

Client Quattro UK Ltd

Southall Lane, Hayes (C&D WRF and CBP)

Acoustic Technical Report



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1 Introduction

MLM Consulting Engineers Ltd have been appointed by Quattro UK Limited (Quattro) (the 'Applicant') to undertake a noise assessment to support a new planning application for retention of the structures As Built for the Construction and Demolition (C&D) Waste Recycling facility and Concrete Batching Plant (CBP) (the 'proposed development'), at land to the west of Southall Lane and to the north of the M4 motorway in Hayes, London, and retention of the plant on site until December 2027.

The site is currently operating under Decision Notice 01032/E/P44 from London Borough of Hounslow. This new application seek to secure planning permission for a number of alterations to the physical structures/ layout of the site that have been built out not in accordance with the approved plans. Current Planning Permission also includes a noise related condition - Planning Condition 9 - which is addressed in this assessment for the new application.

The development seek to continue operate under the same operational mode, and the current proposals include further mitigations such as the erection of additional enclosure /screening to the recycling building, picking station and recycled material storage bays; and the aggregate bays to be covered.

The current proposals include the mitigation measures required by Planning Condition 9, applied to Decision Notice 01032/E/P44 from London Borough of Hounslow for the site. Details were previously submitted to discharge that condition and have been updated and included within this report.

The following report and assessment is based on the results of a background sound monitoring exercise, carried out to determine the existing sound climate at the nearest noise-sensitive receptors to the proposed developments at planning stage in June 2016.

Under current unprecedented situation due the Coronavirus outbreak a new updated sound survey upon which to base the current assessment has been discarded. In addition to the imposed movement restrictions, any noise survey at this time is unlikely to represent normal conditions due to the decrease in traffic flows and activities at the moment. Advice within 'Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments' by the Association of Noise Consultants [ANC] and the Institute of Acoustics [IOA] (Version 2 dated 24 March 2020) has been followed, and the use of the data from the previous survey at the closest noise-sensitive receptors and comparable operating facilities has been considered appropriate and robust.

Based on the results of the available sound survey and relevant UK guidance criteria, the impact of noise from the plant at the closest sensitive receptors to the site has been calculated and assessed.

The assessment considers noise from the plant associated with the C&D Waste Recycling Facility and the CBP, including the breakout noise from the WRF Tipping building and noise breakout from equipment running within the concrete mixing plant structure. On-site vehicle movements associated with the operation of the development have also been modelled, based on the operating capacity provided by the operator, with small variation from the planning consent for the site. The predictions take into account the physical form of the existing and proposed buildings and the topography of the surrounding area.

Further to the plant noise emissions data provided by the operator, the noise model has been populated with characterisation measurements undertaken at two existing sites owned by Quattro and of similar nature to the development, in support of the previous assessment. The aim of this source measurement exercise was to provide representative data of similar sources of noise to those to operate at the development.

Whilst every effort has been made to ensure that this report is easily understood, it is technical in nature; a glossary of terms is included in Appendix A to assist the reader.

Full charted measurement results for the original baseline sound survey are presented in Appendix B.

2 Assessment Methodology and Criteria

The assessment will be made in accordance with the following references and standard, which relevance will be explained in the assessment text:

- NPPF and NPSE;
- BS4142:2014+A1:2019 Method for Rating and Assessing Industrial and Commercial Sound;
- Condition 9 from Planning Decision 01032/E/P44 from London Borough of Hounslow.

The noise assessment will be based on the baseline environmental sound measurements undertaken at original planning stage and reported within the planning noise assessment undertaken by MLM reference MS/101210/PS Revision 3 dated 27 March 2017.

2.1 Local Authority Requirements

The following noise-related planning condition apply to the current development, as stated in Planning Decision 01032/E/P44 from London Borough of Hounslow. Consideration has been given to evaluate compliance of the new proposals with the conditions applied to the currently operating development.

Condition 9

Prior to the commencement of the use hereby approved on the site a noise report shall be submitted to and approved in writing by the Local Planning Authority detailing noise resulting from the operation of the facilities and proposed mitigation measures. This shall include:

- Enclosure of main waste recycling facility operations fully sealed structures to East, North, West and roof with Kingspan cladding panels;
- Enclosure of waste output point (end of the line) fully sealed structure to East, North, West and roof with Kingspan cladding panels;
- Enclosure of picking station and provision of contiguous solid boundary from ground level of base of picking station;
- 3.5m solid boundary wall surrounding application site to Northern, Western and part of Eastern boundary;
- Enclosed concrete mixer plant - enclosed concrete batching operations single sheet steel cladding and covered conveyors;
- Rubber tyres on all mobile plant/machinery.

2.2 Relevant Guidance - British Standard 4142:2014+A1:2019

BS 4142 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises on people who might be inside, or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS 4142 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{A,r,Tr}$ 'rating sound level'. A correction to include consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

BS 4142 states: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:*

- "Typically, the greater this difference, the greater the magnitude of the impact."*
- "A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."*
- "A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."*
- "The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant 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."*

For daytime, the Assessment is typically carried out over a reference time period of one hour, but at night-time, it is typically carried out over a 15 minute period. The periods associated with day or night, for the purposes of the Standard, are considered to be 7am to 11pm and 11pm to 7am, respectively.

As the operation for the site will be 24/7, both night-time and daytime periods have been considered.

Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;
- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating sound level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, and would therefore classified as a No Observed Adverse Effect Level.

2.3 National Planning Policy Framework

The revised National Planning Policy Framework (NPPF) published in July 2018 and updated on 19 February 2019 sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

Planning law requires that applications for planning permission be determined in accordance with the development plan, unless material considerations indicate otherwise. The National Planning Policy Framework must be taken into account in preparing the development plan, and is a material consideration in planning decisions.

The document states that the purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

The NPPF goes on to suggest that achieving sustainable development means that the planning system has three overarching and interdependent objectives: an economic objective, a social objective and an environmental objective.

Planning policies and decisions should play an active role in guiding development towards sustainable solutions, but in doing so should take local circumstances into account, to reflect the character, needs and opportunities of each area.

At the heart of the Framework is a presumption in favour of sustainable development, which for decision-taking it means:

- Approving development proposals that accord with an up-to-date development plan without delay; or
- Where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:
 - i. The application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or
 - ii. Any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.

Under Section 11; Making effective use of land, the following is stated:

Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions.

Regarding noise pollution, the document states the following:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – 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 revised NPPF introduces the concept of ‘agent of change’ and states:

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

As stated above, this document makes reference to mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, but does not set absolute criteria, so reference has been made to BS8233: 2014¹, which provides definitive guidance for amenity levels.

¹ British Standard 8233: 2014: Guidance on sound insulation and noise reduction for buildings. BSI.

2.4 National Planning Practice Guidance, England

Further guidance in relation to the National Planning Policy Framework and the Noise Policy Statement for England has been published in the National Planning Practice Guidance in England: Noise (NPPG)², which summarises the noise exposure hierarchy, based on the likely average response.

This is reproduced in Table below.

Table 1: Significance Criteria From NPPG In England: Noise			
Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	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 Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. 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.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. 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.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

² Department for Communities and Local Government (DCLG), 2014. National Planning Practice Guidance for England: Noise. DCLG.

3 Site Description and Development Proposals

The site is located to the West of Southall Lane, in the North-West of the London Borough of Hounslow. It is bound to the:

- North by Costco Wholesale warehouse with associated car parking facilities, beyond which lies Hayes Road;
- North-West by Virtus Datacentre, beyond which lies the Western International Market;
- East by Southall Lane, beyond which lies Airlinks Golf Club and the David Lloyd Sports Centre;
- South by open space which comprises grassland and scrub with a pond, beyond which lies the M4; and
- West by a site which currently comprises the Hounslow Waste Depot, beyond which lies commercial buildings, car parking areas and the A312 Parkway.

The surrounding area to the North, West and East of the site is predominantly industrial with numerous locally significant industrial sites. To the North of Hayes Road is Bulls Bridge Industrial Estate. Heathrow Airport's North runway is approximately 2.7 km to the West.

The nearest noise-sensitive receptors (NSRs) are residential dwellings located to the North-East of the application site, along Convent Way (approximately 250 m from the nearest site boundary). The nearest Southall Lane commercial receptors are Costco Wholesale, located directly adjacent to the North of the site; Virtus Datacentre, to the North-West of the site (approximately 55 m from the nearest site boundary); and the office buildings on Southall Lane (approximately 25 m from the nearest site boundary).

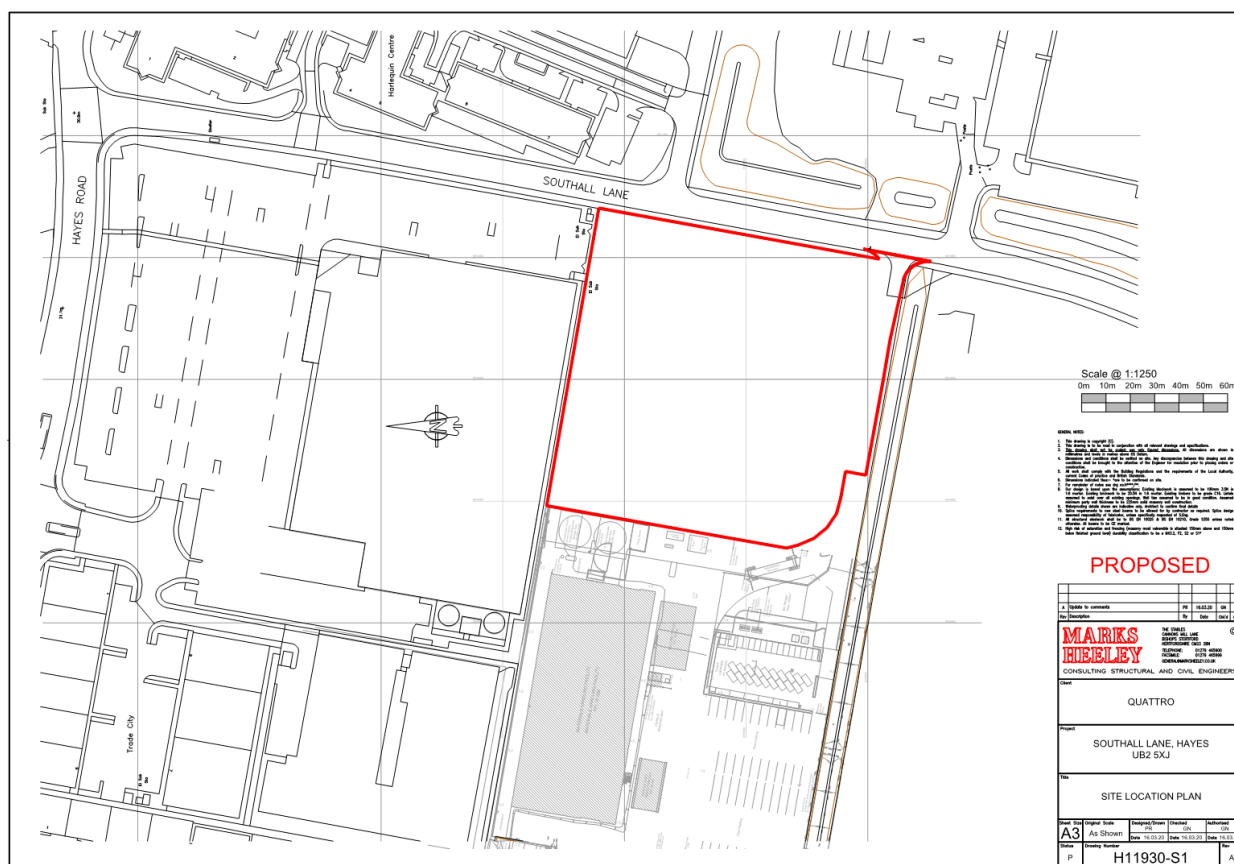


Figure 1: Site Location

The development has temporary consent for three years operation until January 2021, and the proposals seek consent for operating another seven years from the end of that period and until December 2027. The proposed development comprises the following areas and activities (see Figure 2):

- A Construction and Demolition Waste Recycling Facility (WRF);
- A Concrete Batching Plant (CBP); and
- Associated weighbridge, weighbridge office, site office and welfare facilities, storage bays, substation, cars and Heavy Goods Vehicles (HGV) parking.

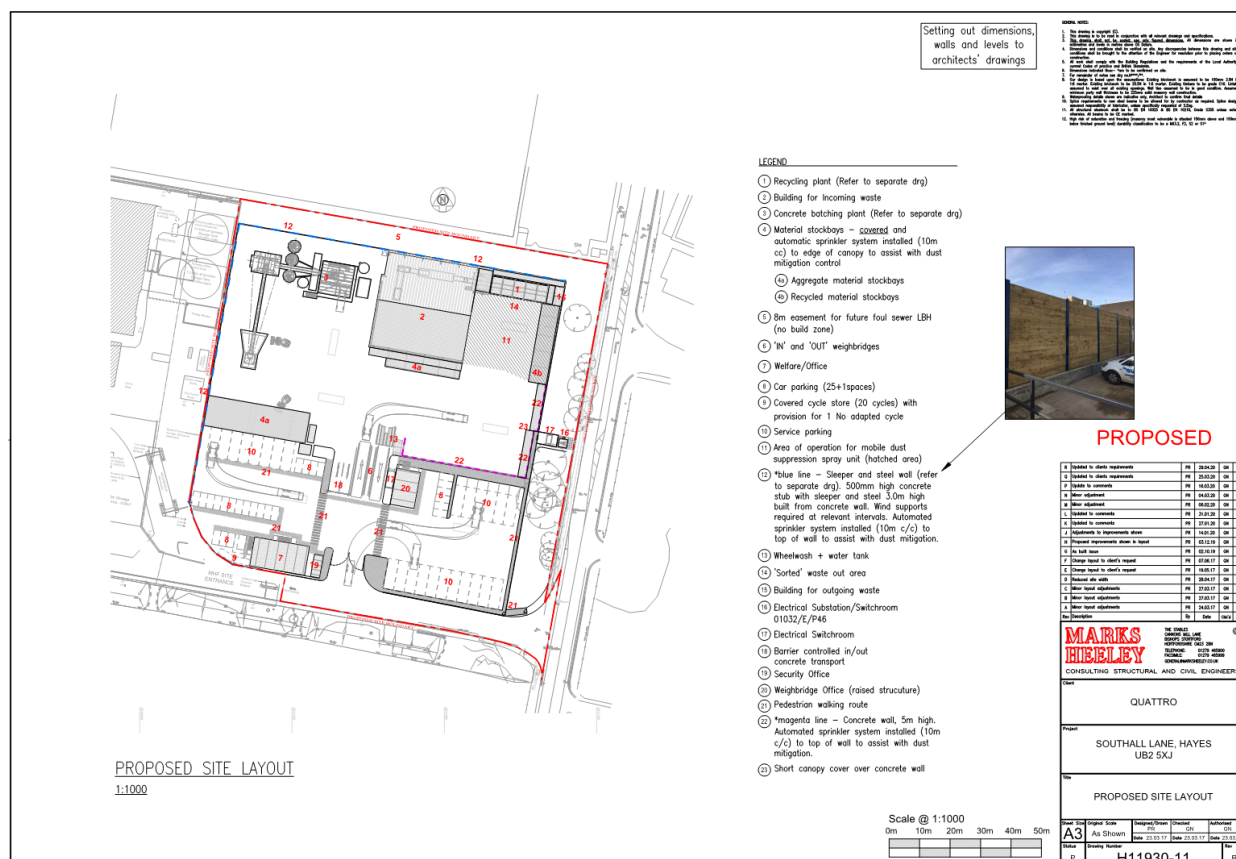


Figure 2: Development Proposals

As can be seen in Figure 2, a 3.5 m high boundary wall on the Northern and Western site boundaries is part of the proposed site (12). On the Northern boundary this runs behind the enclosed final product building (15), the selected waste bins (1) and the enclosed waste tipping building (2), and runs behind the CBP to provide a continuous barrier along the Northern boundary of the operational part of the site and similarly down the Western boundary.

3.1 Construction and Demolition Waste Recycling Facility (WRF)

The WRF is located in the Northern and North-Eastern extents of the site. It comprises:

- Enclosed waste picking stations 6.3 high and solid boundary from ground level to base of picking station, fully enclosed connection with the waste tipping building; and
- Enclosed incoming waste building 10.8m (ridge) 9m (eaves) high, fully sealed structure on the North, West and South sides and fully roofed. The building envelope will comprise RC walls and metal frame panels. The Eastern side would remain partially open (15m W x 7.5m H) to allow access;

- Enclosed waste output point, fully sealed structure on the North, East and West sides and fully roofed, fully enclosed connection with the waste picking stations. The Southern side would connect to the recycled material stock bays, which are screened/covered except for the open area to the west;

The Waste Recycling Plant (WRP) will comprise an initial screen and conveyor and the trommel screen to remove aggregates, which will be housed at the rear of the enclosed waste tipping building. After passing through the trommel screen the remaining waste will pass by conveyor from the enclosed tipping building to an enclosed picking station.

Within the picking station the waste is passed along a conveyor belt and is hand sorted into various waste streams. The waste is passed down various chutes into skips located beneath the picking station in covered bays to prevent dust blow off. The back wall of the covered bays will be continuous with the picking station cabin above to prevent dust blow off.

The remaining waste materials which are predominantly hard core will be collected in a skip located in the final product building at the end of the picking station line. This building will be enclosed on North, West and East site and fully roofed to prevent dust blow off, and connected to the recycled material stock bays which are also screened and covered. The eastern boundary operational area will be enclosed by a 5m high concrete wall with 2m metal sheeting above with cranked canopy. The south boundary of the operational area will be separated to the parking and weighbridge office area by a 5m high concrete wall. Figures 3 and 4 presents layout and elevations of all the elements mentioned above.

The resulting waste would then be crushed and washed, producing high grade aggregate for use in the adjacent proposed CBP, or recycled sand and various grades of shingles to be distributed by the developer. All the stock bays will be covered to prevent dust blow off.

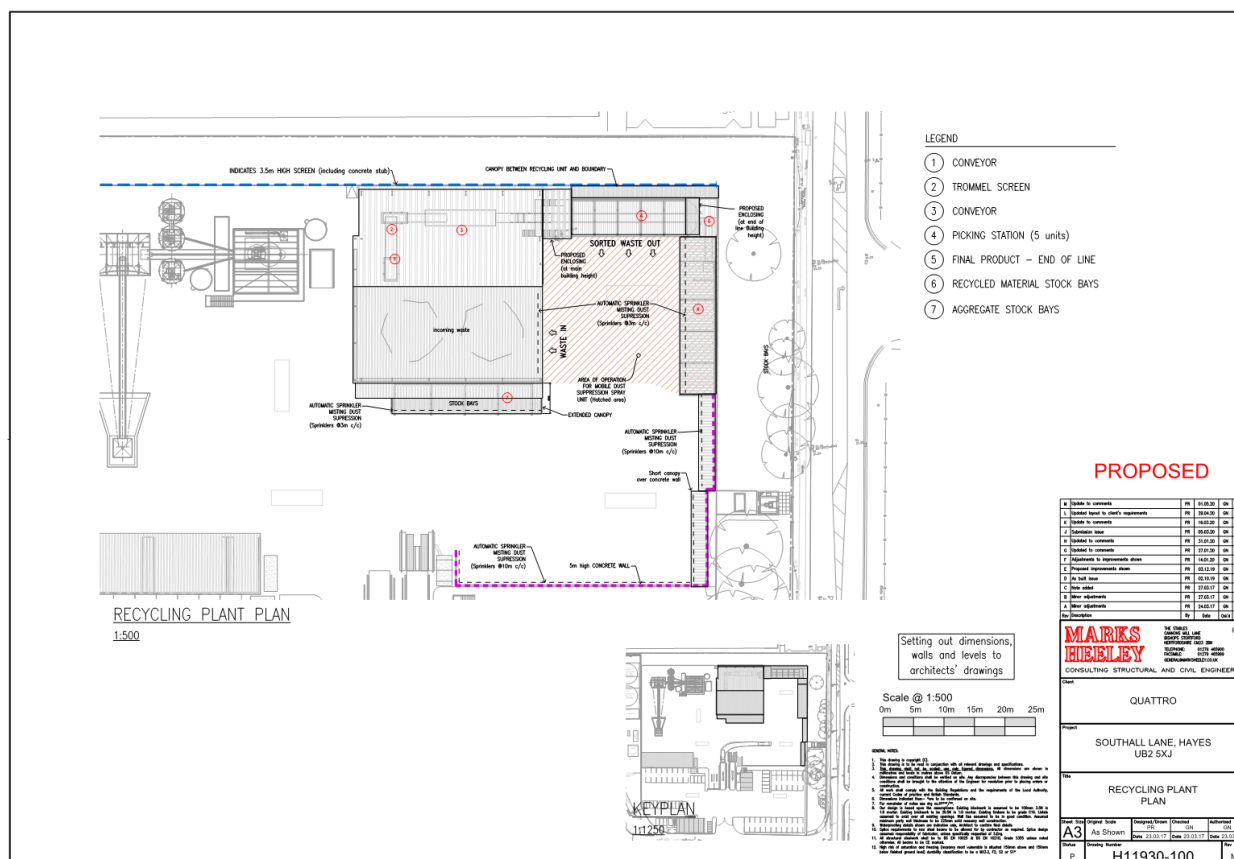


Figure 3: WRF Layout



3.2 Concrete Batching Plant

The CBP would be located in the Northern and North-Western area of the application site. It would comprise:

- Cement silos;
- Enclosed concrete mixing plant and concrete batching operations with single sheet steel cladding;
- Enclosed aggregate storage;
- Feed hoppers and covered conveyor belts.

Figures below show views of the CBP plant.

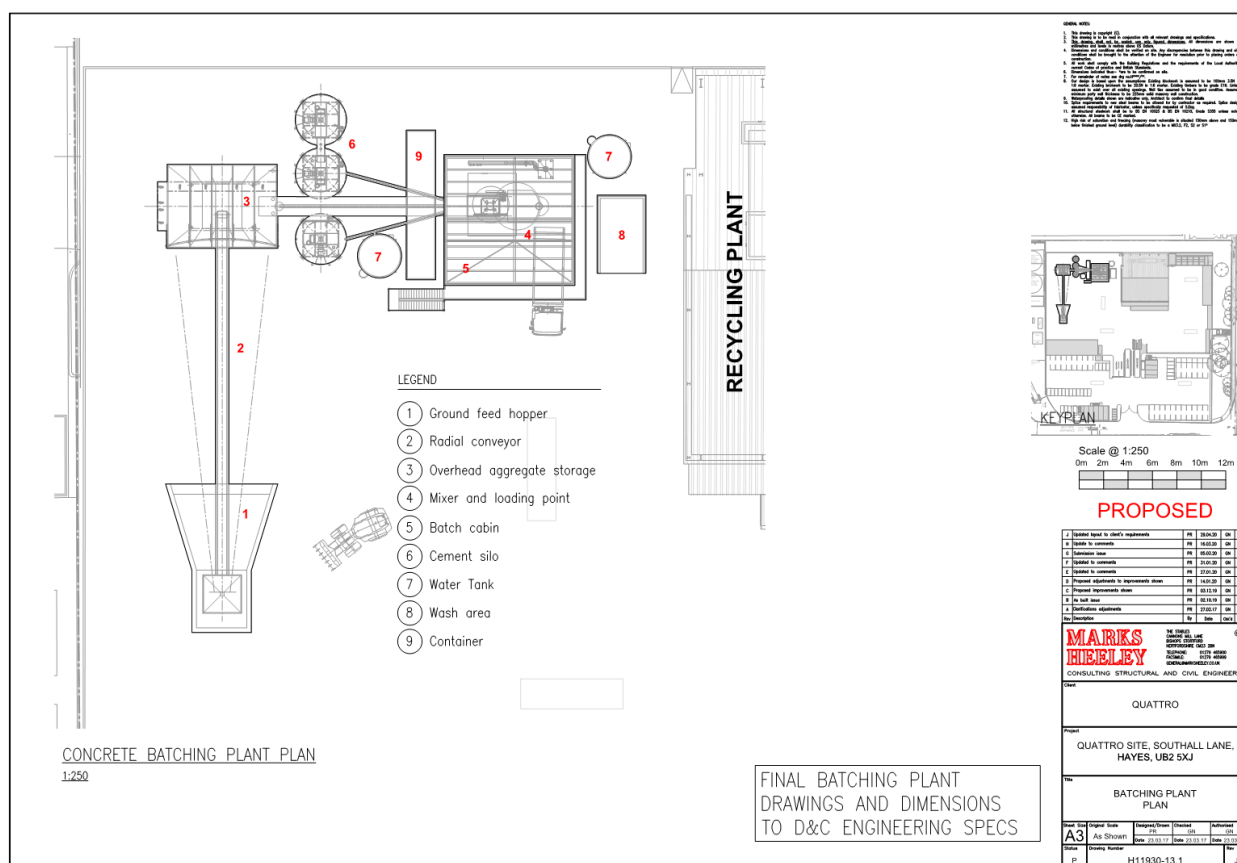


Figure 5: Concrete Batching Plant Layout

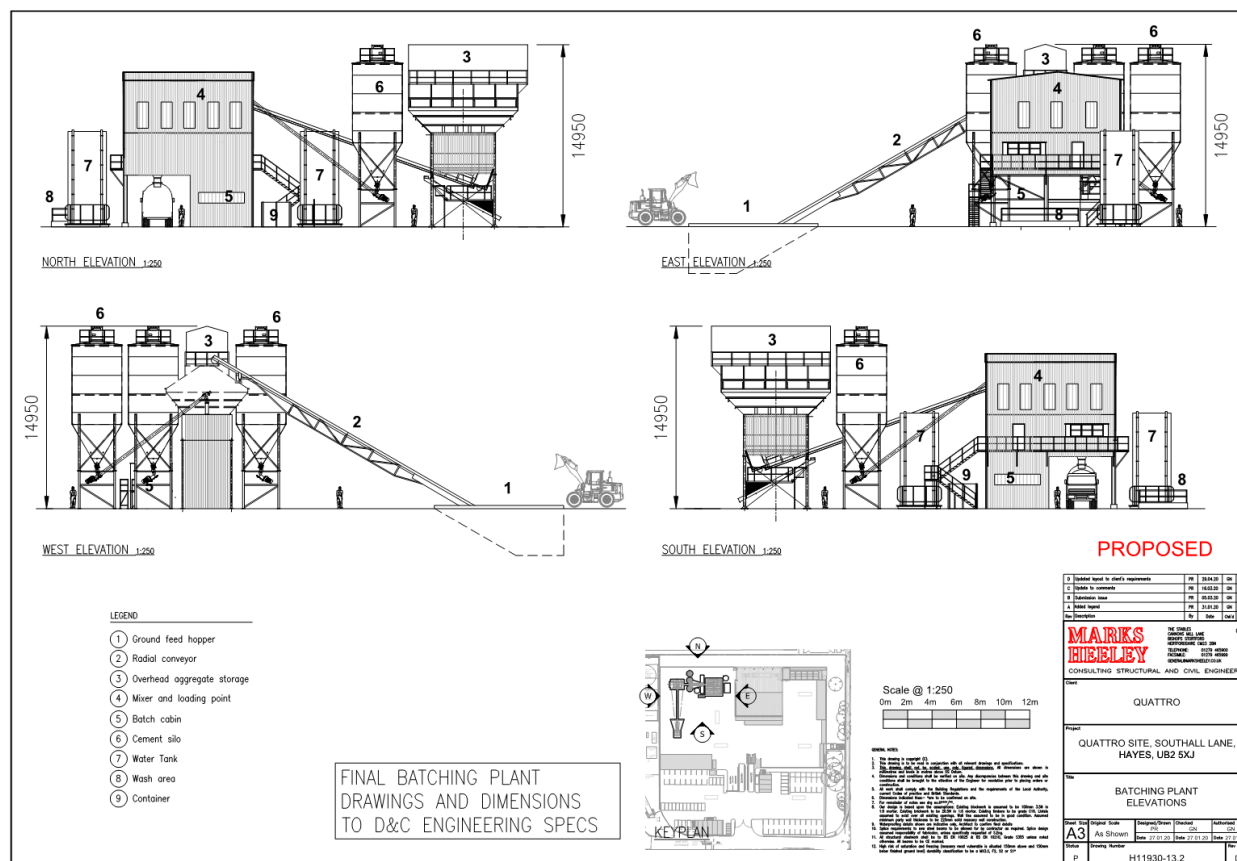


Figure 6: Batching Plant Elevations

3.3 Ancillary Facilities

Further to the above, the development have covered and screened material stockbays (for aggregate sand and stone), located to the south of the CBP and the waste tipping building.

A two storeys site office and welfare building is located to the south of the site and the west of the access point along with a single storey security building. Weighbridge facilities are in the middle of the site.

On-site parking would comprise:

- 26 car parking spaces at the Southern parking area and also at the west and east parking areas;
- 20 cycle parking spaces at the South-Western boundary incl. 1 adapted cycle space; and
- 25 HGV parking spaces at the Southern, Eastern and Northern parking area.

3.4 Development Operating Hours

3.4.1 Construction and Demolition Waste Recycling Facility

The plant does not have restrictions in operational hours, but in terms of processing waste, the WRF plant current hours of operation would be 7am - 6pm Monday to Saturday. The reception of material could be 24 hours, and therefore this has been considered as a worst case.

3.4.2 Concrete Batching Plant

In terms of concrete production, the proposed hours of operation for the CBP will be 24 hours-a-day, seven days a week. However, whilst the plant has the ability to operate on a 24-hour basis and this has been assumed in the current assessment, the developer informs that for at least 75 % of the time the CBP would operate during normal working hours of 7am - 6pm Monday to Saturday, only.

It is understood that the operation over 24 hours applies only to the CBP itself (i.e. the mixing and production of concrete and filling of mixer trucks). Generally A 24-hour operation is not required for supplying aggregate to the plant either from the WRF or by road served deliveries, however movements over 24 hours have been considered as a worst case.

3.5 Development Operating Capacity – Vehicle Movements

3.5.1 Construction and Demolition Waste Recycling Facility

The total vehicle movements associated with the import and export of material to the waste recycling facility is 181 two-way movements per day (in and out total).

The development will also allow for parking HGVs over-night. The fleet parking play a role in the supply and delivery of material to and from the application site. The majority of movements of fleet HGVs leaving the application site in the morning are utilised to assist with clearance of residual waste to landfill or supply of recovered waste to supply sub-base contracts.

Where possible, fleet HGVs is managed to return to the application site in the evenings loaded with aggregate to feed the CBP. On this basis mostly all of the total fleet movements will be either taking material to or from the application site. Minimising the number of times that HGVs leave or enter the site unloaded has clear advantages in terms of minimising HGV movements.

3.5.2 Concrete Batching Plant

Based on the information provided by the developer it is understood that traffic movements which will be generated by this element of the development will be 80 movements per day (in and out total).

4 Sound Baseline Survey

The current assessment is based on the baseline sound survey undertaken at planning stage for the consented site.

The current unprecedented emergency situation in the country due to the Coronavirus outbreak and the associated restrictions in movements and decrease in traffic flows and activities hinder to undertake representative sound surveys, and therefore a new updated sound survey upon which to base the current assessment has been discarded. Advice within 'Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments' by the Association of Noise Consultants [ANC] and the Institute of Acoustics [IOA] (Version 2 dated 24 March 2020) has been followed. The use of data from the previous survey has been considered appropriate and robust.

Baseline environmental sound measurements were undertaken at the nearest NSRs surrounding the site between Monday 6 and Tuesday 7 June 2016.

As a result of the non-secure nature of the application site area, it was not possible to undertake unattended, continuous 24-hour noise monitoring at all necessary measurement positions. Therefore, a short-form survey was undertaken over a continuous three hour period during the daytime and during the night-time periods, at two measurement positions (MP1 – MP2). Measurements were undertaken as follows:

- Daytime – 09:30 – 12:30 hours on 6 June 2016;
- Night-time – 04:00 – 07:00 hours on 7 June 2016.

Further to the above, a 24-hour measurement was undertaken at an off-site location (MP3), close to the M4, 340 m to the South of the site. This location was selected following client's instructions, given it is considered a Metropolitan Open Land area (MOL), intended to protect areas of landscape, recreation, nature conservation and scientific interest which are strategically important in London.

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445³.

All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672⁴. A full inventory of this equipment is shown in Table 2 below.

Table 2: Inventory of Sound Measurement Equipment

Item	Make & Model	Serial Number
1-Sound Level Meter	Rion NA-28	00370297
1-Preamplifier	Rion NH-23	60306
1-Microphone	Rion UC-59	00386
2-Sound Level Meter	01dB Duo	10965
2-Preamplifier	01dB Pre 23	10449
2-Microphone	Gras 40CD	161799
Calibrator	Rion NC-74	34315165

³ British Standard 7445: 2003: Description and measurement of environmental noise. BSI

⁴ British Standard 61672: 2013: Electroacoustics. Sound level meters. Part 1 Specifications. BSI.

The sound measurement equipment used during the survey was calibrated at the start and end of the measurement period. The calibrator used had itself been calibrated by an accredited calibration laboratory within the twelve months preceding the measurements. No significant drift in calibration was found to have occurred on the sound level meter. Calibration certificates of the above equipment are available upon request.

The weather conditions during the measurement period were acceptable for noise measurement, it being dry with very light winds.

The microphones were fitted with protective windshields for the measurements, which are described in greater detail below.

4.1 Measurements Locations

Measurements were carried out at the following locations, as presented in Figure 7 below:

- Position 1 – Short-term attended measurements were undertaken at this location during both daytime and night-time periods. A microphone was positioned approximately 4.5m from Convent Way, in front of the residential blocks of Holmes Court; and 1.5m above ground level. This position was chosen to determine typical background sound levels at the nearest noise-sensitive receptors to the site. Measurements undertaken at this location were free-field and during our time on-site were noted to have been dominated by mixed road traffic movements (buses, cars and trucks), as well as aircraft noise from airplanes flying from/to Heathrow.
- Position 2 – Short-term attended measurements were undertaken at this location during the daytime period only, given this location is considered a noise-sensitive receptor which only operates at daytime (offices). A microphone was positioned approximately 3m from Southall Lane's kerb and 1.5m above ground level. This position was chosen to determine typical background sound levels at the office receptors directly overlooking the proposed development. Measurements undertaken at this location were free-field and during our time on-site were noted to have been dominated by mixed road traffic movements on Southall Lane, several trucks accessing the adjacent site and ongoing road works occurring 80m further south of the measurement location.
- Position 3 – A 24-hour unattended measurement was undertaken at this location. A microphone was positioned approximately 18m from the nearest M4 slip-road (Eastbound) and 1.5m above ground level. Measurements undertaken at this location were free-field and during our time on-site were noted to have been dominated by mixed road traffic movements at the M4.



Figure 7: Sound Monitoring Positions

4.2 Sound Survey Results

Several short-term attended measurements were undertaken at MP1 and MP2, the results of which are presented in Table 3 and Table 4. The results of the unattended measurements at MP3 are presented in Table 5.

Table 3: Summary of Sound Measurements at MP1

Period	Time	Sound Levels (dB)			
		$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{Amax}
Daytime (Monday 6/6/2016)	09:34 - 09:49	62.2	45.9	65.5	78.3
	10:31 - 10:56	60.2	45.3	63.8	76.1
	11:02 - 11:17	61.7	46.7	64.5	78.2
	11:20 - 11:50	60.5	47.5	63.6	79.5
	Summary*	61.2	46.4	64.4	79.5
Night-time (Tuesday 7/6/2016)	04:00 - 07:00	58.1	39.7	61.2	80.5

*Logarithmic average $L_{Aeq,T}$, arithmetic average L_{A90} and L_{A10} , maximum L_{Amax} of all measured levels

Table 4: Summary of Sound Measurements at MP2

Period (Monday 6/6/2016)	Sound Levels (dB)			
	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{Amax}
09:57 - 10:12	72.5	57.5	75.6	88.3
11:57 - 12:27	74.3	59.9	76.5	94.3
Summary*	73.5	58.7	76.1	94.3

*Logarithmic average $L_{Aeq,T}$, arithmetic average L_{A90} and L_{A10} , maximum L_{Amax} of all measured levels

Table 5: Summary of Sound Measurements at MP3				
Period (Monday 6/6/2016 to Tuesday 7/6/2016)	Sound Levels (dB)			
	$L_{Aeq,T}$	Typical $L_{A90,T}$	$L_{A10,T}$	L_{Amax}
Daytime (16:00 – 23:00)	65.5	64	67.1	81.4
Night-time (23:00 – 07:00)	62.3	50	64.6	76.3

The typical L_{A90} background noise levels over the assessment period at MP3 have been derived from a statistical analysis of the values measured on-site. The purpose of this analysis is to select a value that is robustly representative of the existing levels experienced at the site. In this case, the worst-case most frequent value measured on site during the whole monitoring period, rounded to the nearest 0.5 dB, has been used.

5 Noise Assessment

In order to assess the impact of sound from the proposed development, it has been necessary to predict the likely specific sound level from the most significant sources of sound associated with the development at the closest noise-sensitive receptors. Predictions have been undertaken within the noise-modelling suite Cadna/A, in accordance with the ISO 9613⁵ prediction methodology.

The noise model has been based on the noise sources data provided by the developer and complemented with a comprehensive set of sound source measurements historically undertaken by MLM at sites of similar nature, along with source data provided in BS5228⁶. A source characterisation measurement exercise was also undertaken at two existing sites owned and currently run by Quattro on Wednesday 14 December 2016:

- Concrete Batching Plant site on Regency Street, Park Royal, London NW10 6NR; and
- Construction & Demolition Waste Recycling Facility on Lionel Road South, Brentford, TW8 0JA.

In addition, the model considers the effects of topography, ground absorption, atmospheric absorption and acoustic reflections (max. order of reflection 2), as well as applying a light downwind correction to consider a typical worst-case downwind situation. In terms of ground absorption, the ground has been considered as acoustically hard to allow for a worst case scenario.

5.1 Noise Model Data and Assumptions

Table 6 summarises the noise sources data provided by the developer and included in the noise model for the operation of the plant. The relevant source sound measurements undertaken at Quattro's existing sites, which have been used in our assessment, are also presented in Table 6. Where source sound data has not been provided or measured, MLM has either used data from our database or used BS5228-1 reference data.

Noise spectra in octave frequency bands have been considered in the model. Where not provided, frequency spectrums have been based on MLM's historic measured spectrum of similar noise sources for current plant operations and adapted to the broadband noise levels provided by the developer.

Table 6: Plant Noise Emission Data From Manufacturer And MLM's Database

Part of the site	Element	Source Data	Octave Band Data Provided (dB) - PWL								L _{WA}
			63	125	250	500	1k	2k	4k	8k	dBA
WRF	Screen and conveyor (Sandvik QE141)	Manufacturer	Broadband sound pressure levels provided by the manufacturer for both elements, mapped on a sketch drawing (see Appendix C). Spectrum levels have been based on MLM's measured data for Dartford Recycling Plant.								
	Trommel (Kiverco KL830)	MLM source data calculated from measurements at Quattro's C&D W site	104	101	97	96	95	93	90	85	100
	Dustboss DB-60 dust		90	89	103	102	96	90	84	81	102

⁵ International Standards Organisation, 1996: Acoustics – Attenuation of sound during propagation outdoors.

⁶ British Standards Institution, 2014. British Standard BS5228-1: 2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise. BSI.

Table 6: Plant Noise Emission Data From Manufacturer And MLM's Database

Part of the site	Element	Source Data	Octave Band Data Provided (dB) - PWL								L _{WA}
			63	125	250	500	1k	2k	4k	8k	dBA
	suppression system										
	Debris catcher	MLM database	95	95	95	96	88	97	100	99	105
	Conveyors (PWL dB/m)		75	78	77	79	86	84	80	75	88
	Lorry moving		105	98	97	95	94	92	88	83	99
	Lorry idling		96	91	89	88	88	82	70	63	91
	Front end loader into waste screen	BS5228-1 Table C.6 32	111	105	98	98	98	96	92	86	103
	Dump truck tipping fill	BS5228-1 Table C8 20	116	110	102	102	102	101	98	95	108
CBP	Concrete Mixing Building and truck being loaded at loading bay	MLM source data calculated from measurements at Quattro's CBP site	97	94	96	97	97	96	94	89	102
	Truck unloading cement into silo		93	92	96	100	96	97	91	81	102
	Conveyor (lineal PWL dB/m)	MLM database	75	78	77	79	86	84	80	75	88
	Hopper mixer		97	94	96	97	97	96	94	89	102
	Lorry moving		105	98	97	95	94	92	88	83	99
	Front end loader into ground feed hopper	BS5228-1 Table C.6 32	111	105	98	98	98	96	92	86	103

Most of the WRF operations happen within fully or partially enclosed buildings. The external walls and roof of the waste tipping building and final output building will be fully sealed structures such that they provide significant acoustic screening to the internal reverberant noise levels generated within the building. The waste tipping building has been modelled as a sound radiating building (walls and roof), with an open area on the Eastern façade as the entrance to the building. The acoustic performance of the external fabric of the waste tipping building and Outgoing Waste Building is presented in Table 7. It must be noted that areas of the walls are made of reinforced concrete which will provide a higher sound reduction than those modelled and presented below, and therefore the noise model represents a worst case scenario.

Table 7: Sound Reduction Index for Waste Tipping Building and Outgoing Waste Building fabric (dB)									
Item	Frequency (Hz)								R _w
	63	125	250	500	1k	2k	4k	8k	
Cladding panel (i.e. data taken from Kingspan AWP)	20	15	17	23	18	25	40	46	24

The internal reverberant sound pressure level within the waste tipping building has been calculated based on the following noise sources, and considering that all operate 100% of the time, which represents a very worst case.

Table 8: Sound Levels within the Waste Tipping Building									
Item	Sound Power Level (dB)								L _{WA}
	63	125	250	500	1k	2k	4k	8k	
Screen and conveyor (Sandvik QE141)	97	105	114	110	100	96	94	88	110
Trommel (Kiverco KL830)	104	101	97	96	95	93	90	85	100
Debris catcher	95	95	95	96	88	97	100	99	105
Conveyor	75	78	77	79	86	84	80	75	88
Lorry moving	105	98	97	95	94	92	88	83	99
Front end loader into waste screen	111	105	98	98	98	96	92	86	103
Dump truck tipping fill	116	110	102	102	102	101	98	95	108
Approximate volume of the building = 30m W x 32m L x 9,8 m H = 9408 m ³									
Assumed Reverberation Time (s)	2.5	2.4	2.3	2.2	2.0	1.9	1.9	1.9	-
Internal reverberant Sound Pressure Level	96	91	92	89	83	82	80	78	91 dBA SPL

Picking stations associated with the WRF have not been considered in our acoustic model since they have been observed to not be noisy, based on the source measurements and observations in Quattro's existing C&D Waste Recycling site on Lionel Road, London. Noise from the picking stations mostly comprise impulsive sounds from small size waste being dropped from a height to metallic containers located directly underneath each picking station.

The proposals include enclosure and screening for most of the activities, and all stock bays will be covered and screened. The 3.5m solid boundary wall surrounding the application site on the Northern and Western boundary will also provide additional acoustic screening to the sources of noise generated within the site which are not enclosed by the structures detailed above.

The concrete mixing building will be cladded, and therefore has been modelled as a sound radiating building (walls and roof), based on the source measurements undertaken at Quattro's existing CBP site on Lionel Road South, Brentford. The building fabric of the concrete mixing building (walls and roof) will be a single sheet steel, the sound reduction performance for this material is presented in Table 9.

Table 9: Sound Reduction Index for Concrete Mixing Building fabric (dB)									
Item	Frequency (Hz)								R _w
	63	125	250	500	1k	2k	4k	8k	
Single sheet steel cladding	12	14	15	18	18	18	18	20	19

Seven lorries idling have been modelled as point sources distributed across the HGV on-site vehicle parking area, assumed to operate during part of the daytime period. One front-end loader has also been modelled as a point source providing service to the CBP. Further to all the above, a cement tank truck and a truck pumping cement into a Silo have also been modelled as point sources, based on our source measurements at Quattro's existing CBP.

Several internal HGV movements have been modelled within the site as line sources to characterise the C&D waste delivery, transport to the CBP area and any additional in/out trips as detailed in Section 3.5 of the report. Total HGV daily movements have been used as a worst-case (181 associated with the WRF operations and 80 with the CBP operations), split over the potential 24-hours period that the development will be operating.

Worst-case operating percentages are shown in Table 10 according to the BS4142-assessment periods (1 hour for the daytime, 15 minutes for the night-time). Operating profiles of the different parts of the plant have been taken into account based on the observations taken on site during our visits to the existing Quattro's sites and confirmed with conversations with the developer at planning stage for the consented site. The developer has informed that the proposed site will continue operating under the same conditions.

The conveyors will be covered and therefore an attenuation of 10 dB have been applied for the sound data in tables above.

Table 10: Development Operating Profile			
Part of the site	Element	Operating time over assessment period	
		Day (1 hour)	Night (15 min)
WRF	Screen and conveyor	100%	Considered as Daytime Only
	Trommel	100%	Considered as Daytime Only
	Mobile dust suppression system	100%	Considered as Daytime Only
	Debris catcher	100%	Considered as Daytime Only
	Conveyor	100%	Considered as Daytime Only
	Front end loader into waste screen	50%	Considered as Daytime Only
	Dump truck tipping fill	50%	Considered as Daytime Only
	Lorry moving	50%	50%
	Dust Suppression System	100%	Considered as Daytime Only
CBP	Concrete Mixing Building and truck being loaded at loading bay underneath	100%	100%
	Truck unloading cement into silo	50%	50%
	Conveyor	100%	100%
	Hopper mixer	100%	100%
	Lorry moving	100%	100%
	Front end loader into hopper	50%	Considered as Daytime Only

5.2 Operational Noise Assessment

5.2.1 Operational Noise Assessment on Residential Receptors

The impact of noise from the operation of the development has been assessed in accordance with BS 4142, based on a comparison between the predicted $L_{A_{r,Tr}}$ rating sound levels from the development operation with the measured $L_{A90,T}$ background sound levels at the closest noise-sensitive residential receptors in the vicinity.

BS4142 advises that when the noise contains a tonality, impulsivity, intermittency and other sound characteristics, that a correction depending on the extent of the aforementioned characteristics of the sound is added to the specific noise level to obtain the $L_{A_{r,Tr}}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in noise measurements, data and calculations can also be applied when necessary. It also advises that the assessment of the significance of sound needs to take into account the context in which the sound will occur.

The predicted noise levels and associated impact at the nearest NSRs, due to the operation of the development are presented in Table 11. In line with BS4142, values have been rounded to the nearest whole number. The assessment has not considered any character corrections for the calculation of the $L_{A_{r,Tr}}$ 'rating sound level', given that the predicted levels at all NSRs do not show any tonal component, and intermittency or other acoustic features are not considered to be discernible at the nearest residential receptor (R1 – Convent Way).

Table 11: BS 4142:2014 Assessment					
Position	Period	Rating Level $L_{A_{r,Tr}}$ (dB)	Background $L_{A90,T}$ Sound Level (dB) within planning Noise Assessment	Excess of $L_{A_{r,Tr}}$ (dB) above background	BS 4142 Significance of Sound (depending on context)
R1 – Residential receptors on Convent Way	Day time (07:00 – 23.00)	45	46	-1	Indication of Low Impact
	Night-time (23.00 – 07.00)	37	40	-3	Indication of Low Impact

As can be seen in Table 11 above, the calculated specific noise level due to the operation of the development is predicted to be 1 dB below the measured background sound level at the assessed noise-sensitive receptor during the day and 3 dB below the measured background sound level during the night.

Considering the context, the sound from the development is not expected to change the character of the existing ambient sound, which is already affected by industrial and commercial noise.

In addition to the above, it should be noted that to date the applicant and Hounslow Council have not received noise complaints for the current site operation, and therefore considering the attenuation measures included in the current proposals, is very unlikely that the proposed site will cause a noise impact at the residential receptors in the area.

Based on the above, the predicted sound levels from the development are considered to be an indication of low impact according to BS4142 and would therefore be classified as a No Observed Adverse Effect.

5.2.2 Operational Noise Assessment on Neighbouring Commercial Receptors

Following the request from the Local Authority to include the neighbouring commercial receptors (i.e. Costo Wholesale and Virtus Datacentre) in the noise impact assessment for the consented operation, these elements have also been included in the current assessment.

Virtus Datacentre

The maximum predicted external façade incident noise levels due to Quattro's operations are expected to be 52 dB(A) $L_{Aeq,day}$ (0700-2300) and 50 dB(A) $L_{Aeq,night}$ (2300-0700) at Virtus Datacentre.

It is understood that the building contains offices, and therefore the impact on this type of rooms has been assessed.

British Standard 8233:2014 - Guidance on Sound Insulation and Noise Reduction for Buildings draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions. As part of this document recommendations are given for the internal noise levels which are commensurate with achieving appropriate conditions for study and work within offices and appropriate conditions within rooms requiring speech, telephone communication or rooms used for listening. For executive offices, the recommended internal ambient noise levels for an executive (or single-occupancy) office, range between 35 and 40 dB(A).

It is understood that the Southern façade of the building is a fully sealed façade, based on a cladding system, thermal double-glazed windows and mechanically ventilated rooms, there are no operable elements overlooking to the proposed development. As such, the composite sound reduction performance of such façade is expected to be well in excess of 15 dB typically assumed for an open window and, as such, the internal ambient noise levels in the Virtus office areas due to the development are expected to comfortably comply with the recommended noise levels in BS8233.

Costo Wholesale

It is understood that Costco Wholesale warehouse comprises an opticians and a hearing centre located in the South-Eastern corner of the warehouse. These activities are understood to be the most sensitive to noise and have been considered within this assessment. The two dedicated spaces are independent from the warehouse's external structure and both hearing centre and opticians walls are based on basic plasterboard constructions. The hearing tests are undertaken in an audiometry cabin, designed to provide quiet noise conditions therein. The warehouse building is considered to provide significant sound reduction, and the existing noise conditions within the warehouse are not considered as very quiet.

Based on all the above and the maximum predicted external façade incident noise levels due to Quattro's operations, which are expected to be 64 dB(A) $L_{Aeq,day}$ (0700-2300) at Costco Warehouse South-Eastern corner, the estimated internal ambient noise levels in both eye test room and audiometry room are expected to be well below the 30 dB(A), which is the lowest ambient noise levels recommended in BS8233: 2014 for rooms with good listening requirements.

Office Building on Southall Lane

The closest office building to the East to the development has also been assessed. The sound measurements undertaken at MP2, close to the existing office building show that current sound levels affecting the building are already high. In order to evaluate the impact of the new development operation in the existing office building, a relative change in ambient noise level assessment has been undertaken at the Southall Lane office receptor (R2). The assessment has only been undertaken at daytime since the existing offices are not expected to be used at night.

Table 12: Relative Change in Ambient Noise Level Assessment - Daytime					
Receptor	Measured Ambient Sound Level $L_{Aeq,T}$ (dB)	Predicted Specific Sound Level $L_{Ar,Tr}$ (dB)	Predicted Future Ambient Sound Level $L_{Aeq,T}$ (dB)	Change in ambient noise level	Impact Significance
R2 – Southall Lane (offices)	73.5	58	73.6	0.1	Negligible

Our calculations show that the development is likely to have a negligible impact on the future ambient sound levels at the office receptor on Southall Lane.

In addition to the above, it should be noted that the inclusion of the enclosures, screened areas, and the proposed concrete wall, has reduced the noise levels in the surrounding area in relation to the original consented site, helping to contain the higher noise levels within the site, and reducing the noise breakout in the areas surrounding the site.

6 Conclusion

MLM Consulting Engineers Ltd have been appointed by Quattro UK Limited (Quattro) (the 'Applicant') to undertake a noise assessment to support a new planning application for retention of the structures 'As Built' for the Construction and Demolition (C&D) Waste Recycling facility and Concrete Batching Plant (CBP) (the 'proposed development'), at land to the west of Southall Lane and to the north of the M4 motorway in Hayes, London, and retention of the plant on site to December 2027.

The current proposals include the mitigation measures stated in Planning Condition 9, applied to Decision Notice 01032/E/P44 from London Borough of Hounslow for the site.

The assessment is based on the results of a background sound monitoring exercise, carried out to determine the existing sound climate at the nearest noise-sensitive receptors to the proposed developments at the consented site planning stage in June 2016.

The assessment has considered noise from the plant associated with the WRF and the CBP, including the breakout noise from the WRF Tipping building and noise breakout from equipment running within the concrete mixing plant structure. On-site vehicle movements associated with the operation of the development have also been modelled, based on the operating capacity of the consented site and recent transport surveys. The predictions take into account the physical form of the proposed buildings and the topography of the surrounding area.

The noise model has been populated with characterisation measurements undertaken at two existing sites owned by Quattro and of similar nature within the consented planning stage report.

The BS4142 assessment indicates that the operation of the plant associated with the proposed development will not exceed the measured background sound level at the nearest and most exposed residential receptors, during both daytime and night-time periods. This is considered to be an indication of low impact and would therefore be classified as a No Observed Adverse Effect.

The lack of noise complaints for the current site operation received by the applicant and Hounslow Council, support the fact that considering the additional attenuation measures included in the current proposals, it is very unlikely that the proposed site will cause a noise impact at the residential receptors in the area.

The assessment has also shown the low impact at the nearby commercial units close to the site.

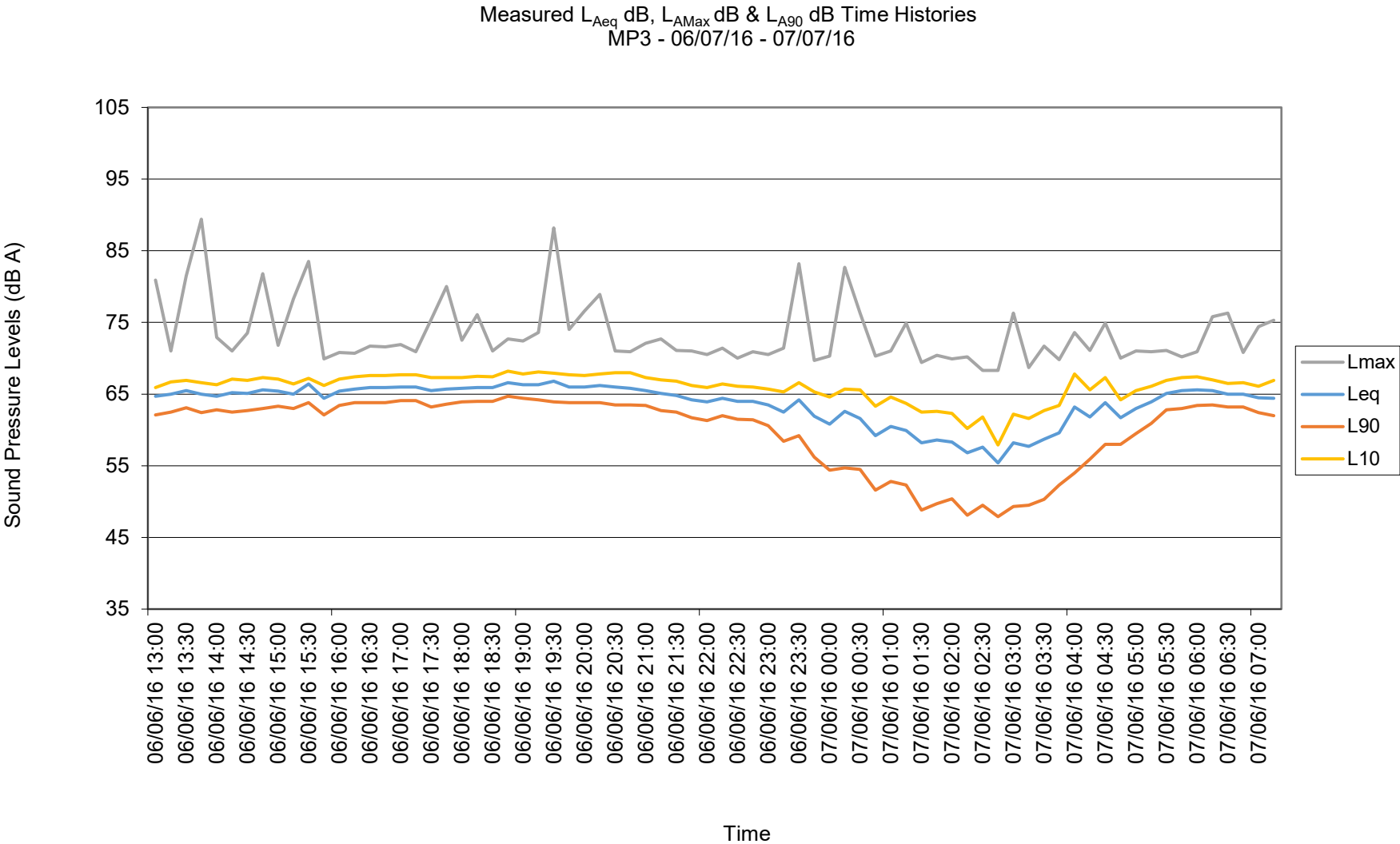
It has been observed that the inclusion of the mitigation measures in the current proposals (enclosures, screened areas, and the proposed concrete wall), has reduced the noise breakout in the surrounding areas in relation to the original consented site.

Appendix A - Glossary of Acoustic Terminology

Wording	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of $20\mu\text{Pa}$ (20×10^{-6} Pascal's) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1 / s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

Appendix B - Long Term Measurements Results

Time History of Long-term Measurement (MP3)



Appendix C - Noise Maps

Noise Map at 1.5m high – Daytime Operations



Noise Map at 1.5m high – Night-time Operations



Appendix D - Manufacturer's Plant Noise Emission Data

Sandvik QE141 Screen

Operator's manual - 1 Safety

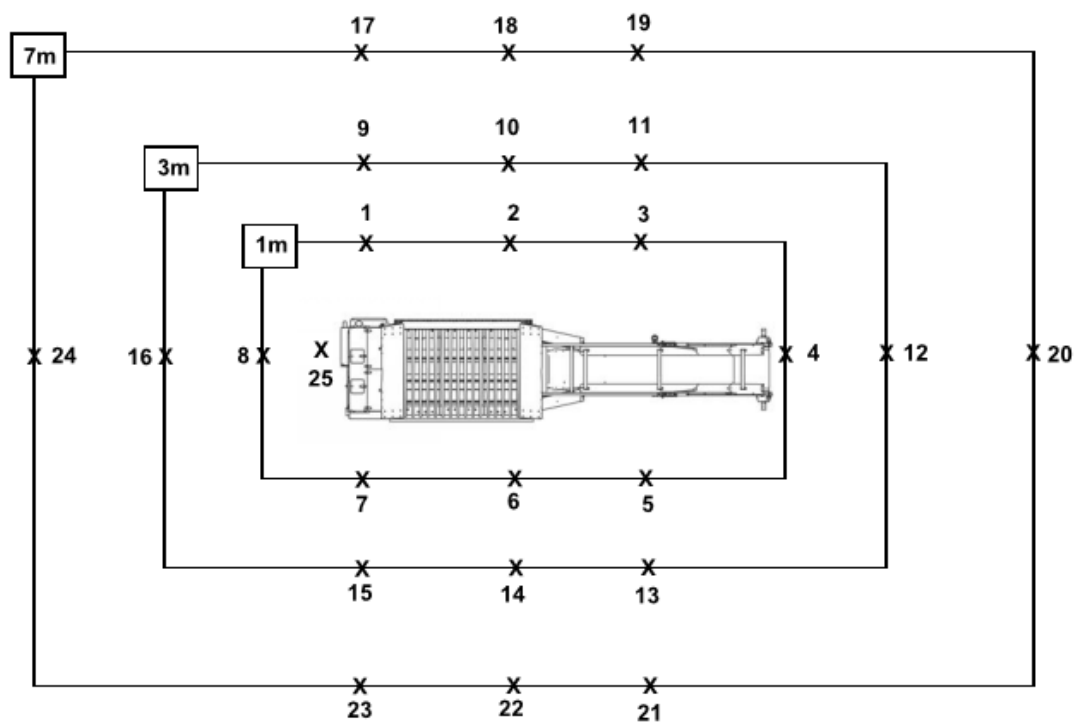
QE141

1.12 Measured noise levels



NOISE HAZARD

Ear protection **MUST** be worn if you are within 10m (33ft) of the machine when the engine and other parts of the machine are running.



The indicated measured noise levels are at 1m (3.5ft), 3m (9.8ft) and 7m (23ft) using a Casella CEL-244 [Type 2] meter with an empty machine all systems running situated in an open area with minimum reflective surfaces and structures.

Note that product processing and local conditions will have an affect on the noise levels experienced.

Ref	Background Average Noise Level (L _{aeq}) [dB]	Machine Running Average Noise Level (L _{aeq}) [dB]
1	54	92.3
2	54.7	83.7
3	56.5	80.9
4	55.4	77.4
5	54.2	77.9
6	55.7	80.8
7	54.8	84.9
8	56.3	94.2
9	54.5	92.3
10	52.1	85.4
11	53.3	79.6
12	54.5	75.6
13	54.6	76.6
14	53.3	80.4
15	55.3	81.1
16	53.3	88.6
17	54.2	86.7
18	53.0	84.8
19	52.6	80.3
20	54.6	73.1
21	54.7	74.8
22	55.4	76.7
23	55.8	78.7
24	51.8	82.6
25	55.5	96.9



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