



Knowl Hill Limited
Broadwater Park Golf Club
Noise Management Plan

Document Ref: 183125/NMP

January 2020



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Report for:

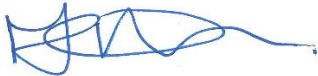
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<i>Issue Date</i>	Document Reference
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1.0 INTRODUCTION

Overview

- 1.1 This Noise Management Plan (NMP) has been produced to accompany the Waste Recovery Permit application by Knowl Hill Ltd (the Operator).
- 1.2 The site is located off Guildford Road (A3100), circa 1.8 km north-east of Godalming town centre, in Surrey. The site will be accessed from the south off the A3100. The site location is presented in 183125/D/001.
- 1.3 The proposal involves the importation of waste material for the required earthworks to cap and re-profile Broadwater Park Golf Club. Furthermore, there will be a soil management area (SMA) crushing and screening of construction and demolition wastes to produce recovered aggregate for on-site re-use. The activity is a recovery operation. The recovery operation will take circa 24 months.
- 1.4 As part of the application for an Environmental Permit, the Operator has provided a noise management plan to outline management and control measures for the permit activities on site. It should be noted that the waste recovery operation activity is anticipated to take less than 2 years. Given the temporary construction phase of this project and level of plant operational, the requirement for a noise assessment is not deemed necessary. A noise assessment was undertaken as part of the Planning Permission and was approved. This has been included for information. A noise management plan has been included as a conservative and precautionary measure.
- 1.5 Management and control measures will be in accordance with H3 Horizontal Guidance for Noise – Part 2 Noise Assessment and Control. The control measures and the requirement for a specific noise management plan have been instructed based on the assumption that an assessment would conclude a management plan and certain control measures would be required.
- 1.6 This report establishes the sensitive receptors surrounding the site, identifies any potential risks associated with the proposed activities and outlines required controls.

2.0 SENSITIVE RECEPTORS

- 2.1 The site and surrounding sensitive receptors are shown on drawing 183125/D/002. The nearest sensitive receptor susceptible to noise emissions will be the residents in the properties immediately bordering the western boundary of the site and the residential properties to the south of the site opposite the A3100.
- 2.2 The land to the west and south of the site is used primarily for residential land purposes whereas the land to the north and west and of the site is used primarily as mixed residential and recreational purposes. The sensitive receptors are shown in drawing 183125/D/002. Godalming Town Football Club is located adjacent to the south-west boundary of the site. The A3100 is immediately to the south of the site.
- 2.3 Meteorological wind data from Farnborough Airport from 2015, located circa 15.7 km north-west of the site, is presented in Appendix C in an Air Quality Assessment report conducted by Vanguardia in July 2017 (doc ref: VC-170613-AQ-RP-0001). The data shows that the prevailing wind direction is from the south-west quadrant. The nearest and most sensitive receptors to noise, residential properties, are considered upwind of the prevailing wind direction.
- 2.4 In August 2017, Vanguardia completed a Construction Noise Assessment in support for a planning application for the redevelopment of the Broadwater Park Golf Club. The assessment sets out the background noise levels and details the impact of noise on surrounding sensitive receptors. The assessment concludes that the noise levels at the most sensitive receptor locations are within the construction noise criteria without the implementation of operational controls. The Construction Noise Assessment is presented in Appendix B. Taking a conservative approach to noise management, the operational control measures to mitigate the risk to noise emissions are listed below.

3.0 MANAGEMENT AND MITIGATION

- 3.1 The noise levels generated by the site operations are not expected to have the potential to cause a notable impact to surrounding residential and recreational land uses. Taking a conservative approach to noise management, the Operator will implement control measures to minimise noise emissions from site works.
- 3.2 The works will involve movement and tipping of Heavy Goods Vehicles (HGVs) and placement of waste by mechanical operations. There will be crushing and screening of construction and demolition inerts by mobile plant. The anticipated plant includes a bulldozer, dumper, crusher/screener, tractor, and 1-2 excavators.
- 3.3 Waste will be imported, placed and compacted over the existing golf course and will be imported from Guildford Road. The placement activity is mobile and location likely to change dependent on the work program. The site layout is presented in 183125/D/004.
- 3.4 The site will operate between the hours set out below:

Days	Hours
Monday to Friday	07:30 – 18:30 hrs
Saturday	No vehicle movements or operation
Sunday and Public Holidays	No vehicle movements or operation

- 3.5 Site design and management controls include:
- Adherence to the working hours;
 - All topsoil material will be temporarily stockpiled in 3 m high bunding within the site providing additional acoustic screening to the surrounding receptors during the importation phase. The location of the topsoil storage areas is shown in drawing 183125/D/004;
 - Only plant conforming with relevant national or international standards, directives or recommendations on noise emissions will be used;

- Ensuring regular and effective maintenance of plant;
- The location of the works, including the internal haul route and SMA, will be as far from most sensitive receptors as possible i.e. through the centre of the site; and
- Induction briefing to all employees regarding the need to keep noise to a minimum and the health hazards associated with exposure to excessive noise. This will include training on the proper use and maintenance of plan and equipment, positioning of machinery to reduce noise emissions to surrounding receptors and site personnel, avoidance of unnecessary noise and the protection of persons against noise.

3.6 Site operational controls include:

- Reducing drop heights to waste storage area and/or working plant;
- No bulldozer operations until 8:00 am during working hours;
- During the filling activity, when the activity is near the most sensitive receptors (the western portion of the site), the mobile bulldozer will adopt a 'quiet hours' working scenario. This will involve two hours on, two hours off, or working within an area away from the nearest receptors to provide additional respite to local receptors;
- any fixed generators within welfare area will be enclosed or screened to minimise noise emissions;
- all vehicles will obey the internal speed limit of 5 mph; and
- all machines in intermittent use shall be shut down in the intervening period between work and throttled down to a minimum.

4.0 MONITORING AND RECORDS

4.1 Noise monitoring will be undertaken by inspection at boundary on a daily basis. The locations are shown in drawing 183125/D/005.

4.2 Quantitative noise monitoring will be undertaken in the unlikely event that problems are identified or if there is a substantiated noise complaint.

4.3 In the event of a substantiated noise complaint or elevation during inspection, the following procedure will apply for the monitoring exercise:

- The noise survey will be carried out during standard construction working hours for a minimum of 15 minutes to measure representative noise levels of worst-case construction operations;
- Measurements will be undertaken in accordance with British Standard BS 7445-1:2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*', with instrumentation meeting the standards set out in BS EN 61672-1: 2013 '*Electroacoustics – Sound level meters. Specifications*';
- Measurements will comprise of broadband indices L_{Aeq} , L_{A10} , L_{Amax} and L_{A90} . The equipment chosen will be a Class 1 noise level meter with a suitable traceable calibration certificate. Field calibration will also be undertaken and documented prior to and after measurements; and
- When possible, the measurement position should be chosen to best represent the noise levels at the most exposed façade of the sensitive building to the works. Alternatively, a free field location with direct line of sight to the works should be sought in order to facilitate the calculation of noise levels at the receptor assuming a reasonable distance correction factor.
- A conservative action trigger threshold will be 55 dB L_{Aeq} (1-hour) (free-field) taken from guidance issued by the World Health Organisation proposed guidelines for community noise.
- The quantitative monitoring and reporting would be undertaken within 1 month of the complaint and issued to the local Authority and/or EA.

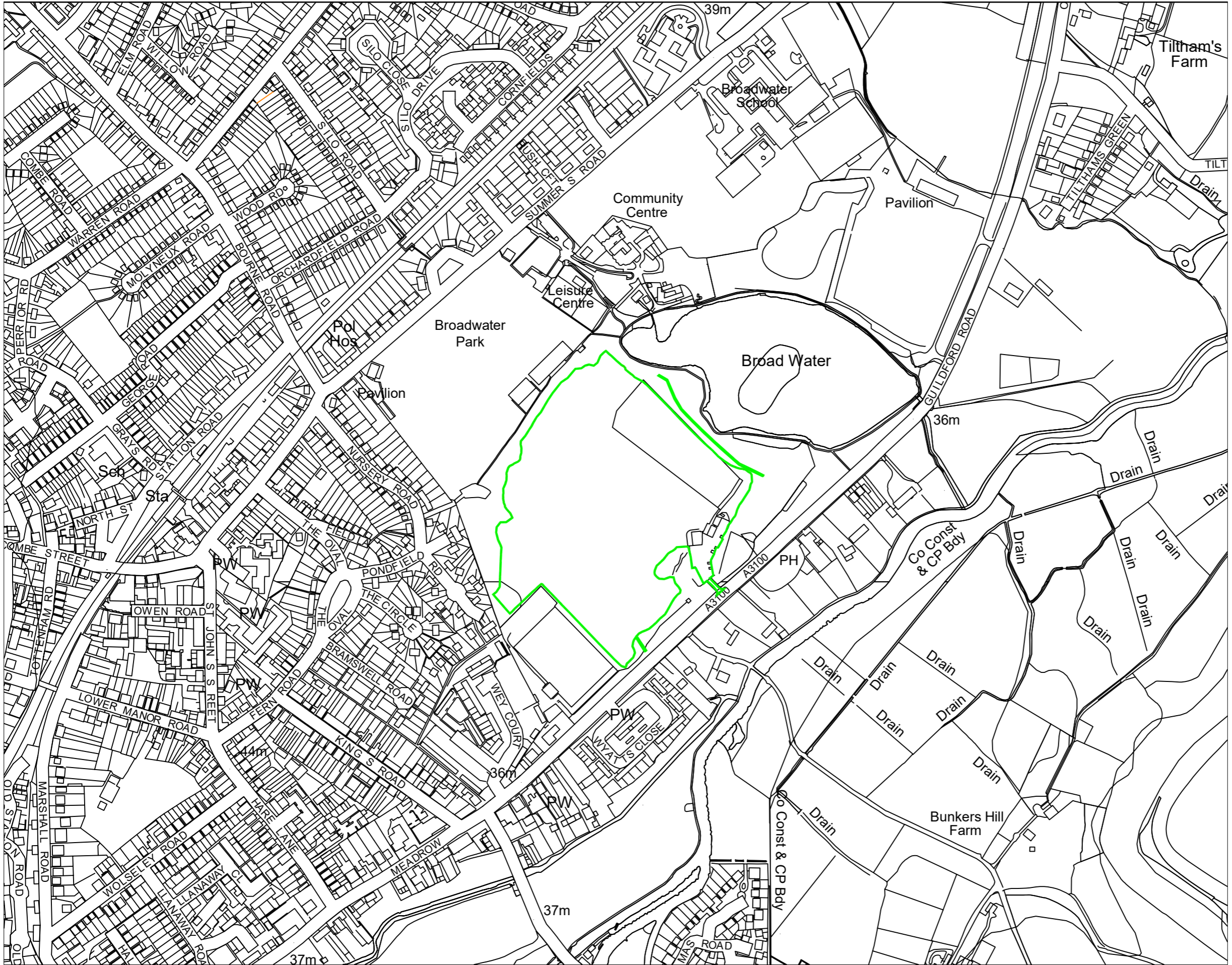
4.5 The monitoring proforma is shown in Appendix A. A record of any complaints arising regarding noise emissions and the actions taken will be kept in the Site Diary.

4.6 If there are exceedances of 55 dB L_{Aeq} , the Operator shall be informed immediately, and appropriate measures taken as soon as practicable to minimise the noise contribution from the site. Measures will include the use of time limitations and temporary screening using soil bunds may need to be considered. In such cases, repeat noise measurements will be undertaken at the affected receptor(s) immediately after implementation of the control measures in order to confirm that the noise limit is

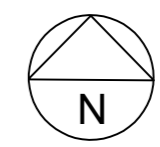
being met. The resulting noise report along with details of the actions implemented by the restoration works manager shall be issued to the Local Planning Authority and the Environment Agency within 1 week.


- 4.7 In the event of sustained noise issues or substantiated complaints, this NMP will be reviewed and updated. The NMP will be issued to the Environment Agency for approval and operations will cease within 100 m of the impacted receptor(s).

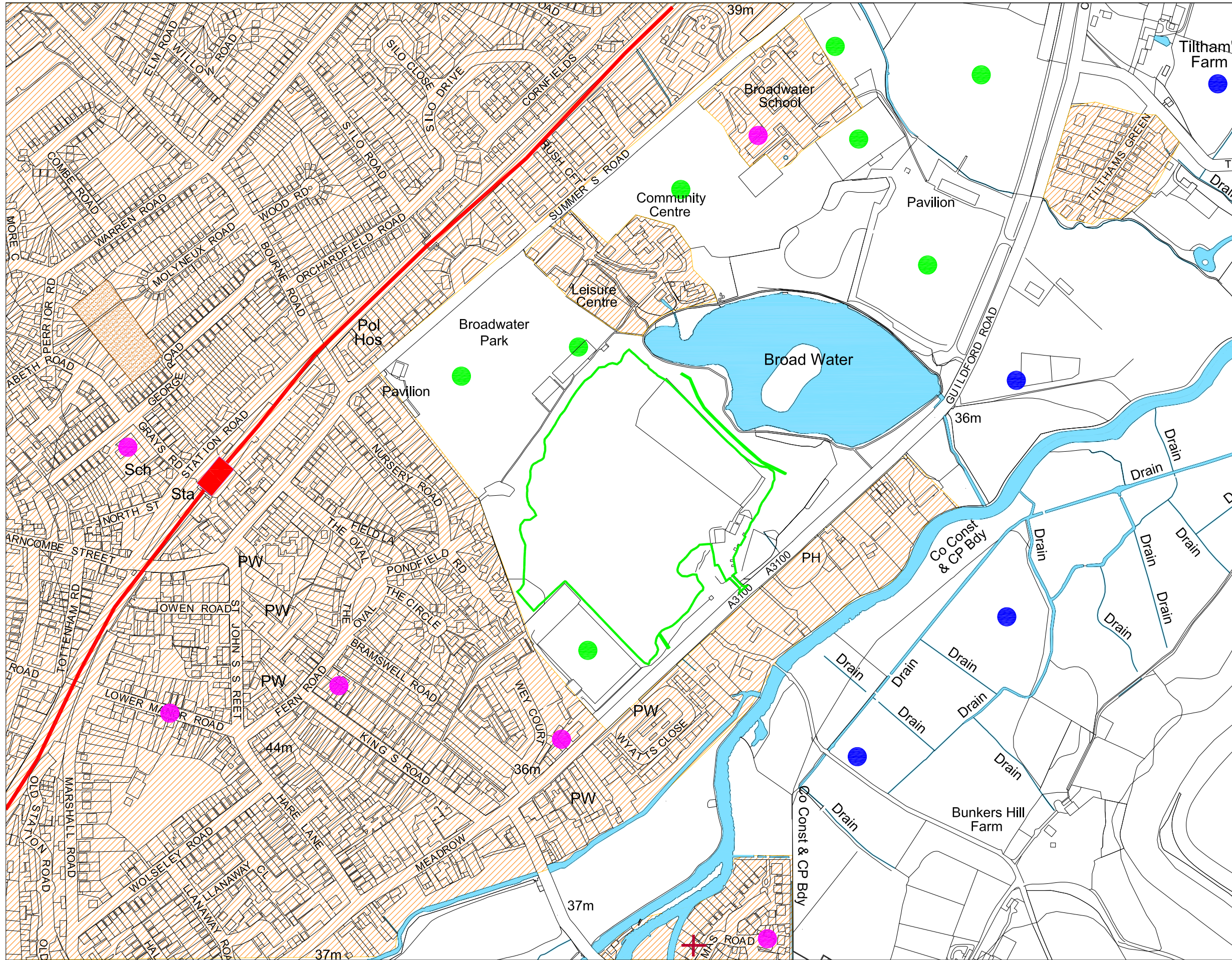
DRAWINGS



Key:
— Permit boundary

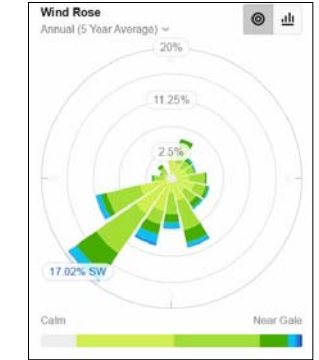


Rev.	Details	Drawn Chkd.	Date
Project 183125 Broadwater Golf Club			
Title Site Location Plan			
		AA Environmental Ltd Units 4-8 Cholswell Court Shippon Abingdon Oxon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-llp.com www.aae-llp.com	
Scale	Date	Drw. No.	Rev.
1:5,000@A3	Jan'20	183125/D/001	
	Drawn	Chkd.	
	JM	EB	



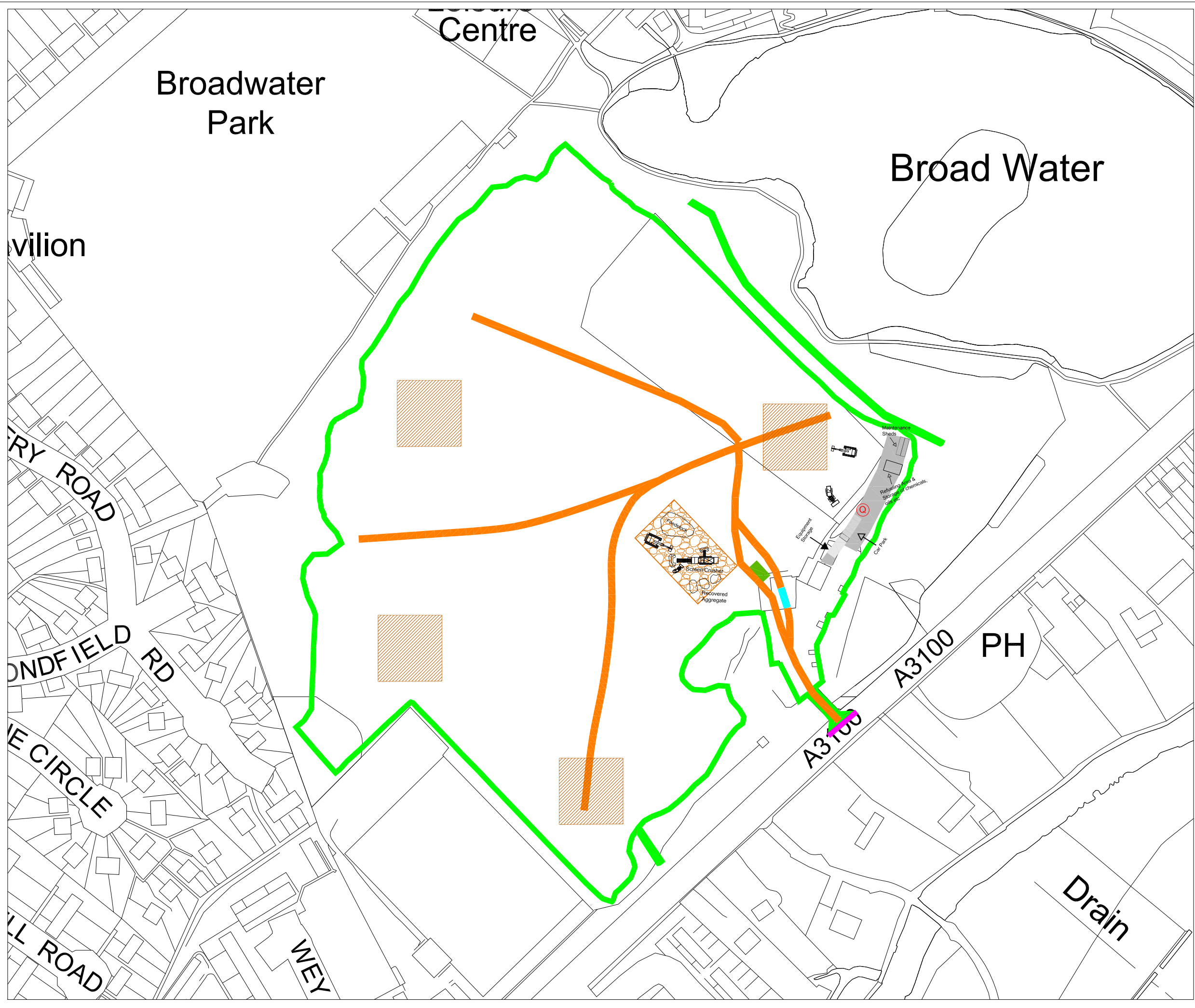
- Key:**
- Permit boundary
 - Residential Properties
 - Water Features
 - Recreational Areas
 - Agricultural Areas
 - Railway Network and Station
 - + Medical Centre
 - Educational
 - Allotments

- Notes:**
1. The underlying bedrock geology is Atherfield Clay Formation. The underlying superficial geology are River Terrace Deposits consisting of sand and gravel. The bedrock geology is designated as unproductive strata and superficial geology is designated as a Secondary A Aquifer
 2. Some areas directly adjacent to the site's south east corner are identified as Deciduous Woodland.
 3. Farnborough Windrose - Taken from the Willyweather website (<https://wind.willyweather.co.uk/se/surrey/farncombe.html>)



4. For detailed information about receptors within 1km of the site please refer to the ESSD (183125/ESSD).

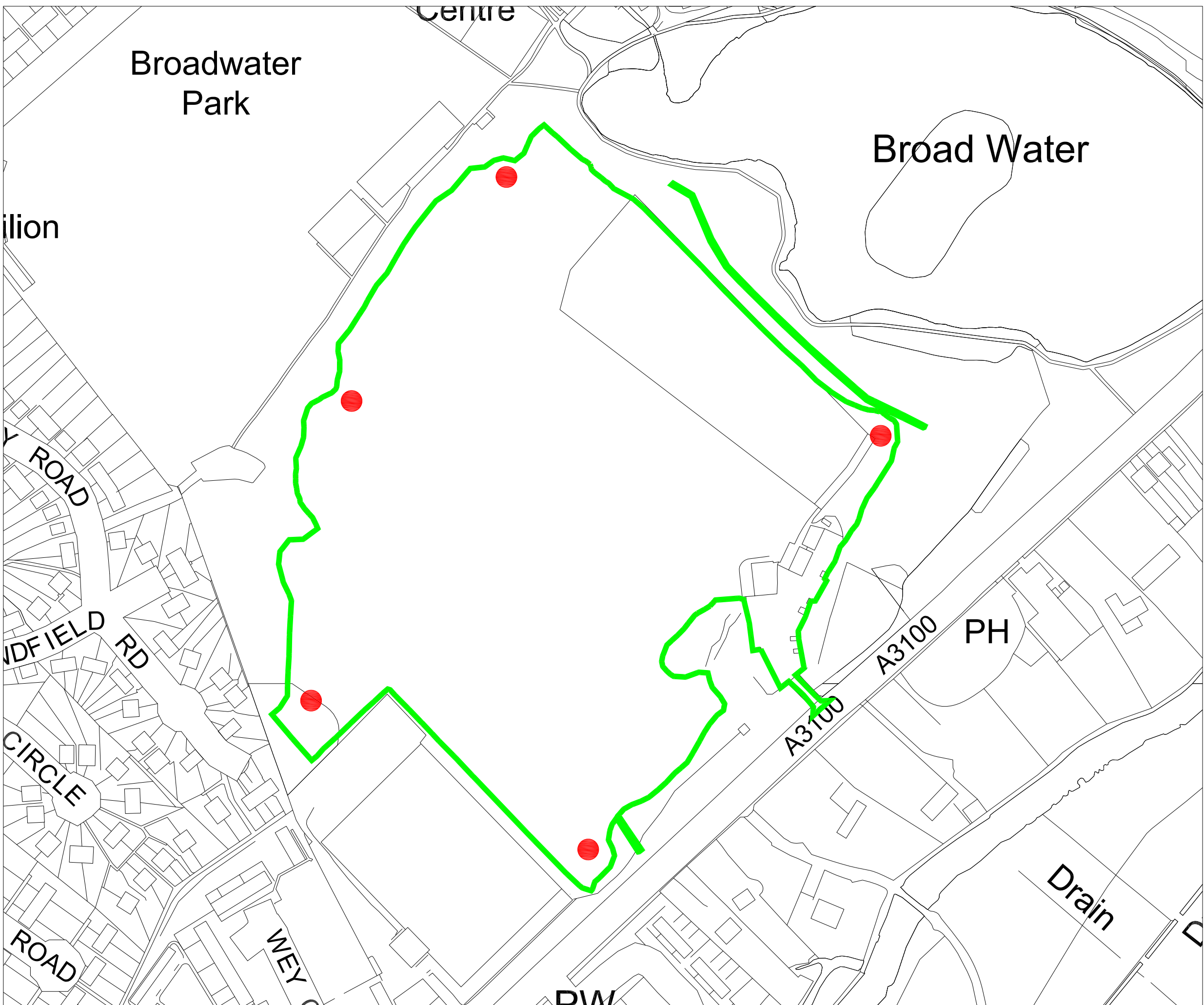
Rev.	Details	Drawn Chkd.	Date
<p>Project 183125 Broadwater Golf Club</p>			
<p>Title Site Receptor Plan</p>			
<p>AA Environmental Ltd Units 4-8 Cholswell Court Shippon Abingdon Oxon OX13 6HX T: (01235) 536042 F: (01235) 523849 Info@aae-llp.com www.aae-llp.com</p>			
Scale 1:5,000@A3	Date Jan '20	Drawn JM	Chkd. EB
Drg. No. 183125/D/002			Rev.



- Key:**
- Permit boundary
 - Haulage Route (indicative)
 - Site Access
 - Wheel Wash
 - Q Quarantine Area
 - Topsoil Storage
 - Admin - Portacabin
 - Contractors Compound
 - Soil Management Area (SMA)

- Notes:**
1. Car and Machinery Park, equipment lock up area, fuels, oils and chemicals storage and storage of incidental waste are all within the Contractors Compound. The designated area for refueling and maintenance is within the Contractors Compound.
 2. Further information about the drainage, the landscaping design and cross section can be found in the David Weller drawings listed below:
 - 811.13 Rev C, Control of Surface Water Runoff
 - 811.03, Landscape Plan
 - 811.04, Cross Sections
 3. The maximum stockpile height will be 3 meters.
 4. There are no permanent buildings on site during infilling.
 5. All suppression is mobile. All spray heads/cannons can be easily positioned. All stockpile heights will be lower than the arc coverage.
 6. Golf course will be unsurfaced and any internal haul routes will be surfaced by compacted hardcore. Locations of routes may change, dependent on working area/programme.

Rev.	Details	Drawn Chkd.	Date
Project			
183125 Broadwater Golf Club			
Title			
Site Layout Plan			
AA Environmental Ltd Units 4-8 Cholswell Court Shippon Abingdon Oxon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-llp.com www.aae-llp.com			
Scale	Date	Drw. No.	Rev.
1:2,000@A3	Jan'20	183125/D/004	
Drawn	Chkd.		
JM	EB		



- Key:
- █ Permit boundary
 - Visual Dust/Noise Inspection Points

Rev.	Details	Drawn Chkd.	Date
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Project
 183125
 Broadwater Golf Club

Title
 Site Monitoring Plan

AA Environmental Ltd
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1:2,000@A3	Drawn JM	Chkd. EB	183125/D/005	

APPENDIX A



Attended Noise Survey			Job No. BROADWATER PARK GOLF CLUB					
Monitoring Date								
Dynamic Range:								
Station	Start Time (hr:min)	Construction Activity/Equipment used	Measurement Duration (T, mins)	LAeq, T (dB)	LAMax, T (dB)	LA10, T (dB)	LA90, T (dB)	Monitoring Comments
Signed (Surveyor):								

APPENDIX B

BROADWATER PARK GOLF COURSE

CONSTRUCTION NOISE ASSESSMENT

VC-102480-EA-RP-0001

Ro0

2ND AUGUST 2017



VANGUARDIA
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DOCUMENT CONTROL

DOCUMENT TITLE	CONSTRUCTION NOISE ASSESSMENT	REVISION	R00
DOCUMENT NUMBER	VC-102480-EA-RP-0001	ISSUE DATE	2ND AUGUST 2017
PROJECT NUMBER	102480	AUTHOR	I ALLI-BALOGUN
STATUS	PLANNING	CHECKED	S TURNER
ISSUED TO	CHRISTOPHER FOREMAN (KNOWL HILL); BRUCE WELLER (WELLER DESIGNS)	PASSED	

REVISION HISTORY

REVISION	NOTES	DATE ISSUED
R00	ISSUED	2 ND AUGUST 2017

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1. INTRODUCTION

- 1.1. Vanguardia have been appointed by Knowl Hill to carry out a construction noise assessment for the proposed redevelopment of Broadwater Park Golf Course. The proposed redevelopment includes the creation of a new adventure golf course.
- 1.2. Broadwater Park Golf Course is located to the southwest of Broadwater, Godalming. The site boundary is indicated in Figure 1 (red dashed line). The nearest noise-sensitive properties are on Pondfield Road to the west of the site, Summers Road to the north and Guildford Road to the east.
- 1.3. This report summarises the construction noise assessment carried out for the redevelopment of the golf course.

2 . ENVIRONMENTAL NOISE SURVEY

- 2.1. An environmental noise level survey was conducted between 20th June and 27th June 2017 to determine the typical noise climate during the proposed construction hours (07:00 – 18:00). The survey locations are indicated in Figure 1.



Figure 1 Survey Location Plan

- 2.2. Noise levels at the site are dominated by road traffic on the A3100 Guildford Road. The traffic flow along this road is consistent throughout the daytime. Locations 1 and 2 are considered representative of the residential dwellings to the west and north, respectively. The noise levels at Location 2 were also influenced by a water feature/fountain within Broadwater Lake. It was not possible to conduct an unattended survey at Location 3. Instead, short-term attended measurements were undertaken at Location 3 to determine the likely noise levels at the Premier

Inn hotel/Beefeater Manor pub and residential properties to the southeast of the site during the daytime.

- 2.3. A summary of the survey results is presented in the table below. Full survey data is given in Appendix A.

Table 1 Noise Survey Results (Weekdays, 07:30 hours to 18:30 hours)

Survey Location	Average Ambient Noise Level, $L_{Aeq,1hr}$
1	49 dB
2	55 dB
3	72 dB*

* Survey result based on short-term attended - two 15 minute - measurements

3 . C R I T E R I A

3.1. The redevelopment site is located within the county of Surrey. RPS Group, who provide planning consultancy services to Surrey County Council, have been contacted to agree a suitable construction noise criterion for the scheme. The adopted noise criterion is example method 2 from Annex E of BS 5228-1:2009+A1:2014, which states:

“Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.”

3.2. As the pre-construction ambient noise levels are more than 5 dB below the construction noise lower cut-off value of 65 dB $L_{Aeq,T}$ during the daytime at survey locations 1 and 2, the construction noise criteria at these locations automatically becomes 65 dB $L_{Aeq,T}$, using this method.

3.3. The measured ambient noise level at survey location 3 is 72 dB $L_{Aeq,T}$. However, as a precautionary approach, the ambient noise levels at those properties are assumed to be 5 dB lower than the measured value (i.e. 67 dB $L_{Aeq,11hr}$), to account for the fact that some of the residential properties along Guildford Road are slightly further away from the road than the measurement location and that the 11 hour average may be slightly lower. This value is still above the daytime lower cut-off value of 65 dB. Therefore, the noise criteria here is 72 dB $L_{Aeq,T}$ (i.e. 67 + 5).

3.4. The proposed noise criteria, for the pre-construction ambient plus construction noise, at each receiver position are presented in Table 2.

Table 2 Noise Criteria

Receiver Position	Description	Noise Criterion, $L_{Aeq,T}$
1	Houses on Pondfield Road to the west of the site	65 dB
2	Houses on Summers Road to the north of the site (east of the tennis courts)	65 dB
3	Hotel and houses to the southeast of the site	72 dB

4 . C O N S T R U C T I O N N O I S E

REDEVELOPMENT PROGRAMME

4.1. It is understood that the redevelopment of the golf course will take place over six distinct phases:

- Phase 1 – site setup (signage, contractors compound)
- Phase 2 – site runoff management features (swales, ditches, lake)
- Phase 3 – remodelling of range outfield
- Phase 4 – remodelling of southern section of golf course
- Phase 5 – remodelling of central section of golf course
- Phase 6 – construction of adventure golf course

4.2. The contractor, Knowl Hill, has confirmed the type of plant and machinery that will be used, as well as the expected percentage on time for each item. The source noise level of each plant item has been taken from Annex C of BS 5228-1:2009+A1:2014, except for the road sweeper for which the manufacturer’s noise data is available. The quasi-stationary plant data used for this assessment is presented in Table 3. No material construction noise is expected to be generated during Phase 1, as no heavy construction machinery will be used during that phase.

Table 3 Quasi-Stationary Plant

Phase	Plant & Machinery Type	BS 5228 Annex C ref.	L _{Aeq,T} at 10 m	Activity On-Time (as percentage of 11 hour day)
2, 3, 4, 5 & 6	3-way soil screening plant, Extec 5000 (or similar)	C10.15	81 dB	45%
	Bulldozer, Cat D6T (or similar)	C2.1	75 dB	82%
	14t tracked excavator 1	C2.25	69 dB	45%
	14t tracked excavator 2			73%
	10t dump truck, Whacker Neuson (or similar)	C2.32	74 dB	73%
	Tractor	C4.74	80 dB	5%

4.3. In addition to the quasi-stationary machinery listed above, there will be deliveries of soil by road lorries. Once on-site these will travel via haulage routes. The location of each haul road is given in Appendix C. The number of expected lorry deliveries during each construction phase is presented in Table 4.

Table 4 Lorry Deliveries

Phase	Duration of Phase	Number of Lorry Deliveries
1	2 weeks	0
2	4 weeks	1380
3	35 weeks	12296
4	13 weeks	4662
5	14 weeks	4776
6	6 weeks	676

4.4. The noise levels of the lorries have been taken from Annex C of BS 5228-1:2009+A1:2014. This is presented in Table 5.

Table 5 Mobile Plant

Phase	Plant & Machinery Type	BS 5228 Annex C ref.	L _{Aeq,T} at 10 m	L _{WA}
2, 3, 4, 5 & 6	Road lorry	C11.10	77 dB	105 dB
	Road sweeper	n/a	81 dB*	109 dB

* Derived from manufacturer's L_{WA} data

CALCULATION METHODOLOGY

- 4.5. The predicted construction noise levels at each receiver position have been calculated using the methods set out in BS 5228-1:2009+A1:2014 Annex F.2 (Methods of calculation).
- 4.6. For the quasi-stationary plant, the procedure outlined in Annex F.2.2 has been used considering the distance adjustment for soft ground, K_s, as given in equation (F.2).
- 4.7. For the mobile plant, the procedure outlined in Annex F.2.5 has been used. This method is expressed as equation (F.6), which is reproduced below:

$$L_{Aeq,T} = L_{WA} - 33 + 10\log_{10}Q - 10\log_{10}V - 10\log_{10}d$$

where: L_{WA} is the sound power level of the plant, in decibels (dB);

Q is the number of vehicles per hour;

V is the average vehicle speed, in kilometres per hour (km/h);

d is the distance of the receiver position from the centre of the haul road, in metres (m).

Additional corrections are included for the angle of view, reflections at the receiver position, screening and on-time (from Table F.2 of BS 5228).

ASSUMPTIONS AND LIMITATIONS

- 4.8. The amount of construction activity on site is seasonal and can be subject to weather conditions. For example, the soil screening plant is only expected to be operational between April and October. The activity on-time percentage, presented in Table 3, is based on the peak usage of each plant item. For example, the dump truck on-time percentage is based on eight hours of use per 11 hour day, despite this being the case for only three months of the year (for the nine months of the year it will be used for five hours per day). Therefore, the construction noise predictions represent the worst-case day. It is likely that the noise levels at the receiver positions will be less than the values stated in this report for majority of the construction period.
- 4.9. Where manufacturer's noise data is not available, noise values have been taken from Annex C of BS 5228-1:2009+A1:2014 for the appropriate power rating and size/capacity. Although this introduces a level of uncertainty to the predictions, the calculations assume that all quasi-stationary plant (except for the soil screening plant) operates, simultaneously, at the shortest distance between each receiver position and the edge of the area that defines each construction phase. Similarly, the distance adjustment for mobile plant uses the shortest distance between each receiver position and the haul road.
- 4.10. For the mobile plant calculations, a worst-case angle of view of 180° has been assumed from each receiver position to all haul roads.
- 4.11. For all calculations, the screening correction is assumed to be 0 dB and the correction for reflections at the receiver positions is taken to be +3 dB.
- 4.12. The number of lorry deliveries, presented in Table 4, has been used to determine the number of vehicles per hour for each construction phase. For all mobile plant, the activity on-time percentage is assumed to be 100% and a vehicle speed of 10 mph (16 km/h) has been used.

RESULTS

- 4.13. A summary of the calculation results is presented in Table 6, along with the noise level criteria for comparison. Detailed calculation results (including distance adjustment, activity on-time correction etc.) are given in Appendix B.

Table 6 Predicted Construction Noise Levels at each Receiver Position

Phase	Total Noise Level from Quasi-Stationary Plant, $L_{Aeq,1thr}$	Total Noise Level from Mobile Plant, $L_{Aeq,1thr}$	Resultant Construction Noise Level, $L_{Aeq,1thr}$	Total Noise Level*, $L_{Aeq,1thr}$	Noise Level Criteria, $L_{Aeq,T}$	Excess of Total Noise Level over Criteria
Receiver Position 1						
2	61 dB	49 dB	61 dB	61 dB	≤65 dB	-4 dB
3	53 dB	47 dB	54 dB	55 dB		-10 dB
4	60 dB	50 dB	61 dB	61 dB		-4 dB
5	61 dB	48 dB	61 dB	62 dB		-3 dB
6	50 dB	44 dB	51 dB	53 dB		-12 dB
Receiver Position 2						
2	60 dB	46 dB	60 dB	61 dB	≤65 dB	-4 dB
3	60 dB	48 dB	60 dB	61 dB		-4 dB
4	49 dB	47 dB	51 dB	56 dB		-9 dB
5	51 dB	47 dB	52 dB	57 dB		-8 dB
6	49 dB	43 dB	50 dB	56 dB		-9 dB
Receiver Position 3						
2	66 dB	47 dB	66 dB	70 dB	≤72 dB	-2 dB
3	58 dB	48 dB	59 dB	68 dB		-4 dB
4	66 dB	48 dB	66 dB	70 dB		-2 dB
5	57 dB	47 dB	57 dB	67 dB		-5 dB
6	57 dB	45 dB	57 dB	67 dB		-5 dB

* Total noise level is the pre-construction ambient noise level (Table 1) plus the resultant construction noise level.

4.14. It can be seen, from Table 6, that the total noise level is within the noise level criteria during every phase of construction.

5 . C O N C L U S I O N

- 5.1. This report presents the results of the construction noise assessment for the redevelopment of Broadwater Park Golf Course.
- 5.2. The assessment includes an environmental noise survey which was carried out around the golf course and the prediction of likely noise levels from the construction works.
- 5.3. The results have been compared with criteria agreed with the noise consultants representing Surrey County Council.
- 5.4. The assumptions included in the predictions err on the side of caution so that the results given are the maximum that could occur. For most of the construction works, it would be expected that the noise levels generated would be lower.
- 5.5. The predicted noise levels at each of the receiver positions is within the construction noise criteria.

6 . A P P E N D I X A

NOISE SURVEY DETAILS

6.1. Instrumentation:

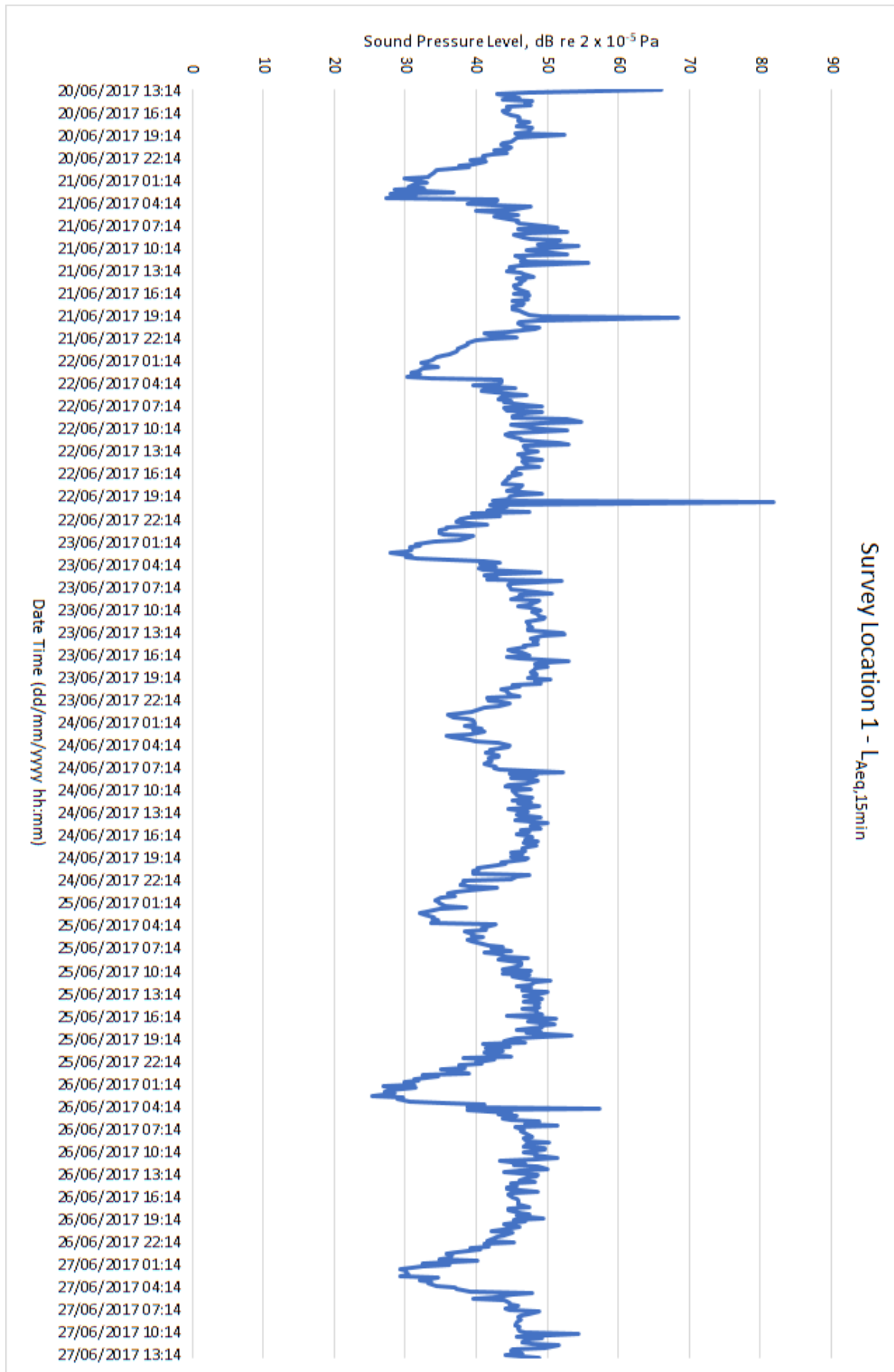
Survey Location	Equipment	Manufacturer	Model	Serial Number
1	Sound Level Meter	Rion	NL-32	00482672
	Pre-Amplifier		NH-21	27776
	Microphone		UC-53A	314051
2	Sound Level Meter	Rion	NL-32	01182957
	Pre-Amplifier		NH-21	28891
	Microphone		UC-53A	315497
3	Sound Level Meter	Larson Davis	824	A3742
	Pre-Amplifier		PRM902	4805
	Microphone	PCB	377B02	105710

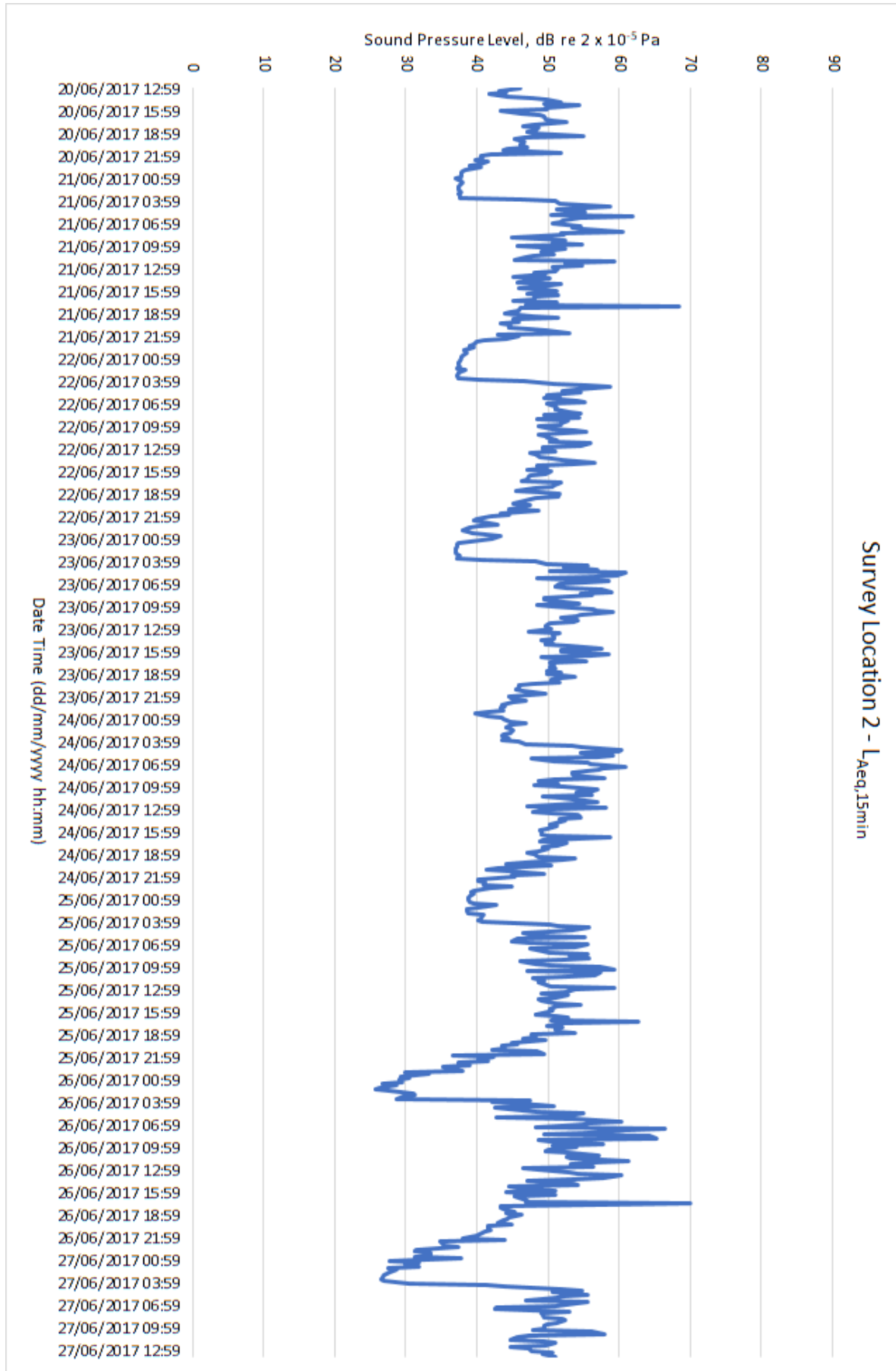
All instruments were calibrated before and after the survey. No significant drift was recorded.

6.2. Measurement Period: The unattended surveys were conducted between 13:00 hours on Tuesday 20th June and 13:45 hours on Tuesday 27th June 2017. The attended survey was conducted on Thursday 15th June and Tuesday 27th June 2017 over a period of 15 minutes on each day.

6.3. Weather Conditions: The weather conditions during the survey period were dry (no precipitation) with light winds i.e. below 5 m/s. This has been verified using weather observations taken from wunderground.com (weather station: IGULDF056).

6.4. Survey Results: The survey data for locations 1 and 2 are presented in the graphs below.





The survey data for location 3 is presented in the table below.

Date	Time	L _{Aeq,15min}
15/06/2017	13:50	72 dB
27/06/2017	13:15	72 dB

7 . APPENDIX B

DETAILED CONSTRUCTION NOISE CALCULATIONS

Predicted Noise Levels of Stationary and Quasi-Stationary Plant at Receiver Position 1

Plant	L _{Aeq,T} at 10 m	Distance, m	Distance Attenuation	Activity On-Time Correction	Reflection	Screening Correction	Activity L _{Aeq,11hr}
Phase 2							
Screening plant	81 dB	271	-34 dB	-3 dB	+3 dB	0 dB	47 dB
Dozer	75 dB	75	-20 dB	-1 dB	+3 dB	0 dB	57 dB
Tracked excavator 1	69 dB	75	-20 dB	-3 dB	+3 dB	0 dB	49 dB
Tracked excavator 2	69 dB	75	-20 dB	-1 dB	+3 dB	0 dB	51 dB
Dump truck	74 dB	75	-20 dB	-1 dB	+3 dB	0 dB	56 dB
Tractor	80 dB	75	-20 dB	-13 dB	+3 dB	0 dB	50 dB
Phase 3							
Screening plant	81 dB	271	-34 dB	-3 dB	+3 dB	0 dB	47 dB
Dozer	75 dB	180	-29 dB	-1 dB	+3 dB	0 dB	48 dB
Tracked excavator 1	69 dB	180	-29 dB	-3 dB	+3 dB	0 dB	39 dB
Tracked excavator 2	69 dB	180	-29 dB	-1 dB	+3 dB	0 dB	41 dB
Dump truck	74 dB	180	-29 dB	-1 dB	+3 dB	0 dB	46 dB
Tractor	80 dB	180	-29 dB	-13 dB	+3 dB	0 dB	41 dB
Phase 4							
Screening plant	81 dB	271	-34 dB	-3 dB	+3 dB	0 dB	47 dB
Dozer	75 dB	80	-21 dB	-1 dB	+3 dB	0 dB	57 dB
Tracked excavator 1	69 dB	80	-21 dB	-3 dB	+3 dB	0 dB	48 dB
Tracked excavator 2	69 dB	80	-21 dB	-1 dB	+3 dB	0 dB	50 dB
Dump truck	74 dB	80	-21 dB	-1 dB	+3 dB	0 dB	55 dB
Tractor	80 dB	80	-21 dB	-13 dB	+3 dB	0 dB	49 dB
Phase 5							
Screening plant	81 dB	271	-34 dB	-3 dB	+3 dB	0 dB	47 dB
Dozer	75 dB	75	-20 dB	-1 dB	+3 dB	0 dB	57 dB
Tracked excavator 1	69 dB	75	-20 dB	-3 dB	+3 dB	0 dB	49 dB
Tracked excavator 2	69 dB	75	-20 dB	-1 dB	+3 dB	0 dB	51 dB
Dump truck	74 dB	75	-20 dB	-1 dB	+3 dB	0 dB	56 dB
Tractor	80 dB	75	-20 dB	-13 dB	+3 dB	0 dB	50 dB

Plant	L _{Aeq,T} at 10 m	Distance, m	Distance Attenuation	Activity On-Time Correction	Reflection	Screening Correction	Activity L _{Aeq,11hr}
Phase 6							
Screening plant	81 dB	271	-34 dB	-3 dB	+3 dB	0 dB	47 dB
Dozer	75 dB	258	-33 dB	-1 dB	+3 dB	0 dB	44 dB
Tracked excavator 1	69 dB	258	-33 dB	-3 dB	+3 dB	0 dB	35 dB
Tracked excavator 2	69 dB	258	-33 dB	-1 dB	+3 dB	0 dB	37 dB
Dump truck	74 dB	258	-33 dB	-1 dB	+3 dB	0 dB	42 dB
Tractor	80 dB	258	-33 dB	-13 dB	+3 dB	0 dB	37 dB

Predicted Noise Levels of Mobile Plant at Receiver Position 1

Plant	L _{WA}	Vehicles per Hour (Q)	Vehicle Speed (V)	Distance between Receiver and Haul Road (d)	Correction Factor (F)*	Correction to L _{Aeq,11hr} (K _r)	Reflection	Activity L _{Aeq,11hr}
Phase 2 (single haul road)								
Lorry	105 dB	6.3	16 km/h	160 m	0.80	-1 dB	+3 dB	48 dB
Road sweeper	109 dB	0.5						41 dB
Phase 3 (single haul road)								
Lorry	105 dB	6.4	16 km/h	264 m	0.80	-1 dB	+3 dB	46 dB
Road sweeper	109 dB	0.5						39 dB
Phase 4 (two haul roads)								
Lorry	105 dB	3.2	16 km/h	160 m	0.80	-1 dB	+3 dB	45 dB
Road sweeper	109 dB	0.5						41 dB
Lorry	105 dB	3.2	16 km/h	80 m	0.50	-3 dB		46 dB
Road sweeper	109 dB	0.5						42 dB
Phase 5 (single haul road)								
Lorry	105 dB	6.2	16 km/h	185 m	0.80	-1 dB	+3 dB	47 dB
Road sweeper	109 dB	0.5						40 dB
Phase 6 (single haul road)								
Lorry	105 dB	2	16 km/h	278 m	1.00	0 dB	+3 dB	42 dB
Road sweeper	109 dB	0.5						40 dB

* From Table F.2 of BS 5228-1:2009+A1:2014

Predicted Noise Levels of Stationary and Quasi-Stationary Plant at Receiver Position 2

Plant	L _{Aeq,T} at 10 m	Distance, m	Distance Attenuation	Activity On-Time Correction	Reflection	Screening Correction	Activity L _{Aeq,1hr}
Phase 2							
Screening plant	81 dB	304	-35 dB	-3 dB	+3 dB	0 dB	46 dB
Dozer	75 dB	85	-21 dB	-1 dB	+3 dB	0 dB	56 dB
Tracked excavator 1	69 dB	85	-21 dB	-3 dB	+3 dB	0 dB	47 dB
Tracked excavator 2	69 dB	85	-21 dB	-1 dB	+3 dB	0 dB	49 dB
Dump truck	74 dB	85	-21 dB	-1 dB	+3 dB	0 dB	54 dB
Tractor	80 dB	85	-21 dB	-13 dB	+3 dB	0 dB	49 dB
Phase 3							
Screening plant	81 dB	304	-35 dB	-3 dB	+3 dB	0 dB	46 dB
Dozer	75 dB	85	-21 dB	-1 dB	+3 dB	0 dB	56 dB
Tracked excavator 1	69 dB	85	-21 dB	-3 dB	+3 dB	0 dB	47 dB
Tracked excavator 2	69 dB	85	-21 dB	-1 dB	+3 dB	0 dB	49 dB
Dump truck	74 dB	85	-21 dB	-1 dB	+3 dB	0 dB	54 dB
Tractor	80 dB	85	-21 dB	-13 dB	+3 dB	0 dB	49 dB
Phase 4							
Screening plant	81 dB	304	-35 dB	-3 dB	+3 dB	0 dB	46 dB
Dozer	75 dB	300	-35 dB	-1 dB	+3 dB	0 dB	42 dB
Tracked excavator 1	69 dB	300	-35 dB	-3 dB	+3 dB	0 dB	34 dB
Tracked excavator 2	69 dB	300	-35 dB	-1 dB	+3 dB	0 dB	36 dB
Dump truck	74 dB	300	-35 dB	-1 dB	+3 dB	0 dB	41 dB
Tractor	80 dB	300	-35 dB	-13 dB	+3 dB	0 dB	35 dB
Phase 5							
Screening plant	81 dB	304	-35 dB	-3 dB	+3 dB	0 dB	46 dB
Dozer	75 dB	226	-32 dB	-1 dB	+3 dB	0 dB	45 dB
Tracked excavator 1	69 dB	226	-32 dB	-3 dB	+3 dB	0 dB	37 dB
Tracked excavator 2	69 dB	226	-32 dB	-1 dB	+3 dB	0 dB	39 dB
Dump truck	74 dB	226	-32 dB	-1 dB	+3 dB	0 dB	44 dB
Tractor	80 dB	226	-32 dB	-13 dB	+3 dB	0 dB	38 dB

Plant	L _{Aeq,T} at 10 m	Distance, m	Distance Attenuation	Activity On-Time Correction	Reflection	Screening Correction	Activity L _{Aeq,11hr}
Phase 6							
Screening plant	81 dB	304	-35 dB	-3 dB	+3 dB	0 dB	46 dB
Dozer	75 dB	265	-34 dB	-1 dB	+3 dB	0 dB	44 dB
Tracked excavator 1	69 dB	265	-34 dB	-3 dB	+3 dB	0 dB	35 dB
Tracked excavator 2	69 dB	265	-34 dB	-1 dB	+3 dB	0 dB	37 dB
Dump truck	74 dB	265	-34 dB	-1 dB	+3 dB	0 dB	42 dB
Tractor	80 dB	265	-34 dB	-13 dB	+3 dB	0 dB	36 dB

Predicted Noise Levels of Mobile Plant at Receiver Position 2

Plant	L _{WA}	Vehicles per Hour (Q)	Vehicle Speed (V)	Distance between Receiver and Haul Road (d)	Correction Factor (F)*	Correction to L _{Aeq,11hr} (K _r)	Reflection	Activity L _{Aeq,11hr}
Phase 2 (single haul road)								
Lorry	105 dB	6.3	16 km/h	352 m	1.00	0 dB	+3 dB	45 dB
Road sweeper	109 dB	0.5						38 dB
Phase 3 (single haul road)								
Lorry	105 dB	6.4	16 km/h	194 m	0.80	-1 dB	+3 dB	47 dB
Road sweeper	109 dB	0.5						40 dB
Phase 4 (two haul roads)								
Lorry	105 dB	3.2	16 km/h	347 m	1.00	0 dB	+3 dB	43 dB
Road sweeper	109 dB	0.5						39 dB
Lorry	105 dB	3.2	16 km/h	310 m	1.00	0 dB		43 dB
Road sweeper	109 dB	0.5						39 dB
Phase 5 (single haul road)								
Lorry	105 dB	6.2	16 km/h	291 m	1.00	0 dB	+3 dB	46 dB
Road sweeper	109 dB	0.5						39 dB
Phase 6 (single haul road)								
Lorry	105 dB	2	16 km/h	296 m	1.00	0 dB	+3 dB	41 dB
Road sweeper	109 dB	0.5						39 dB

* From Table F.2 of BS 5228-1:2009+A1:2014

Predicted Noise Levels of Stationary and Quasi-Stationary Plant at Receiver Position 3

Plant	L _{Aeq,T} at 10 m	Distance, m	Distance Attenuation	Activity On-Time Correction	Reflection	Screening Correction	Activity L _{Aeq,11hr}
Phase 2							
Screening plant	81 dB	151	-27 dB	-3 dB	+3 dB	0 dB	53 dB
Dozer	75 dB	47	-15 dB	-1 dB	+3 dB	0 dB	62 dB
Tracked excavator 1	69 dB	47	-15 dB	-3 dB	+3 dB	0 dB	54 dB
Tracked excavator 2	69 dB	47	-15 dB	-1 dB	+3 dB	0 dB	56 dB
Dump truck	74 dB	47	-15 dB	-1 dB	+3 dB	0 dB	61 dB
Tractor	80 dB	47	-15 dB	-13 dB	+3 dB	0 dB	55 dB
Phase 3							
Screening plant	81 dB	151	-27 dB	-3 dB	+3 dB	0 dB	53 dB
Dozer	75 dB	110	-24 dB	-1 dB	+3 dB	0 dB	53 dB
Tracked excavator 1	69 dB	110	-24 dB	-3 dB	+3 dB	0 dB	45 dB
Tracked excavator 2	69 dB	110	-24 dB	-1 dB	+3 dB	0 dB	47 dB
Dump truck	74 dB	110	-24 dB	-1 dB	+3 dB	0 dB	52 dB
Tractor	80 dB	110	-24 dB	-13 dB	+3 dB	0 dB	46 dB
Phase 4							
Screening plant	81 dB	151	-27 dB	-3 dB	+3 dB	0 dB	53 dB
Dozer	75 dB	47	-15 dB	-1 dB	+3 dB	0 dB	62 dB
Tracked excavator 1	69 dB	47	-15 dB	-3 dB	+3 dB	0 dB	54 dB
Tracked excavator 2	69 dB	47	-15 dB	-1 dB	+3 dB	0 dB	56 dB
Dump truck	74 dB	47	-15 dB	-1 dB	+3 dB	0 dB	61 dB
Tractor	80 dB	47	-15 dB	-13 dB	+3 dB	0 dB	55 dB
Phase 5							
Screening plant	81 dB	151	-27 dB	-3 dB	+3 dB	0 dB	53 dB
Dozer	75 dB	144	-27 dB	-1 dB	+3 dB	0 dB	50 dB
Tracked excavator 1	69 dB	144	-27 dB	-3 dB	+3 dB	0 dB	45 dB
Tracked excavator 2	69 dB	144	-27 dB	-1 dB	+3 dB	0 dB	44 dB
Dump truck	74 dB	144	-27 dB	-1 dB	+3 dB	0 dB	49 dB
Tractor	80 dB	144	-27 dB	-13 dB	+3 dB	0 dB	43 dB

Plant	L _{Aeq,T} at 10 m	Distance, m	Distance Attenuation	Activity On-Time Correction	Reflection	Screening Correction	Activity L _{Aeq,1hr}
Phase 6							
Screening plant	81 dB	151	-27 dB	-3 dB	+3 dB	0 dB	53 dB
Dozer	75 dB	142	-27 dB	-1 dB	+3 dB	0 dB	50 dB
Tracked excavator 1	69 dB	142	-27 dB	-3 dB	+3 dB	0 dB	45 dB
Tracked excavator 2	69 dB	142	-27 dB	-1 dB	+3 dB	0 dB	44 dB
Dump truck	74 dB	142	-27 dB	-1 dB	+3 dB	0 dB	49 dB
Tractor	80 dB	142	-27 dB	-13 dB	+3 dB	0 dB	43 dB

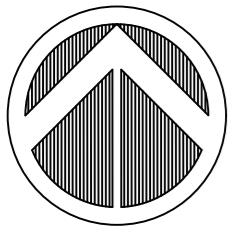
Predicted Noise Levels of Mobile Plant at Receiver Position 3

Plant	L _{WA}	Vehicles per Hour (Q)	Vehicle Speed (V)	Distance between Receiver and Haul Road (d)	Correction Factor (F)*	Correction to L _{Aeq,1hr} (K _r)	Reflection	Activity L _{Aeq,1hr}
Phase 2 (single haul road)								
Lorry	105 dB	6.3	16 km/h	225 m	0.80	-1 dB	+3 dB	46 dB
Road sweeper	109 dB	0.5						39 dB
Phase 3 (single haul road)								
Lorry	105 dB	6.4	16 km/h	140 m	0.63	-2 dB	+3 dB	48 dB
Road sweeper	109 dB	0.5						40 dB
Phase 4 (two haul roads)								
Lorry	105 dB	3.2	16 km/h	238 m	0.80	-1 dB	+3 dB	43 dB
Road sweeper	109 dB	0.5						39 dB
Lorry	105 dB	3.2	16 km/h	256 m	1.00	0 dB		44 dB
Road sweeper	109 dB	0.5						40 dB
Phase 5 (single haul road)								
Lorry	105 dB	6.2	16 km/h	253 m	0.90	0 dB	+3 dB	46 dB
Road sweeper	109 dB	0.5						39 dB
Phase 6 (single haul road)								
Lorry	105 dB	2	16 km/h	150 m	0.80	-1 dB	+3 dB	43 dB
Road sweeper	109 dB	0.5						41 dB

* From Table F.2 of BS 5228-1:2009+A1:2014

8 . A P P E N D I X C

CONTRACTORS WORKS PLAN



Key:

- | | | |
|---|----------------------------------|--|
| Existing Tree Blocks | New Playlines | Contractors Site Compound |
| Existing Major and Minor Contours (0.20m intervals) | New Range Outfield | Proposed Tree Clearing / Transplanting |
| New Out Of Play Roughs / Wildflowers Areas | Proposed Contours (1m intervals) | Haulage Routes For Lorries |
| New Fairways | New Bunkers | |
| New Greens | New Ponds | |
| New Semi Rough | New Ditch | |
| New Tees | New Permissive Footpath | |
- For location of tree protection fencing refer to Challice Consultings Arboricultural Survey - CC/403 AR2848



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