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Mekatek Ltd

Rhymney, Wales

Environmental Noise Impact Assessment

29 August 2017

PROJECT:	Mekatek Ltd Rhymney, Wales Environmental Noise Impact Assessment
CLIENT:	Sol Environment Ltd No.7 Greenway Farm Bath Road Wick Bristol BS30 9RL
DOCUMENT REFERENCE:	P1752-REP01-REV A-BDH
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DATE:	29 August 2017

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1.0 INTRODUCTION

Sol Acoustics Ltd (Sol) has been commissioned by Sol Environment Ltd (SE) to conduct an environmental noise assessment to establish the noise impact resulting to the surrounding environment, as arising from the defined, worst case operation of the existing Mekatek Limited industrial premises site, which is located off St Clare's in Rhymney, Wales. Specifically, the objectives of this assessment are as follows:

- To identify the nearest noise sensitive premises to the site (i.e. receptors), which are most likely to be potentially affected by environmental noise arising from plant and/or processes associated with the Application Site during the proposed operating periods (e.g. daytime and night-time periods).

- To determine the prevailing daytime and night time background noise climate at the nearest receptors.

- To identify all existing and significant noise sources at the site, such as specific fixed processing plant and machinery as well as noise generated from external HGV movements.

- To obtain suitable source noise level data for the identified significant noise sources at the Application site.

- To calculate the resultant environmental noise contribution and impact arising at the nearest noise sensitive receptors to the site during daytime and night time periods taking factors such as distance to receptors, acoustic screening and other environmental features into consideration.

- To carry out an environmental noise assessment of the proposed development in accordance with the methodology prescribed in relevant Standards and guidance (i.e. British Standard 4142: 2014) to determine the significance of the potential noise impact generated.

2.0 DESCRIPTION OF SITE

2.1 General Site Overview and Noise Sensitive Receptors (NSRs)

The Site is located on St Clare's, just off Wellington Way in Rhymney, Wales. The site is currently in use by Mekatek Ltd, although the site is not currently permitted to operate during overnight periods.

The site itself is located within the Maerdy Industrial Estate (Unit C) and as such boarders with other existing and operational industrial premises directly to the north and west. There is a commuter railway line located along the western site boundary. Currently on the site are the existing industrial buildings and industrial equipment as operated by Mekatek.

The nearest noise sensitive premises to the site are as follows:

- Two-storey residential premises located approximately 25m to the on the east of Mekatek site boundary, as on the opposite (east) side of Wellington Way.

- The single storey Maerdy House adjoining the eastern site boundary (but to the south east of the Mekatek processing building), as located on the near (west) side of Wellington Way.

- Single storey residential premises located approximately 30m to the south of the Mekatek site boundary, as on the opposite (south) side of St Clare's.

With regards to the existing site topography, based upon site observations in the absence of formal topography mapping data specifically for the immediate site, the topography of the Mekatek site was observed to be generally flat. Just to the east of the site there is a steep c.6m high embankment. The residential premises located on Wellington Way are located on the top of the embankment and as such overlook the Mekatek Industrial site. Based upon site observations, the nearest residential premises on Wellington Way have direct line of sight of the roof of the Mekatek processing building, but not the building walls.

Figure 1 below indicates the proposed location of the Development in relation to the nearest noise sensitive premises as well as the location of the four noise monitoring positions used to inform the assessment (as discussed in Section 3.0 of this report).

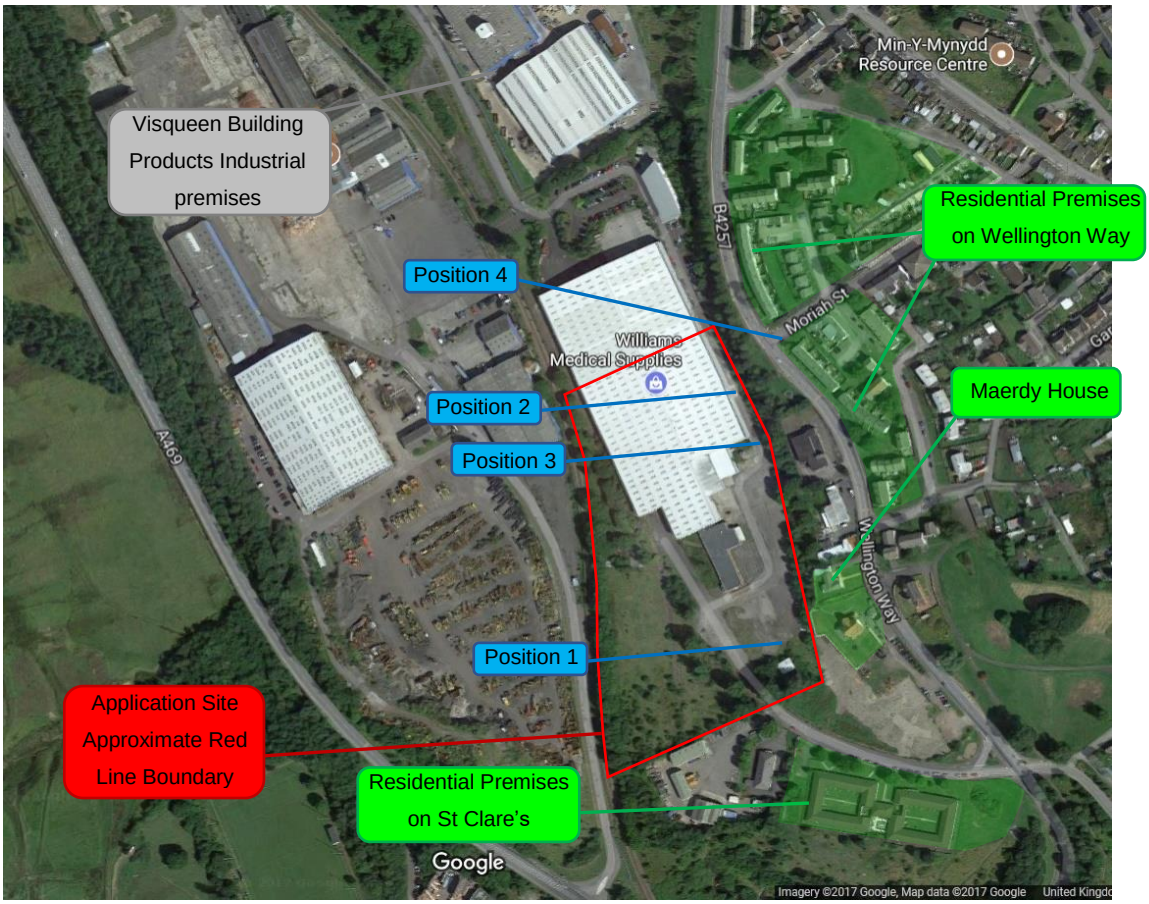


Figure 1: Site and surrounding areas, receptors and noise monitoring locations

2.2 Characteristics of the Installation

2.2.1 Overview of the Site

The purpose of the installation is to process and recycle used electrical goods and plastic waste. The waste facility is designed to accept 30,999 tonnes per annum of mixed recyclable material. The activities on site include the receipt of various types of solid wastes, their separation, segregation and processing into various grades for recycling via the use of mechanical plant and/or manual sorting.

The site is currently not permitted to operate during overnight periods, but, subject to Regulatory approval, the site is proposing to operate 24 hours a day.

There are three main buildings located on the site, which are discussed below:

- **Processing Building**: All fixed installation recycling processes are conducted within this single building. The building is 8.8-metre-high (at apex), and is located to the north of the site. The industrial building houses all of the existing industrial plant and processes.

  With regards to the building construction, this comprises of a profiled steel, double skin structure. External walls are typically constructed from lightweight insulated cladding panels, with a c.1-metre-high masonry push wall along the east façade.

  The roof is also of an insulated, lightweight metal profiled cladding panel type, complete with rooflight panels. There are a number of roller shutter access doors, personnel doors and ventilation louvres located on the various facades of the building.

  HGVs access the Processing Building via the roller shutter located on the east façade of the south annex. The roller shutter is typically left open for convenience during the day to permit for HGV movements when required but will be closed daily from 16:30 to 07:00 to reduce the noise impact from the internal processes on nearby residents.

- **Office**: The office building adjoins the Processing Building to the south and provides staff welfare facilities, offices and meeting room accommodation. The office building is c.4 metres high and is located to the south of the processing building. There are no significant environmental noise sources associated with the Office Building,

- **Ancillary Building**: The ancillary building is c.3 metre high and located to the south of the site. It is currently not used by Mekatek and there are no noise sources associated with this building.

In addition to the three buildings on site there an external covered storage area adjoining the Processing Building, an external uncovered storage along the eastern boundary of the site, a HGV weighbridge and access road located just south of the office building and staff carparking areas. The location of the above are shown in Figure 3.

2.2.2 Internal Site Operations

With regards to the processing plant, the following machinery operate within the Main Processing Building:

- Rotorshredder
- Stokermill
- Green Dragon shredder
- Ulster Engineering granulator
- Small air compressor

In addition to the above, small scale fork lift trucks (FLTs) are used to transfer both processed and unprocessed waste to required work stations (the specific tonnage of the FLTs ranges from c.1.5 tonnes to c.3.5 tonnes). The current internal floor plan and plant layout of the Processing Building is as shown in Figure 4.

2.2.3 External Site Operations

With regards to external site operations, there are currently no plant or specific production processes which operate externally. There is no external ventilation equipment, exhaust stack or other fixed machinery associated with the development.

In terms of deliveries, there are up to two HGV deliveries per day; these occur during daytime periods only, restricted, by Planning consent, to between 07:00 hours and 16:00 hours. The HGVs arrive via the south site entrance, and proceed to the Processing Building via weighbridge. The HGVs are unloaded within the industrial unit.

Once ready for despatch, the HGVs turn around within the industrial building (thus avoiding reversing occurring externally of the building) and exit the building by the same roller shutter access on the east façade. The HGVs then exit the site via the south site entrance and weighbridge.

In addition to HGV deliveries, there is also an external site storage area to the east of the site used to store surplus waste skips. Skips would only normally be stored in this area when they cannot otherwise be stored within the Processing Building next to the required work station. Sol understand through discussions with Mekatek that the storage area is infrequently used.

As a typical worst case, skips would be stored and moved to/from this area up to 2-3 times per week. Sol understand that the skips would only be taken to/from the Processing Building and would not be taken directly off-site from this area. Based upon Sol Acoustics' site observations, HGVs are used to pick up / drop off storage skips. HGVs are typically fitted with reversing bleepers and this can be heard whilst the skips are being moved.

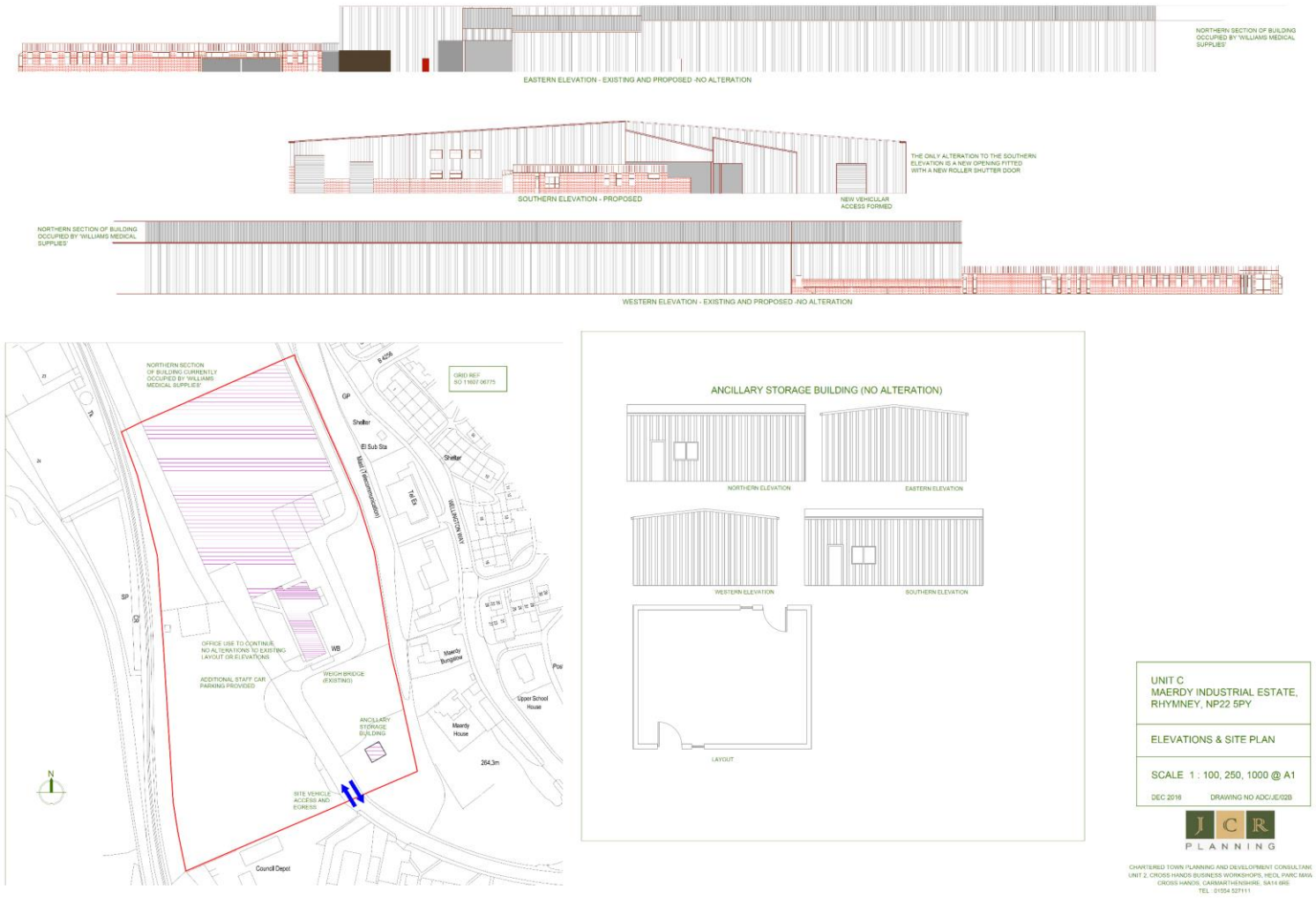


Figure 2: Existing site layout and elevations

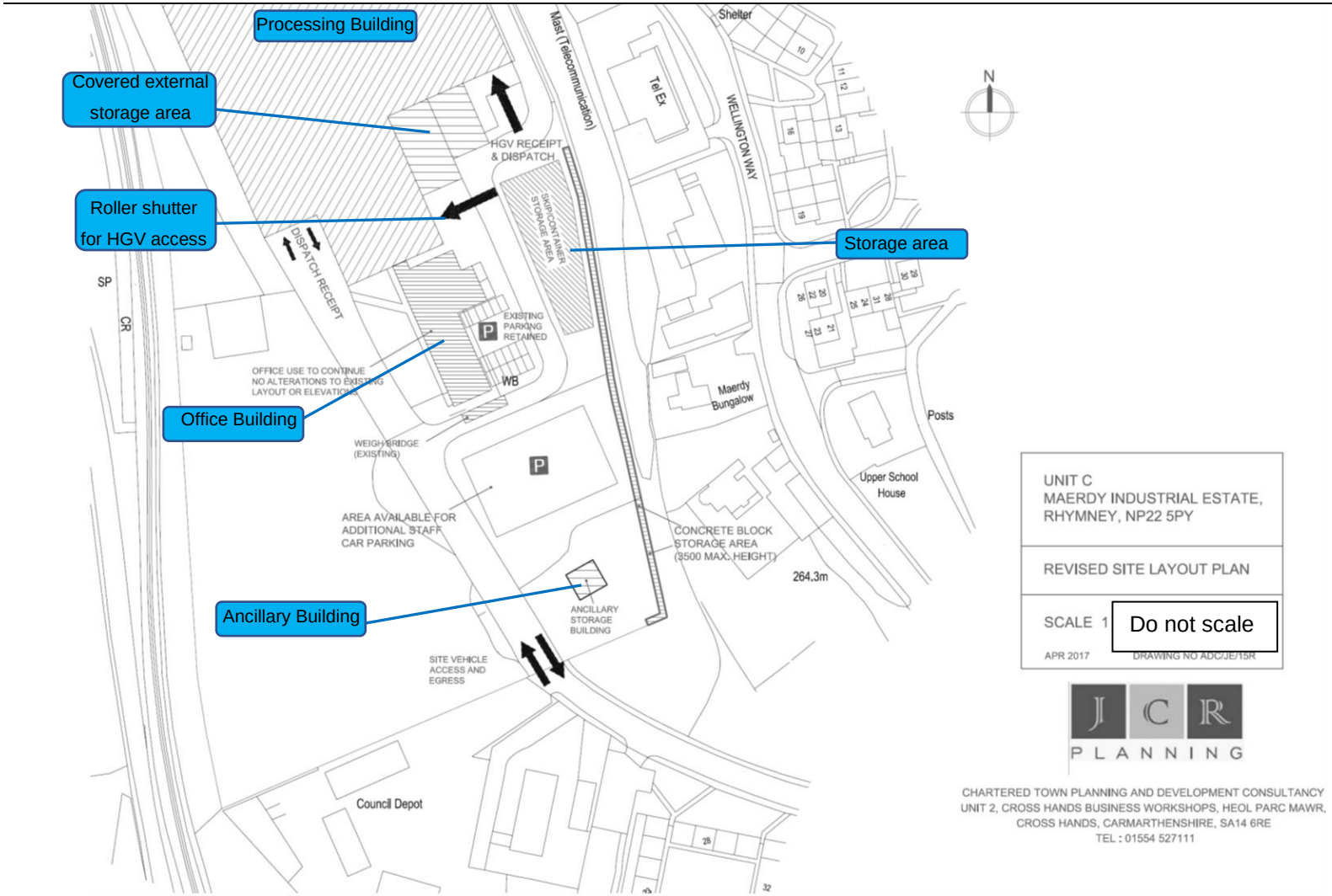


Figure 3: Detailed site layout

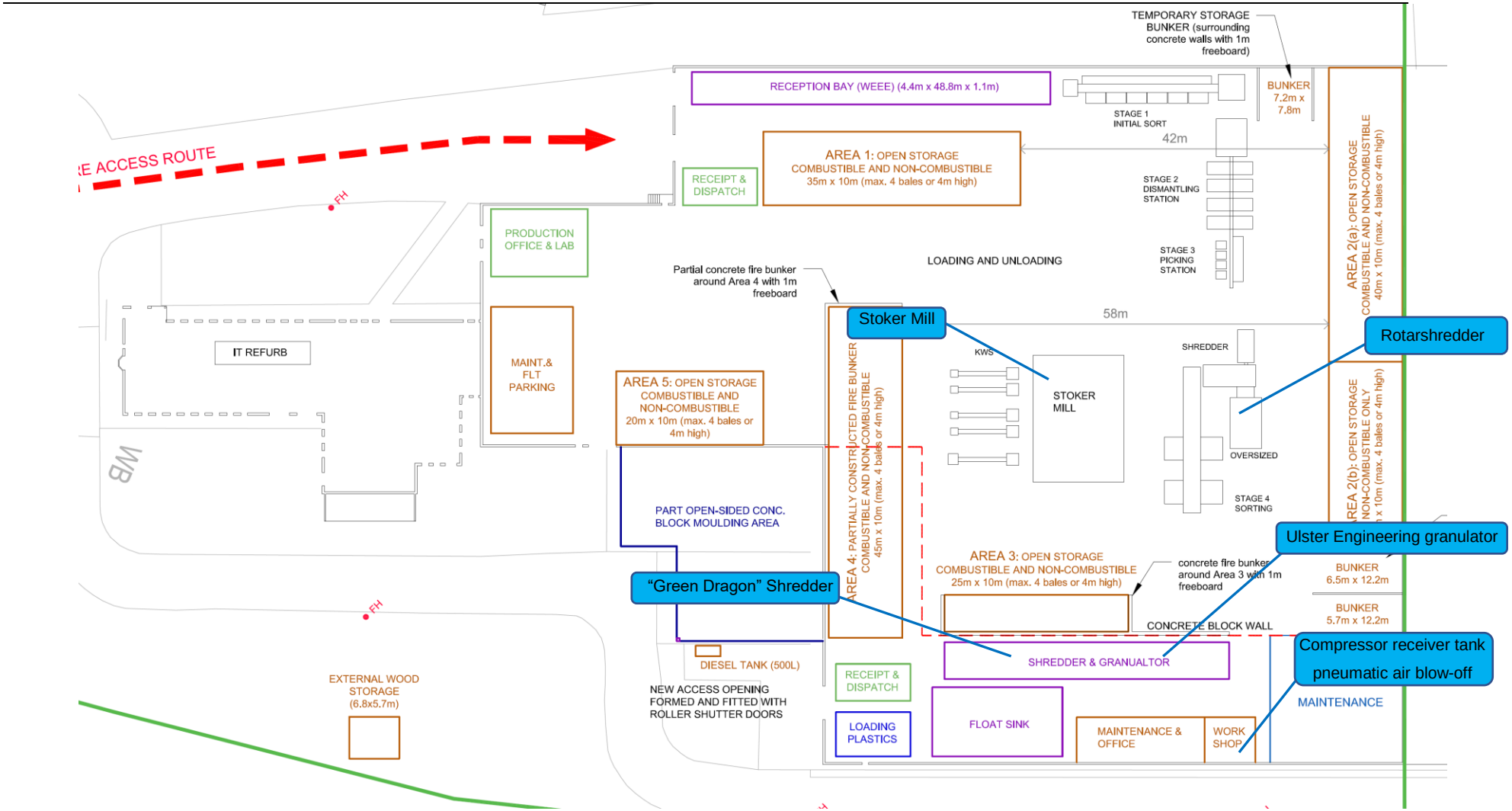


Figure 4: Existing Processing Building site layout

3.0 DETAILS OF INVESTIGATION

In order to inform the assessment, an environmental noise survey have been conducted by Sol between 1 August to 10 August 2017. The purpose of these measurements was to determine the prevailing environmental noise climate expected at the nearest noise sensitive premises to the Application Site as well as to determine the noise level emissions generated by the existing plant and processes associated with the site.

3.1 Survey Methodology

The potential impact from the site has been determined in accordance with British Standard BS4142: 2014: *Method for rating and assessing industrial and commercial sound*. In order to inform the assessment, it is necessary to determine the existing background noise levels expected at each of the identified noise sensitive premises: namely the residential premises on Wellington Way, at Maerdy House and on St Clare's (refer to Figure 1 for further details).

The existing background noise levels expected at the residential premises located on St Clare's and at Maerdy House have been determined based upon the results of a continuous environmental noise survey conducted towards the south of the Mekatek site (namely Position 1, refer to Section 3.2 for further details) between 1 August to 10 August 2017.

Based upon a review of the site and the surroundings, it was determined that there was not an appropriate location on or off site in which to securely install and leave unattended noise monitoring equipment for the purposes of determining the existing environmental noise levels expected at the noise sensitive receptors located on Wellington Way. Therefore, the background noise levels expected at this noise sensitive receptor have been detained based upon the results of a fully attended sample noise level measurements (namely Position 4, refer to Section 3.2 for further details) conducted during a typical weekday night-time period on Thursday 10 August 2017.

In order to assess the potential noise impact from the development site, Mekatek were granted permission to operate for a single night time period only in order to assist Sol with the noise impact assessment.

Night-time operations commenced at approximately 22:00 hours on Wednesday 9 August and ceased at approximately 02:00 hours on Thursday 10 August 2017. During this time Mekatek were asked to operate a “worst case” night-time shift pattern but, at specific periods, Sol requested that all site operations temporarily cease, in order that a qualitative and quantitative comparison of the noise as arising from the development operating in worst case conditions, as compared to the pre-existing background noise climate at the nearest noise sensitive premises, with no plant operation, could be made.

Specifically, the following observations were made regarding the operation of the site. Note that the specified periods exclude the transition time it takes for the equipment and processes to fully switch on and off:

- *22:07 – 23:49 hours – Mekatek operating a worst case night-time shift*
- *00:03 – 00:19 hours – Mekatek operations cease*
- *00:26 – 01:02 hours – Mekatek operating a worst case night-time shift*
- *01:09 – 01:30 hours – Mekatek operations cease*
- *01:36 – 01:47 hours – Mekatek operating a worst case night-time shift*

During the period between 22:07 and 23:49 hours, a series of sample noise measurements were undertaken within the Processing Building, in order to determine the general reverberant noise levels generated during worst case night-time operations, whilst simultaneously monitoring the corresponding, resultant Ambient noise levels at fixed external noise monitoring location (namely Position 2, refer to Section 3.2 for further details), as located directly outside the Processing Building along the east façade.

The purpose of these simultaneous measurements was to provide a means for directly assessing the actual achieved sound insulation performance provided by the existing external building fabric of the Processing Building (for the purposes of noise modelling and prediction to off-site receptors, refer to Section 6.2).

At Sol’s request, all Mekatek operations ceased between 00:03 hours and 00:19 hours, and again between 01:09 hours and 01:30 hours. During these periods, the resultant residual noise levels (i.e. the noise climate as occurring entirely due to other *non Mekatek* environmental noise sources) were measured at site boundary monitoring locations (Position 2 and Position 3), as well as at receptor locations also (Position 1 and Position 4, the latter being attended throughout, as this is the more critical noise sensitive receptor in closer proximity to the plant).

Conversely, the resultant ambient noise level (i.e. the environmental noise as arising from the operation of all Mekatek plant and processes, as well as all other non-Mekatek noise sources also, such as cars and other nearby plant/commercial premises) was similarly measured at the site boundary and receptor locations during 00:26 hours to 01:02 hours, and 01:36 hours to 01:47 hours also, thereby allowing a direct, quantitative comparison to be drawn between the recorded “all plant off” (residual and background noise) vs. “all plant on” (ambient noise), for environmental noise impact assessment purposes.

During the survey, no observable levels of vibration were observed external to the site.

3.2 Noise Measurement Positions

The environmental noise survey consisted of four separate fixed continuous noise monitoring positions as well as a series of attended sample measurements. A description of the noise measurements undertaken is provided below:

- **Noise Measurement Position 1**: this monitoring location was sited at the southern boundary of the site towards the existing but unused ancillary building, and was installed at a height of approximately 1.5 metres above local ground level.

  Unmanned, continuously logged environmental noise data was obtained on a 24-hour basis from 1 August until 10 August 2017. The primary purpose of the noise measurements at this position was to determine the pre-existing background noise level at a location which is considered to be representative of the nearest noise sensitive premises on St Clare's and at the rear of the Maerdy House residential property that is located on the west side of Wellington way, as positioned to the south of the site.

- **Noise Measurement Position 2**: this monitoring location was sited approximately 8.5 metres to the east of the Mekatek Ltd industrial building, and installed at a height of approximately 1.5 metres above local ground level.

  Noise levels at this position were monitored continuously from approximately 15:00 hours on Wednesday 9 August until approximately 12:15 hours on Thursday 10 August 2017. Noise measurements at this position were largely unattended for the duration of the survey; the purpose was to determine the degree of noise egress as occurring from the external cladding specifically on the east façade of the Mekatek Processing Building, as during known, specific plant and machinery operations.

- **Noise Measurement Position 3**: this monitoring location was sited on the eastern site boundary of the site; the microphone height was approximately 6 metres above local ground level.

  The noise levels were monitored continuously from approximately 16:00 hours on Wednesday 9 August until approximately 12:30 hours on Thursday 10 August 2017. This measurement position had direct line of sight of the roller shutter located on the east façade of the southern annex of the Processing Building and as such was exposed to the direct noise level contribution from the plant within the processing building via the open roller shutter. The results of the noise measurements conducted at this position have been used in order to determine the noise level contribution as arising from Mekatek Processing Building via the open roller shutter.

- **Noise Measurement Position 4**: this offsite noise monitoring location was sited in close proximity to 1 Wellington Way; specifically, the microphone was positioned approximately 3.5 metres from the front façade of the house (in “free field” conditions), at a microphone height of 1.2 metres above local ground level.

  Noise measurements were fully attended at all times, and these were undertaken from approximately 00:25 hours until 02:00 hours on Thursday 10 August 2017.

- **Sample Noise Measurements**: various specific, short-sampled noise measurements were undertaken in addition to those described above for the various static monitoring locations. These included (but were not limited to) short-sampled noise measurements of the reverberant noise level within the Processing Building (including main production and “plastic lines”), localised noise egress assessment from specific, selected elements of the Processing Building external building fabric (such as louvres and doors), HGV movements on site etc.

All noise monitoring equipment was Type 1 Precision Grade, and the complete measuring systems were field calibrated immediately prior to, and following the noise survey period. (Full details of the noise monitoring systems are retained on file by Sol, including traceable calibration records; these are available for review if needed).

Metrological data was recorded at Position 3. During the observed measurement period, the prevailing weather conditions remained favourable for the purposes of environmental noise assessment throughout the entire survey period, with a light breeze (5m/s gust speed or lower) and no rain occurring.

Further details are provided in Appendix A, including automatically logged weather conditions. Notwithstanding the weather conditions recorded, the microphone systems were entirely weatherproofed and fitted with all-weather environmental windshields and bird spikes.

4.0 NOISE SURVEY RESULTS SUMMARY

4.1 Background Noise Climate

4.1.1 St Clare's and at Maerdy House Background Noise Climate (Position 1)

The results of the continuous unattended environmental noise measurements at Position 1 have been used to determine the prevailing background noise level at the existing residential premises to the south of the site on St Clare's and at Maerdy House to the east of the Application Site.

Table 3 provides a basic summary of the typical overall, A-weighted noise levels measured at Position 1, in L_{Aeq} and L_{A90} terms, during daytime and night time periods, weekdays and weekends. The measured noise levels pertinent to the BS4142: 2014 environmental noise impact assessment are highlighted in ***bold, italic*** text.

Date	Daytime (07:00 - 23:00)		Night Time (23:00 – 07:00)	
	dB, $L_{Aeq,16hour}$	**dB $L_{A90,15min}$ (Typical)**	**dB, $L_{Aeq,8hour}$**	**dB $L_{A90,15min}$ (Typical)**
Tuesday 1 August 2017	48*	42*	43	35
Wednesday 2 August 2017	51	***44***	48	39
Thursday 3 August 2017	55	47	42	***34***
Friday 4 August 2017	48	***44***	41	***34***
Saturday 5 August 2017	49	***44***	40	***34***
Sunday 6 August 2017	45	41	42	36
Monday 7 August 2017	48	42	39	31
Tuesday 8 August 2017	48	41	44	38
Wednesday 9 August 2017	51	48	44	39
Thursday 10 August 2017	48*	43*	-	-
***** Measurement not conducted for the full 16-hour assessment period				

Table 1: Summary of typical, measured environmental noise levels at Position 1

4.1.2 Wellington Way Background Noise Climate (Position 4)

The results of the short term attended environmental noise measurements at Position 4 have been used to determine the existing background noise level at the existing residential premises to the east of the site, along Wellington Way:

Start Time, hh:mm:ss	Duration, hh:mm:ss	Broadband A-weighted Residual Noise Measurements		
		dB, $L_{A90,5min}$	dB, $L_{Aeq,5min}$	dB, $L_{AFmax,\ 5min}$
01:08:26	00:05:00	42	44	49
01:13:28	00:05:00	43	44	48
01:18:31	00:05:00	43	52	69
01:23:33	00:05:00	43	48	68
01:28:35	00:00:53	43	54	68

Table 2: Summary of typical, measured environmental noise levels at Position 4

It can be seen from Table 2 that the background noise levels ($L_{A90,5min}$) are very consistent at c.43dB $L_{A90,5min}$ for the duration of the background noise measurements. The ambient ($L_{Aeq,5min}$) and maximum ($L_{Amax,5min}$) noise levels vary at this receptor location, but this was mainly due to noise from passing cars on Wellington way and Moriah Street.

It was observed during the attended measurement at that this position that the background noise climate was dominated by existing industrial noise from the Visqueen industrial site located to the north of the development (the location of this premises is identified in Figure 1). The noise from the Visqueen industrial site was observed to be slightly tonal but constant and unvarying.

4.1.3 Background Noise Summary

Based upon the results of the environmental noise survey, Table 3 presents a summary of the typical weekday daytime and weekend daytime background noise levels which shall be used to form the benchmark for the environmental noise assessment:

Measurement Position	**Associated Residential Premises**	**Assessment Period**	**dB $L_{A90,15min}$ (Typical)**
1	St Clare's (south of development site) and Maerdy House (east of development site)	Daytime (07:00 - 23:00)	44
		Night-time (23:00 – 07:00)	34
4	Wellington Way (east of development site)	Daytime (07:00 - 23:00)	43
		Night-time (23:00 – 07:00)	43

Table 3: Benchmark background noise levels

4.2 Plant Operating (Ambient) and Plant Off (Residual) Noise Measurements

4.2.1 Noise Egress from Non Roller Shutter Door East Façade of the Processing Building (Position 2)

Table 4 presents the "all plant on" (Ambient) sound pressure level as recorded at Position 2. These measurements include the noise contribution from typical processes within the Processing Building on the Mekatek site, but will also include other off-site environmental noise sources:

Start time, hh:mm:ss	Duration, hh:mm:ss	Unweighted Time-Averaged Sound Pressure Level, $L_{eq,T}$ dB @ Octave Frequency Band Centre Frequency, Hz									dB(A)
		31.5	63	125	250	500	1k	2k	4k	8k	
22:07:00	01:42:00	62	61	57	48	44	40	36	31	24	47
00:26:00	00:36:00	63	60	56	49	42	37	34	30	23	46
01:36:00	00:11:00	62	57	51	47	40	38	35	31	24	44

Table 4: "All Mekatek plant on" (Ambient) noise level results at Position 2

Table 5 presents the residual sound pressure level as recorded at Position 2. These measurements were taken in the absence of noise generated from the Mekatek processing plant but include the noise contribution from all other off-site environmental noise sources.

These data are used in conjunction with the ambient noise levels presented in Table 4 to calculate and predict the environmental noise emitted specifically by the Mekatek plant in isolation (the so-called "Specific Level"), for the purposes of assessing the environmental noise impact of the Mekatek plant:

Start time, hh:mm:ss	Duration, hh:mm:ss	Unweighted Time-Averaged Sound Pressure Level, $L_{eq,T}$ dB @ Octave Frequency Band Centre Frequency, Hz									dB(A)
		31.5	63	125	250	500	1k	2k	4k	8k	
00:03:00	00:16:00	51	53	45	41	34	32	27	22	15	38
01:09:00	00:21:00	54	51	43	40	35	29	24	22	15	37

Table 5: "All plant off" (Residual) noise level results at Position 2

4.2.2 Roller Shutter Door East Façade of the Processing Building (Position 3)

Table 6 presents the "all plant on" (Ambient) noise levels measured at Position 3 during a typical working morning on 10 August 2017. Note that these measurements were conducted during the daytime with the roller shutter doors to the east façade of the southern annex of the Processing Building left open:

Start time, hh:mm:ss	Duration, hh:mm:ss	Unweighted Time-Averaged Sound Pressure, $L_{eq,T}$ dB @ Octave Frequency Band Centre Frequency, Hz									dB(A)
		31.5	63	125	250	500	1k	2k	4k	8k	
07:02:03	05:21:10	59	59	52	47	44	43	40	34	32	48

Table 6: "All Mekatek plant on" (Ambient) noise level results at Position 3 (roller shutter doors open)

4.2.3 Wellington Way Noise Sensitive Receptors (Position 4)

Table 7 presents the results of the attended Ambient noise levels as measured at Position 4 on Thursday 10 August 2017. These measurements include the noise contribution from the Mekatek site in addition to noise from other environmental noise sources.

Start time, hh:mm:ss	Duration, hh:mm:ss	Broadband A-weighted Ambient Noise Measurements		
		dB, $L_{A90,5min}$	dB, $L_{Aeq,5min}$	dB, $L_{AFmax,\ 5min}$
00:26:53	00:05:00	44	48	62
00:31:55	00:05:00	44	49	64
00:47:02	00:05:00	44	45	52
00:52:04	00:05:00	44	46	51
00:57:06	00:05:00	44	46	54
01:37:05	00:05:00	44	46	60
01:42:07	00:02:07	44	51	67

Table 7: Broadband A-weighted Ambient noise levels as measured at Position 4

4.2.4 St Clare's Residential Housing and Maerdy House (Noise Sensitive Receptors, Position 1)

Table 8 presents the results of the unattended Ambient and Residual noise levels as measured at Position 1 on 9th and 10th August 2017. The Ambient and Residual noise levels have been determined based upon the known periods of plant operating and plant off:

Start time, hh:mm:ss	Duration, hh:mm:ss	Site Activity	Broadband A-weighted Ambient Noise Measurements		
			dB, $L_{A90,T}$	dB, $L_{Aeq,T}$	dB, $L_{AFmax,T}$
22:07:00	01:42:00	Plant operating (Ambient)	42	45	58
00:03:00	00:16:00	Plant off (Residual)	40	43	53
00:26:00	00:36:00	Plant operating (Ambient)	39	41	49
01:09:00	00:21:00	Plant off (Residual)	38	40	56
01:36:00	00:11:00	Plant operating (Ambient)	37	39	43

Table 8: Broadband A-weighted Ambient and Residual noise levels as measured at St Clare's Residential Housing and Maerdy House, Position 1

4.3 Internal Source Noise Level Measurements

To reiterate, there is no externally mounted plant, including stacks, fans, ventilators located at the Mekatek site. Apart from external HGV deliveries, all site operations and processes occur within the Processing Building. Therefore, this assessment is concerned only with noise break-out from the internal building processes via the external building fabric.

A series of plant noise measurements were conducted within the Processing Building on 9 August 2017. The purpose of these individual noise source measurements was to determine, by direct noise measurement, which items of Mekatek plant generate the highest levels of noise and thus the most significant in respect of potential environmental noise impact. The following notes were made with regards to the operation of the plant during plant noise and reverberant level measurements:

- **Rotorshredder**: variable speed between 250rpm – 1500rpm speed. The Rotorshredder was processing large flat screen TVs. Hand loaded.

- **Stokermill**: Fixed speed machine hand loading. The Stokermill was processing domestic wire.

- **“Green Dragon” shredder**: Fixed speed shredder, hand loaded. The shredder was processing “PP” windscreen washer containers.

- **Ulster Engineering granulator**: Fixed speed shredder, hand loaded. The shredder was processing “PP” windscreen washer containers.

- **Compressor receiver tank pneumatic air blow-off**: This item of plant was unattended and operated automatically. The compressor periodically released air creating a high frequency impulsive hiss.

It should be noted that these measurements will include a so-called “reverberant” noise level contribution from other noise sources (most notably the Rotashredder machine, which is a primary noise source). The results of the internal source noise level measurements are presented in Table 9:

Source	Measurement Distance, m	Unweighted Time-averaged Sound Pressure Level, $L_{eq,T}$ dB @ Octave Band Centre Frequency, Hz									dB(A)
		31.5	63	125	250	500	1k	2k	4k	8k	
Rotashredder trommel (drum)	1	82	81	83	87	90	90	90	89	83	96
Rotashredder, side elevation	3	90	85	81	83	85	88	90	90	86	96
Rotashredder raw materials input chute	1	79	79	84	89	93	92	92	91	85	98
Rotashredder, side elevation	3	90	86	86	90	92	92	93	92	87	99
Stokkermill inlet hopper	1	83	86	88	86	85	83	83	82	76	90
"Green Dragon" plastics shredder	1	80	85	86	86	88	84	81	80	77	90
"Green Dragon" plastics granulator	1	80	84	87	93	101	94	89	88	85	100
"Ulster Engineering" plastics granulator	1	79	81	84	89	91	96	90	93	92	100
"Ulster Engineering" plastics shredder	1	80	80	82	84	87	89	88	89	87	95

Table 9: Internal Mekatek plant source noise level measurements

4.4 General Processing Building Internal Noise Levels

Table 10 presents the results of the measured general, internal (i.e. “reverberant”) noise levels measured within the General Processing Building, as conducted at various locations, with all plant operating at “worst case” conditions. The results from these tests have been used to determine a spatially averaged internal noise level within the Processing Building, for noise egress calculations and 3D noise modelling purposes.

During the reverberant noise level measurements, all of the main plant was operating as previously described (i.e. worst case), and all site mobile plant such as fork lift trucks were also operating within the building.

Start time, hh:mm:ss	Duration, hh:mm:ss	Unweighted Time-averaged Sound Pressure Level, dB $L_{eq,T}$ @ Octave Band Centre Frequency, Hz									dB $L_{Aeq,T}$	dB $L_{A90,T}$
		31.5	63	125	250	500	1k	2k	4k	8k		
22:46:54	00:04:59	82	79	81	86	88	87	87	86	80	93	90
22:52:15	00:04:59	83	80	82	84	86	85	84	83	78	91	86
22:57:19	00:04:50	83	80	82	85	88	87	86	85	79	93	90
23:22:42	00:05:00	78	78	80	84	86	85	84	87	85	92	90
23:27:44	00:05:00	77	76	79	85	86	85	84	86	84	92	86
23:32:46	00:05:00	78	77	80	86	87	86	85	88	86	94	92
23:37:49	00:01:09	77	76	78	86	85	85	84	87	86	93	91
Spatial average		80	78	81	85	87	86	85	86	84	93	-

Table 10: Measured reverberant sound pressure levels in Processing Building

4.5 Noise from External HGV Operations (e.g. Deliveries)

A series of external sample noise measurements were conducted on site on Thursday 10 August 2017 between approximately 12:55 hours and 13:05 hours in order to determine the noise level impact generated by external HGV movements on the site.

Table 11 presents the maximum sound pressure noise levels recorded during a typical HGV pass-by on the site. Table 12 presents the typical time-averaged sound pressure level generated by various external HGV activities on the site.

It should be noted that during the infrequent collection and drop off of skips to the external storage areas, HGV are required to reverse towards the skips. It was noted that the HGV was fitted with a reversing bleeper.

Source	Measurement distance, m	Unweighted Maximum Sound Pressure Level, dB L_{fmax} @ Octave Band Centre Frequency, Hz									dB(A)
		31.5	63	125	250	500	1k	2k	4k	8k	
HGV pass-by	6	71	72	77	74	77	77	75	70	62	81

Table 11: Maximum sound pressure levels generated by a typical HGV pass-by on site

Source	Duration, hh:mm:ss	Unweighted Time-averaged Sound Pressure Level, dB $L_{eq,T}$ @ Octave Band Centre Frequency, Hz									dB(A)
		31.5	63	125	250	500	1k	2k	4k	8k	
HGV traversing weighbridge	00:00:49	75	71	66	62	63	64	63	57	48	69
HGV external skip collection (infrequent)	00:02:36	76	74	71	69	70	70	71	61	52	75
HGV external skip drop-off (infrequent)	00:02:03	75	76	72	73	74	72	69	64	54	76

Table 12: Time-averaged sound pressure level generated by external HGV activities

5.0 ASSESSMENT CRITERIA

5.1 BS4142 Assessment Methodology and Adopted Environmental Noise Targets

In terms of appropriate environmental noise impact, whilst not absolutely definitive, BS4142: 2014 *'Methods for Rating and Assessing Industrial and Commercial Sound'* (BS4142) provides guidance for assessing the magnitude of environmental noise impact as arising from sites of an industrial nature.

The procedure contained in BS 4142 for assessing the likely magnitude of environmental noise impact for a given installation is to compare the measured or predicted noise level from the source in question, the 'Specific Level' immediately outside the noise sensitive premises, with the pre-existing background noise level. Where the noise contains attention attracting characteristics such as tonal, impulsive, intermittent elements, it may be appropriate to apply a correction to the 'Specific Level' to obtain the 'Rating Level'.

BS 4142 states that 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. Typically, the greater this difference, the greater the resulting environmental noise impact:

a) Typically, the greater this difference, the greater the likely acoustic impact.

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

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

d) 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.

It is important to note from the above that the predicted noise impact, as based upon the difference between the Rating Level and the existing background noise level, is stated as being dependant on the context of the specific noise source.

For the daytime, this assessment is carried out over a one-hour period, and over a fifteen-minute period at night. The daytime and night-time periods are defined as occurring between 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

6.0 NOISE IMPACT ASSESSMENT

The noise impact from the Application Site has been determined based upon the results directly obtained noise data, and observations made during the fully attended “plant on” and “plant off” noise measurements. The results of the fully attended have then been used to determine the BS4142-defined Specific Level at the nearest noise sensitive premises during the night-time period.

In addition, a 3D computer based environmental noise model of the complete Application Site, incorporating all internal plant and processes, HGV deliveries and suchlike, and the surrounding areas and receptors *et al*. The 3D noise model outputs have been calibrated to the actual, as measured results of the fully attended noise survey at Position 4.

6.1 Empirically Derived BS4142 Noise Impact Assessment at Receptors

6.1.1 Specific Noise Level (1 Wellington Way Receptor, Position 4)

The actual, BS4142-defined Specific Level as generated from the Mekatek site at the residential premises on Wellington Way has been *directly and empirically* determined simply by subtracting the Residual noise level as measured at noise sensitive receptors with no Mekatek plant or processes running (see Table 2) from the Ambient noise level measured with the Mekatek plant and processes running (see Table 7).

It should be noted that the night time noise level measurements conducted at the 1 Wellington Way noise sensitive receptor (i.e. Position 4) were affected by occasional passing cars. Whilst relatively infrequent, the noise levels generated by a passing car was a significant in terms of *Ambient* and *Residual* noise levels. It can be seen from the results in Table 2 and Table 7 that both the ambient and residual $L_{Aeq,5min}$ vary significant between consecutive measurements for this reason.

Therefore, rather than rely on the $L_{Aeq,5min}$ results obtained at this receptor, it is considered more appropriate to consider the underlying $L_{A90,5min}$ acoustic parameter noise data, not least because all the Mekatek plant and *night time* processes (i.e. excluding any HGV deliveries) are very near continuous and unvarying in nature, amplitude over time, and content (e.g. continuously rotating machinery etc.).

The L_{A90} is a statistical noise parameter that actually represents the quietest 10% of the measurement period, and as such it is entirely unaffected by an occasional, extraneous passing car which might occur once during an entire 5-minute duration noise measurement.

This can be seen from the results presented in Table 2 and Table 7, which indicate very little to no variation in the measured results, in L_{A90} terms, despite the variable presence of passing vehicles on Wellington Way.

Thus, Table 13 presents the predicted resultant Mekatek-only environmental noise contribution at each noise sensitive receptor, albeit as based upon the actual, measured ambient and residual sound level measurements when using the $L_{A90,5min}$ acoustic parameter:

Receptor Location	**Broadband A-weighted Sound Levels in dB $L_{A90,5min}$ terms**		
	Typical Underlying "Ambient" Level	**Typical Underlying "Residual" Level**	**Resultant Underlying "Specific" Level**
Wellington Way (Position 4)	44	43	37

Table 13: Resultant Mekatek-only underlying noise levels in comparison to background noise levels at receptors, in $L_{A90,5min}$ terms

The above resultant, empirically-derived "underlying Specific Level" per receptor, as based on the $L_{A90,5min}$ results, do not take into consideration the potentially varying noise level contribution from the Mekatek site.

The results of the reverberant noise level measurements within the processing building, as presented in Table 10, indicate that there is typically a +3dB difference between the $L_{A90,5min}$ and $L_{Aeq,5min}$ noise measurements. On an empirical basis, then, it would be reasonable to suggest that the same level difference would apply to the true Specific Level at the nearest noise sensitive premises, as arising from the full, worst case operation of the Mekatek site.

Therefore, the true, empirically derived Specific Level expected at 1 Wellington Way (Position 4), as incorporating this +3dB uplift as attributable to overall, time-averaged $L_{Aeq,T}$ internal factory noise levels, as compared to underlying, corresponding L_{A90} noise levels - is 40dB $L_{Aeq,Tr}$.

6.1.2 Specific Noise Level (St Clare's Residential Housing and Maerdy House, Position 1)

The Specific Level expected at St Clare's and Maerdy House, Position 1, has been derived empirically from the results of the Ambient and Residual noise level measurements recorded at this location during the known times of plant operating and downtime, as presented in Table 8.

It can be seen from the tabled data that the noise levels in steadily reduce over time in both $L_{Aeq,T}$ and $L_{A90,T}$ terms, irrespective of site operations (i.e. the measured noise levels reduce at later periods, irrespective of the plant status). This would suggest that the noise climate at this location, in both $L_{Aeq,T}$ and $L_{A90,T}$ terms, is dominated by other non-Mekatek environmental noise sources.

Whilst it is not possible to definitively predict the specific noise level based upon the measured data, it is reasonable to suggest that the Specific Level produced by the Mekatek plant is well below the existing background noise level i.e. circa or 30dB $L_{Aeq,T}$ below (acoustically insignificant).

6.1.3 Subjective Night Time Noise Assessment

In terms of a subjective assessment of the Mekatek late night (c.01:00 hours) noise as arising at nearest receptors with the plant operating in worst case mode, this was just faintly audible and specifically characterised as follows:

- Near continuous, faintly audible background "minor impact" noise from the rotary shredder (whilst processing large TV screens).
- A periodic, very faint "purring" noise was identified which, based upon Sol's experience of the Mekatek processing equipment, is assumed to be associated with the "Green dragon" shredder's granulator unit.
- An intermittent high frequency hiss which is positively identified as the compressor receiver tank pneumatic air blow-off (the plant is located on the east façade within the Processing Building, which is ventilated via an open, non-acoustic timber louvre).

All were subjectively considered to be of low acoustic significance.

BS 4142 states that "… *When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied*."

On this basis, it is considered appropriate to apply a +3dB correction to account for intermittent acoustic character observed from the with the site. The same correction is expected to apply at all identified noise sensitive receptors.

6.1.4 Empirically Derived BS4142 Night Time Noise Impact Assessment at Receptors

Table 14 presents empirically derived, BS4142-defined noise *Rating Level* expected at the nearest noise sensitive receptors, as compared to the existing as measured background noise level.

Based upon the site observations made at receptors it has been considered appropriate to apply a +3dB character correction to the predicted Specific Levels at each noise sensitive receptor location in order to determine the Rating Level:

Measurement Position	Associated Residential Premises	Assessment Period	Predicted Rating Level, dB $L_{Ar,Tr}$	Typical Background Noise level, dB L_{A90}	Difference, dB
4	Wellington Way	Night-time (07:00 – 23:00)	43	43	-
1	Maerdy House and St Clare's	Night-time (07:00 – 23:00)	33	34	-1

Table 14: Predicted noise level impact at the nearest noise sensitive premises

It can be seen from the above that the empirically calculated noise Rating Level as generated from Mekatek site during a *worst case* night-time period are not expected to exceed the existing background noise level at either noise sensitive receptors. In accordance with BS 4142:2014, this is an indication of the Specific sound source (i.e. Mekatek plant as operating in night time mode) having a low impact, depending on the context.

6.2 Desktop 3D Environmental Noise Model and Daytime Assessment

6.2.1 Noise Model Information and Assumptions

In order to further augment the empirical BS4142 noise assessment, as based on directly measured overnight "plant on" and "plant off" environmental noise levels at actual receptors, a 3D computer noise model of the site and surrounding receptors has been constructed using proprietary DataKustik 'CadnaA' Noise Mapping software. The noise model has been generated based upon the following information and assumptions.

(a) The noise model was set up to apply the noise prediction methodology set out in ISO 9613-2: *Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation.*

(b) The model has assumed a base ground absorption of 1. However, areas of hard ground (i.e. for building, large tarmacked areas and roads) have been modelled with a ground absorption of 0.

(c) The model was set to include up to second order reflected noise from solid structures.

(d) The existing land topography of the development site and surrounding area up to and including the nearest noise sensitive premises has been taken into consideration in the assessment. In lieu of a detailed topographical site information; the assessment has been based upon 3rd party 5 metre Digital Terrain Model (DTM) topographical information which has been obtained from emapsite.com.

It should be noted that the topographical data in this format is obtained using the Lidar technique (light detection and radar) obtained from a passing aircraft. Whilst this method of data typically provides the ground height expected in the absence of any plants and small objects such as houses etc, it can be affected by large reflective surfaces such as large warehouses.

Following a review of topographical information available for the site it became apparent the 5 metre DTM topographical information had been affected by presence of the existing Mekatek building and the data does not reflect the true topography as observed by Sol on site. Therefore, and in lieu of any more accurate topographical data, the DTM information used within the model as obtained from emapsite has been manually amended based upon on site observations. The topography for the wider area has not otherwise been corrected.

(e) Noise egress from the Processing Building have has been modelled by determining the level of noise radiated from the external building fabric of the building based upon the assessment methodology provided within British Standard 12354-4:2000: *Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 4: Transmission of indoor sound to the outside*. The average reverberant sound pressure level within the building has been determined based on results of the sample noise measurement conducted within the building during worst case night-time operations.

(f) The actual construction of the external building fabric to the processing building is not known. Therefore, the sound insulation performance of the external building fabric to the Processing Building has been determined as based upon results of the reverberant noise level measurements within the processing building and the simultaneous Specific Level, i.e. corrected for the noise contribution for other off-site environmental noise sources, as determined at Position 2.

Thus, the likely overall, compound sound insulation performance of the external cladding has been empirically determined based upon the results of the 3D noise model and are presented in Table 15:

Construction	**Predicted Sound Reduction Index (SRI, dB) @ Octave Band Centre Frequency (Hz)**								**R_w (dB)**
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Processing building external building fabric	15	14	20	34	39	42	46	51	41

Table 15: Predicted overall sound insulation performance of the external building fabric to the processing building

(g) It is expected from site inspection that the roof construction would provide a lower sound insulation performance compared to the wall construction. However, it was not possible to determine the sound insulation performance provided by the roof from on-site noise measurement alone, as there was no safe access to the roof area. The noise contribution from the roof has therefore been empirically determined based upon noise level data obtained at Position 4.

(h) The noise impact from external HGV movements on-site have been included in the daytime assessment. As a typical worst case, it has been assumed that up to 1 HGV could arrive or depart from the site during the BS 4142 defined daytime 1-hour assessment period. The noise impact from the HGV movements around the site have been modelled as a moving point source assuming an average speed of 15 km/h. Other external HGV activities, such as mounting and dismounting the weighbridge have been modelled as fixed-point sources, which have been corrected for the effective “on-time” observed for each event, correct for the BS 4142: 2014 defined 1-hour daytime assessment period.

(i) The potential noise impact associated with the infrequent use of the external storage area has also been considered, but assessed separately to the known typical HGV site movements. For the purposes of the assessment, it is assumed that a single skip would be collected from or deposited to the external storage area and taken into the Processing Building during any given 1-hour daytime period.

(j) The daytime noise level impact from the open roller shutter on the east façade of the Processing Building has been included within the assessment. The noise level impact from the open roller shutter has been determined based upon the ambient noise level measurements recorded at Position 3 (refer to Table 6) taking into consideration the Specific Level generated from the Processing Building. The roller shutter has been modelled as an areas source with the measured dimensions of the open roller shutter.

6.2.2 Daytime 3D Environmental Noise Model Assessment BS4142 Noise Impact Assessment at Receptors

Based upon the above, the noise model has been used to predict the daytime Specific Level expected at each of the nearest identified noise sensitive receptors, Table 16, presents the predicted results based upon the typical site operations, which are compared to the existing background noise level.

Table 17 presents the predicted results based upon the *infrequent use* of the external storage area. The corresponding noise maps, in terms of the predicted Specific levels, are presented in Appendix B.

Based upon the site observations made at Position 4, it has been considered appropriate to apply a +3dB character correction to the predicted Specific Levels at each noise sensitive receptor in order to determine the existing noise rating level.

Residential Dwellings	**Assessment Period**	**Predicted Rating Level, dB $L_{Ar,Tr}$ ***	**Typical Background Noise level, dB L_{A90}**	**Difference, dB**
Wellington Way (east Of Application site)	Daytime (07:00 – 23:00)	44	43	+1
Maerdy House (adjoining Application site)	Daytime (07:00 – 23:00)	47	44	+3
St Clare's (south of Application site)	Daytime (07:00 – 23:00)	40	44	-4

Table 16: Predicted daytime noise level impact at the nearest noise sensitive premises based upon typical site operations

Residential Dwellings	Assessment Period	Predicted Rating Level, dB $L_{Ar,Tr}$ *	Typical Background Noise level, dB L_{A90}	Difference, dB
Wellington Way (east Of Application site)	Daytime (07:00 – 23:00)	44	43	+1
Maerdy House (adjoining Application site)	Daytime (07:00 – 23:00)	47	44	+3
St Clare's (south of Application site)	Daytime (07:00 – 23:00)	35	44	-9

Table 17: Predicted noise level impact at the nearest noise sensitive as occurring during *infrequent use* of the external storage area

It can be seen from Table 16 that during the daytime, the noise Rating Level could be expected to exceed the existing background noise level by, at worst, +3dB at the Maerdy House residential premises. BS4142:2014, the predicted noise Rating Level is *below adverse impact*, depending on the context.

Similarly, during the infrequent use of the external storage area, see Table 17, the noise rating level could be expected to exceed the existing background noise level by, at worst, +3dB as predicted at the Maerdy House residential premises. BS4142:2014, the predicted noise Rating Level is below adverse impact, depending on the context.

As stated within BS4142, it is important to consider the context of the predicted noise level when determining the magnitude of the impact. In terms of context, the proposed development site is situated in an existing and active industrial estate. The worst affected nearest noise sensitive premises are in close proximity to the site and have direct line of sight of the Mekatek site. Therefore, it would be reasonable to suggest that residents of the worst affected residential premises would expect that a level of industrial noise would be audible at their properties from the Application site.

Taking context into consideration, the operations of the existing Mekatek site are not expected to have an adverse noise impact on any of the identified nearest noise sensitive premise during both daytime and night-time periods.

7.0 NOISE MITIGAITION BASED UPON BEST AVAILIBLE TECHNIQUES

This section of the report outlines a number of identified Best Available Techniques (BAT) that could be implemented on the site in order to limit the noise impact experienced at the nearest noise sensitive receptors.

7.1 Pneumatic Blow-off Attenuator to Compressor

The characteristic hiss from the air compressor located within the processing building was specifically observed and recognised at the nearest noise sensitive premise. The noise impact from this source can be reduced by fitting the compressor with a Silvent pneumatic silencers or similar (details below)

http://www.silvent.com/en-uk/products/?group=1702-air-nozzles

7.2 Noise Mitigation for External Site Operations

It has been identified that noise from the external HGV movements is a noise source at Maerdy House during the daytime period. Whilst not identified to be problematic in specific BS4142 environmental noise assessment terms, and limited by planning consent to daytime hours only between 07:00 hours and 16:00 hours, noise from a reversing bleeper was specifically identified as a noise source associated with the infrequent waste skip collections and deposits. (Note that the existing on-site mobile plant, fork lift trucks, use light-based reversing warning systems).

Therefore, the noise impact from this specific noise sources could be limited by upgrading the current site-based HGV shunting unit tonal bleepers with a white noise or smart revering signals, where this is possible to do so.

7.3 Night Time Quiet Feedstock Programming

Notwithstanding that the worst case Mekatek plant operation was assessed during night time periods (e.g. flat TV screens being processed by Rotashredder) and found to be sub-adverse, it is nevertheless recommended that noisy feedstock be processed during daytime periods only where possible, in order to further minimise night time noise impact.

7.4 Recommendations for the Noise Management Plan

Table 18 provides a basic summary of the recommendations for environmental noise mitigation, incorporating 'Best Available Techniques" (BAT).

It is recommended that these measures be included within the Noise Management Plan (NMP):

Component	Comment on Potential Noise Impact	Recommended Actions to be Taken
Pneumatic Blow-off Attenuator to Compressor	The characteristic "hiss" from the air compressor receiver tank discharge audible at the nearest affected residential premises	Fit the compressor with a "Silvent" pneumatic blow off silencer or similar
External HGV movements	The acoustic character associated with intermittent, impulsive and tonal reversing beepers associated with HGVs reversing can be unnecessarily disturbing for residents.	Ensure that HGVs operating on the site are fitted with "white noise" or smart revering signals, where this is possible to do so. External HGV movements must adhere to the consented hours of operation.
Intelligent management of 'noisy' feedstock	Noise from the internal processes at the site during worst-case operations was observed to be audible at the nearest Nosie sensitive premises during the night-time period.	Where possible, ensure that particularly noisy processes (e.g. flat TV screens being processed by Rotashredder) are carried out during less sensitive periods of the daytime and not during the night-time.

Table 18: Recommendations for noise mitigation for the NMP based upon BAT

8.0 CONCLUSION

Sol has been commissioned by Sol Environment Ltd (SE) to conduct an environmental noise assessment to establish the noise impact resulting to the surrounding environment, as arising from the defined, worst case operation of the existing Mekatek Limited industrial premises site, which is located off St Clare's in Rhymney, Wales.

In order to inform the assessment, an environmental noise survey have been conducted by Sol between 1 August to 10 August 2017. The purpose of these measurements was to determine the prevailing environmental noise climate expected at the nearest noise sensitive premises to the Application Site as well as to determine the noise level emissions generated by the existing plant and processes associated with the site. During the survey, no significant levels of vibration as arising from the internal site processes were observed outside of the premises.

The noise impact from the Application Site has been determined based upon the results directly obtained, and observations made during the fully attended "plant on" and "plant off" noise measurements as well as from the results of a 3D computer based environmental noise model of the complete Application Site.

The assessment has shown that based upon the current site arrangement and proposals, but assuming 24-hour site operation, the rating level from the application site could be expected to exceed the existing background noise level by, at worst, +3dB at any residential premises, at any time. In accordance with BS4142: 2014, this is an indication of less than adverse impact, depending on the context.

On this basis, noise from the operations of the existing Mekatek site is not expected to have an adverse impact on any of the identified nearest noise sensitive premise during both daytime and night-time periods.

Regardless, this report provides a series of recommended Best Available Techniques (BAT) which could be implemented in order to further limit the noise impact experienced at the nearest noise sensitive receptors.

APPENDIX A
NOISE SURVEY DETAILS AND SUMMARY RESULTS

LOCATION

Rhymney, Wales

DATES, TIMES AND WEATHER CONDITIONS

Date	Daytime (07:00 - 23:00)					Night Time (23:00 – 07:00)				
	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s	Max Gust, m/s	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s	Max Gust, m/s
09/08/2017	15	0	NE	1	5	9	0	NE	0	2
10/08/2017	14	0	NE	1	3	-	-	-	-	-

PERSONNEL PRESENT DURING MEASUREMENTS

Brian Horner – Sol Acoustics

Simon Ferenczi – Sol Acoustics

INSTRUMENTATION

Position 1

01 dB DUO Sound level meter (serial no. 10511)

01 dB PRE22 Microphone preamplifier (serial no. 10130)

GRAS 40CD Microphone capsule (serial no. 136864)

01 dB CAL 21 Acoustic calibrator (serial no. 51030984)

Position 2

01dB Cube Sound level meter (serial no. 11114)

01dB Pre22 Microphone preamplifier (serial no. 1610399)

GRAS 40CD Microphone capsule (serial no. 260807)

01dB CAL 21 Acoustic calibrator (serial no. 34375244)

Position 3

01dB Cube Sound level meter (serial no. 11117)

01dB Pre22 Microphone preamplifier (serial no. 1610404)

GRAS 40CD Microphone capsule (serial no. 260827)

01dB CAL 21 Acoustic calibrator (serial no. 34375244)

Position 4 and sample measurements

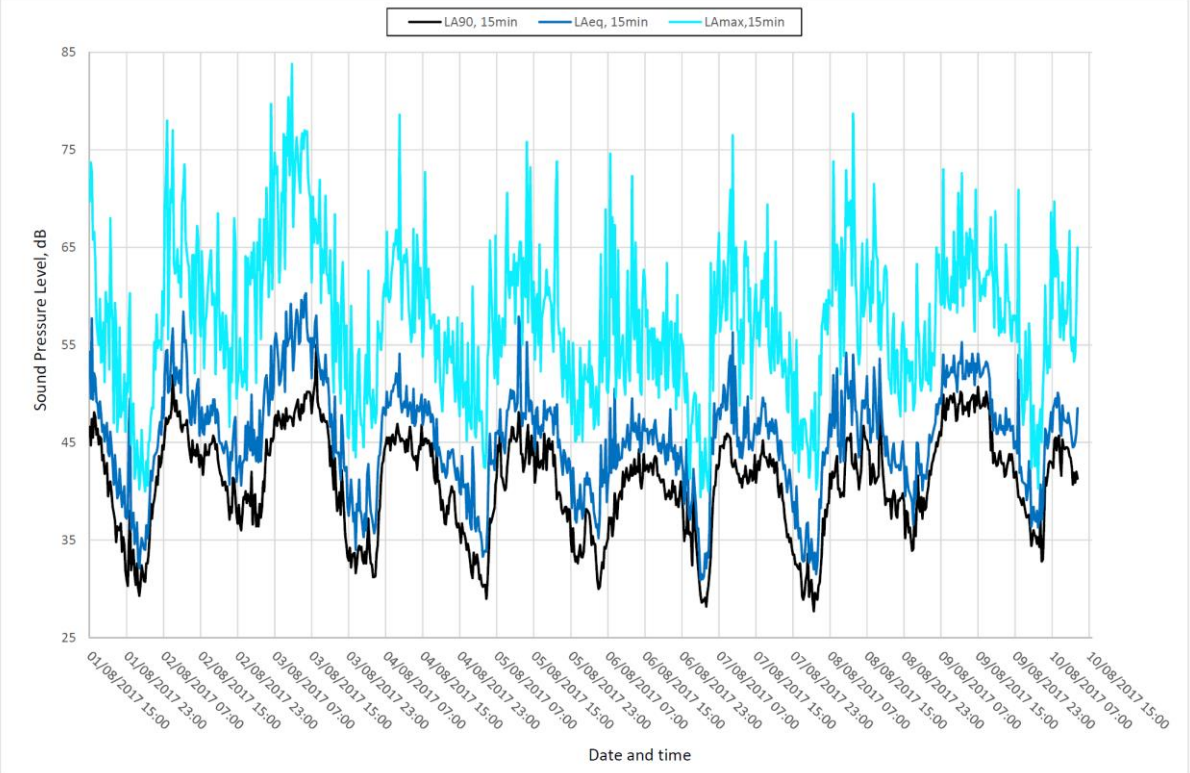
Norsonic 139 Sound level meter (serial no. 1392778)
Norsonic 1207 Microphone preamplifier (serial no. 20308)
Norsonic 1227 Microphone capsule (serial no. 170638)
Norsonic 1251 Acoustic calibrator (serial no. 29917)

METHODOLOGY

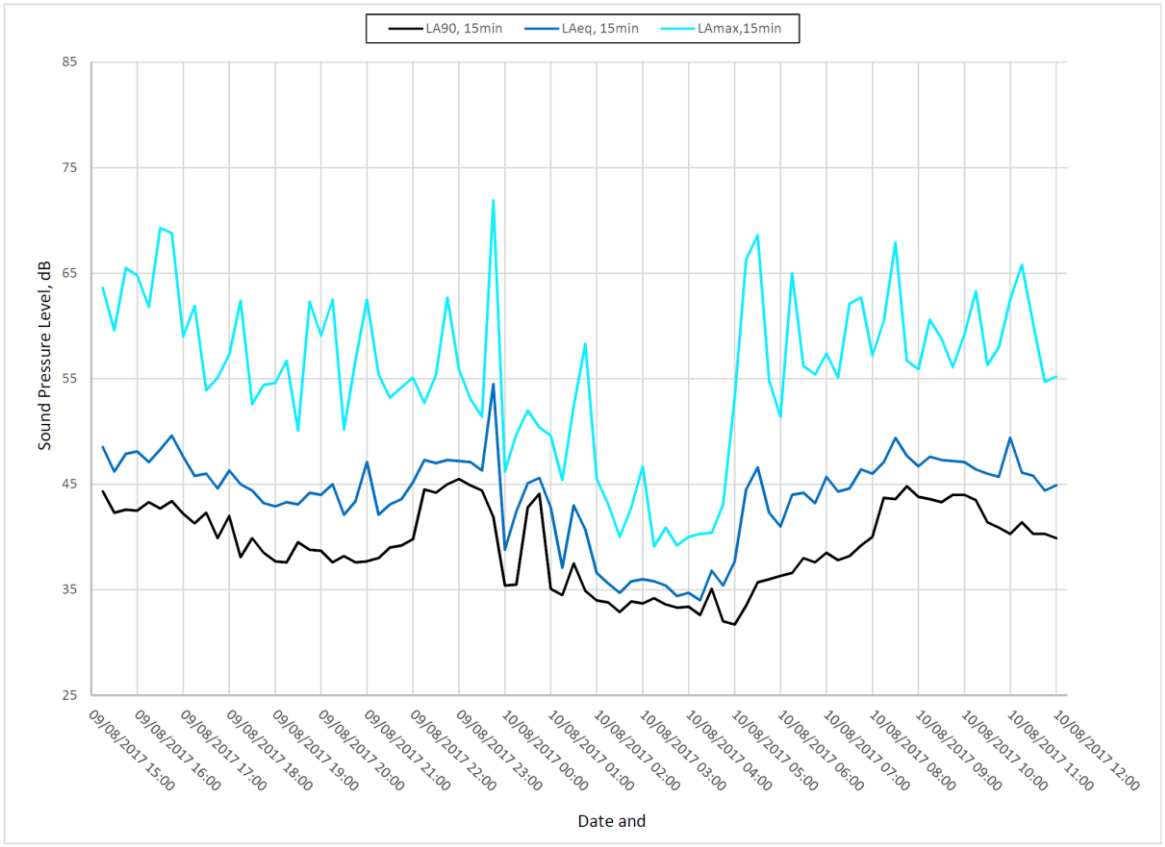
Before and after the measurements the noise monitoring equipment was calibrated to an accuracy of ±0.3dB using the Cal 21 Calibrator. The calibrator produces a sound pressure level of 94dB re $2x10^{-5}$ Pa @ 1kHz.

MEASUREMENT RESULTS

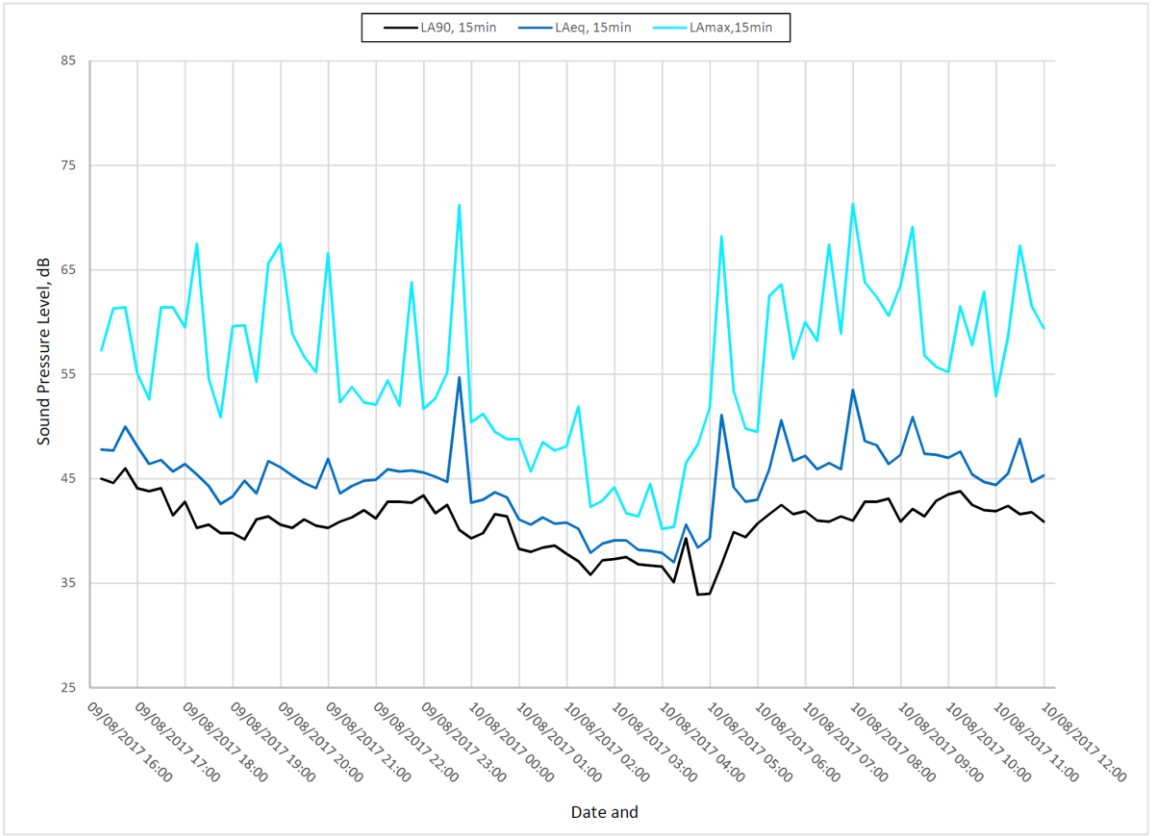
Graph A1 summarise the results obtained at Monitoring Positions 1.



Graph A1: Position 1, 1st to 10th August 2017



Graph A2: Position 2, 9th to 10th August 2017



Graph A3: Position 3, 9th to 10th August 2017

APPENDIX B

CADNAA NOISE MAPS

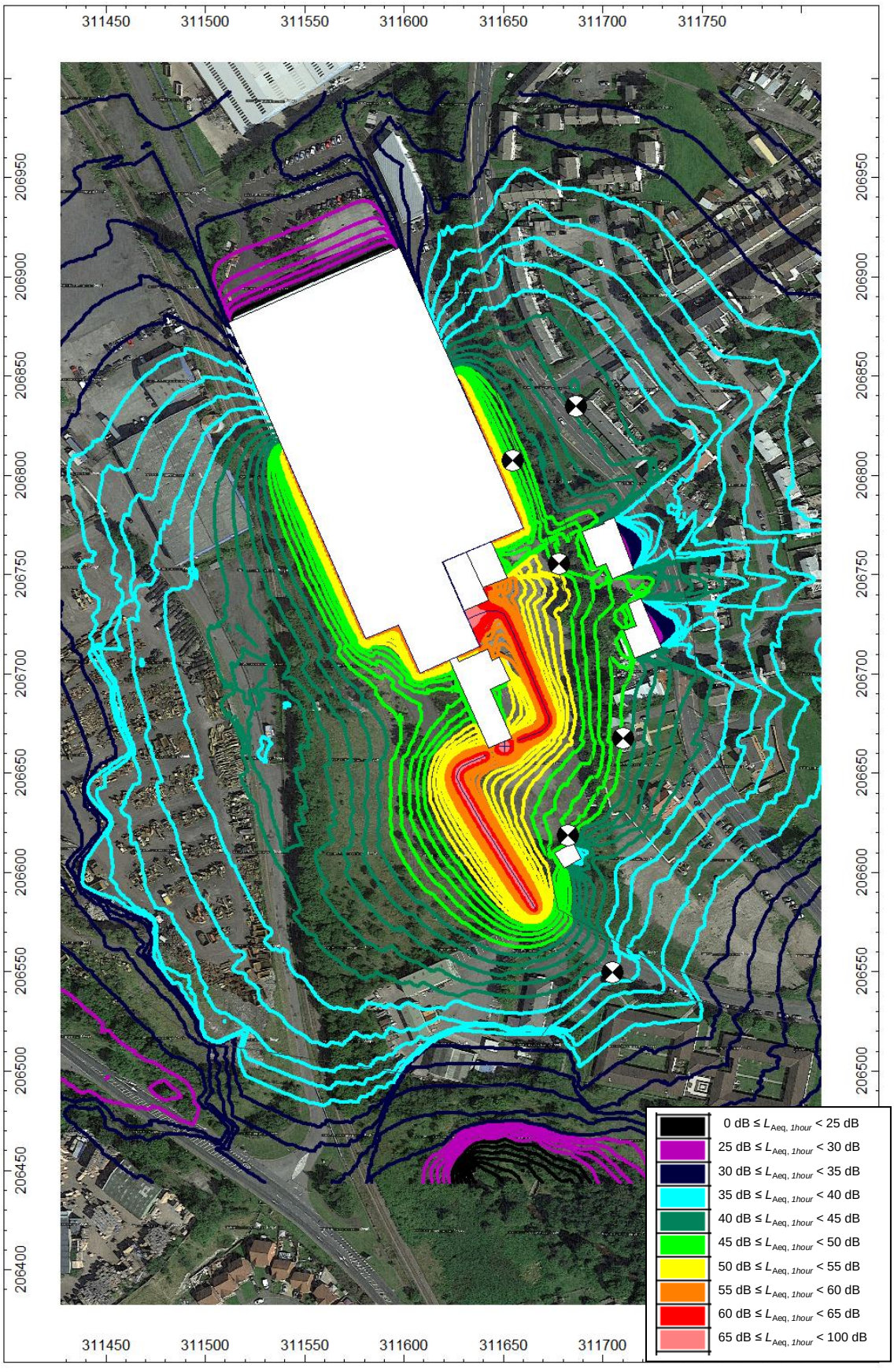


Figure B1: Predicted daytime $L_{Aeq,1hour}$ Specific Level at 1.5m above local ground level

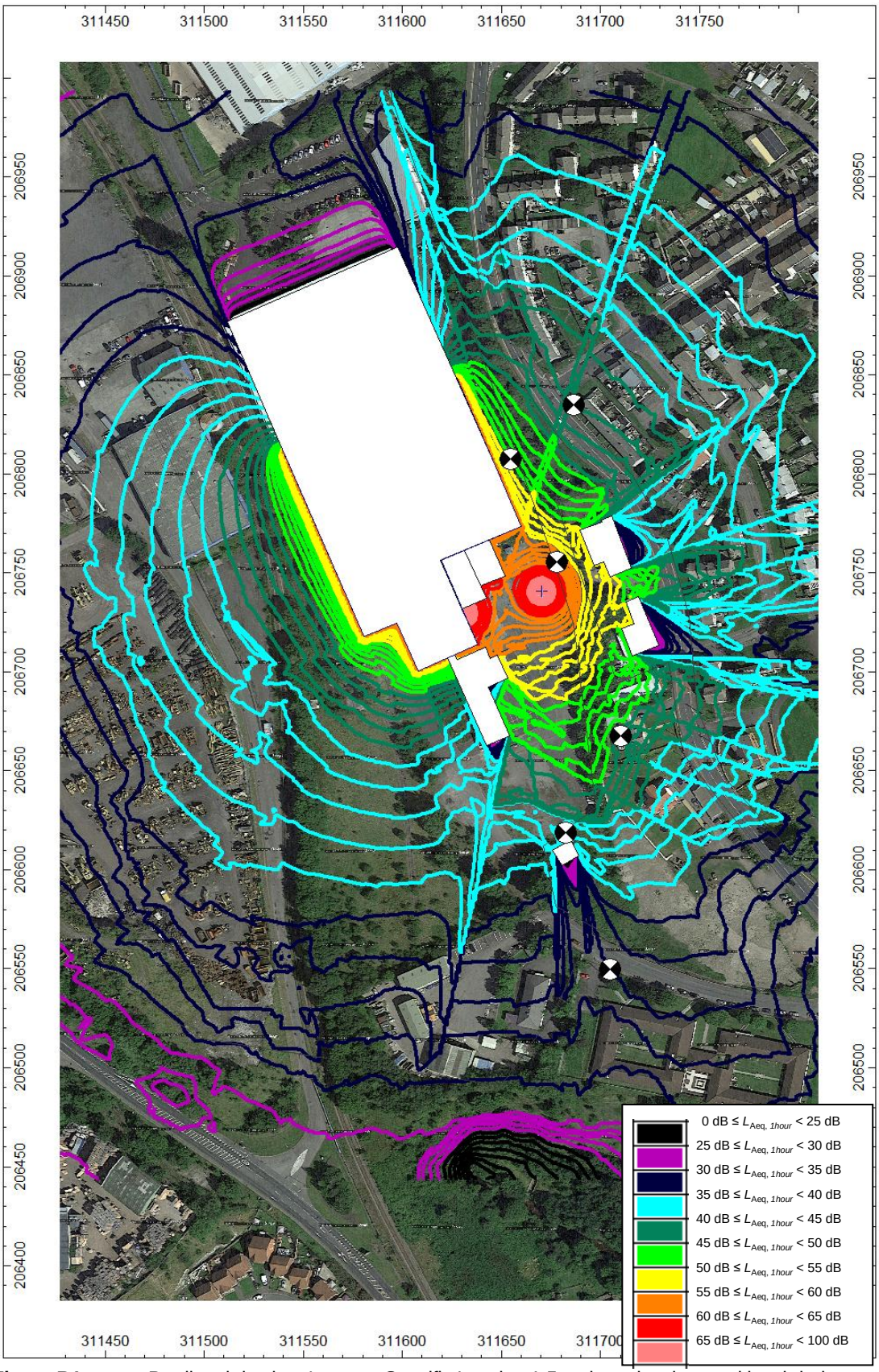


Figure B1: Predicted daytime $L_{Aeq,1hour}$ Specific Level at 1.5m above local ground level during infrequent operations of the external storage area

APPENDIX C

DETAILS AND PROFESSIONAL QUALIFICATIONS OF CONTRIBUTING SOL STAFF

Company Details

Name of Organisation:	Sol Acoustics Limited
Status:	Private Limited Company
Address:	4 Adams Court Adams Hill Knutsford WA16 6BA
Telephone Number:	01565 632535
E-Mail:	info@solacoustics.co.uk
Nature of Business:	Acoustic Consultancy
Directors:	Simon Ferenczi
Company Registration Number:	4218702

Key Technical Personnel & Qualifications

Simon Ferenczi	Institute of Acoustics Diploma (with additional modules), MIOA
Brian Horner	BSc(Hons), MIOA

Company Accreditations

Sol Acoustics is a member of The Association of Noise Consultants (ANC) and is qualified to perform sound insulation testing under the ANC's accredited testing scheme to demonstrate compliance with the requirements of Approved Document E of the Building Regulations.