HARMONDSWORTH QUARRY RESTORATION ENVIRONMENTAL PERMIT APPLICATION

Environmental Risk Assessment

Prepared for: Ingrebourne Valley Limited

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1.0 INTRODUCTION

Ingrebourne Valley Limited (IV) has retained SLR Consulting Ltd (SLR) to prepare an Environmental Risk Assessment (ERA) in support of an Environmental Permit (EP) application, for the proposed Harmondsworth quarry restoration (the Site), located off Holloway Close, Harmondsworth, Hillingdon, West London.

This ERA provides an assessment of the risks to the environment and human health from emissions that may be associated with the waste recovery operations at the Site. It has been completed in accordance with the Environment Agency (EA) Guidance: Risk assessments for your environmental permit. The aim of the assessment is to identify any significant risks and demonstrate that the risk of pollution or harm will be acceptable by taking the appropriate measures to manage the risks.

1.1 Proposed Development

The site consisted of two agricultural fields prior to development of the extraction phase. Topsoil will be stripped and stored in temporary bunds on the site perimeter pending use in the subsequent restoration phase. Overburden will be removed and stored in temporary stockpiles within the site as extraction progresses. The quarry will be worked through the superficial Langley Silt deposits to the base of the Taplow Gravel to a depth of between 6m and 9m below ground level. The quarry will fully excavate the Taplow Gravels to the top of the London Clay bedrock, removing approximately 450,000m^3 of sand and gravel over a 10 to 12-year period. The mineral will be extracted in four phases and will be processed off-site.

Groundwater levels at the site are between 4 and 7m below ground level and dewatering is required for excavation of the lower deposits within the mineral seam. The site will be isolated from the aquifer by the installation of a low permeability 'picture frame' barrier around the perimeter of the whole site. The construction of the perimeter barrier will facilitate local dewatering during extraction of mineral and allow mineral to be dug dry. No imported waste will be used for construction of the barrier.

The base of the void is underlain by over 60m of low permeability London Clay deposits which will form an impermeable basal barrier upon which imported waste will be deposited for restoration. Groundwater will be managed within the site using temporary and discharge of water from the final phase will be made to the attenuation swale outside the barrier on the southern boundary of the site.

Infilling will take place within the void to restore the surface according to the restoration contours required by planning permission, using a combination of site derived materials and suitable imported inert waste. Imported inert restoration material will be screened to separate any oversize material before placement in the void. Oversize material will be crushed on a campaign-basis using mobile crushing plant and will be used as infill on-site. The plant area will be located 3-4m below ground level following excavation of the sand and gravel in that area.

2.0 ENVIRONMENTAL RISK ASSESSMENT

2.1 Overview of Methodology

This ERA presents an assessment of the risks to the environment and to human health from emissions that may be associated with the proposed operations at the Site.

The assessment has been completed in accordance with the Environment Agency (EA) Technical Guidance *'Risk*

Assessments for your Environmental Permit' last updated 10 December 2020[1]. The aim of the assessment is to identify any significant risks and demonstrate that the risk of pollution or harm will be acceptable by taking the appropriate measures to manage these risks.

This ERA follows the steps in EA's guidance to identify and assess the risks from the proposed recovery operation:

Step 1 Identify and consider risks for the Site, and the sources of the risks;

Step 2 Identify the receptors (people, animals, property and anything else that could be affected by the hazard) at risk from the Site;

Step 3 Identify the possible pathways from the sources of the risks to the receptors;

Step 4 Assess risks relevant to the specific activity and check they're acceptable and can be screened out;

Step 5 State what will be done to control risks if they're too high;

Step 6 Submit the assessment as part of the permit application.

2.2 Consideration of Risks

Step 1 considers the potential risks to the environment from the proposed development. The risk assessment must identify whether any of the following risks could occur and what the environmental impact could be:

- any discharge, for example sewage or trade effluent to surface or groundwater;
- accidents;
- odour (not for standalone water discharge and groundwater activities);
- noise and vibration (not for standalone water discharge and groundwater activities);
- uncontrolled or unintended ('fugitive') emissions, for which risks include dust, litter, pests and pollutants that shouldn't be in the discharge;
- visible emissions, e.g. smoke or visible plumes; and
- release of bioaerosols, for example from shredding, screening and turning, or from stack or open point source release such as a biofilter.

In addition, the EA guidance identifies risks from specific activities for which additional risk assessments must be completed depending on the activity being carried out and where substances are released or discharged into the environment. The EA guidance Risk assessment for installations, waste and mining waste operations and landfill Sites indicates that the Environmental Site Setting & Design (ESSD) template should be used to consider the additional risks for deposit for recovery activities. Accordingly, an assessment of those risks is provided in the ESSD report in section 4 of this application and are not considered in this ERA.

Potential risks can be screened out if they are not relevant for the site or by carrying out tests to check whether they are within acceptable limits or environmental standards. If they are, any further assessment of the pollutant is not necessary because the risk to the environment is insignificant.

[1] Environment Agency - 'Risk Assessments for your Environmental Permit' May 2018, https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit.

There are no discharges to surface water or groundwater, visible emissions or releases of bioaerosols resulting from the proposed development.

Therefore, only the following risks are required to be assessed for the recovery operation:

- Odour;
- Noise and Vibration;
- Fugitive Emissions (including dust, mud, litter and pests); and
- Accidents.

2.3 Receptors

Step 2 of the risk assessment considers the receptors (people, animals, property and anything else that could be affected by the hazard) that could be at risk from the site. The surrounding land use and receptors are described in detail below and a summary is provided in Table 3-2.

For the purposes of this ERA the following distances have been used to identify potentially sensitive receptors:

- A 2km radius from the Site's EP boundary has been used to identify potentially sensitive receptors of European ecological importance including RAMSAR sites, Special Areas of Conservation (SAC) and Special Protection Areas (SPA);
- A 1km radius from the Site's EP boundary has been adopted in reviewing potentially sensitive receptors of ecological importance along with features such as sites of cultural and natural heritage. This includes National Nature Reserves (NNR), Local Nature Reserves (LNR) and Sites of Special Scientific Interest (SSSI), in line with EA guidance; and
- A radius of 500m from the Site's EP boundary has been adopted for all other potentially sensitive receptors (for example, residential, commercial, industrial, agricultural and surface water receptors).

2.3.1 Site Setting

The Site is approximately 11 hectares in size and is located to the north of the village of Harmondsworth at National Grid Reference TQ06057823. The M4 motorway lies adjacent to the northern boundary of the Site, with the town of West Drayton beyond. To the east of the Site there is a wooded hedge beyond which lies Holloway Close, a petrol filling station, a small industrial estate and a disused nursery. An area of grassland used for grazing lies between the southern boundary and the village of Harmondsworth, with Heathrow Airport located 1km to the south. The western boundary of the Site is adjacent to Saxon Lake, a large water body formed by a former gravel pit.

The Site is located within the Metropolitan Green Belt. Two Nature Conservation sites are located nearby: Lower Colne which lies 400m to the west beyond Saxon Lake and St George's Meadow 700m to the north. The nearest residential properties are located on Little Benty, West Drayton, approximately 145m from the northern permit boundary. A public footpath, from West Drayton to Harmondsworth, runs along the western boundary of the Site.

The Site will be accessed at the south-eastern corner from the junction of Holloway Close with Holloway Lane.

The Site location is shown in Drawing 001 and the Environmental Permit Boundary is shown on Drawing 002. The Environmental Site Setting and Cultural and Natural Heritage receptors are illustrated on Drawing 003 and 004 respectively.

A summary of the Site's immediate surrounding land uses is identified in Table 3-1 below.

Table 2-1
Surrounding Land Uses

Boundary	Description
North	M4 Motorway
East	Commercial units
South	Agricultural fields
West	Saxon Lake – local wildlife site

The immediate surrounding land use is described in further detail below;

2.3.2 Industrial/Commercial Premises

There are numerous industrial and commercial premises within a 500m radius from the site boundary. The closest of which lie adjacent to the eastern edge of the Site boundary where a small commercial/industrial area holds a Shell Petrol Station, Charging Station and Car Wash, along with Caravan Storage Heathrow and CTS Logistics. There are several other industrial/commercial premises in each direction form the Site.

2.3.3 Residential Properties

There are numerous residential properties within a 500m radius from the Site boundary, primarily those in West Drayton which lie immediately beyond the M4 to the north, and those in Harmondsworth to the south. The nearest residential property to the Site is on Little Benty, West Drayton, which is located approximately 145m from the northern permit boundary. Other residential properties in the vicinity of the Site are ones off Holloway Land to the south of the Site.

2.3.4 Local Transport Network

The M4 motorway lies approximately 20m from the northern boundary of the Site. Several other local roads and lanes serve the village, including Holloway Lane approximately 30m to the south and south-west of the Site boundary, and Harmondsworth Road approximately 60m to the east at the closest point to the Site boundary.

2.3.5 Surface Water Features

There are two surface water drains within a 500m radius of the Site boundary. One lies adjacent to the boundary to the east of the Site, and the other approximately 375m from the Site boundary to the north-west.

Immediately to the west of the Site is Saxon Lake, a waterbody within a former sand and gravel quarry and which is now a local wildlife site. The lake is believed to be groundwater fed with no connection to surface watercourses in the area.

The Site is located within the catchment of the River Colne which flows in a southerly direction through the base of the shallow valley, approximately 500m to the west of the site at its closest.

2.3.6 Open Ground

Agricultural land and open spaces lie adjacent to the southern boundary.

2.3.7 Historic Landfills

There are a number of historic landfills within 500m of the Site, which are identified on Drawing 004. The closest of these lies 80m to the east of the Site.

2.4 Geology

The proposed development area is located on superficial deposits comprising Langley silts, overlying Taplow Gravels. These superficial deposits are underlain by London Clay bedrock, with Chalk present at depth. The site investigation indicates that the silt deposits are between 1.3m and 5.1m in thickness and described 'soft light brown sandy silty gravelly clay'. The underlying gravels were recorded at between 2.2m and 4.4m thickness and described as 'brown fine to coarse sandy Gravel'.

2.5 Hydrogeology

Available groundwater level monitoring data indicates that groundwater is present at depths of between 4.5m and 7.5m below ground level with a saturated thickness of between 1m and 2.2m. Groundwater flow is in a predominantly south-westerly direction across the site towards the River Colne.

2.5.1 Aquifer Designations

The Environment Agency classify the Taplow Gravels as a 'Principal Aquifer' whilst the underlying London Clay and overlying Langley Silts are both classified as 'Unproductive Strata', on the Multi-Agency Information for the Countryside (MAGIC)[2] website.

2.5.2 Source Protection Zones

The EA has confirmed that the proposed development is not located within a groundwater/Source Protection Zone (SPZ). The nearest SPZ which is a Total Catchment (Zone 3) is 5km to the west of the site and relates to a potable water supply from the Chalk aquifer. The EA has also indicated that there are two licensed groundwater abstractions (with a total of four abstraction points) within a 2km radius of the site. The nearest abstraction is located 400m to the south of the site and abstracts groundwater from the shallow Taplow Gravels aquifer for agricultural purposes.

2.6 Hydrology

The Groundwater Vulnerability layer on MAGIC map reveals that the Site lies within an area known for Unproductive classification. There is an area of Medium-High groundwater vulnerability classification directly adjacent to the Site along its western boundary.

2.6.1 Flooding

The Site lies within Flood Zone 1 and therefore has a low probability of flooding.

[2] Multi-Agency Information for the Countryside – Available at: http://www.magic.gov.uk, accessed May 2020

2.7 Ecology

2.7.1 Protected Species

The EA's Nature and Heritage Conservation screening report identifies the presence of a European eel (Anguilla Anguilla) migratory route along the Duke of Northumberland river located 490m west of the site.

2.7.2 Local Wildlife Site

Local Wildlife Sites have been identified adjacent of the site. The Environment Agency Screening Report identifies Saxon Lake as a Local Wildlife Site, as seen on Drawing 004.

2.7.3 Protected Woodland

The Environment Agency's Nature and Heritage Conservation screening report identifies protected deciduous woodland adjacent to the northern boundary of the site along both sides and the central reservation of the M4.

2.7.4 Other designated sites

Searches on the MAGIC website along with the EA's Nature and Heritage Conservation screening report (acquired from the EA's online service) confirmed that there are none of the following within 2km of the Site's boundary:

- Site of Special Scientific Interest (SSSI);
- Special Areas of Conservation (SAC);
- National Nature Reserve (NNR);
- Local Nature Reserve (LNR);
- Areas of Outstanding Natural Beauty (AONB);
- National Forest;
- Ancient Woodland
- RAMSAR sites; and
- Special Protection Areas (SPA).

2.8 Cultural and Heritage

2.8.1 Listed Buildings

There are several listed buildings within a 1km radius of the Site boundary.

- The majority of the listed buildings within the 1km radius are Grade II listed, the closest to the Site boundary being 25 Holloway Lane approximately 240m to the south of the Site boundary.
- There is one Grade I listed building within a 1km radius of the Site boundary, which is The Great Barn, Harmondsworth which lies 300m to the south-west of the Site.
- There are several Grade II* listed buildings within a 1km radius of the Site, the closest of which is Church of St Mary, Harmondsworth, which lies 330m to the south-west of the Site boundary.

2.8.2 Other

Trails

- A public right of way runs along the western boundary of the Site. There are numerous other tracks and footpaths within the surrounding area.

Searches on the MAGIC website confirms that there are none of the following within 2km of the application site:

- National Trust Properties;
- Scheduled Monuments;
- Registered Parks and Gardens;
- World Heritage Sites; and
- Registered Battlefields.

2.9 Identified Receptors

Table 2-2
Identified Receptors

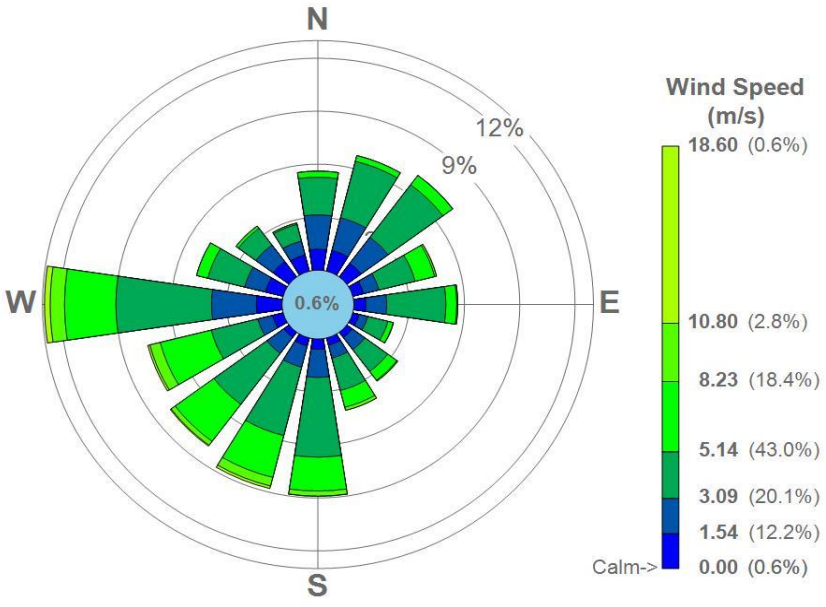
Receptor Name	Receptor Type	Direction from Site	Approximate Distance from Site Boundary (in metres)
Local receptors within 500m of the Site boundary as shown on Drawing 003			
Shell Garage	Commercial/Industrial	East	Adjacent
CTS Logistics	Commercial/Industrial	East	Adjacent
Caravan Storage Heathrow	Commercial/Industrial	East	Adjacent
Saxon Lake	Surface Water Feature	West	Adjacent
Surface Water Drain	Surface Water Feature	East	Adjacent
Deciduous Wood	Protected Woodland	North	Adjacent
Agricultural land	Open Ground	South	Adjacent
M4	Local Transport Network	North	20m
Holloway Lane	Local Transport Network	South/South-East	30m
Harmondsworth Road	Local Transport Network	East	60m
Housing within West Drayton – nearest property: Little Benty	Residential Properties	North	145m

Receptor Name	Receptor Type	Direction from Site	Approximate Distance from Site Boundary (in metres)
Housing within Harmondsworth – nearest property: Holloway Lane	Residential Properties	South	210m
Surface Water Drain	Surface Water Feature	East	375m
River Colne	Surface Water Feature	West	500m
Ecological, Cultural and Natural Heritage receptors located within 1km of the Site boundary as shown on Drawing 004			
Public Right of Way	Recreation/Footpath	West	Adjacent
25 Holloway Lane (Grade II)	Listed Building	South	240m
The Great Barn, Harmondsworth	Listed Building	South-West	300m
Church of St Mary, Harmondsworth	Listed Building	South-West	330m

2.10 Windrose

Figure 3-1 shows the wind pattern in 2018 as identified by the Heathrow meteorological station, which is the closest weather station to the Site situated 1.9km to the south of the Site. The most prominent wind direction is from the west to east. Winds from the south/south-west to the north/west-west are frequent with winds from other directions being more infrequent.

Figure 2-1
Heathrow Meteorological Station, 2018



2.11 Pathways, Control Measures and Risk Assessment

The following tables (4.1 - 4.4) in this section present a summary of the potential risks to receptors based on an assessment of the hazard and the pathway (Step 4) for each of the following:

- Odour;
- Noise and Vibration;
- Fugitive Emissions (including dust, mud, litter and pests); and
- Accidents.

The assessment includes consideration of the control measures which will be in place to mitigate potential harm and manage these risks (Step 5).

The probability of exposure is the likelihood of the receptors being exposed to the hazard, and is defined as low, medium or high. These terms are qualified as follows;

- Low: exposure is unlikely, barriers in place to mitigate against exposure.
- Medium: exposure is fairly probable, barriers to exposure less controllable.
- High: exposure is probable, direct exposure likely with few barriers.

The methodology outlined in Section 2.1 of this report is the basis on which it is determined whether the proposed operations will lead to significant impacts on the surrounding environment. Where a conclusion of 'not significant' has been reached, it is proposed that the mitigation and management measures that will be in place at the Site will be sufficient to ensure that there will be no impact at the surrounding environment.

Table 2-3 Odour Risk Assessment and Control Measures

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Odour From acceptance and use of waste for restoration	Sensitive receptors as listed in Table 3-2, including, residential, recreational, commercial and industrial.	Air	Only inert wastes will be deposited which are not considered to be odorous. Strict waste acceptance procedures will ensure only inert materials are accepted at the site. Site operatives will conduct daily inspections of the Site to identify any unacceptable odour sources. Site workers will also be encouraged to conduct informal inspections throughout the day and report any odours they notice. If any odours are identified, the cause will be immediately investigated. Any odorous materials will be isolated in a sealed container before being taken off-Site to an appropriate licenced treatment facility. The results of any inspections or investigations due to complaints will be recorded. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Negligible	Odour nuisance and loss of amenity.	**Not significant.**

Table 2-4 Noise Risk Assessment and Control Measures

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Noise Engine noise form vehicles entering and exiting the Site. Noise from the site plant used for restoration.	Sensitive receptors as listed in Table 3-2, including, ecological, residential and cultural receptors.	Air.	A Noise Risk Assessment (NRA) has been completed for the Site (Appendix B). Section 5 of this detail Site management and noise controls which will be in place on Site to ensure noise emissions are managed to an appropriate level. Management techniques detailed in this NRA include; • Site operations will be restricted to hours specified in the planning consent. • Speed limits will be implemented for vehicles using the site. • Traffic calming measures will be implemented to enforce speed limits. • Site access & haul roads and operational areas will be maintained and repaired to minimise emissions of noise due to uneven and poor surfacing.	Low – vehicle and plant noise will only be during operational hours and intermittent.	Noise disturbance and nuisance to local residents during operational hours.	**Not significant.**

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
			• Auditory inspections will also be carried out daily & in response to complaints and a record of the inspection findings will be made in the site diary. • Plant will be selected & operated to minimise noise and fitted with appropriate silencers provided by the manufacturer. • Modern and well maintained plant will be used and all site plant and machinery will be operated and maintained in accordance with manufacturer's specifications. • Where mobile plant is found to be defective, the plant will be taken out of service until it can be repaired. • Mobile plant will be fitted with non-tonal white noise reversing signals. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			

Table 2-5 Fugitive Risk Assessment and Management Plan

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
To Air:						
Dust From emplacement of materials. Dust from vehicle movements. Dust from waste treatment.	Sensitive receptors as listed in Table 3-2, including, transport, agricultural, ecological, residential, commercial, recreational and cultural receptors.	Air	Restriction on deposition, or treatment of exceptionally dusty waste under certain weather conditions. Temporary suspension of operation under exceptionally dry and windy weather. Speed limits will be implemented for vehicles using the site. Maintenance and repair of site access and haul roads. Road sweeping or spraying down of haul road and vehicles during dry weather. A water bowser will be used to reduce impact of dust and to control dust from waste treatment operations where necessary. Investigations of operational areas will be carried out daily by Site personal to identify the presence of any excessive dust emissions.	Low – due to management and operational procedures in place.	Nuisance dust on cars and windows of houses. Harm to human health.	**Not significant**

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
			The result of any inspections or investigations as a result of complaints, will be recorded. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
To Water						
<u>Runoff from the Site</u> Contaminated run off.	Local surface water features including drainage ponds. Groundwater.	Land.	Only inert waste will be accepted at the site. Accordingly, percolation from the site will not be contaminated. However, measures can be put in place to ensure risk from runoff from Site is managed; Activities on Site (i.e. screening and deposition of waste) will all take place below ground level within the void itself. Therefore, there is no risk from runoff from these activities as any run-off will remain contained within the void. There is a low risk of contaminated run-off from the perimeter bunds which are situated on ground level above the void.	Medium – surface water features located adjacent and to the permit boundary.	Groundwater and surface water contamination.	**Not significant.**

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
			Despite this, the following measures will be in place to further manage any potential risk from contaminated run-off; • All tanks containing potentially polluting substances will be adequately bunded i.e. to 110% of the maximum capacity; • Maintenance and repair of site vehicles to prevent polluting leaks. Waste acceptance procedures to prevent the acceptance of non-inert waste; • Strict waste acceptance procedures in place will ensure no unauthorised waste is accepted on Site; • Spill kits will be stored on Site containing appropriate absorbent materials to use in the event of a spillage; Site operations will be inspected daily for signs of spillages.			

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
			The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
Pests						
Birds, vermin and pests	Sensitive receptors as listed in Table 3-2, including, transport, agricultural, ecological and cultural receptors.	Land and Air.	The waste types accepted at the site are unlikely to attract birds, vermin & insects. Waste acceptance procedures will ensure that only authorised inert wastes are accepted. In the event that birds, vermin & insects are identified at the site appropriate remedial action will be taken. If necessary, a specialist pest control contractor will be employed to undertake remedial measures. Investigations of operational areas will be carried out daily by Site personal to identify the presence of any pest animals. The result of any inspections or investigations as a result of complaints, will be recorded.	Low.	Nuisance and health issues.	**Not significant.**

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
			The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
Mud/Litter						
<u>Mud</u> from vehicle movements Mud on roads.	Local transport network.	Land.	The surfacing of all roads and operational areas will be maintained as required to maintain the integrity of the surfacing. The access road will be subject to maintenance and repair. A road brush will be utilised when necessary to sweep the main access road. Vehicles will be cleaned before leaving the Site and checked to ensure they're clean and their load is secured. Daily inspections of the Site will be conducted by Site personal to identify if there are any problems associated with mud or waste debris.	Low	Mud on roads, nuisance and dangerous conditions.	**Not significant.**

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
			In the event that mud, debris or waste arising from the site is deposited outside the site, the affected area will be cleaned, and traffic will be isolated from sources of mud and debris within the site. The results of any inspections or investigations due to a complaint will be recorded in the Site diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
<u>Litter</u> Litter from waste.	Sensitive receptors as listed in Table 3-2, including, transport, agricultural, ecological and cultural receptors.	Air.	The waste types accepted at the site are unlikely to generate significant quantities of litter. Waste acceptance procedures will ensure that only authorised wastes are accepted. The site and its immediate surrounding will be inspected on a daily basis and action will be taken to maintain the area free of significant accumulations of litter and debris. The results of any inspections or investigations due to complaints, will be recorded.	Low	Dangerous conditions on roads. Nuisance from litter.	**Not significant.**

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
			The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			

Table 2-6 Accidents Risk Assessment and Management Plan

What do you do that can harm and what could be harmed		Managing the Risk		Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Spillage and Leakage Leakage of fuel and oils from site plant.	Local land quality. Local surface water features including ponds and drains. Groundwater.	Overland and seepage through site surface.	Tanks used for the storage of fuel and maintenance oil, will be constructed so that any leaks/spillages will be contained. Tanks will be surrounded by a leakage containment bund capable of containing at least 110% of the volume of the largest tank within the bund or 25% of the total tank volume within the bund, whichever is the greater. Storage tanks will be constructed to the appropriate British Standard. Tanks will be inspected visually on a daily basis by the site staff to ensure the continued integrity of the tanks and identify the requirement for any remedial action. Minor spillages will be cleaned up immediately, using sand or proprietary absorbent. Materials suitable for absorbing and containing minor spillages will be maintained on site.	Low	Odour nuisance. Water contamination.	**Not significant.**

			The site staff will undertake daily monitoring for evidence of spillage and leakage. Alongside regular visual inspections, the tanks will be fitted with level indicators to prevent overfilling. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
Fire	Sensitive receptors as listed in Table 3-2, including, transport, agricultural, ecological and cultural receptors.	Air	Only waste which will not readily burn will be accepted at the site. The plant inspection schedule will include checks of electrical equipment within the site to ensure that any faults are identified and repaired. Fire-fighting equipment will be kept in the site office. Smoking will not be permitted in the operational areas of the site. The operators working practices will ensure assessment of fire hazards and training of employees in fire prevention, e.g. in the use of fire extinguishers and emergency procedures. No waste shall be burned on the site and a fire at the site will be treated as an emergency. Actions to be taken in the event of a fire: • Notify the fire brigade immediately and the EA as soon as practicable; • Isolate the burning area and attempt to extinguish the fire utilising the on-Site fire extinguishers, if safe to do so; • Prevent, if possible, contaminated site drainage from entering any unsurfaced ground; and	Low.	Nuisance (smoke and fumes) and harm to human health. Water contamination (runoff)	**Not significant.**

			• Evacuate the site if the fire is not containable. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
Vandalism/Security	Sensitive receptors as listed in Table 3-2, including, transport, agricultural, ecological and cultural receptors.		Post and wire fencing or natural barriers will be in place around the operational areas of the site. A lockable gate is present at the entrance to the site and will be locked whenever the site is not accepting waste. Gates and fencing will be inspected daily by the operations staff to identify deterioration and damage and the need for any repairs. Fencing and gates will be maintained and repaired to ensure their continued integrity. In the event that damage is sustained repairs will be made by the end of the working day. If this is not possible, suitable measures will be taken to prevent any unauthorised access to the site and permanent repairs will be affected as soon as practicable. All visitors to the site will be required to register in the visitor's book and sign out again on exit. This minimises the risk of unauthorised visitors being present at the site. Operation procedures, including regular inspections, ensure continual monitoring of security provision at the site. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low	Nuisance and harm to human health. Contamination of land and surface water.	**Not significant.**

Flooding	Sensitive receptors as listed in Table 3-2, including, transport, agricultural, ecological and cultural receptors.	Run off over land.	Indicative maps, presented on the Environment Agency website, confirm that the site is not within the flood extent of any local water courses. An evacuation plan will be implemented in the unlikely event of flooding. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low	Contamination of groundwater and surface water.	**Not significant.**

3.0 CONCLUSION

This ERA has been undertaken in accordance with EA guidance. The assessment is provided as part of the application for the application for Ingrebourne Valley Limited as part of an environmental permit for the proposed quarry restoration at Harmondsworth.

This qualitative risk assessment has considered any discharge (e.g. sewage or trade effluent) to surface or groundwater), accidents, odour, noise and vibration, uncontrolled or unintended fugitive emissions, visible emissions and release of bioaerosols. The assessment concludes that with the implementation of the risk management measures described above, potential hazards from the proposed inert landfill and waste treatment facility are not likely to be significant and no further assessment is required.

APPENDIX 1

Noise Assessessment

LFAcoustics
consulting engineers

NOISE ASSESSMENT

HARMONDSWORTH QUARRY
MINERALS EXTRACTION AND INFILLING

INGREBOURNE VALLEY LTD

FEBRUARY 2021

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NOISE ASSESSMENT

HARMONDSWORTH QUARRY
MINERALS EXTRACTION AND INFILLING

INGREBOURNE VALLEY LTD

FEBRUARY 2021

Revision	Prepared By	Date
1.0	L Jephson BEng (Hons) MIOA	3/2/21

CONTENTS

1. Introduction

LF Acoustics Ltd have been appointed by Ingrebourne Valley Ltd to undertake an assessment of the noise levels associated with proposed infilling operations to be carried out at Harmondsworth Quarry.

Planning permission to operate the quarry was granted by LB Hillingdon Council (App. Ref. 73289/APP/2017/3976) on 10 October 2019. Given the location of the quarry, adjacent to the M4 motorway and the fact that there are no residential properties within close proximity to the site, no noise assessment was required to accompany the planning application, nor any noise limits imposed.

Work has recently commenced within the quarry to undertake the initial soils stripping and formation of the bunding around the perimeter of the quarry.

A permit is now being sought for the importation of inert materials to allow the quarry to be progressively restored and this report presents an assessment of the noise levels during the permitted infilling operations.

The following sections of this report present an assessment of the noise levels associated with the future operations within the quarry. Section 2 provides a summary of the applicable standards and guidance used to assess noise within quarries, to ensure significant effects upon occupants of surrounding properties are minimised. Section 3 presents the results of noise monitoring undertaken adjacent to the potentially most affected dwellings to establish the prevailing noise levels. Section 4 provides an outline of the proposed working within the quarry, results of calculations of the operational noise levels and an assessment against appropriate limits. Section 5 provides recommendations for the control and management of noise within the quarry. Finally, Section 6 provides a summary of this report.

The assessment has been prepared by L Jephson BEng (Hons), MIOA, Director of LF Acoustics Ltd.

2. Standards and Guidance

A description of the noise units referred to within this report is provided in Appendix A.

2.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF), revised in February 2019 [1], sets out the Government's planning policies for England and how these should be applied. It provides a framework upon which locally-prepared plans for housing and other development can be produced.

The purpose of the planning system is to contribute to the achievement of sustainable development and at the heart of the Framework is a presumption in favour of sustainable development.

With regards noise, paragraph 180 of the NPPF advises that local planning policies and decisions should contribute to and enhance the natural and local environment by:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels noise pollution.
- mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development (including cumulative effects) – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The Planning Policy Guidance note on noise, published in March 2014 and updated July 2019 [2], defines potential adverse effects and the required mitigation, as follows:

No Observed Adverse Effect

Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life (no specific measured required to mitigate noise).

Observed Adverse Effect

Noise can be heard and causes small changes in behaviour and/or attitude, eg turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life (mitigate and reduce noise levels to a minimum).

Significant Observed Adverse Effect

The noise causes a material change in behaviour and/or attitude, eg avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area (avoid).

The minerals planning guidance attached to the NPPF relating to noise was updated in March 2014 [3], which covers mineral extraction and related processes, provides guidance and advises upon acceptable levels of noise from site operations.

For normal daytime works the guidance seeks to ensure that the operations do not result in significant adverse effects and advises for normal daytime operations that the following limits should not exceed:

• 10 dB above the background (L_{A90}) noise level; subject to

• a maximum value of 55 dB $L_{Aeq,\ 1\ hour}$ (free field).

Where background noise levels are low, the guidance accepts that it may be very difficult to achieve a limit based upon background + 10 dB(A) without imposing unreasonable burdens on the mineral operator. In such cases, the limit set should be as near that level as practicable during normal working hours and should not exceed 55 dB $L_{Aeq,\ 1\ hour}$ (free field).

The guidance suggests that in the evening (19:00 – 22:00) $L_{Aeq,\ 1\ hour}$ noise levels should not exceed the background (L_{A90}) noise level by more than 10 dB and during the night-time a limit of 42 dB $L_{Aeq,\ 1\ hour}$ should be adopted.

In addition to the general daytime works, the guidance advises that all mineral operations will have some particularly noisy short-term activities that cannot meet the limits set for normal operations. These include soil-stripping, construction or removal of bunding or spoil heaps and construction of new permanent landforms. A level of 70 dB $L_{Aeq,\ 1\ hour}$ is suggested as a limit for these activities for periods of up to eight weeks in any one year. Where the duration of temporary works may exceed eight weeks it can be appropriate to apply a lower limit for a longer period. The guidance also recognises that, in wholly exceptional cases, where there is no viable alternative, a limit of more than 70 dB $L_{Aeq,\ 1\ hour}$ may be appropriate in order to obtain other environmental benefits.

2.2. British Standard BS 4142

The Environment Agency require an assessment of the noise levels attributable to the permitted operations, i.e. the importation of materials in relation to the infilling operations to be made against the requirements of BS 4142 [4].

BS 4142 is intended for the assessment of noise from commercial and industrial operations and is not intended to be applied to the assessment of noise from minerals operations, including aggregate recycling and restoration operations and construction and demolition, as advised in Section 1.3 of the Standard. It is clear from the Standard that the most appropriate guidance to adopt is that contained within the PPG described above.

However, consideration to this Standard has been given within this report to address the requirements of the EA.

BS 4142 is a comparative standard in which the estimated noise levels from the proposed development are compared to the representative background noise level from existing uses.

BS 4142 relates the likelihood of complaint to the difference between the Rating Level of the noise being assessed and the background noise level.

The background noise level is the L_{A90} noise level, usually measured in the absence of noise from the source being assessed, but may include other existing industrial or commercial sounds. The

background noise levels should generally be obtained from a series of measurements each of not less than 15 minute duration.

The Rating Level of the noise being assessed is defined as its L_{Aeq} noise level (the 'specific noise level'), with the addition of appropriate corrections should the noise exhibit a marked impulsive and/or tonal component or should the noise be irregular enough in character to attract attention. Given that the noise attributable to the operation of a sand and gravel quarry is principally associated with diesel engines, it has not been considered appropriate to apply any corrections when determining the Rating Levels of noise from the operation of the site.

During the daytime, the specified noise levels are determined over a reference time interval of 1 hour.

If the Rating Level of the noise being assessed exceeds the background level by 10 dB or more BS 4142 advises that there is likely to be an indication of a significant adverse impact, depending upon context. A difference between background level and Rating Level of around 5 dB is likely to be an indication of an adverse impact, depending upon context. The lower the Rating Level is, relative to the background noise level, the less likely the specific source will have an adverse or significant adverse impact. Where the Rating Level does not exceed the background noise level is an indication of a low impact, depending upon context.

3. Baseline Noise Assessment

3.1. Identification of Potentially Affected Noise-Sensitive Receptors

The quarry is located directly to the south of the M4 motorway and is bounded and accessed to the east by the A3044 Harmondsworth Road. The location of the quarry is indicated on Figure 1.

The closest residential properties are located to the north of both the quarry and M4, along Little Benty and The Brambles. The closest properties are approximately 110 metres from the northern quarry boundary. Existing noise levels at these properties are principally influenced by traffic travelling on the M4.

Other potentially affected properties are located to the south, along Holloway Lane, Meadowlea Close and Acacia Mews. The closest of these properties are approximately 190 metres from the southern quarry boundary. Ambient (L_{Aeq}) noise levels at these dwellings were observed to be influenced by a mix of road traffic noise form the M4 and A3044, with background (L_{A90}) noise levels influenced by traffic travelling along the M4.

3.2. Unattended Noise Survey

In order to establish typical background noise levels at the surrounding properties, an unattended noise survey was carried out between Friday 11th and Monday 25th January 2021.

A Rion NL-52 Class 1 Sound Level Analyser was used for the survey. The meter a had Rion WS-15 microphone protection fitted, which maintains Class 1 performance during a wide range of weather and stronger wind conditions. The instrument was fitted with audio recording capability to record snapshots of audio throughout the survey period to enable the principal sources of noise to be identified

The instrument was calibrated before and after the exercise using a Rion NC-74 Class 1 Acoustic Calibrator, with the instrument reading 94.0 dB on each occasion. The instruments had been laboratory calibrated within 24 months of the survey to national standards. Details of the instruments used for both the unattended and sample measurements along with the laboratory calibration dates are provided below.

Instrument	Serial No.	Calibration Date	Laboratory / Certificate No.
Rion NL-52 Class 1 SLM (Unattended)	00231656	12/3/19	ANV – TRCT/19/1172
Rion NL-52 Class 1 SLM (Sample – North)	01121405	27/7/20	Svantek – 14015742-2
Rion NL-52 Class 1 SLM (Sample – South)	01076307	27/7/20	Svantek – 14015742-3
Rion NC-74 Class 1 Acoustic Calibrator	35125830	6/7/20	ACSL – 15801

Table 3.1 Instrumentation Details

No secure locations were identified adjacent to the properties where the monitoring equipment could be left for a number of days. A suitable location was identified within the quarry, located along the southern boundary. Given that the background noise environment is principally influenced by the M4 traffic, this position was considered to be representative.

The monitoring positions are indicated on Figure 1.

The microphone was set along the quarry boundary and positioned freefield and at a height of 1.3 metres above the ground. Measurements were taken over 15 minute periods throughout the survey period.

Weather conditions for the survey remained dry. Winds were generally light during the initial part of the monitoring period, with stronger winds observed between Tuesday 19th to Thursday 21st January, before turning light again from Friday 22nd. Due to the location close to the M4 and the provision of appropriate microphone weather protection, the results indicated minimal variation in noise levels during the periods of stronger winds.

The results of the survey are provided graphically in Appendix B.

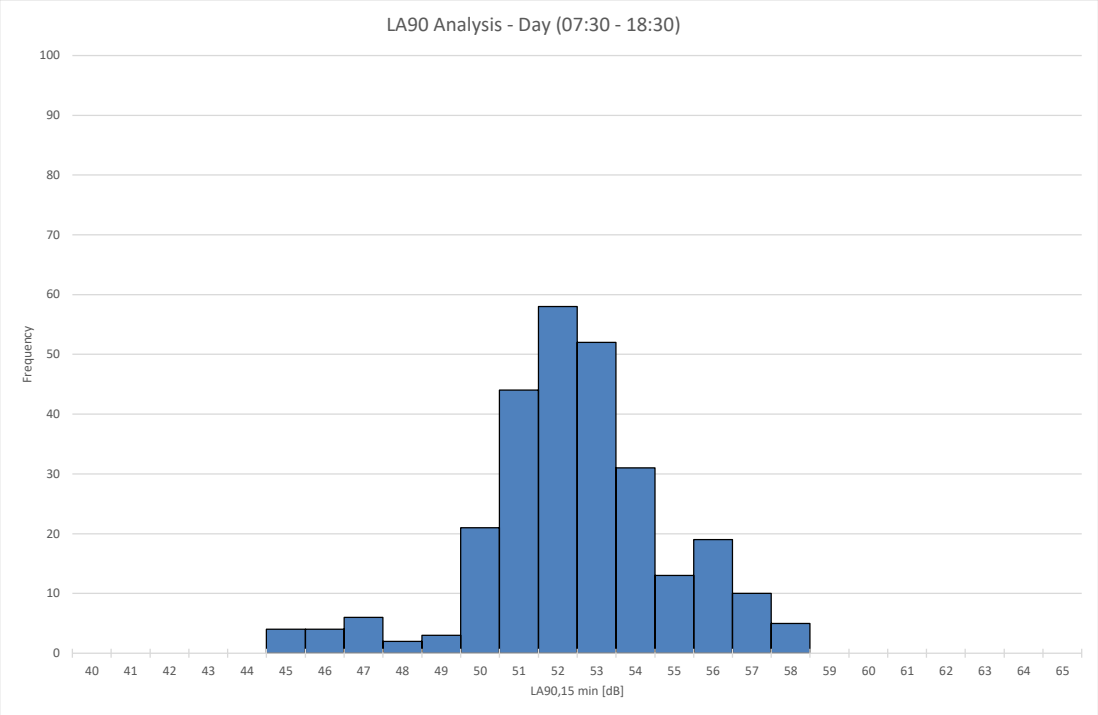
The background (L_{A90}) noise levels obtained during the periods when the quarry would operate (07:30 – 18:30 Mondays to Fridays with no working at weekends) have been analysed to determine the typical background noise levels at the monitoring position.

The results are summarised below.

Date		Period Noise Levels [dB]	
		$L_{Aeq,T}$	Typical L_{A90}
Friday	15/01/2021	52	50
Monday	18/01/2021	55	51
Tuesday	19/01/2021	56	53
Wednesday	20/01/2021	56	52
Thursday	21/01/2021	56	53
Friday	22/01/2021	55	52
Monday	25/01/2021	57	56

Table 3.2 Period Noise Levels

A statistical analysis of the measured data obtained throughout the survey periods for the operational periods has been made to derive the typical background level, with the analysis provided below.



As indicated, the results indicate typical background noise levels at this location of 52 dB $L_{A90,\ 15\ minute}$.

3.3. Attended Noise Surveys

To supplement the unattended noise survey and to determine the variation in noise levels between the unattended survey position and the dwellings to the north, an attended noise monitoring exercise was carried out during Monday 25th January 2021.

Measurements were obtained over a period of 1 hour simultaneously with the unattended noise survey at two positions: one adjacent to the properties along Little Benty; and a second along the public footpath to the north of the dwellings at Acacia Mews. The monitoring positions are indicated on Figure 1.

At each position, measurements were made using a Rion NL-52 Class 1 Sound Analyser, with the microphone set at a height of 1.3 metres above the ground and in freefield conditions.

Noise levels at each monitoring position were observed to be principally attributable to M4 traffic throughout the survey period.

The results of the surveys are presented in Appendix C. The results have been compared to the results obtained from the unattended survey to determine the variation in noise levels, from which a typical background (L_{A90}) noise level has been established. The results indicate the following levels.

Location	Background (L_{A90}) Noise Levels [dB]	
	Difference with Unattended Survey	Typical L_{A90}
Little Benty	+10	62
Acacia Mews	+1	53

Table 3.3 Background Noise Levels

4. Calculations and Assessment

4.1. Proposed Site Operations

Works have recently commenced within the quarry, with soils presently being stripped and stored in perimeter bunding.

Bunding is to be constructed from the top soils and subsoils around the perimeter of the quarry, which will remain in situ during the extraction and infilling operations. The bunds will be removed as part of the final restoration, once the infilling has been completed.

Hours of operation for the quarry would be within working hours permitted within the planning permission between 07:30 – 18:30 Mondays to Fridays, with no working on Saturdays, Sundays or public holidays.

The quarry is to be worked in three main phases. The phases and location of the perimeter bunding is indicated on Figure 2.

Phase 1 would be worked initially, with extraction progressing in a northly direction. As the extraction moves into Phase 2, infilling of Phase 1 would commence, with the extraction and infilling operations progressing through Phases 2 and 3.

The sand and gravel would be excavated using a single excavator, with the material loaded onto HGV for transportation as-dug to another IVL site for processing. No processing would be carried out on site.

Materials for infilling would be brought to site by HGV and placed directly onto the working area. The materials would then be spread periodically during the day using a dozer.

The maximum number of HGV movements per day would be 100 (50 in / 50 out). A number of the vehicles would back haul, i.e. bring infill materials in and take excavated material out. Based upon the anticipated throughput it is anticipated that there would be up to 10 HGV movement per hour during the day.

4.2. Proposed Criteria

As indicated previously, given the location, no conditions restricting noise levels attributable to operations within the quarry were imposed on the planning permission.

That aside, the minerals PPG advises that noise levels attributable to normal operations at residential premises, should not exceed a level of more than 10 dB(A) above background, subject to an upper freefield noise limit for daytime operations of 55 dB $L_{Aeq,\ 1\ hour}$. On this basis, it is reasonable to adopt a limit of 55 dB $L_{Aeq,\ 1\ hour}$ at surrounding properties.

It is noted that the background noise levels are 53 dB L_{A90} at the properties to the south and 62 dB L_{A90} at the properties to the north. It is clear therefore, that by applying a 55 dB L_{Aeq} limit, noise levels would only be a maximum of 2 dB(A) above the background levels at the properties to the south and 7dB(A) below the background levels at the properties to the north. Assessing the proposed limit against the BS 4142 criteria would therefore indicate that adverse impacts were unlikely.

4.3. Calculation Methodology

Calculations of the noise levels associated with the operation of the quarry have been made for operations carried out within each main phase.

The calculations have been made using the SoundPlan computer modelling software. This software implements the calculation methodology from ISO 9613-2 [5].

Existing ground levels have been obtained from LiDAR data, with soft ground assumed for the surrounding fields and hard ground for the M4 within the calculations.

To provide a worst case assessment, it has been assumed that the plant would be operating at the existing ground levels, which would be representative of the initial cut and final stages of the infilling and restoration of each phase. Generally, the plant would be operating at a lower level within the quarry, which would result in lower levels of noise at surrounding properties attributable to the increased attenuation provided by the boundary bunding.

Calculations have been made assuming the plant working along the northern and southern boundaries of each phase, to provide an indication of the highest noise levels at the surrounding properties.

The calculations have been made at the following four positions representative of the properties potentially most likely to be affected by the operation of the quarry:

- Acacia Mews;
- Holloway Lane;
- Little Benty; and
- The Brambles.

The calculation positions are indicated on Figure 1.

4.4. Noise Source Terms

Noise source terms for the plant anticipated to be used within the quarry have been based upon measurements taken by LF Acoustics of similar plant operating in other quarries, which were considered representative of the plant likely to operate on site.

The assumed source terms are as follows.

Source	Source Height [m]	Source Level @ 10m [dB L_{Aeq}]	Equivalent SWL [dB(A)]	Usage
Excavation				
Excavator	2	75.6	103.6	100%
HGV Movement	2	-	101.2	10 Movements / hour (Total)
Infilling and Restoration Operations				
Dozer	2	79.5	107.5	100%
HGV Movement	2	-	101.2	10 Movements / hour (Total)

Table 4.1: Source Term Noise Levels

4.5. Calculation Results

The results of the modelling are provided within Appendix D, which presents the output from the Soundplan modelling at the calculation positions for each phase, based upon the plant working along the northern and southern boundaries of each phase.

4.6. Results and Assessment of Noise Levels

The calculated noise levels attributable to the proposed operations carried out within the quarry have been assessed against the proposed noise limits presented in Table 4.1. The calculation results and assessment are provided below.

Location	Calculated Noise Levels [dB $L_{Aeq, 1\ hr}$]			Minimum Difference re 55 dB $L_{Aeq, 1\ hr}$ Limit [dB]	Limit Exceeded?
	Phase 1 Infilling / Phase 2 Extraction (North / South)	Phase 2 Infilling / Phase 3 Extraction (North / South)	Phase 3 Infilling (North / South)		
Little Benty	50.4 / 49.1	50.2 / 46.5	46.1 / 43.3	-4.6	No
The Brambles	48.0 / 46.5	47.6 / 44.1	44.0 / 40.0	-7.0	No
Arcacia Mews	38.4 / 39.5	39.9 / 42.1	41.5 / 42.1	-12.9	No
Holloway Lane	40.5 / 41.6	41.6 / 44.1	44.1 / 45.1	-9.9	No

Table 4.2 Calculation Results

The calculations indicate that the noise levels attributable to the operation of the quarry, including extraction and infilling would generate low levels of noise at the surrounding residential properties.

Assessing the noise levels against the 55 dB $L_{Aeq, 1\ hour}$ limit based upon the minerals PPG, indicates that the noise levels would remain at least 4 dB(A) below the limit and therefore not result in any adverse noise impacts.

An assessment has additionally been made against the BS 4142 guidance.

Noise from the operation of the quarry would be continuous in nature, with the main source of noise associated with the engines of the on-site plant. This noise is not tonal or characteristic in nature and would be of similar characteristics to the noise from traffic on the surrounding road network. On this basis, no penalties have been applied when determining the rating level of noise associated with the operation.

An initial assessment has been made by assessing the highest calculated noise levels from each phase against the typical background noise levels. The assessment is presented below.

Location	Calculated Highest Noise Levels [dB $L_{Aeq, 1\ hr}$]			Typical Background Noise Level [dB L_{A90}]	Minimum Difference re L_{A90} [dB]
	Phase 1 Infilling / Phase 2 Extraction	Phase 2 Infilling / Phase 3 Extraction	Phase 3 Infilling		
Little Benty	51	50	46	62	-11
The Brambles	48	48	44	62	-14
Arcacia Mews	40	42	42	53	-11
Holloway Lane	42	44	45	53	-8

Table 4.3 BS 4142 Initial Assessment

The assessment above indicates that the noise levels attributable to the operation of the site would remain at least 8 dB(A) below the typical background noise levels at the surrounding properties. The assessment would therefore conclude that the operation would have a low impact at the surrounding properties, with the operation of the site generally inaudible at the surrounding properties.

Consideration has been given to uncertainties within the assessment. The calculations have been made upon the basis of the plant operating at a high level within the quarry and fully operational. Generally, the plant would operate at a lower level and only partially during an hourly period. This assumption provides worst case operating conditions and thus minimises any potential uncertainty in the assessment. Furthermore, the site noise levels are substantially below the background noise levels and any uncertainty in the calculation / measurement would not have any significance to the outcome of the assessment.

In summary, noise levels attributable to the proposed extraction and infilling operations within the quarry, would remain substantially below an acceptable noise limit based upon the minerals PPG. Furthermore, noise levels would remain substantially below the prevailing background noise levels at the surrounding properties, with noise from the operation generally not audible. On this basis, the proposed operations would not result in any adverse noise impacts.

5. Site Management and Control

Whilst the assessment indicates that the operation of the site would not result in any adverse noise impacts or effects, appropriate management controls would be adopted to ensure noise levels associated with site operations were minimised.

In general, the following control measures would be adopted:

- Only modern and well maintained plant would be used;
- All plant would be fitted with the appropriate silencers provided by the manufacturer;
- Where plant was found to be defective (e.g. through a broken silencer), the plant would be taken out of service until it was repaired;
- Mobile plant would be fitted with non-tonal white noise reversing signals;
- Materials would be handled carefully, ensuring drop heights were minimised; and
- The speed limit would be maintained on site.

In general, given the levels of noise predicted, it is not anticipated that any regular noise monitoring would be required to be undertaken on site, providing the plant is well maintained.

Should a complaint be received, the site manager or senior staff member would undertake a subjective assessment of the noise levels generated by the site operations within a period of 4 hours of the complaint having been received during normal working hours.

The subjective assessment would be made outside the complainant's property to identify the source of noise giving rise to the complaint. If the source is identified, appropriate measures would be taken on site promptly to either take the item of plant generating the high noise level out of service, or to consider an amendment to the working practices should the source of the complaint be associated with a particular activity.

Once the remedial measures are completed, a further subjective assessment would be made to ensure the noise levels had reduced.

If the complaint was justified and it was not possible to either identify the particular source or undertake simple remedial actions, a noise monitoring exercise would be undertaken. A competent person would visit the site within five working days of the complaint having been received and undertake measurements and an assessment of the noise levels at the property and on site. Measures would be identified through consultation with site operatives which would seek to reduce the source of the complaint and these would be implemented within a period of 28 days, which would enable sufficient time for alternative plant to be identified or additional mitigation measures to be provided, if required.

A further measurement exercise would be undertaken upon the completion of the works to ensure that the measures were effective.

A record of all complaints and remedial actions taken would be maintained within the site offices, which would be made available for inspection by officers upon request.

6. Summary

LF Acoustics Ltd were appointed by Ingrebourne Valley Ltd to undertake an assessment of the noise levels associated with proposed infilling operations to be carried out at Harmondsworth Quarry.

Planning permission to operate the quarry was granted by LB Hillingdon Council (App. Ref. 73289/APP/2017/3976) on 10 October 2019. Given the location of the quarry, adjacent to the M4 motorway and the fact that there are no residential properties within close proximity to the site, no noise assessment was required to accompany the planning application, nor any noise limits imposed.

Work has recently commenced within the quarry to undertake the initial soils stripping and formation of the bunding around the perimeter of the quarry.

A permit is now being sought for the importation of inert materials to allow the quarry to be progressively restored and this report presents an assessment of the noise levels during the permitted infilling operations.

Baseline noise monitoring has been carried out around the site to determine the current background noise levels at surrounding residential properties, upon which appropriate site noise limits have been derived in accordance with the current minerals PPG.

Calculations of the noise levels have been made on the basis of the plant anticipated to operate within the quarry and assessed against the proposed operational noise limits and against the requirements of BS 4142.

The assessment concluded that the site noise levels would remain below the proposed operating limits and below the prevailing background noise levels, thus seeking to ensure any potential adverse noise impacts and effects were minimised.

References

1. Ministry of Housing, Communities and Local Government. National Planning Policy Framework. February 2019.

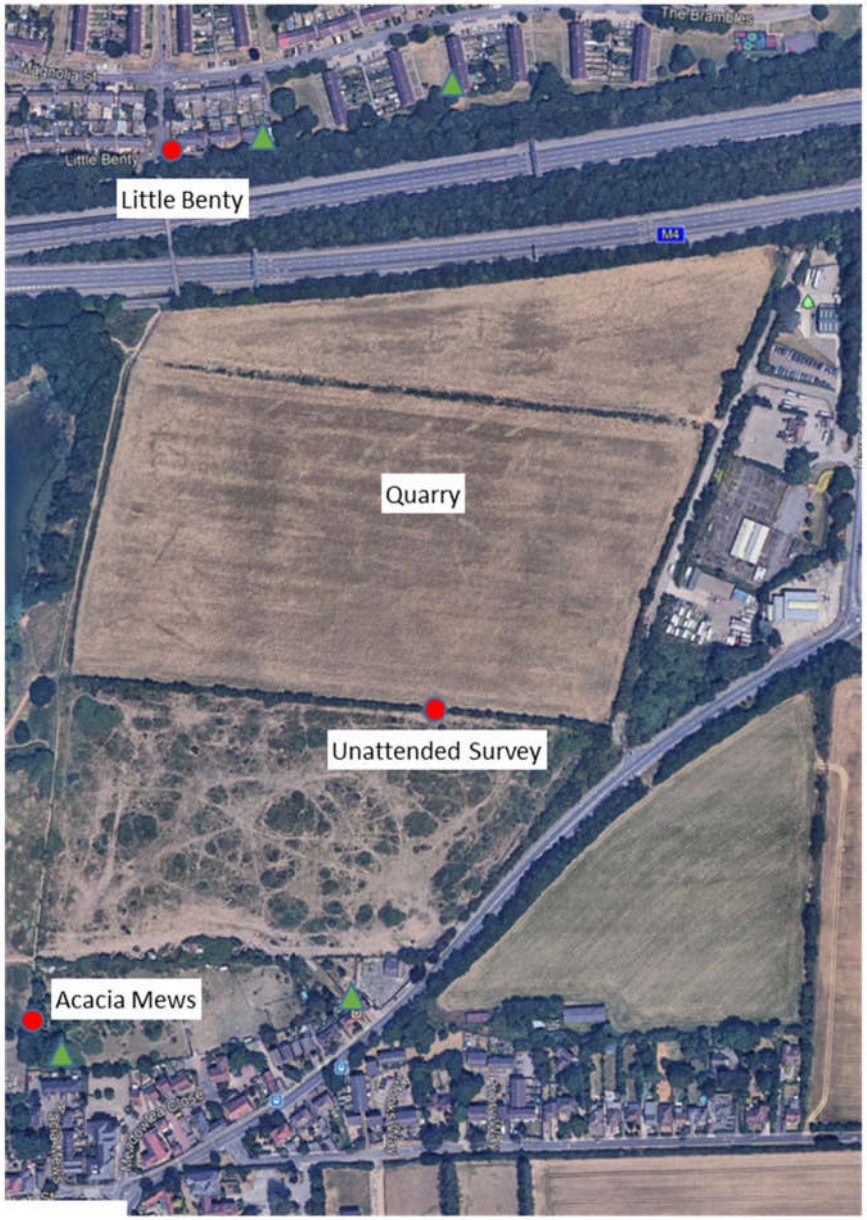
2. Department for Communities and Local Government. Planning Practice Guidance. Noise. 6 March 2014, last updated 22 July 2019.

3. Department for Communities and Local Government. Planning Practice Guidance. Assessing Environmental Impacts from Minerals Extraction. 17 October 2014.

4. British Standards Institute. Methods for Rating and Assessing Industrial and Commercial Sound. BS 4142. 2014 + A1:2019.

5. ISO. Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation. ISO 9613-2. 1996.

Figures



Key

- Noise Survey Position
- Noise Calculation Position

Figure 1:
Site Location and
Noise Monitoring
/ Calculation Positions

LFAcoustics
consulting engineers

LFAcoustics
consulting engineers

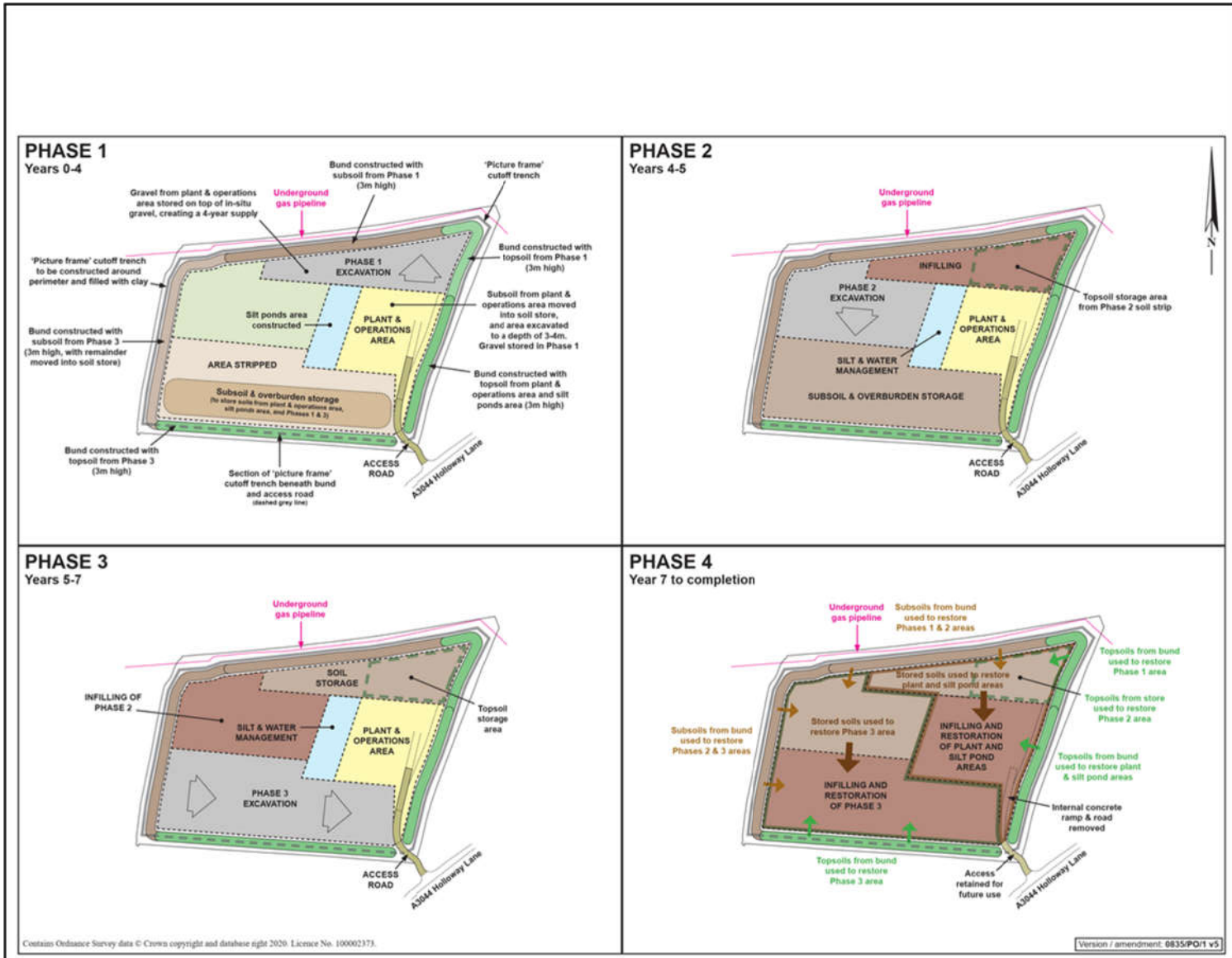


Figure 2:
Phasing Plan

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consulting engineers

LFAcoustics
consulting engineers

Appendix A
Noise Units

Decibels (dB)

Noise can be considered as 'unwanted sound'. Sound in air can be considered as the propagation of energy through the air in the form of oscillatory changes in pressure. The size of the pressure changes in acoustic waves is quantified on a logarithmic decibel (dB) scale firstly because the range of audible sound pressures is very great, and secondly because the loudness function of the human auditory system is approximately logarithmic.

The dynamic range of the auditory system is generally taken to be 0 dB to 140 dB. Generally, the addition of noise from two sources producing the same sound pressure level will lead to an increase in sound pressure level of 3 dB. A 3 dB noise change is generally considered to be just noticeable, a 5 dB change is generally considered to be clearly discernible and a 10 dB change is generally accepted as leading to the subjective impression of a doubling or halving of loudness.

A-Weighting

The bandwidth of the frequency response of the ear is usually taken to be from about 18 Hz to 18,000 Hz. The auditory system is not equally sensitive throughout this frequency range. This is taken into account when making acoustic measurements by the use of A-weighting, a filter circuit that has a frequency response similar to the human auditory system. All the measurement results referred to in this report are A-weighted.

Units Used to Describe Time-Varying Noise Sources (L_{Aeq}, L_{Amax}, L_{A10}, and L_{A90})

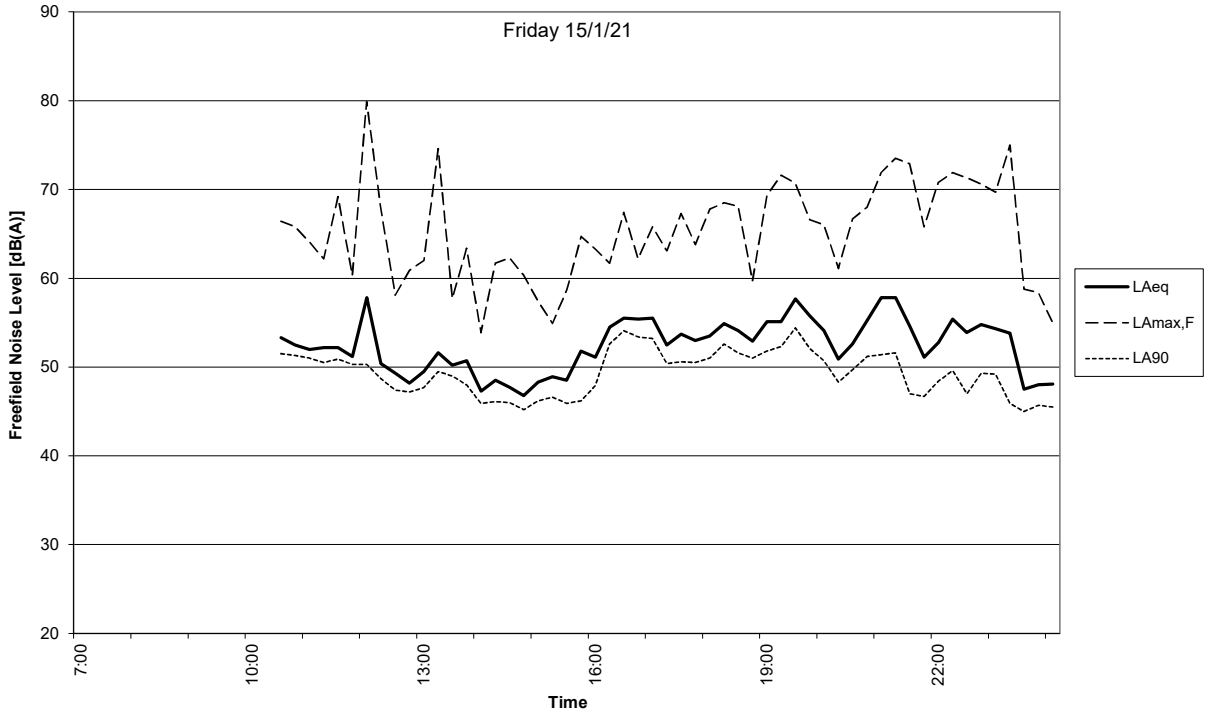
Instantaneous A-weighted sound pressure level is not generally considered as an adequate indicator of subjective response to noise because levels of noise usually vary with time.

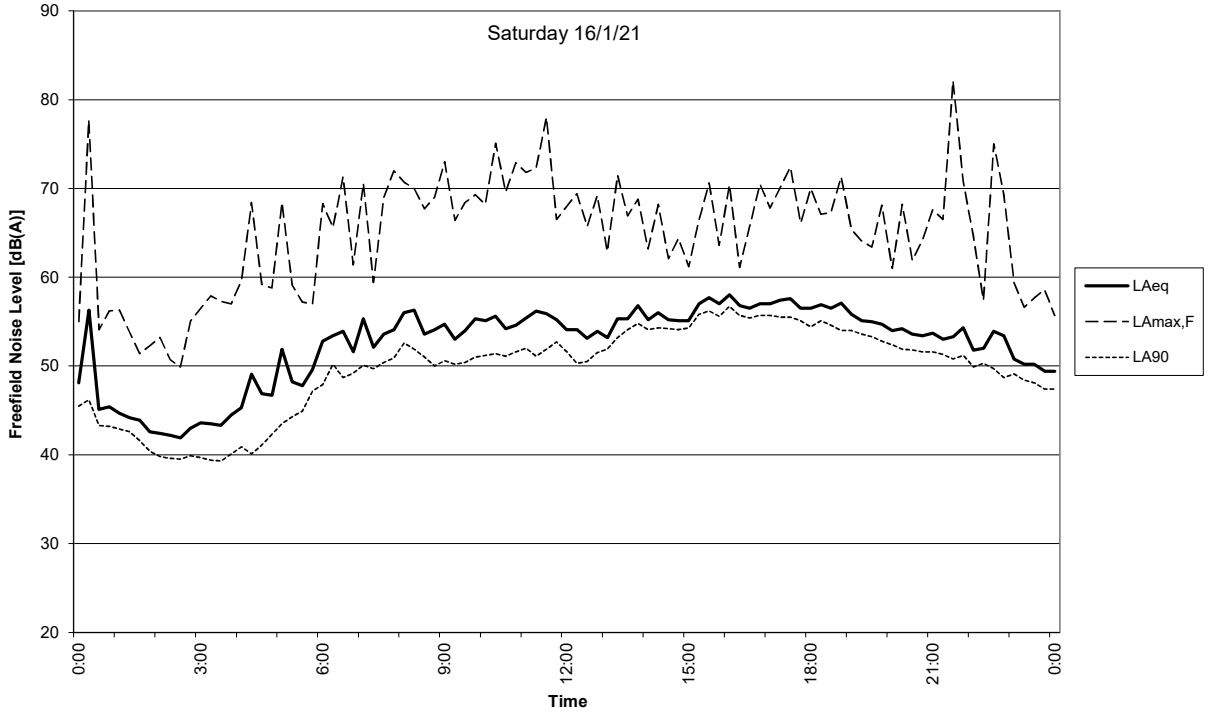
For many types of noise the Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$) is used as the basis of determining community response. The $L_{Aeq,T}$ is defined as the A-weighted sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period, T.

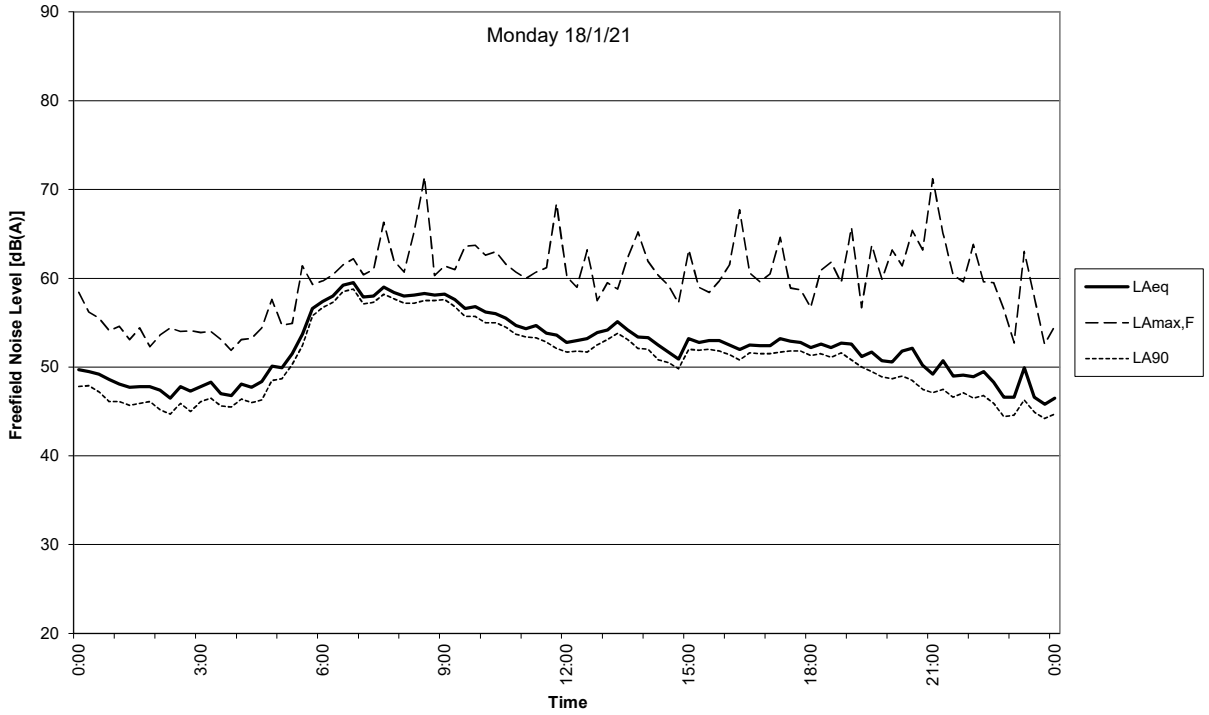
The L_{Amax} is the maximum value that the A-weighted sound pressure level reaches during a measurement period. $L_{Amax\ F}$, or Fast, is averaged over 0.125 of a second and $L_{Amax\ S}$, or Slow, is averaged over 1 second. All L_{Amax} values referred to in this report are Fast.

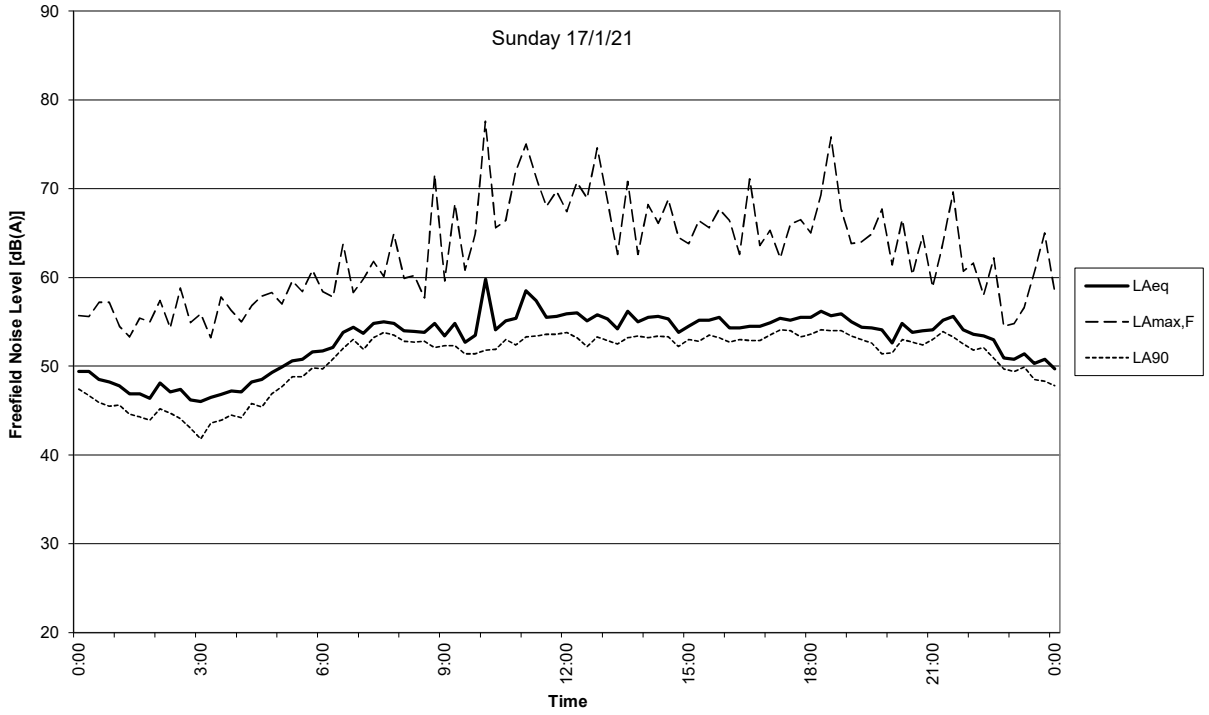
The L_{A90} is the noise level exceeded for 90% of the measurement period. It is generally used to quantify the background noise level, the underlying level of noise that is present even during the quieter parts of measurement period.

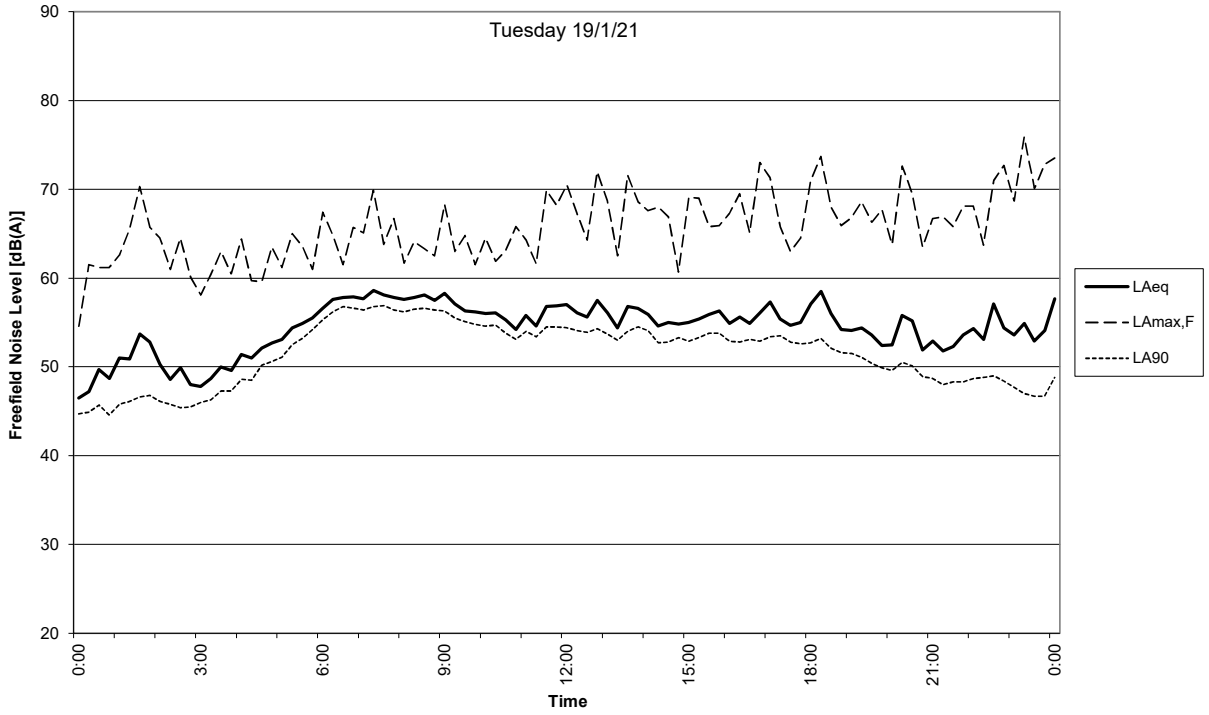
Appendix B
Results of Unattended Noise Survey
Location U1 – Southern Quarry Boundary

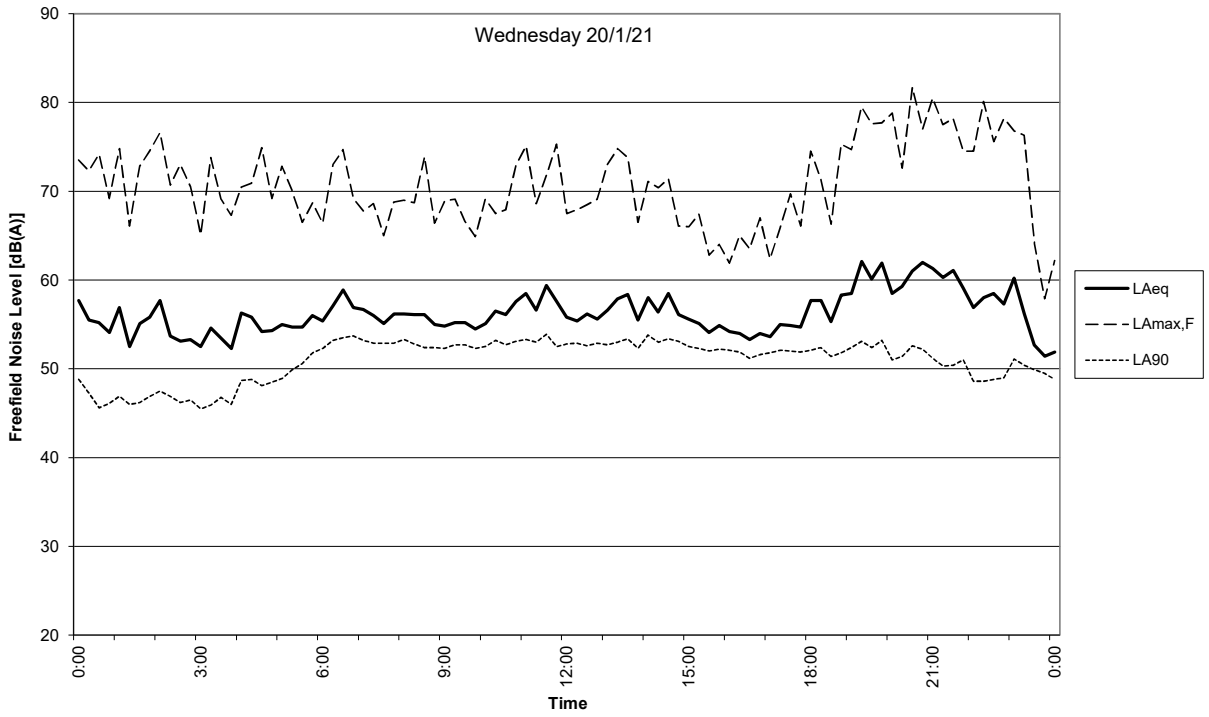

Friday 15/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
7:00
10:00
13:00
16:00
19:00
22:00
Time
LAeq
LAmax,F
LA90

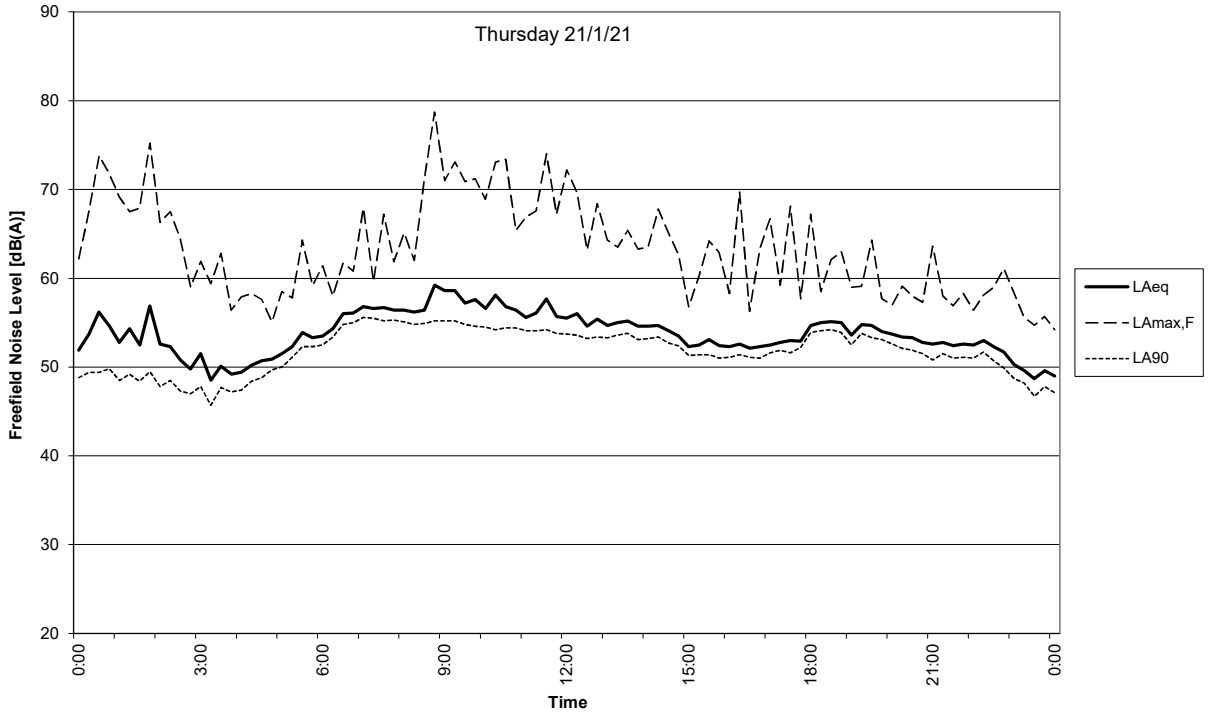

Saturday 16/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90

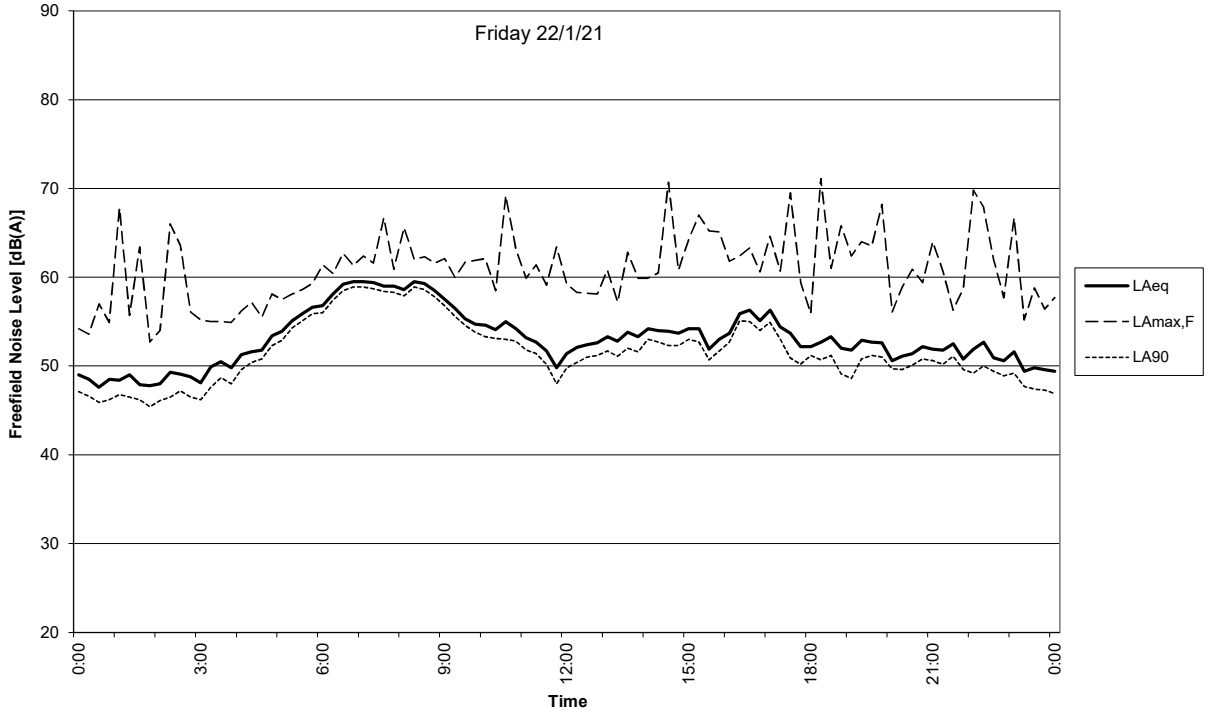

Monday 18/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90

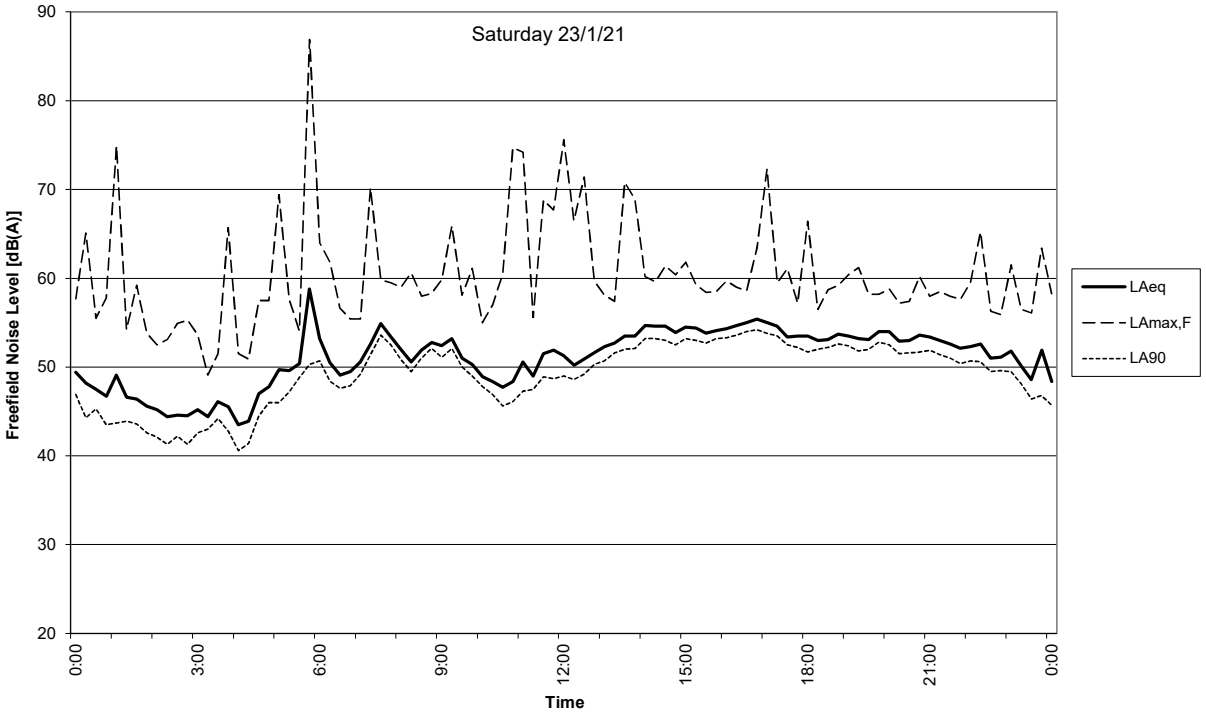

Sunday 17/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90

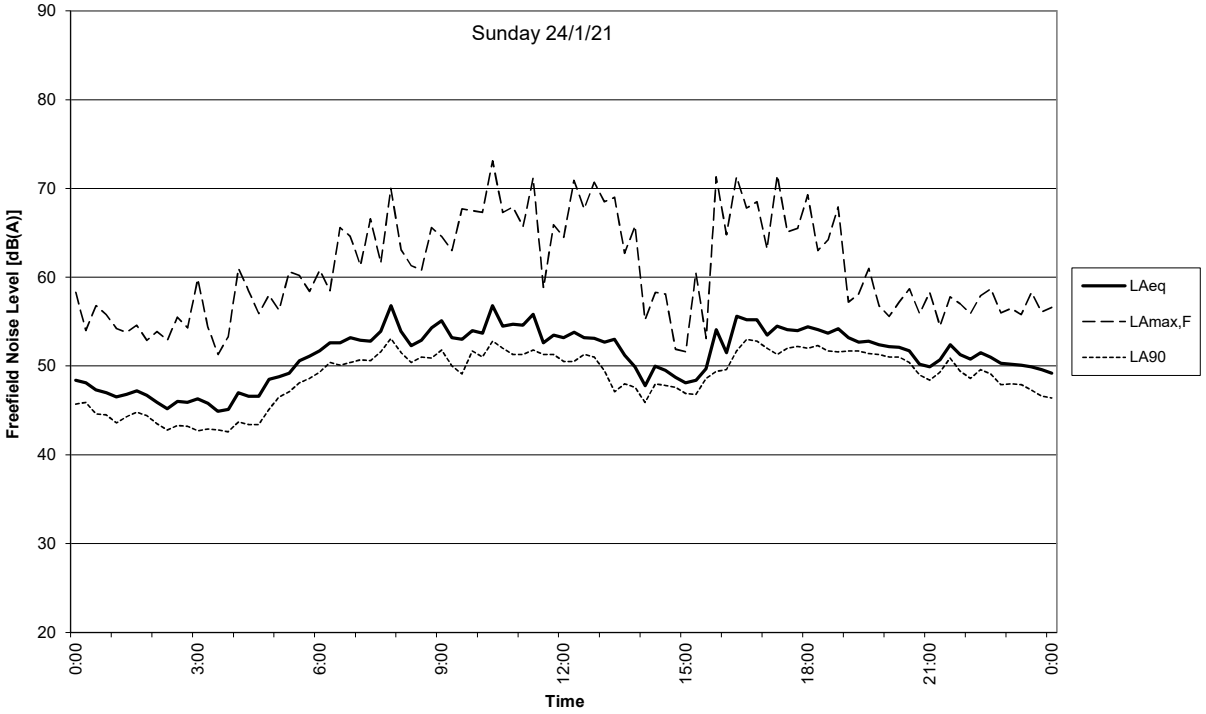

Tuesday 19/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90

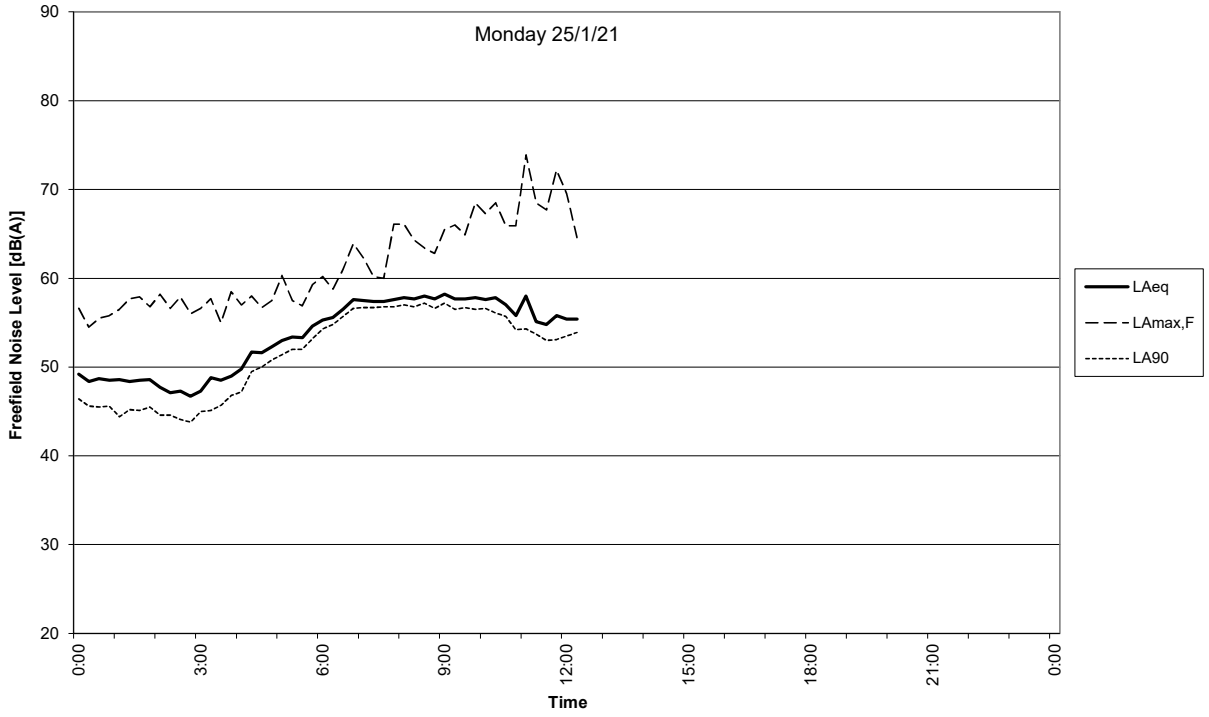

Wednesday 20/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90


Thursday 21/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90


Friday 22/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90


Saturday 23/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90


Sunday 24/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90


Monday 25/1/21
Freefield Noise Level [dB(A)]
90
80
70
60
50
40
30
20
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
Time
LAeq
LAmax,F
LA90

Appendix C
Attended Survey Results

Harmondsworth Quarry
Results of Attended Noise Measurements Carried Out on 25-Jan-21

Equipment Used: Rion NL-52 Class 1 Sound Level Analysers
All Levels; Fast, Freefield, Mic Height 1.2 metres.

		FREEFIELD									
		Sample Measurement Results				Unattended Measurement Results				Difference	
		L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	L_{A90}
S1	11:15	68.6	85.2	70.7	64.2	55.1	68.5	56.0	53.7	13.5	10.5
	11:30	68.4	75.7	70.7	64.3	54.8	67.7	56.0	53.0	13.6	11.3
	11:45	68.3	74.8	70.6	64.0	55.8	72.2	57.1	53.1	12.5	10.9
	12:00	68.0	82.0	70.2	64.3	55.4	69.5	56.6	53.5	12.6	10.8
								Average Difference =		**13.1**	**10.9**
S2	11:30	59.4	88.9	59.2	55.6	54.8	67.7	56.0	53.0	4.6	2.6
	11:45	59.5	76.4	61.5	55.2	55.8	72.2	57.1	53.1	3.7	2.1
	12:00	57.0	72.1	58.0	54.8	55.4	69.5	56.6	53.5	1.6	1.3
	12:15	57.1	75.7	57.9	55.3	55.4	64.6	56.6	53.9	1.7	1.4
								Average Difference =		**2.9**	**1.9**

Appendix D
SoundPlan Modelling Results

Harmondsworth Quarry
Mean propagation Leq - Phase 1 Infilling (N Props)

Legend

Source		Source name
Source type		Type of source (point, line, area)
Time slice		Name of time slice
L'w	dB(A)	Sound power level per m, m²
Lw	dB(A)	Sound power level per unit
l or A	m,m²	Size of source (length or area)
S	m	Distance source - receiver
Adiv	dB	Mean attenuation due to geometrical spreading
Agr	dB	Mean attenuation due to ground effect
Abar	dB	Mean attenuation due to screening
Aatm	dB	Mean attenuation due to air absorption
dLrefl	dB	Level increase due to reflections
Ls	dB(A)	Unassessed sound pressure level at receiver
Ls=Lw+Ko+ADI+Adiv+Agr+Abar+Aatm+Afol_site_house+Awind+dLrefl		
dLw	dB	Correction due to source operation time
Lr	dB(A)	Assessed level of time slice

Harmondsworth Quarry
Mean propagation Leq - Phase 1 Infilling (N Props)

10

Source	Source type	Time slice	L'w dB(A)	Lw dB(A)	l or A m,m²	S m	Adiv dB	Agr dB	Abar dB	Aatm dB	dLrefl dB	Ls dB(A)	dLw dB	Lr dB(A)
Receiver Acacia Mews Fl GF LAeq,1hr dB(A) LAeq,1hr 38.4 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		521.51	-65.3	-1.6	-3.9	-3.0	2.4	36.1	0.0	36.1
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		476.25	-64.5	-1.6	-3.6	-2.0	2.2	34.0	0.0	34.0
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	466.6	487.49	-64.8	-1.9	-3.0	-2.5	1.1	15.2	10.0	25.2
Receiver Holloway Lane Fl GF LAeq,1hr dB(A) LAeq,1hr 40.5 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		429.65	-63.7	-1.5	-3.9	-2.5	2.5	38.3	0.0	38.3
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		420.84	-63.5	-1.6	-3.4	-1.7	2.3	35.8	0.0	35.8
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	466.6	345.66	-61.8	-1.8	-3.1	-1.8	0.4	18.1	10.0	28.1
Receiver Little Benty Fl GF LAeq,1hr dB(A) LAeq,1hr 50.4 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		167.52	-55.5	0.0	-5.1	-1.0	2.4	48.2	0.0	48.2
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		147.99	-54.4	-0.1	-4.7	-0.6	2.3	46.1	0.0	46.1
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	466.6	232.18	-58.3	-0.4	-4.5	-1.2	2.3	24.1	10.0	34.1
Receiver The Brambles Fl GF LAeq,1hr dB(A) LAeq,1hr 48.0 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		161.83	-55.2	-0.2	-5.2	-1.0	0.0	45.9	0.0	45.9
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		195.46	-56.8	-0.6	-4.1	-0.9	2.4	43.6	0.0	43.6
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	466.6	228.64	-58.2	-0.8	-4.4	-1.2	0.4	22.1	10.0	32.1

Harmondsworth Quarry
Mean propagation Leq - Phase 1 Infilling (S Props)

10

Source	Source type	Time slice	L'w dB(A)	Lw dB(A)	l or A m,m²	S m	Adiv dB	Agr dB	Abar dB	Aatm dB	dLrefl dB	Ls dB(A)	dLw dB	Lr dB(A)
Receiver Acacia Mews Fl GF LAeq,1hr dB(A) LAeq,1hr 39.5 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		496.24	-64.9	-1.5	-3.9	-2.9	2.4	36.6	0.0	36.6
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		395.43	-62.9	-1.6	-3.6	-1.7	2.1	36.0	0.0	36.0
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	468.0	470.23	-64.4	-1.9	-3.0	-2.4	1.3	15.7	10.0	25.7
Receiver Holloway Lane Fl GF LAeq,1hr dB(A) LAeq,1hr 41.6 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		405.41	-63.1	-1.5	-3.9	-2.4	2.4	38.9	0.0	38.9
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		336.36	-61.5	-1.6	-3.6	-1.5	2.4	37.9	0.0	37.9
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	468.0	334.68	-61.5	-1.8	-3.1	-1.7	0.6	18.6	10.0	28.6
Receiver Little Benty Fl GF LAeq,1hr dB(A) LAeq,1hr 49.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		182.56	-56.2	-0.1	-4.4	-1.2	2.4	47.9	0.0	47.9
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		233.14	-58.3	-0.3	-3.8	-1.0	2.3	42.5	0.0	42.5
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	468.0	259.77	-59.3	-0.5	-4.1	-1.4	2.3	23.3	10.0	33.3
Receiver The Brambles Fl GF LAeq,1hr dB(A) LAeq,1hr 46.5 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		185.18	-56.3	-0.5	-4.3	-1.3	0.0	45.1	0.0	45.1
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		272.96	-59.7	-0.9	-3.7	-1.2	2.3	40.5	0.0	40.5
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.2	468.0	253.24	-59.1	-0.8	-4.1	-1.4	0.2	21.0	10.0	31.0

Harmondsworth Quarry
Mean propagation Leq - Phase 2 Infilling (N Props)

10

Source	Source type	Time slice	L'w dB(A)	Lw dB(A)	l or A m,m²	S m	Adiv dB	Agr dB	Abar dB	Aatm dB	dLrefl dB	Ls dB(A)	dLw dB	Lr dB(A)
Receiver Acacia Mews Fl GF LAeq,1hr dB(A) LAeq,1hr 39.9 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		476.59	-64.6	-1.5	-3.9	-2.8	2.4	37.1	0.0	37.1
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		381.40	-62.6	-1.6	-3.6	-1.6	2.2	36.4	0.0	36.4
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.8	538.1	465.31	-64.3	-1.9	-3.1	-2.4	1.4	16.4	10.0	26.4
Receiver Holloway Lane Fl GF LAeq,1hr dB(A) LAeq,1hr 41.6 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		422.72	-63.5	-1.5	-3.8	-2.5	2.4	38.5	0.0	38.5
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		324.55	-61.2	-1.6	-3.6	-1.4	2.4	38.2	0.0	38.2
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.8	538.1	340.70	-61.6	-1.8	-3.2	-1.8	0.7	19.1	10.0	29.1
Receiver Little Benty Fl GF LAeq,1hr dB(A) LAeq,1hr 50.2 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		146.75	-54.3	0.0	-5.2	-0.9	2.3	49.3	0.0	49.3
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		246.21	-58.8	-0.3	-3.8	-1.1	2.3	42.0	0.0	42.0
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.8	538.1	234.92	-58.4	-0.4	-4.2	-1.2	2.3	24.9	10.0	34.9
Receiver The Brambles Fl GF LAeq,1hr dB(A) LAeq,1hr 47.6 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		196.05	-56.8	-0.5	-4.6	-1.3	2.4	46.7	0.0	46.7
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		287.00	-60.1	-0.9	-3.9	-1.3	2.5	39.9	0.0	39.9
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.8	538.1	249.21	-58.9	-0.8	-4.1	-1.4	0.9	22.5	10.0	32.5

Harmondsworth Quarry
Mean propagation Leq - Phase 2 Infilling (S Props)

10

Source	Source type	Time slice	L'w dB(A)	Lw dB(A)	l or A m,m²	S m	Adiv dB	Agr dB	Abar dB	Aatm dB	dLrefl dB	Ls dB(A)	dLw dB	Lr dB(A)
Receiver Acacia Mews Fl GF LAeq,1hr dB(A) LAeq,1hr 42.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		391.66	-62.9	-1.5	-3.9	-2.4	2.4	39.2	0.0	39.2
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		295.40	-60.4	-1.6	-4.0	-1.2	2.2	38.6	0.0	38.6
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.5	500.0	415.29	-63.4	-1.8	-3.2	-2.2	1.6	17.4	10.0	27.4
Receiver Holloway Lane Fl GF LAeq,1hr dB(A) LAeq,1hr 44.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		332.81	-61.4	-1.5	-3.9	-2.1	2.4	40.9	0.0	40.9
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		236.25	-58.5	-1.6	-4.2	-1.0	2.4	40.9	0.0	40.9
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.5	500.0	302.29	-60.6	-1.8	-3.3	-1.6	1.0	20.1	10.0	30.1
Receiver Little Benty Fl GF LAeq,1hr dB(A) LAeq,1hr 46.5 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		236.88	-58.5	-0.2	-4.1	-1.5	2.3	45.4	0.0	45.4
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		337.56	-61.6	-0.4	-3.6	-1.4	2.3	38.9	0.0	38.9
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.5	500.0	299.79	-60.5	-0.5	-4.0	-1.6	2.3	22.2	10.0	32.2
Receiver The Brambles Fl GF LAeq,1hr dB(A) LAeq,1hr 44.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		276.73	-59.8	-0.8	-4.1	-1.8	2.4	43.4	0.0	43.4
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		375.04	-62.5	-1.0	-3.7	-1.6	0.0	34.9	0.0	34.9
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	86.5	500.0	307.29	-60.7	-1.0	-4.0	-1.7	0.7	19.7	10.0	29.7

Harmondsworth Quarry
Mean propagation Leq - Phase 3 Infilling (N Props)

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Source	Source type	Time slice	L'w dB(A)	Lw dB(A)	l or A m,m²	S m	Adiv dB	Agr dB	Abar dB	Aatm dB	dLrefl dB	Ls dB(A)	dLw dB	Lr dB(A)
Receiver Acacia Mews Fl GF LAeq,1hr dB(A) LAeq,1hr 41.5 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		387.02	-62.7	-1.5	-3.9	-2.3	2.4	39.3	0.0	39.3
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		351.57	-61.9	-1.6	-3.6	-1.5	2.2	37.3	0.0	37.3
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.8	432.3	450.86	-64.1	-1.8	-3.0	-2.4	1.3	15.8	10.0	25.8
Receiver Holloway Lane Fl GF LAeq,1hr dB(A) LAeq,1hr 44.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		318.67	-61.1	-1.5	-3.9	-2.0	2.4	41.4	0.0	41.4
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		249.66	-58.9	-1.6	-3.8	-1.1	2.3	40.5	0.0	40.5
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.8	432.3	314.63	-60.9	-1.8	-3.2	-1.7	0.5	18.7	10.0	28.7
Receiver Little Benty Fl GF LAeq,1hr dB(A) LAeq,1hr 46.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		249.04	-58.9	-0.2	-4.1	-1.6	2.3	44.9	0.0	44.9
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		322.27	-61.2	-0.4	-3.9	-1.4	2.4	39.2	0.0	39.2
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.8	432.3	304.75	-60.7	-0.6	-4.0	-1.6	2.4	21.3	10.0	31.3
Receiver The Brambles Fl GF LAeq,1hr dB(A) LAeq,1hr 44.0 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		282.67	-60.0	-0.8	-4.2	-1.8	2.4	43.1	0.0	43.1
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		340.68	-61.6	-0.9	-3.8	-1.5	0.0	35.9	0.0	35.9
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.8	432.3	293.50	-60.3	-0.9	-4.1	-1.6	0.0	18.9	10.0	28.9

Harmondsworth Quarry
Mean propagation Leq - Phase 3 Infilling (S Props)

10

Source	Source type	Time slice	L'w dB(A)	Lw dB(A)	l or A m,m²	S m	Adiv dB	Agr dB	Abar dB	Aatm dB	dLrefl dB	Ls dB(A)	dLw dB	Lr dB(A)
Receiver Acacia Mews Fl GF LAeq,1hr dB(A) LAeq,1hr 42.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		320.85	-61.1	-1.5	-4.3	-1.9	2.4	41.0	0.0	41.0
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		374.66	-62.5	-1.6	-3.7	-1.6	0.6	35.0	0.0	35.0
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.9	440.5	419.55	-63.4	-1.8	-3.2	-2.2	0.6	15.9	10.0	25.9
Receiver Holloway Lane Fl GF LAeq,1hr dB(A) LAeq,1hr 45.1 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		225.87	-58.1	-1.5	-5.1	-1.3	2.4	43.9	0.0	43.9
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		233.38	-58.4	-1.6	-4.3	-1.0	0.0	38.5	0.0	38.5
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.9	440.5	279.03	-59.9	-1.8	-3.5	-1.5	0.3	19.6	10.0	29.6
Receiver Little Benty Fl GF LAeq,1hr dB(A) LAeq,1hr 43.3 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		342.24	-61.7	-0.3	-4.2	-2.1	2.4	41.6	0.0	41.6
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		374.65	-62.5	-0.4	-3.8	-1.6	2.4	37.8	0.0	37.8
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.9	440.5	344.06	-61.7	-0.6	-4.0	-1.8	2.4	20.2	10.0	30.2
Receiver The Brambles Fl GF LAeq,1hr dB(A) LAeq,1hr 40.0 dB(A)														
Dozer (infilling)	Point	LAeq,1hr	107.5	107.5		366.09	-62.3	-0.8	-4.1	-2.2	0.0	38.0	0.0	38.0
Excavator (Extraction)	Point	LAeq,1hr	103.6	103.6		375.52	-62.5	-0.8	-3.8	-1.6	0.0	34.9	0.0	34.9
HGV Movements (Infilling / Extraction)	Line	LAeq,1hr	59.5	85.9	440.5	332.51	-61.4	-1.0	-4.0	-1.8	0.0	17.7	10.0	27.7

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