 2009 + A1: 2014, Annex F, assuming 80% soft ground between the site and the receiver locations.

The method of assessing screening is that attributed to Maekawa as used in BS 5228-1: 2009 + A1: 2014, Annex F and various other Government published documents. This method uses the calculated path difference and octave band noise data for each noise source over the frequency range stated in BS 5228-1: 2009 + A1: 2014, Annex F.

The effects of ground absorption are not used in the calculations if screening has been assessed and offers a higher attenuation.

The nearest distances to the respective dwellings, from the various items of plant, have been used in an acoustic model for the site to calculate the reasonable worst case $L_{Aeq,T}$ site noise levels.

A summary site noise calculation sheet for each of the nearest dwellings is included after the explanation of table headings used in the calculation spreadsheet.

Additional details relating to noise calculation, specifically requested by the Environment Agency, are included in **Appendix K**.

Appendix I – Noise Calculation Methods (continued)

Table at top of page, a summary of the noise sources identified for calculation.

Ref.
Reference number for plant items.

Plant Item
A list of plant items selected as potentially significant noise sources.

Comments on Plant
Typically a reference to where the noise data has been measured or sourced from.

Activity LAeq @ 10 m
The equivalent A-weighted noise level for a nominal period, T, at a distance of 10 metres for this noise source, where appropriate.

Power LWA or LWA / m
The A-weighted sound power level for each plant item. A sound power level can be used to determine an $L_{Aeq,\,T}$ at any distance required, assuming hemispherical propagation.

1 hour On-time %
The operating time of each plant item given as a percentage of the period, generally taken to be 1 hour.

Capacity Tonnes
Capacity in tonnes of for example a dump truck; when in combination with a daily or hourly amount of material to be moved by dump trucks can be used to determine the number of dump truck movements per day or per hour.

Source Height
The height above the ground at which the actual noise source is located, for example noise sources associated with a medium sized wheeled loader would normally be approximately 2 m above ground level.

2 way flow Q per hour
Used for haul road calculations and specifies the number of vehicles expected on the haul road per hour.

Speed V kph
The expected average speed of the vehicles on the haul road.

Plant Set back(m)
This plant set back, e.g. 10 m, is used when barrier attenuation is being considered to test and ensure that the barrier attenuation is not overstated by placing the noise source too close in behind a bund or barrier.

BS5228 method
The reference number is used in a look up table to indicate which method within BS5228 has been used for assessing this particular noise source.

Appendix I – Noise Calculation Methods (continued)

Table at bottom of page, dB $L_{Aeq, T}$ noise level contributions from the individual noise sources.

Ref.
Reference number for plant items – to link with table at top of page.

Plant Item
A list of plant items felt to be a potential noise source – to link with table at top of page.

Plan Distance
The distance from the noise source to receptor in metres, when appropriate the worst case scenario is used i.e. the shortest separation distance.

Working Distance
Any further distance correction, in metres, used to alter the distance of the noise source to the receptor, for testing alternative scenarios if required.

Ground Height
The ground height at the location of the noise source, in metres above sea level (Ordnance datum).

Working Height / depth
Any further adjustment to the height of the noise source, for example if noise sources are positioned above or below existing ground level.

Source Height
Indicates the noise source height taking account of the ground height and the height / depth adjustment.

Angle Degrees & Range Metres
Used in the Haul Road Method calculations only and specifies the angle of view and the perpendicular distance to the haul road or extended line of the haul road.

Barrier – Receiver
Distance of any acoustic barrier to the receptor in metres, used to determine path difference.

Barrier Height
The height of the barrier in metres, used to determine path difference.

Path Diff.
The difference in path length from noise source to receptor to which the sound propagation is subjected by introduction of any barrier.

Barrier Atten.
The attenuation in dB(A) caused by the barrier to the resultant dB $L_{Aeq, T}$ for the noise source, based on calculations in octave bands for each noise source.

Appendix I – Noise Calculation Methods (continued)

Soft Ground %
The percentage of the ground between the noise source and receptor which is taken to be soft, i.e. grass and farm land, rather than hard, i.e. concrete or water.

Ground Atten.
The attenuation in dB(A) caused by any soft ground to the resultant dB $L_{Aeq, T}$ for the noise source, in decibels.

Resultant L_{Aeq}
The resulting dB $L_{Aeq, T}$ noise level for the individual noise source at the receptor, including attenuation factors and any mitigation at source.

Appendix J – Summary Site Noise Calculation Sheets

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height :	1.5	m	Train Barrier Height :	5	m										
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD	Unloading Barrier Height :	8	m										
	ADDITIONAL PUMP (S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height :	92	m AOD	Infill Barrier Height :	7	m										
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow	Speed	0									BS5228		
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour	V kph	Plant Set back(m)									method		
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3				0	m back	1	Activity								
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3				0	m back	1	Activity								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30	15	0	m back	4	Haul Road								
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2				0	m back	1	Activity								
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
10	Plant Item 10			-1027	-999	100		2				0	m back	1	Activity								
11	Plant Item 11			-1027	-999	100		2				0	m back	1	Activity								
12	Plant Item 12			-1027	-999	100		2				0	m back	1	Activity								
13	Plant Item 13			-1027	-999	100		2				0	m back	1	Activity								
14	Plant Item 14			-1027	-999	100		2				0	m back	1	Activity								
15	Plant Item 15			-1027	-999	100		2				0	m back	1	Activity								
	Location No.	**1**	**Lawford Bridge (Bridle Road)**																				
	Receiver Height	93.5	m AOD																				
							Daytime Background Level																
	Site Noise Level for Items 1 to 6	**50**	dB LAeq, 1 hour, free field				49	dB LA90, T															
	Site Noise Level for Item 7 or Item 8 + Item 9	**27**	dB LAeq, 1 hour, free field																				
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant								
		Distance	Distance	Height	Height/depth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq								
1	Locomotive - stationary (west of foot bridge)	70	70	90.0	0.0	93.0	0	0	60	95.0	0.215	13.3	80.0	1.6	41.8								
2	Train movement - to place full wagons in unloading area	15	18	90.0	0.0	93.0	0	0	15	95.0	0.673	17.1	80.0	0.0	26.6								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	150	150	90.0	0.0	93.0	0	0	130	98.0	0.693	16.3	80.0	2.9	35.0								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	150	150	90.0	0.0	93.0	0	0	130	98.0	0.693	16.9	80.0	2.9	34.4								
5	Dump truck movements to / from / within infill area	70	70	92.0	0.0	94.0	30	0	50	95.0	0.046	8.5	80.0	1.8	43.3								
6	Placement / compaction within infill area (dozer / compactor)	150	150	92.0	0.0	94.0	0	0	50	95.0	0.027	7.3	80.0	3.1	48.2								
7	Diesel powered suction pump for dewatering (68 m AOD)	230	230	68.0	0.0	70.0	0	0	50	90.0	0.033	7.6	80.0	3.8	27.2								
8	Diesel powered suction pump for dewatering (61 m AOD)	230	230	61.0	0.0	63.0	0	0	50	90.0	0.123	10.5	80.0	3.8	24.3								
9	Diesel powered suction pump for dewatering (57 m AOD)	350	350	57.0	0.0	59.0	0	0	50	90.0	0.024	7.0	80.0	4.6	24.1								
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height:	1.5	m		Train Barrier Height:	5	m									
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD		Unloading Barrier Height:	8	m									
	ADDITIONAL PUMP(S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height:	92	m AOD		Infill Barrier Height:	7	m									
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow	Speed	0										BS5228	
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour	V kph	Plant Set back(m)										method	
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3				0	m back	1	Activity								
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3				0	m back	1	Activity								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30	15	0	m back	4	Haul Road								
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2				0	m back	1	Activity								
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
10	Plant Item 10			-1027	-999	100		2				0	m back	1	Activity								
11	Plant Item 11			-1027	-999	100		2				0	m back	1	Activity								
12	Plant Item 12			-1027	-999	100		2				0	m back	1	Activity								
13	Plant Item 13			-1027	-999	100		2				0	m back	1	Activity								
14	Plant Item 14			-1027	-999	100		2				0	m back	1	Activity								
15	Plant Item 15			-1027	-999	100		2				0	m back	1	Activity								
	Location No.	**2**	**Avenue Road (Jubilee Street)**																				
	Receiver Height	93.5	m AOD																				
							Daytime Background Level																
	Site Noise Level for Items 1 to 6	**49**	dB LAeq, 1 hour, free field				47	dB LA90, T															
	Site Noise Level for Item 7 or Item 8 + Item 9	**25**	dB LAeq, 1 hour, free field																				
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant								
		Distance	Distance	Height	Height/depth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq								
1	Locomotive - stationary (west of foot bridge)	100	100	90.0	0.0	93.0	0	0	90	95.0	0.209	13.3	80.0	2.2	38.7								
2	Train movement - to place full wagons in unloading area	35	38	90.0	0.0	93.0	0	0	35	95.0	0.634	16.9	80.0	0.7	20.3								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	50	50	90.0	0.0	93.0	0	0	35	98.0	1.097	18.0	80.0	1.1	42.9								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	50	50	90.0	0.0	93.0	0	0	35	98.0	1.097	18.8	80.0	1.1	42.1								
5	Dump truck movements to / from / within infill area	70	70	92.0	0.0	94.0	60	0	35	99.0	0.783	17.8	80.0	1.8	37.0								
6	Placement / compaction within infill area (dozer / compactor)	70	70	92.0	0.0	94.0	0	0	35	99.0	0.783	16.7	80.0	1.8	45.4								
7	Diesel powered suction pump for dewatering (68 m AOD)	100	100	68.0	0.0	70.0	0	0	40	92.0	1.210	18.3	80.0	2.4	23.7								
8	Diesel powered suction pump for dewatering (61 m AOD)	120	120	61.0	0.0	63.0	0	0	40	92.0	1.307	18.7	80.0	2.7	21.7								
9	Diesel powered suction pump for dewatering (57 m AOD)	190	190	57.0	0.0	59.0	0	0	40	92.0	0.508	15.0	80.0	3.5	21.4								
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height :	1.5	m		Train Barrier Height :	5	m										
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD		Unloading Barrier Height :	8	m										
	ADDITIONAL PUMP (S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height :	92	m AOD		Infill Barrier Height :	7	m										
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow	Speed	0		BS5228										
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour	V kph	Plant Set back(m)		method										
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3				0	m back	1	Activity									
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3				0	m back	1	Activity									
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity									
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity									
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30	15	0	m back	4	Haul Road									
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2				0	m back	1	Activity									
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity									
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity									
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity									
10	Plant Item 10			-1027	-999	100		2				0	m back	1	Activity									
11	Plant Item 11			-1027	-999	100		2				0	m back	1	Activity									
12	Plant Item 12			-1027	-999	100		2				0	m back	1	Activity									
13	Plant Item 13			-1027	-999	100		2				0	m back	1	Activity									
14	Plant Item 14			-1027	-999	100		2				0	m back	1	Activity									
15	Plant Item 15			-1027	-999	100		2				0	m back	1	Activity									
	Location No.	**3**	**Follager Road (Ground Floor)**																					
	Receiver Height	97.5	m AOD																					
							Daytime Background Level																	
	Site Noise Level for Items 1 to 6	**52**	dB LAeq, 1 hour, free field				44	dB LA90, T																
	Site Noise Level for Item 7 or Item 8 + Item 9	**30**	dB LAeq, 1 hour, free field																					
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant									
		Distance	Distance	Height	Height/depth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq									
1	Locomotive - stationary (west of foot bridge)	300	300	90.0	0.0	93.0	0	0	200	90.0	-0.152	0.0	80.0	4.0	38.5									
2	Train movement - to place full wagons in unloading area	15	18	90.0	0.0	93.0	0	0	15	90.0	-2.459	0.0	80.0	0.0	43.7									
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	250	250	90.0	0.0	93.0	0	0	130	90.0	-0.213	0.0	80.0	3.7	43.2									
4	Material into dump trucks (Liebherr LH60 excavators x 2)	250	250	90.0	0.0	93.0	0	0	130	90.0	-0.213	0.0	80.0	3.7	43.2									
5	Dump truck movements to / from / within infill area	50	50	92.0	0.0	94.0	90	0	35	99.0	0.721	17.5	80.0	1.2	40.5									
6	Placement / compaction within infill area (dozer / compactor)	50	50	92.0	0.0	94.0	0	0	35	99.0	0.721	16.4	80.0	1.2	48.6									
7	Diesel powered suction pump for dewatering (68 m AOD)	200	200	68.0	0.0	70.0	0	0	30	94.0	0.007	5.8	80.0	3.6	30.2									
8	Diesel powered suction pump for dewatering (61 m AOD)	180	180	61.0	0.0	63.0	0	0	30	94.0	0.097	9.9	80.0	3.4	27.0									
9	Diesel powered suction pump for dewatering (57 m AOD)	130	130	57.0	0.0	59.0	0	0	30	94.0	0.570	15.5	80.0	2.9	24.2									
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0									
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0									
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0									
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0									
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0									
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0									

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height:	1.5	m	Train Barrier Height:	5	m										
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD	Unloading Barrier Height:	8	m										
	ADDITIONAL PUMP(S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height:	92	m AOD	Infill Barrier Height:	7	m										
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow	Speed	0							BS5228				
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour	V kph	Plant Set back(m)							method				
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3				0	m back	1	Activity								
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3				0	m back	1	Activity								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30	15	0	m back	4	Haul Road								
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2				0	m back	1	Activity								
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
10	Plant Item 10				-1027	-999	100		2				0	m back	1	Activity								
11	Plant Item 11				-1027	-999	100		2				0	m back	1	Activity								
12	Plant Item 12				-1027	-999	100		2				0	m back	1	Activity								
13	Plant Item 13				-1027	-999	100		2				0	m back	1	Activity								
14	Plant Item 14				-1027	-999	100		2				0	m back	1	Activity								
15	Plant Item 15				-1027	-999	100		2				0	m back	1	Activity								
	Location No.	**4**	**Izod Road (Ground Floor)**																				
	Receiver Height	97.5	m AOD																				
							Daytime Background Level																
	Site Noise Level for Items 1 to 6	**51**	dB LAeq, 1 hour, free field				44	dB LA90, T															
	Site Noise Level for Item 7 or Item 8 + Item 9	**26**	dB LAeq, 1 hour, free field																				
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant								
		Distance	Distance	Height	Height/depth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq								
1	Locomotive - stationary (west of foot bridge)	450	450	90.0	0.0	93.0	0	0	380	90.0	-0.116	0.0	80.0	4.6	34.3								
2	Train movement - to place full wagons in unloading area	15	18	90.0	0.0	93.0	0	0	15	90.0	-2.459	0.0	80.0	0.0	43.7								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	350	350	90.0	0.0	93.0	0	0	330	90.0	-0.280	0.0	80.0	4.2	39.8								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	350	350	90.0	0.0	93.0	0	0	330	97.0	0.368	14.5	80.0	4.2	29.5								
5	Dump truck movements to / from / within infill area	50	50	92.0	0.0	94.0	90	0	35	99.0	0.721	17.5	80.0	1.2	40.5								
6	Placement / compaction within infill area (dozer / compactor)	50	50	92.0	0.0	94.0	0	0	35	99.0	0.721	16.4	80.0	1.2	48.6								
7	Diesel powered suction pump for dewatering (68 m AOD)	330	330	68.0	0.0	70.0	0	0	50	94.0	0.005	5.5	80.0	4.5	26.1								
8	Diesel powered suction pump for dewatering (61 m AOD)	300	300	61.0	0.0	63.0	0	0	50	94.0	0.060	8.8	80.0	4.3	23.7								
9	Diesel powered suction pump for dewatering (57 m AOD)	230	230	57.0	0.0	59.0	0	0	50	94.0	0.294	13.1	80.0	3.8	21.7								
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC			Receiver Height:	1.5	m	Train Barrier Height:	5	m										
	PARKFIELD ROAD RUGBY						Train / Unloading Ground :	90	m AOD	Unloading Barrier Height:	8	m										
	ADDITIONAL PUMP (S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)						Infill Ground Height:	92	m AOD	Infill Barrier Height:	7	m										
				Activity	Power LWA	1 hour	Capacity	Source		Speed	0								BS5228			
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height	Q per hour	V kph	Plant Set back(m)								method			
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3			0	m back	1	Activity								
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3			0	m back	1	Activity								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3			0	m back	1	Activity								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3			0	m back	1	Activity								
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2	30	15	0	m back	4	Haul Road								
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2			0	m back	1	Activity								
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2			0	m back	1	Activity								
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2			0	m back	1	Activity								
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2			0	m back	1	Activity								
10	Plant Item 10			-1027	-999	100		2			0	m back	1	Activity								
11	Plant Item 11			-1027	-999	100		2			0	m back	1	Activity								
12	Plant Item 12			-1027	-999	100		2			0	m back	1	Activity								
13	Plant Item 13			-1027	-999	100		2			0	m back	1	Activity								
14	Plant Item 14			-1027	-999	100		2			0	m back	1	Activity								
15	Plant Item 15			-1027	-999	100		2			0	m back	1	Activity								

	Location No.	**5**	**Tank Cottages (Railway Cottages)**																			
	Receiver Height	91.5	m AOD																			
	Site Noise Level for Items 1 to 6	**50**	dB LAeq, 1 hour, free field				Daytime Background Level															
	Site Noise Level for Item 7 or Item 8 + Item 9	**30**	dB LAeq, 1 hour, free field				44	dB LA90, T														
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant							
		Distance	Distance	Height	Heightdepth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq							
1	Locomotive - stationary (west of foot bridge)	480	480	90.0	0.0	93.0	0	0	30	90.0	-0.045	0.0	80.0	4.7	33.6							
2	Train movement - to place full wagons in unloading area	20	23	90.0	0.0	93.0	0	0	20	90.0	-1.250	0.0	80.0	0.0	41.5							
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	380	380	90.0	0.0	93.0	0	0	350	98.0	0.471	14.9	80.0	4.4	28.4							
4	Material into dump trucks (Liebherr LH60 excavators x 2)	380	380	90.0	0.0	93.0	0	0	350	98.0	0.471	15.4	80.0	4.4	27.9							
5	Dump truck movements to / from / within infill area	50	50	92.0	0.0	94.0	30	0	30	97.0	0.661	17.1	80.0	1.2	36.1							
6	Placement / compaction within infill area (dozer / compactor)	50	50	92.0	0.0	94.0	0	0	30	97.0	0.661	16.1	80.0	1.2	48.9							
7	Diesel powered suction pump for dewatering (68 m AOD)	360	360	68.0	0.0	70.0	0	0	20	90.0	-0.002	0.0	80.0	4.6	26.2							
8	Diesel powered suction pump for dewatering (61 m AOD)	330	330	61.0	0.0	63.0	0	0	20	90.0	0.001	5.0	80.0	4.5	26.6							
9	Diesel powered suction pump for dewatering (57 m AOD)	250	250	57.0	0.0	59.0	0	0	20	90.0	0.032	7.6	80.0	4.0	26.4							
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height :	1.5	m		Train Barrier Height :	5	m								
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD		Unloading Barrier Height:	8	m								
	ADDITIONAL PUMP(S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height :	92	m AOD		Infill Barrier Height :	7	m								
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow		Speed	0						BS5228			
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour		V kph	Plant Set back(m)						method			
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3					0		m back		1		Activity			
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3					0		m back		1		Activity			
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3					0		m back		1		Activity			
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3					0		m back		1		Activity			
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30		15	0		m back		4		Haul Road			
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2					0		m back		1		Activity			
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2					0		m back		1		Activity			
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2					0		m back		1		Activity			
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2					0		m back		1		Activity			
10	Plant Item 10			-1027	-999	100		2					0		m back		1		Activity			
11	Plant Item 11			-1027	-999	100		2					0		m back		1		Activity			
12	Plant Item 12			-1027	-999	100		2					0		m back		1		Activity			
13	Plant Item 13			-1027	-999	100		2					0		m back		1		Activity			
14	Plant Item 14			-1027	-999	100		2					0		m back		1		Activity			
15	Plant Item 15			-1027	-999	100		2					0		m back		1		Activity			
	Location No.	**6**	**Follager Road (First Floor)**																			
	Receiver Height	100	m AOD																			
						Daytime Background Level																
	Site Noise Level for Items 1 to 6	**53**	dB LAeq, 1 hour, free field			44	dB LA90, T															
	Site Noise Level for Item 7 or Item 8 + Item 9	**39**	dB LAeq, 1 hour, free field																			
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant							
		Distance	Distance	Height	Height/depth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq							
1	Locomotive - stationary (west of foot bridge)	300	300	90.0	0.0	93.0	0	0	200	90.0	-0.213	0.0	80.0	4.0	38.5							
2	Train movement - to place full wagons in unloading area	15	18	90.0	0.0	93.0	0	0	15	90.0	-2.957	0.0	80.0	0.0	43.7							
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	250	250	90.0	0.0	93.0	0	0	130	90.0	-0.324	0.0	80.0	3.7	43.2							
4	Material into dump trucks (Liebherr LH60 excavators x 2)	250	250	90.0	0.0	93.0	0	0	130	90.0	-0.324	0.0	80.0	3.7	43.2							
5	Dump truck movements to / from / within infill area	50	50	92.0	0.0	94.0	90	0	35	99.0	0.467	15.7	80.0	1.2	42.3							
6	Placement / compaction within infill area (dozer / compactor)	50	50	92.0	0.0	94.0	0	0	35	99.0	0.467	14.8	80.0	1.2	50.2							
7	Diesel powered suction pump for dewatering (68 m AOD)	200	200	68.0	0.0	70.0	0	0	0	0.0	-1.000	0.0	80.0	3.6	32.4							
8	Diesel powered suction pump for dewatering (61 m AOD)	180	180	61.0	0.0	63.0	0	0	0	0.0	-1.000	0.0	80.0	3.4	33.5							
9	Diesel powered suction pump for dewatering (57 m AOD)	130	130	57.0	0.0	59.0	0	0	0	0.0	-1.000	0.0	80.0	2.9	36.9							
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0							

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height :	1.5	m	Train Barrier Height :	5	m										
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD	Unloading Barrier Height:	8	m										
	ADDITIONAL PUMP(S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height :	92	m AOD	Infill Barrier Height :	7	m										
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow	Speed	0									BS5228		
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour	V kph	Plant Set back(m)									method		
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3				0	m back								1	Activity	
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3				0	m back								1	Activity	
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back								1	Activity	
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back								1	Activity	
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30	15	0	m back								4	Haul Road	
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2				0	m back								1	Activity	
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back								1	Activity	
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back								1	Activity	
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back								1	Activity	
10	Plant Item 10			-1027	-999	100		2				0	m back								1	Activity	
11	Plant Item 11			-1027	-999	100		2				0	m back								1	Activity	
12	Plant Item 12			-1027	-999	100		2				0	m back								1	Activity	
13	Plant Item 13			-1027	-999	100		2				0	m back								1	Activity	
14	Plant Item 14			-1027	-999	100		2				0	m back								1	Activity	
15	Plant Item 15			-1027	-999	100		2				0	m back								1	Activity	
	Location No.	**7**	**Izod Road (First Floor)**																				
	Receiver Height	100	m AOD																				
						Daytime Background Level																	
	Site Noise Level for Items 1 to 6	**52**	dB LAeq, 1 hour, free field			44	dB LA90, T																
	Site Noise Level for Item 7 or Item 8 + Item 9	**33**	dB LAeq, 1 hour, free field																				
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant								
		Distance	Distance	Height	Height/depth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq								
1	Locomotive - stationary (west of foot bridge)	450	450	90.0	0.0	93.0	0	0	380	90.0	-0.141	0.0	80.0	4.6	34.3								
2	Train movement - to place full wagons in unloading area	15	18	90.0	0.0	93.0	0	0	15	90.0	-2.957	0.0	80.0	0.0	43.7								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	350	350	90.0	0.0	93.0	0	0	330	90.0	-0.305	0.0	80.0	4.2	39.8								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	350	350	90.0	0.0	93.0	0	0	330	97.0	0.340	14.2	80.0	4.2	29.8								
5	Dump truck movements to / from / within infill area	50	50	92.0	0.0	94.0	90	0	35	99.0	0.467	15.7	80.0	1.2	42.3								
6	Placement / compaction within infill area (dozer / compactor)	50	50	92.0	0.0	94.0	0	0	35	99.0	0.467	14.8	80.0	1.2	50.2								
7	Diesel powered suction pump for dewatering (68 m AOD)	330	330	68.0	0.0	70.0	0	0	0	0.0	-1.000	0.0	80.0	4.5	27.2								
8	Diesel powered suction pump for dewatering (61 m AOD)	300	300	61.0	0.0	63.0	0	0	0	0.0	-1.000	0.0	80.0	4.3	28.1								
9	Diesel powered suction pump for dewatering (57 m AOD)	230	230	57.0	0.0	59.0	0	0	0	0.0	-1.000	0.0	80.0	3.8	30.9								
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height :	1.5	m	Train Barrier Height :	5	m										
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD	Unloading Barrier Height:	8	m										
	ADDITIONAL PUMP(S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height :	92	m AOD	Infill Barrier Height :	7	m										
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow	Speed	0		BS5228									
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour	V kph	Plant Set back(m)		method									
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3				0	m back	1	Activity								
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3				0	m back	1	Activity								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30	15	0	m back	4	Haul Road								
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2				0	m back	1	Activity								
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
10	Plant Item 10			-1027	-999	100		2				0	m back	1	Activity								
11	Plant Item 11			-1027	-999	100		2				0	m back	1	Activity								
12	Plant Item 12			-1027	-999	100		2				0	m back	1	Activity								
13	Plant Item 13			-1027	-999	100		2				0	m back	1	Activity								
14	Plant Item 14			-1027	-999	100		2				0	m back	1	Activity								
15	Plant Item 15			-1027	-999	100		2				0	m back	1	Activity								
	Location No.	**8**	**Follager Road (Second Floor)**																				
	Receiver Height	102.5	m AOD																				
						Daytime Background Level																	
	Site Noise Level for Items 1 to 6	**54**	dB LAeq, 1 hour, free field			44	dB LA90, T																
	Site Noise Level for Item 7 or Item 8 + Item 9	**39**	dB LAeq, 1 hour, free field																				
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant								
		Distance	Distance	Height	Heightdepth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq								
1	Locomotive - stationary (west of foot bridge)	300	300	90.0	0.0	93.0	0	0	200	90.0	-0.285	0.0	80.0	4.0	38.5								
2	Train movement - to place full wagons in unloading area	15	18	90.0	0.0	93.0	0	0	15	90.0	-3.415	0.0	80.0	0.0	43.7								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	250	250	90.0	0.0	93.0	0	0	130	90.0	-0.457	0.0	80.0	3.7	43.2								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	250	250	90.0	0.0	93.0	0	0	130	90.0	-0.457	0.0	80.0	3.7	43.2								
5	Dump truck movements to / from / within infill area	50	50	92.0	0.0	94.0	90	0	35	99.0	0.269	13.7	80.0	1.2	44.3								
6	Placement / compaction within infill area (dozer / compactor)	50	50	92.0	0.0	94.0	0	0	35	99.0	0.269	12.9	80.0	1.2	52.1								
7	Diesel powered suction pump for dewatering (68 m AOD)	200	200	68.0	0.0	70.0	0	0	0	0.0	-1.000	0.0	80.0	3.6	32.4								
8	Diesel powered suction pump for dewatering (61 m AOD)	180	180	61.0	0.0	63.0	0	0	0	0.0	-1.000	0.0	80.0	3.4	33.5								
9	Diesel powered suction pump for dewatering (57 m AOD)	130	130	57.0	0.0	59.0	0	0	0	0.0	-1.000	0.0	80.0	2.9	36.9								
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								

Appendix J – Summary Calculation Sheets (continued)

	CEMEX INFILL PROJECT	**4663**	**22-Mar-21**	PWC				Receiver Height :	1.5	m		Train Barrier Height :	5	m									
	PARKFIELD ROAD RUGBY							Train / Unloading Ground :	90	m AOD		Unloading Barrier Height :	8	m									
	ADDITIONAL PUMP(S) FOR DEWATERING (ASSUMED AT START WITHOUT BARRIERS IN PLACE)							Infill Ground Height :	92	m AOD		Infill Barrier Height :	7	m									
				Activity	Power LWA	1 hour	Capacity	Source		2 way flow	Speed	0		BS5228									
Ref	Plant Item	Comments on Plant		LAeq @ 10 m	or LWA / m	On-time %	Tonnes	Height		Q per hour	V kph	Plant Set back(m)		method									
1	Locomotive - stationary (west of foot bridge)	Measured Barrington 15.03.17		72	100	100		3				0	m back	1	Activity								
2	Train movement - to place full wagons in unloading area	Measured Banbury 30.03.17		64	92	3		3				0	m back	1	Activity								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	Measured Barrington 06.07.17		75	103	97		3				0	m back	1	Activity								
5	Dump truck movements to / from / within infill area	Measured Barrington 06.07.17		80	108	100		2		30	15	0	m back	4	Haul Road								
6	Placement / compaction within infill area (dozer / compactor)	Reduced by 3 dB LWA		79	107	100		2				0	m back	1	Activity								
7	Diesel powered suction pump for dewatering (68 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
8	Diesel powered suction pump for dewatering (61 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
9	Diesel powered suction pump for dewatering (57 m AOD)	Upper Sound Power Level for unit		62	90	100		2				0	m back	1	Activity								
10	Plant Item 10			-1027	-999	100		2				0	m back	1	Activity								
11	Plant Item 11			-1027	-999	100		2				0	m back	1	Activity								
12	Plant Item 12			-1027	-999	100		2				0	m back	1	Activity								
13	Plant Item 13			-1027	-999	100		2				0	m back	1	Activity								
14	Plant Item 14			-1027	-999	100		2				0	m back	1	Activity								
15	Plant Item 15			-1027	-999	100		2				0	m back	1	Activity								
	Location No.	**9**	**Izod Road (Second Floor)**																				
	Receiver Height	102.5	m AOD																				
						Daytime Background Level																	
	Site Noise Level for Items 1 to 6	**54**	dB LAeq, 1 hour, free field			44	dB LA90, T																
	Site Noise Level for Item 7 or Item 8 + Item 9	**33**	dB LAeq, 1 hour, free field																				
Ref	Plant Item	Plan	Working	Ground	Working	Source	Angle	Range	Barrier	Barrier	Path	Barrier	Soft	Ground	Resultant								
		Distance	Distance	Height	Height/depth	Height	Degrees	Metres	-Receiver	Height	Diff.	Atten.	Ground %	Atten.	LAeq								
1	Locomotive - stationary (west of foot bridge)	450	450	90.0	0.0	93.0	0	0	380	90.0	-0.170	0.0	80.0	4.6	34.3								
2	Train movement - to place full wagons in unloading area	15	18	90.0	0.0	93.0	0	0	15	90.0	-3.415	0.0	80.0	0.0	43.7								
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	350	350	90.0	0.0	93.0	0	0	330	90.0	-0.332	0.0	80.0	4.2	39.8								
4	Material into dump trucks (Liebherr LH60 excavators x 2)	350	350	90.0	0.0	93.0	0	0	330	97.0	0.313	13.9	80.0	4.2	30.1								
5	Dump truck movements to / from / within infill area	50	50	92.0	0.0	94.0	90	0	35	99.0	0.269	13.7	80.0	1.2	44.3								
6	Placement / compaction within infill area (dozer / compactor)	50	50	92.0	0.0	94.0	0	0	35	99.0	0.269	12.9	80.0	1.2	52.1								
7	Diesel powered suction pump for dewatering (68 m AOD)	330	330	68.0	0.0	70.0	0	0	0	0.0	-1.000	0.0	80.0	4.5	27.2								
8	Diesel powered suction pump for dewatering (61 m AOD)	300	300	61.0	0.0	63.0	0	0	0	0.0	-1.000	0.0	80.0	4.3	28.1								
9	Diesel powered suction pump for dewatering (57 m AOD)	230	230	57.0	0.0	59.0	0	0	0	0.0	-1.000	0.0	80.0	3.8	30.9								
10	Plant Item 10	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
11	Plant Item 11	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
12	Plant Item 12	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
13	Plant Item 13	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
14	Plant Item 14	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								
15	Plant Item 15	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0								

Appendix K – BS4142 Summary Table for Receiver Locations

CEMEX Parkfield Road Rugby	**5143**	**18/03/21**	**PWC**

Permit Application submitted to Environment Agency - Request for Noise Impact Assessment (NIA) and Noise Management Plan (NMP)

The NIA should be based on BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound' and contain the following information:

A BS4142 assessment, i.e. a comparison of the rating level (the predicted specific level of onsite activities, plus any penalties for characteristic sound) against a background level (the LA90 level derived from background monitoring data) at all noise sensitive receptor locations. There must also be a discussion on context (i.e. sound scape).

Longer Term Operations (material placement)

Site Noise Calculation Receiver Location	**Calculated**	**Acoustic**	**Rating**	**Background**	**LAr, Tr minus**
See Page 157 in Chapter 9 Noise of ES	**dB LAeq, 1 hour**	**Adjustment**	**Level LAr, Tr**	**dB LA90, T**	**dB LA90, T**
Lawford Bridge (Bridle Road)	50	3	53	49	4
Avenue Road (Jubilee Street)	49	3	52	47	5
Follager Road (Ground Floor)	51	3	54	*45*	9
Follager Road (First Floor)	52	3	55	*45*	10
Follager Road (Second Floor)	54	3	57	*45*	12
Izod Road (Ground Floor)	50	3	53	*45*	8
Izod Road (First Floor)	52	3	55	*45*	10
Izod Road (Second Floor)	53	3	56	*45*	11
Tank Cottages (Railway Cottages)	50	3	53	44	9

Temporary Operations (bund formation)

Site Noise Calculation Receiver Location	**Calculated**	**Acoustic**	**Rating**	**Background**	**LAr, Tr minus**
See Page 158 in Chapter 9 Noise of ES	**dB LAeq, 1 hour**	**Adjustment**	**Level LAr, Tr**	**dB LA90, T**	**dB LA90, T**
Lawford Bridge (Bridle Road)	55	6	61	49	12
Avenue Road (Jubilee Street)	66	6	72	47	25
Follager Road	70	6	76	*45*	31
Izod Road	70	6	76	*45*	31
Tank Cottages (Railway Cottages)	69	6	75	44	31

Background dB LA90, T values in italics are estimated from the measurement locations east and west of Follager Road and Izod Road

Typically, the greater this difference, the greater the magnitude of the impact.

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

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

Appendix L – Additional Details Related to Noise Calculation

The Receiver Location (Easting and Northing to nearest 10 m) values are shown below for the site noise calculation locations.

Site Noise Calculation Location	Receiver Ground Height (m AOD)	Approximate Easting (m)	Approximate Northing (m)
Lawford Bridge (Bridle Road)	92.0	449 110	275 550
Avenue Road (Jubilee Street)	92.0	449 260	275 640
Follager Road (Ground Floor)	96.0	449 370	275 730
Izod Road (Ground Floor)	96.0	449 540	275 840
Tank Cottages (Railway Cottages)	90.0	449 550	275 900

The Plant Item Locations (Easting and Northing to nearest 10 m) values below relate to Location No. 5 "*Tank Cottages*" for the separation distance of 50 m to infill and 380 m to unloading as shown in the "*Summary Calculation Sheet*" in **Appendix J**.

Ref	Plant Item	Easting (m)	Northing (m)
1	Locomotive - stationary (west of foot bridge)	449 150	275 620
2	Train movement - to place full wagons in unloading area	449 560	275 880
3	Wagon unloading (Liebherr LH60 tracked excavators x 2)	449 230	275 680
4	Material into dump trucks (Liebherr LH60 excavators x 2)	449 230	275 680
5	Dump truck movements to / from / within infill area	449 510	275 870
6	Placement / compaction within infill area (dozer / compactor)	449 510	275 870

There are no noise emitting buildings on the site and no site buildings or off-site buildings included in the calculations.

The octave band spectra for the noise sources are the same for each of the summary site noise calculation sheets and are shown on the next page for Location No. 5 "*Tank Cottages*".

The Barrier co-ordinates (Easting and Northing to nearest 10 m) values are shown below.

Ref	Barrier Description	Easting (m)	Northing (m)	Easting (m)	Northing (m)
	5 m high wall (locomotive)	449 040	275 540	449 200	275 640
	8 m high wall (unloading)	449 200	275 640	449 250	275 670
	5 m high bund (for infill)	449 230	275 680	449 540	275 880
	7 m high bund (for infill)	449 230	275 680	449 540	275 880
	5 m high wall (Tank Cottages)	449 540	275 880	449 510	275 930

Appendix L – Additional Details Related to Noise Calculations (continued)

Note: The GA Table is a linear regresion to zero

Note: The Range Table uses Table D2

							Height	G.A. Limit	Distance ratio	Correction
							0	1.00	0	1.00
	LINEAR short term Leqs						2	1.00	0.5	1.00
	Frequency Octave Band						3	0.92	0.7	0.80
	125	250	500	1000	2000	A	4	0.85	1	0.63
	-16	-9	-3	0	1		5	0.77	1.5	0.50
Barrington 15.03.17	68	63	71	68	63	72	6	0.69	2	0.40
Banbury 07.05.98	72	70	66	64	64	70	7	0.62	3	0.28
Barrington 06.07.17	71	60	62	60	55	64	8	0.54	4	0.20
Barrington 06.07.17	77	77	74	73	66	76	9	0.46	5	0.16
Wingmoor Farm 08.10.08	82	79	79	77	73	81	10	0.38	6	0.13
Barrington 06.07.17	78	74	66	67	65	72	11	0.31	7	0.10
Southam 04.05.01	76	69	65	64	62	69	12	0.23	8	0.09
Southam 04.05.01	76	69	65	64	62	69	13	0.15	9	0.08
Southam 04.05.01	76	69	65	64	62	69	14	0.08	10	0.08
	0	0	93	0	0	90	15	0.00	11	0.06
	0	0	93	0	0	90				
	0	0	93	0	0	90				
	0	0	93	0	0	90				
	0	0	93	0	0	90				
	0	0	93	0	0	90				

Note to model: Check individual LAeq lines for all sources

Note to model: Barrier illuminated zone is set to zero

Note to model: Method for mobile plant in a defined area is for slow moving plant
typically of speeds from 5 km/h to 10 km/h working over short traverses

Conveyor LAeq, T = LWA / m + 10 log (on time %/100) - 5 - 10 log (distance)
+ 10 log (angle / 180) - barrier or ground attenuation

From p 130 Figure F.3	14	18	22	24	28	dB									
BS5228 Upper Limit	14	18	22	24	28	dB									
Rank	**Resultant level from source spectrum minus**						**BS5228 methods**				**Additional Method**		Max Source or Receiver		
	calculated barrier reduction (frequency related)						1	2	3	4	**5**		Height	G.A.factor	Ref
	125	250	500	1000	2000	A	Activity	Power	Defined Area	Haul Road	**Conveyor**				
4	68	63	71	68	63	72	33.6	33.6	33.6	-999.0	-999.0	2314.429	3	0.9	1
2	72	70	66	64	64	70	41.5	41.5	41.5	-999.0	-999.0	14245.1	3	0.9	2
5	61	48	47	43	34	49	28.4	28.4	28.4	-999.0	-999.0	687.3921	3	0.9	3
6	67	64	60	55	46	61	27.9	27.9	27.9	-999.0	-999.0	612.6389	3	0.9	4
3	71	65	63	58	51	64	48.9	48.9	48.9	36.1	61.1	4110.633	2	1.0	5
1	67	60	50	48	43	56	48.9	48.9	48.9	-999.0	-999.0	77993.78	2	1.0	6
9	76	69	65	64	62	69	26.2	26.2	26.2	-999.0	-999.0	421.5742	2	1.0	7
7	71	64	60	59	57	64	26.6	26.6	26.6	-999.0	-999.0	460.227	2	1.0	8
8	71	63	58	56	52	62	26.4	26.4	26.4	-999.0	-999.0	440.6766	2	1.0	9
10	0	0	93	0	0	90	-1087.0	-1087.0	-1087.0	-999.0	-999.0	2E-109	2	1.0	10
10	0	0	93	0	0	90	-1087.0	-1087.0	-1087.0	-999.0	-999.0	2E-109	2	1.0	11
10	0	0	93	0	0	90	-1087.0	-1087.0	-1087.0	-999.0	-999.0	2E-109	2	1.0	12
10	0	0	93	0	0	90	-1087.0	-1087.0	-1087.0	-999.0	-999.0	2E-109	2	1.0	13
10	0	0	93	0	0	90	-1087.0	-1087.0	-1087.0	-999.0	-999.0	2E-109	2	1.0	14
10	0	0	93	0	0	90	-1087.0	-1087.0	-1087.0	-999.0	-999.0	2E-109	2	1.0	15

Appendix M – Acoustic Barrier Construction Details

Warwickshire County Council require that "*The development hereby permitted shall not be commenced until full details of the acoustic screen fencing has been submitted to the County Planning Authority for approval. Following approval the acoustic fencing shall be installed and maintained throughout the duration of the development*."

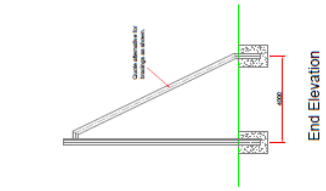
For the "*8 m Rail Offloading Acoustic Wall*", CEMEX propose the use of the material shown in Appendix 3 "Noise barrier one-sided high-absorbing with upgraded sound insulation, sheet thickness 1.25 mm, perforation 6 mm COL", with the 'absorbing' side facing the rail unloading activity.

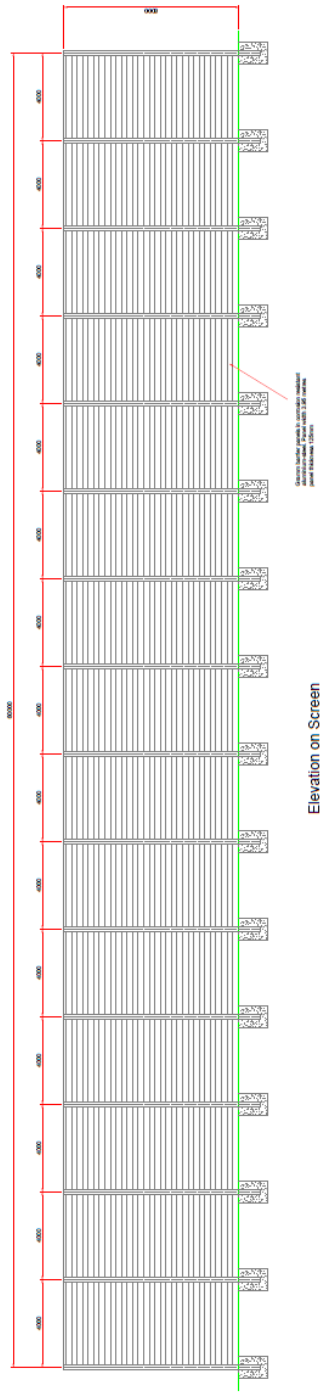
For the "*5 m High Acoustic Wall*" CEMEX propose the use of the Gramm Barrier Systems Ltd "METASoundBlok" product shown in Appendix 4, with the 'absorbing' side facing the railway siding. This barrier is specially designed to reduce noise generated by rail and road traffic.

These details are awaiting approval from the County Planning Authority.

Appendix M – Acoustic Barrier Construction Details (continued)

This relates to the “8 m Rail Offloading Acoustic Wall” (blue line) in Appendix D.

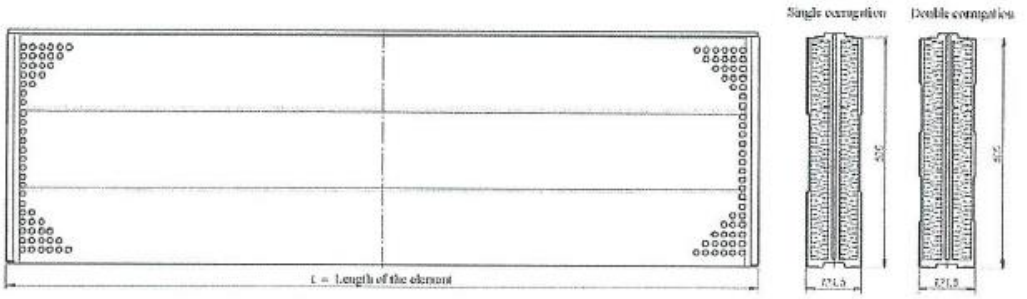




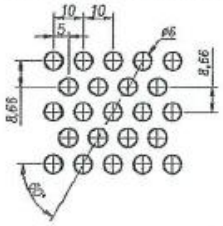
Appendix M – Acoustic Barrier Construction Details (continued)

11 **Noise barrier one-sided high-absorbing with upgraded sound insulation, sheet thickness 1.25 mm, perforation 6 mm *COL***

Mounting		*Measurement*	
Reverberation room:	*1 March 2004*	*Sound absorption:*	*2 March 2004*
Wall test stand:	*20 April 2004*	*Airborne sound insulation:*	*21 April 2004*



Perforation pattern (COL), Ø=6 mm
Perforation of the total surface area ~ 30%



approx. 1.5	mm	1.25 mm aluminium sheet (AlMn1Mg1) coated, perforated, perforation diameter approx. 6 mm, perforation of the total surface area approx. 30 %, beaded profile
approx. 50	mm	rock wool slab with coating of a nonwoven fabric made of glass fibre (towards the perforated surface), nominal thickness 5 cm, approx. 95 kg/m^3
approx. 6	mm	spacing
approx. 7.8	mm	cement-bound chipboard, approx. 10 kg/m^2
approx. 6	mm	spacing
approx. 50	mm	rock wool slab with coating of a nonwoven fabric made of glass fibre, nominal thickness 5 cm, approx. 97 kg/m^3
approx. 1.5	mm	1.25 mm aluminium sheet (AlMn1Mg1) coated, beaded profile
approx. 123	mm	total (measured) barrier thickness, approx. 30 kg/m^2 weight per unit area

Appendix M – Acoustic Barrier Construction Details (continued)

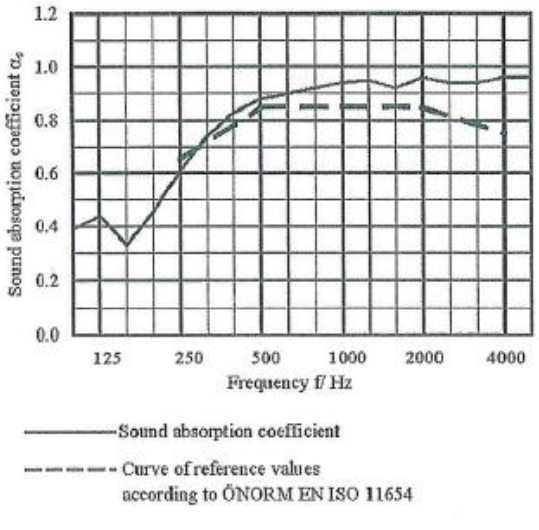
Noise barrier one-sided high-absorbing with upgraded sound insulation, sheet thickness 1.25 mm, perforation 6 mm *COL*

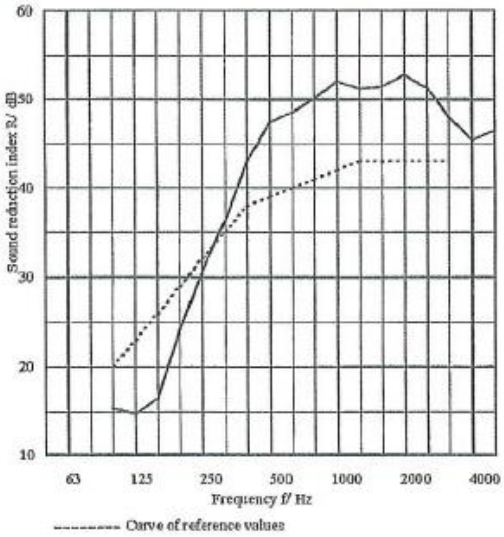
Table 21

Characteristic values	Sound absorption			Sound insulation		
	$\Delta L_{A,\alpha,Str}$, dB	DL_{α}, dB	α_W	$\Delta L_{A,R,Str}$, dB	DL_R, dB	R_W (C;C_{tr}), dB
	10	9	0.85	31	30	39 (-4;-9)

Table 22

One third octave band - centre frequency (Hz)	Sound absorption			Sound reduction index R (in dB) as a function of frequency
	Reverberation time T_1 (s) Reverberation room without test specimen	Reverberation time T_2 (s) Reverberation room with test specimen	Sound absorption coefficient α_s(-)	
100	5.40	3.01	0.39	15.4
125	7.91	3.42	0.44	14.8
160	7.12	3.78	0.33	16.5
200	7.34	3.20	0.46	24.3
250	7.51	2.73	0.61	30.7
315	7.27	2.38	0.74	36.3
400	7.41	2.21	0.83	42.9
500	7.06	2.09	0.88	47.5
630	6.66	2.03	0.90	48.6
800	6.21	1.95	0.92	50.1
1000	5.72	1.88	0.94	52.0
1250	5.54	1.85	0.95	51.2
1600	5.11	1.83	0.92	51.4
2000	4.49	1.69	0.96	52.8
2500	3.90	1.63	0.94	51.3
3150	3.08	1.46	0.94	48.1
4000	2.65	1.35	0.96	45.4
5000	2.31	1.25	0.96	46.5





Appendix M – Acoustic Barrier Construction Details (continued)

METASoundBlok®

SPECIALLY DESIGNED
TO REDUCE NOISE GENERATED BY RAIL AND ROAD TRAFFIC.

CE

GRAMM
BARRIER SYSTEMS

Appendix M – Acoustic Barrier Construction Details (continued)

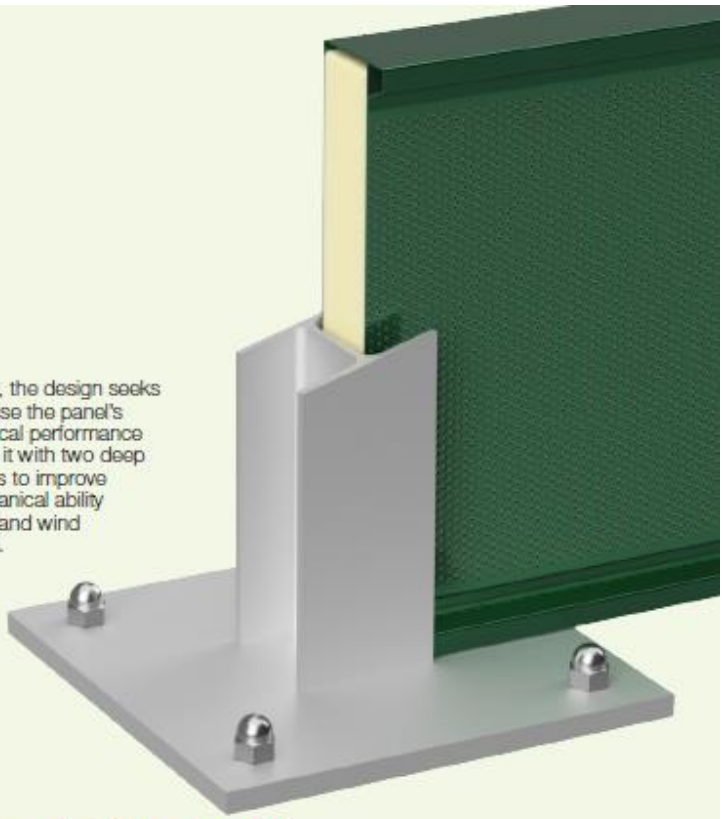
GRAMM
BARRIER SYSTEMS

TECHNICAL DESCRIPTION OF PRODUCT

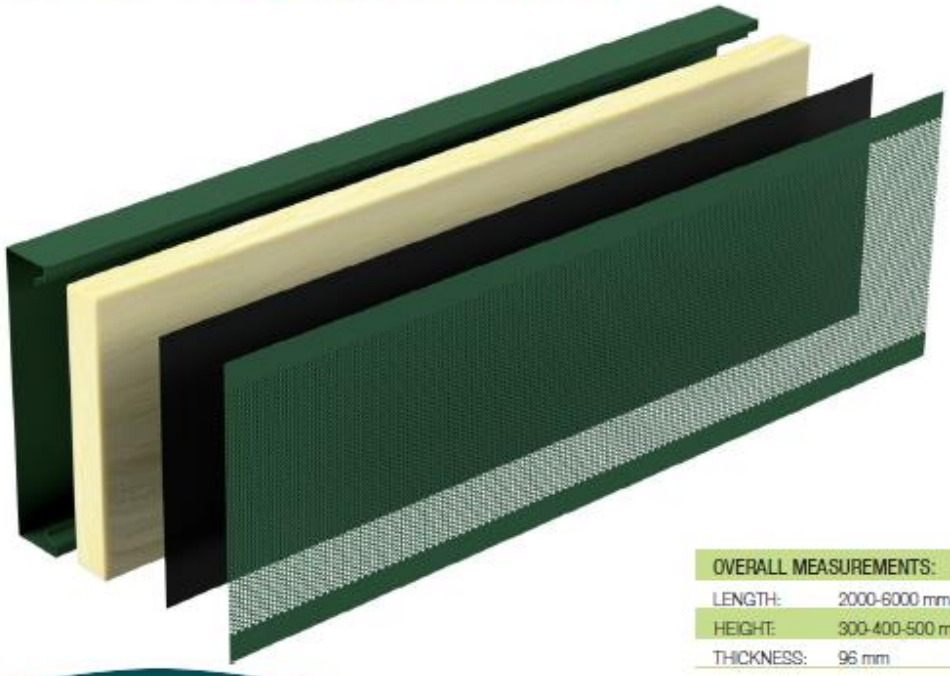
The noise barrier is a product specially designed to reduce the noise generated by road and rail traffic.

Its design criteria use the noise signature of road and rail traffic as a reference, subsequently adapting the barrier's noise abatement properties to optimise its overall efficiency.

Likewise, the design seeks to optimise the panel's mechanical performance by fitting it with two deep guiderails to improve its mechanical ability to withstand wind pressure.



METASoundBlok®



OVERALL MEASUREMENTS:	
LENGTH:	2000-6000 mm
HEIGHT:	300-400-500 mm
THICKNESS:	96 mm

GRAMM
BARRIER SYSTEMS

METASoundBlok®

Appendix M – Acoustic Barrier Construction Details (continued)

GRAMM
BARRIER SYSTEMS

BARRIER COMPOSITION

The noise barrier can be made of grade DX51D+Z200/275-NA galvanised steel plating in accordance with standard UNE EN 10142, or with AA 3105 H24 aluminium sheet, either of which has a powder coating finish, customised as required in any shade on the RAL colour chart.

The inside of the composite panel is made up of sound-absorbing mineral wool of various densities and thickness depending on the precise noise-abatement properties required.

Thus, panels comprise four metal parts. The inner face (directed at the noise source) has holes over 36% of the surface area to provide for noise absorption, while the outer face is a plain, reflective panel. Barrier panels are installed between vertically arranged HEB/HEA profiles to achieve the desired overall height, in 300, 400 or 500 mm modules, and the distance between posts can be varied.

Reflecting face made of plain aluminium/steel plate

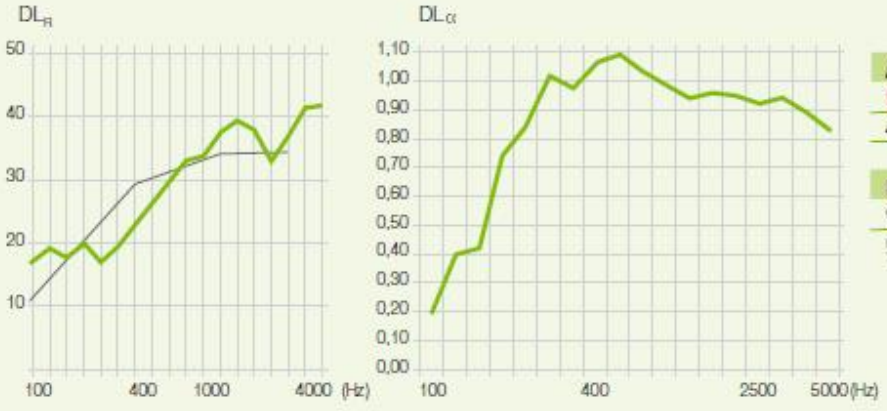
Mineral wool

Glass veil

Absorbing face made of perforated steel/aluminium plate

METASoundBlok®
ACOUSTIC AND MECHANICAL FEATURES

REFERENCE STANDARDS
UNE EN-EN 1794-1:2003; UNE EN-EN 1794-2:2003; UNE EN 1793-1:1998; UNE EN 1793-2:1998



ACOUSTIC PROPERTIES:

B3 class	DL_R = 26-28 dB
A5 class	DL_α = 20 dB

MECHANICAL FEATURES:
Conforms to standard UNE EN1794-1

Design load: up to 300 kg/m² for a span of 4 m
Test load: up to 450 kg/m² for a span of 4 m

GRAMM