



Woodley House
65/73 Crockhamwell Road
Woodley
Reading
RG5 3BJ
Tel: 0118 944844
E-mail: enquiries@paragonacoustics.com

Project:	Hills Meadow Car Wash Reading			
Client:	Mr Anthony Herbert			
Report Title:	Noise Assessment of Car Wash Activity			
Author:	J A Gillott MIOA		Date:	22 nd July 2014
Checked:	P J Shortt MSc MIOA		Date:	22 nd July 2014
Revision:	0			
Report Status:	First issue			
Reference:	3293_CWNA_1			

This report has been prepared by Paragon Acoustic Consultants Ltd with all reasonable care and diligence within the terms of the contract with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. We accept no responsibility to third parties to whom this report, or any part, thereof is made available. Any such party relies upon the report at their own risk.

Woodley House, 65/73 Crockhamwell Road
Woodley, Reading RG5 3JP
Tel: 0118 9448444
E-mail: enquiries@paragonacoustics.com
Registered No.: 5032116: VAT No.: 844917204



SAFETY
SCHEMES IN
PROCUREMENT



ANC
THE ASSOCIATION OF
NOISE CONSULTANTS

Contents

1.0	Introduction	1
2.0	Site Description	1
3.0	Proposed car wash facility layout	2
4.0	Assessment Guidance	2
4.1	BS 4142:1997 " <i>Method for rating industrial noise affecting mixed residential and industrial areas</i> "	2
4.2	Subjective effect of changes in sound pressure level	3
5.0	Noise Measurements	4
5.1	Ambient/Background Noise	4
5.2	Car Wash Activity Noise	4
6.0	Measurement Results	5
6.1	Ambient/Background Noise	5
6.2	Activity Data	5
6.3	Mitigation	5
7.0	Calculation of Car Wash Noise Levels	5
8.0	Conclusions	11

1.0 Introduction

Paragon Acoustic Consultants Ltd has been commissioned by Mr Anthony Herbert to assess noise associated with activity at the proposed car wash facility located at Hills Meadow, George Street, Caversham.

Reading Borough Council Internal Memorandum from Rebecca Moon - Environmental Health Officer, ref EP /498691 that refers to the consultation date received of 15 July 2014 confirms the following:

“Recommended Condition

The car wash shall not be operated until an acoustic assessment has been submitted and approved in writing by this Council. The assessment shall demonstrate that the plant noise rating level will not cause an increase in the existing background noise level when measured / predicted in accordance with BS 4142:1997 methodology. The noise levels shall be determined at the nearest noise-sensitive premises.

Reason: to protect the amenity of neighbouring residents of the proposed development.”

The following assessment reviews the proposed car wash equipment noise emissions to at the nearest noise-sensitive premises. Noise sensitive has been interpreted as being residential properties in the vicinity of the proposed car wash site.

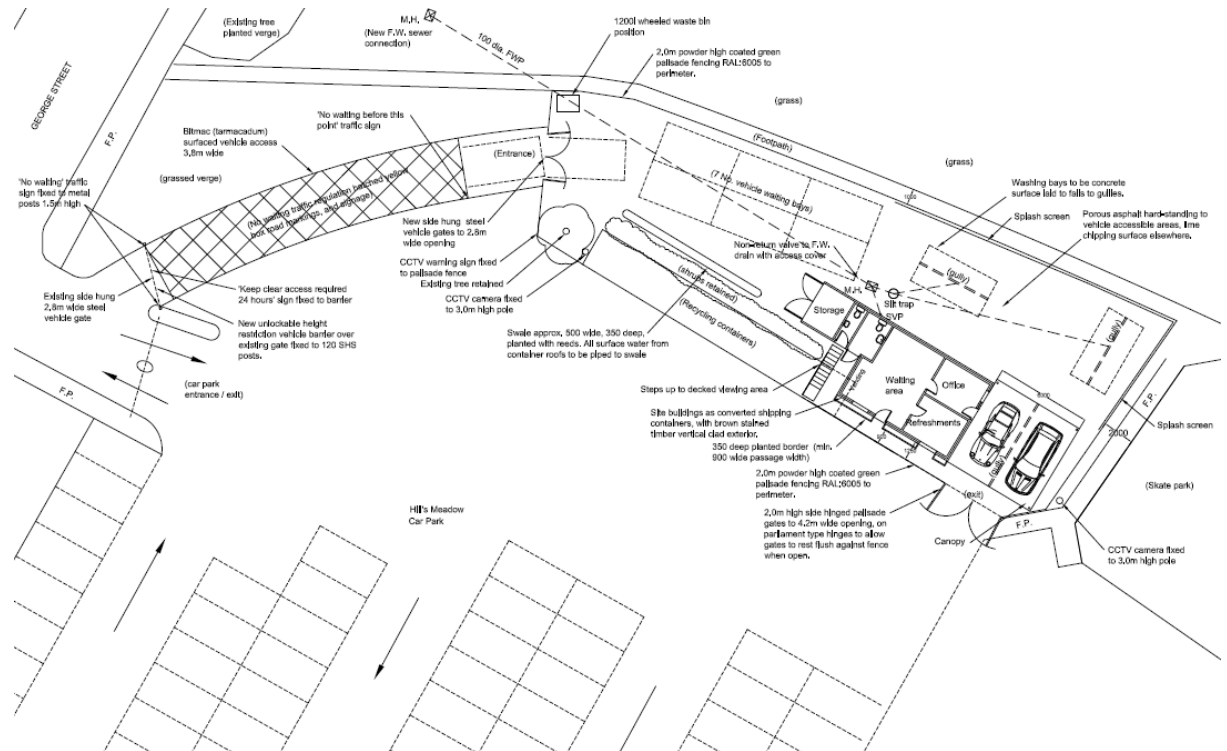
2.0 Site Description

It is proposed to locate the car wash facility on the northern elevation of the existing Hills Meadow car park, adjacent to the existing skate park.

The Hills Mews car park extends to approximately 135m in a north to south orientation and approximately 80m west to east orientation. To the south of the car park lies the river Thames. On the south side of the river Thames lie three storey residential flats. It was noted that the ambient and background noise levels in these areas were likely to be held up by the constant noise of the water flowing over the Thames weir located to the east of these properties.

Extending approximately 140 metres to the north of the car park is a BMX track within waste ground, beyond which lie the gardens and residential properties of dwellings with their frontage on Queens Road. These residential properties are in the order 230m from the proposed car wash facility. To the east lies the car park, waste ground and the river Thames. Residential properties are located in Heron Island, these being approximately 230m from the proposed car wash facility. To the west lies George Street, a two way trafficked highway. Beyond George Street to the west lie Christchurch Meadows. Residential are at a distance of approximately 260m to the west of the proposed car wash facility.

The client has provided a drawing detailing the proposed layout, a section of which is reproduced as follows:



4.1 BS 4142:1997 “Method for rating industrial noise affecting mixed residential and industrial areas”

This British Standard provides a method by which industrial noise can be assessed in terms of the likelihood of complaints arising from people residing in nearby dwellings. The standard describes methods for determining, at the outside of a building:

- a) Noise levels from factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises; and
- b) Background noise level

The standard also describes a method for assessing whether the noise referred to in (a) is likely to give rise to complaints from people residing in the building. The method is not suitable for assessing noise measured inside buildings or when the background and rating levels are both very low¹.

The likelihood that an individual will complain depends on individual attitudes and perceptions in addition to the noise levels and acoustic features present. The standard however, is only concerned with the rating of a noise based on the margin by which it

¹ For the purposes of the standard, background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low.

exceeds a background noise level, with an appropriate allowance for any acoustic characteristics that may be present.

In general, a noise is likely to cause complaints when it exceeds the background by a certain margin:

a difference of around +10 dB or more indicates that complaints are likely;

a difference of around +5 dB is of marginal significance;

if the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

Certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the specific noise level and the background noise level. **Where present at the assessment location**, such features are taken into account by adding 5 dB to the specific noise level to obtain the rating level.

The acoustic feature correction is applied if one or more of the following features occur, or are expected to be present for new or modified noise sources:

The noise contains a distinguishable, discrete continuous note (whine, hiss, screech, hum, etc);

The noise contains distinct impulses (bangs, clicks, clatters, or thumps);

The noise is irregular enough to attract attention.

An important cautionary note is included within the standard:

"the user is reminded that this standard is not based on substantive research but rather on accumulated experience"

As noted above, the BS 4142:1997 methodology is suitable for assessing noise from factories, industrial premises and fixed installations sources of an industrial nature in commercial premises.

4.2 Subjective effect of changes in sound pressure level

The following scale relates changes in sound level to human response, based on Table 3.1 of HA 213/08.

Table 1: Subjective effect of changes in sound pressure level

Noise Change dB(A)	Subjective Reaction	Magnitude of Impact
0.0	No change	None
0.1 to 0.9	Imperceptible change	Negligible
1.0 to 2.9	Perceptible change	Minor
3.0 to 4.9	Perceptible change	Moderate
5.0 to 9.9	Up to a halving/doubling of loudness	Major
10.0 or more	More than a halving/doubling of loudness	Major

5.0 Noise Measurements

5.1 Ambient/Background Noise

Environmental noise surveys have been undertaken to quantify the ambient noise and background noise climate at site prior to operation of the facility. Measurements were made at position representative of the nearest affected dwelling as follows:

- **MP1:** Queens Road – to the north of the proposed car wash facility
- **MP2:** Kings Meadow Road – to the south of the proposed car wash facility

Measurements were made on Sunday 20th July 2014 over the period 07:00 to 09:30 hours. Noise levels were recorded using a 10-minute sample period, the measurement period being considered sufficient to accurately represent the noise climate during the hour in which they were taken.

The measurement data obtained are free-field values due to the minimal contribution of reflected sound energy from nearby surfaces other than the local ground plane. The sound level meter was positioned such that the microphone diaphragm was 1.5 metres above the local ground plane. The quantities recorded included:

$L_{Aeq,T}$: equivalent continuous noise level over the measurement period, T

L_{AFmax} : maximum sound pressure level (Fast time-weighting)

$L_{AF90,T}$: noise level exceeded for 90% of the measurement period, T.

Weather conditions during the survey periods were warm, still and dry with moderate cloud cover.

5.2 Car Wash Activity Noise

A car wash equipment noise survey was carried out on Sunday 20th July 2014. Reference noise data was obtained for the dominant items of fixed equipment i.e. jet wash (both for the main pump noise and the water jet noise cleaning cars) and vacuum cleaner.

Measurements were made at the following positions:

MP2: 1.5m distant from vacuum cleaner;

MP3: 1m distant from jet wash – main pump unit

MP3: 2.5m distant from jet wash- noise of water jet cleaning car;

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of BS EN ISO 60651:1994, BS EN ISO 60804:1994, ANSI S1.4-1985, ANSI S1.43-1997 and applicable parts of DIN 45 657:

Norsonic Type NOR118 Sound level meter (serial number 31990);

Norsonic Type NOR1225 ½" microphone (serial number 7129).

Calibration checks were made prior to and after completion of measurements using a Norsonic Type 1251 acoustical calibrator complying with Class 1 of IEC 942 (1988), calibration level 114.0 dB $\pm$ 0.3 dB, @ 1.0 kHz.

All instrumentation carried a current manufacturer's certificate of conformance.

6.0 Measurement Results

6.1 Ambient/Background Noise

The measured ambient and background noise data are set out in Table 2

Table 2: Ambient and Background Noise Data

File	Date	LAeq	LAFmax	LAF,10	LAF,90
NOR118_6212828_140720_0002.NBF	07:00-08:00 MP1	49	69.2	49.6	37
NOR118_6212828_140720_0003.NBF	07:00-08:00 MP2	49.4	64.4	52.1	45.8
NOR118_6212828_140720_0004.NBF	08:00-09:00 MP1	51.9	70.7	53.3	36.9
NOR118_6212828_140720_0005.NBF	08:00-09:00 MP2	51.8	80.3	52.8	45.5
NOR118_6212828_140720_0006.NBF	09:00-10:00 MP1	54.6	76.4	56.6	39.7
NOR118_6212828_140720_0007.NBF	09:00-10:00 MP2	54.4	74.9	57.7	48.4

6.2 Activity Data

The measured activity data are set out in Table 3

Table 3: Activity Noise Data

File	Date	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz
NOR118_6212828_140720_0008.NBF	Vacume at 1.5 metres	60.6	55.7	76.8	67.9	62.5	65.7	65.2	60.8
NOR118_6212828_140720_0009.NBF	jet wash pump at 1m	66.2	73	67.8	65.2	68.7	63.7	61.8	56.5
NOR118_6212828_140720_0010.NBF	jet wash on car at 2.5 metres	76.1	64	60.6	64.9	64.4	66.9	70.7	73.2

The client has advised that these will be two jet wash machines and 2 number vacuums at the site.

6.3 Mitigation

The analysis accounts for the acoustic screening that will be offered by the proposed buildings of the car wash indicated in the drawing extract given in Section 3.0.

In addition, the "Splash screen" indicated on drawing No 13/039/02 rev A shall comprise an imperforate screen of 6mm thickness Perspex (or equivalent density) that extends from the ground to a height of 1.8 metres.

7.0 Calculation of Car Wash Noise Levels

To quantify noise associated with the car wash facility, three dimensional noise modelling has been undertaken to using CADNA A noise software, which implements the procedures in pertinent documents such as ISO 9613 "Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation", Department of Transport "Calculation of Road Traffic Noise" (CRTN), Department of Transport "Calculation of Railway Noise" (CRN) etc..

The source measurement data have been input to the model to determine noise levels at the nearest dwellings based on the pattern of activity observed on-site and the client's estimate of the typical number of hourly car wash events for a Sunday morning and typical weekday.

For calculation purposes, two orders of mirror source reflection have been allowed for using ray tracing as experience has shown that this approach more accurately models

noise propagation in situations where multiple plane reflecting surfaces are present rather than uniform reflection corrections given in methods such as CRTN

The model used to assess resultant noise levels will not include all buildings surrounding the site, however, the nearest noise sensitive properties are included to allow assessment. The following screenshots of the model are provided for assistance:

Figure 1: Predicted Car Wash Noise Levels at 4m height

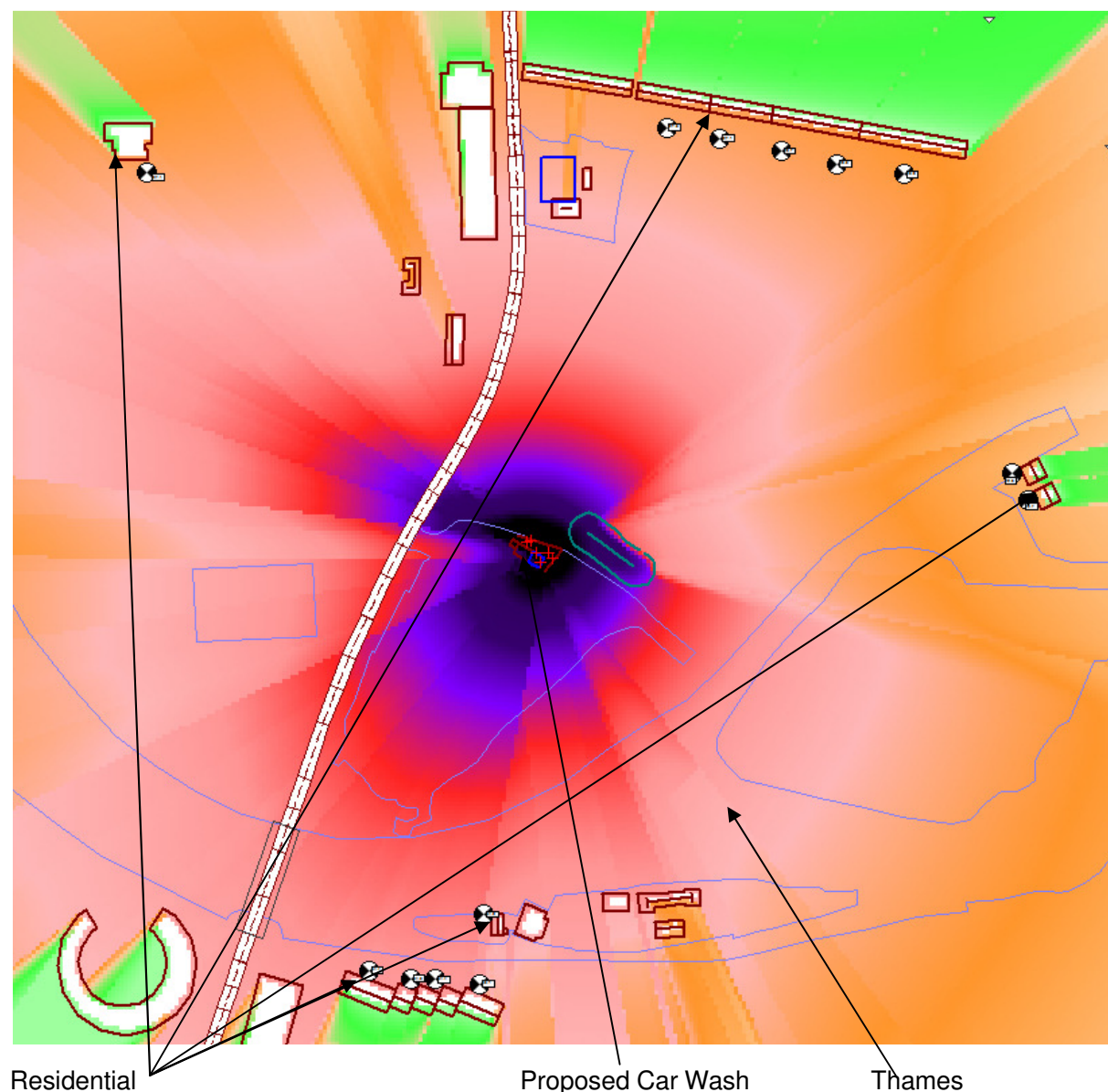


Figure 2: Predicted Noise Levels in vicinity of residential to north (Queen Street)



Figure 3: Predicted Noise Levels in vicinity of residential to south (Kings Meadow Road and in island)



Figure 4: Predicted Noise Levels in vicinity of residential to east (located in Heron Island)



Figure 5: Predicted Noise Levels in vicinity of residential to west (located in Patrick Road)



7.1 Table of results.

The following Table provides a summary of the noise levels predicted at the nearest affected residential properties and compares these to the ambient / background noise levels.

Location	Background LA90 used (Sunday 07:00-09:30)	Ambient LAeq (Sunday 07:00-09:30)	Predicted LAeq noise level	Comment
residential to north (Queen Street)	37 dB LA90	49 dB LAeq	27 LAeq ^[2] dB	Predicted plant noise level 10 dB below the existing likely lowest background level for the operating period of plant, therefore no increase in the existing background noise level. See Note ^[1]
residential to south (Kings Meadow Road and in island)	46 dB LA90	49 dB LAeq	35 LAeq ^[2] dB	Predicted plant noise level 11 dB below the existing likely lowest background level for the operating period of plant, therefore no increase in the existing background noise level. See Note ^[1]
residential to east (located in Heron Island)	46 dB LA90	49 dB LAeq	23 LAeq ^[2] dB	Predicted plant noise level 23 dB below the existing likely lowest background level for the operating period of plant, therefore no increase in the existing background noise level. See Note ^[1]
residential to west (located in Patrick Road)	37 dB LA90	49 dB LAeq	27 LAeq ^[2] dB	Predicted plant noise level 10 dB below the existing likely lowest background level for the operating period of plant, therefore no increase in the existing background noise level. See Note ^[1]

Notes:

^[1] It is commonly accepted that in order for the plant noise level not cause an increase in the existing background noise level when predicted that it will be necessary to restrict mechanical plant noise levels to a maximum of 10 dB below the existing background levels.

^[2] The predicted LAeq noise levels are in the order 20 dB below the measured ambient noise levels at the assessment locations. As such it is considered that acoustic features will not be present at the assessment locations and therefore such features need not be taken into account.

The assessment assumes that two jet wash machines and 2 number vacuums will be operation at the same time. In reality, the client has advised that the Jet wash machines will potentially be operating for only 15 minutes in any given hour. As such, the on-time correction for the jet wash machines over an hour period may reduce predicted hourly noise levels by 6 dB.

A BS 4142 assessment is given for the properties in Queens Road as follows:

Table 4: Car wash noise assessment at Queens Road
(Sunday 07:00 to 10:00 hours)

Results			Relevant Clause	Commentary
Predicted noise Level	$L_{Aeq,60min}$	27 dB	6.3	Specific noise determined by calculation based on near field measurements. Allowable under clause 6.3.5
Background noise level	$L_{A90,10min}$	37 dB	7.3	Measured on Sunday morning as detailed
Assessment to be made during the daytime thus reference time period is 1 hour				
Specific noise level	$L_{Aeq,60min}$	27 dB		Assumes no on-time correction that is potentially allowable. A 6 dB reduction to predicted noise levels of jet wash machines would potentially occur if considered.
Acoustic feature correction	0 dB		8.2	The predicted LAeq noise levels are in the order 20 dB below the measured ambient noise levels at the assessment locations. As such it is considered that acoustic features will not be present at the assessment locations and therefore such features need not be taken into account.
Rating level	(27 + 0) dB = 27 dB			
Background noise level	$L_{A90,10min}$	37 dB		
Excess of rating over background level	(27-37) dB = -10 dB			

Assessment indicates "A positive indication that complaints are unlikely" "

The above Tables sets out the BS 4142:1997 assessment at the most affected dwellings under consideration for the car wash plant operating period. The analysis concludes a situation indicating that a positive indication that complaints are unlikely and it is therefore reasonable to assume no loss of residential amenity

8.0 Conclusions

A detailed assessment of noise from the proposed car wash facility located at Hills Meadow, George Street, Caversham has been undertaken. The analyses demonstrate that subject to adoption of the mitigation measures recommended herein, noise levels would fall into “A positive indication that complaints are unlikely” when assessed according to BS 4142 and hence no loss of residential amenity would result. Furthermore, car wash noise would also meet with the recommended Condition given in the Reading Borough Council Internal Memorandum from Rebecca Moon-Environmental Health Officer, ref EP /498691 that refers to the consultation date received of 15 July 2014 and hence it is considered that planning permission should not be refused on the grounds of noise.