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Environmental Noise Assessment
Prayer Facility
55 Beardwood Brow
Blackburn

AB Acoustics
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Shaw
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May 2017

Introduction

AB Acoustics were commissioned by Inspire Planning Solutions Ltd on behalf of Beardwood Muslim Society to undertake an environmental noise assessment of the new site for a prayer facility – the purpose of the assessment was to determine the likely affect of the change of use of the existing premises on the above site would have on the surrounding residential properties.

This assessment was undertaken in order to accompany a planning application for the above change of use.

A plan of the proposed site is shown below – together with the measurement positions used to determine the existing background noise level in the vicinity – these measurement ;positions are deemed to be representative of the existing noise in the area.

Proposed Site Measurement Location 1 Measurement Location 2

The report presents the results of the survey to establish the existing background noise levels and the assessment of the noise emissions from the site and then discusses any measures that maybe necessary to reduce the noise levels.

As can be seen from the above the site is located in a predominantly residential area .

The proposed hours of operation of the Facility are 05.00 to 00.00 hrs – though it is understood that between 23.00 and 07.00 there will only be one prayer time – at this time it is extremely likely that only local people would use the Facility and would therefore be inclined to walk rather than use cars – it is envisaged that the Facility will not be used on a contineous basis but only possibly three to five times a day for approximately 10 to 15 minutes each time.

There will be no sound equipment used on the premises.

The proposal is for a prayer room for the Men as detailed on the plans at the end of the report but also a Ladies Contemplation Room which will not be used for congregation prayer but more for quiet contemplation.

As the development is for prayer only it is expected that only a small number of people will attend from the immediate area – it is expected that this will be in the order of 12 to 15 for men although the capacity of the prayer space is for around 30 people. The Ladies room will be used for individual prayer and as such no more than 4 or 5 will be present at any one time.

Whilst car parking spaces are available – 4 are existing it is proposed that a further 7 spaces will be available as detailed on the plan at the end of the report.

The Facility is designed to be a local facility and it is expected that the vast majority of uses will actually arrive by foot but clearly, it is possible that some may arrive by car – and use – the car park.

Noise Assessment Criteria

The likelihood of complaints about noise from industrial / commercial premises can be assessed where the standard is appropriate using BS 4142 – 2014.

The above Standard includes in it noise from vehicles that would potentially use the above proposed site.

Within the standard, another Standard, BS8233 is introduced for general guidance on acceptable noise levels within buildings.

Guidance in BS 8233 (Sound Insulation and Noise Reduction in Buildings) provides design criteria for noise inside dwellings. These are:

Bedrooms: LAeq.T = 30 dBA
Living Areas: Laeq,T = 35 dBA

However it is usual for Blackburn LPA to apply a blanket 30 dBA level to all room,s at all times of the day.

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB LAmax inside the bedroom – this relates to 60 dB LAmax external to the bedroom.

In brief an ‘Outdoor Living Area’ should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

It is understood that the proposed Facility will not be used for social purposes and therefore there will be no music noise of any kind from the Facility.

The Qualitative Guidance NPPG

This new guidance issued in March 2014 is qualitative therefore it does not contain any quantitative guidance on acceptable noise levels.

Paragraph 10 states ' *Care should be taken, however, to avoid these (British Standards) being implemented as fixed thresholds as specific circumstances may justify some variation being allowed'* .

Therefore it is clear that current guidance assumes that quantitative standards can be used provided that there is flexibility in their application.

In paragraph 5 various noise categories and thresholds are set out; up to and including "Noticeable and Intrusive" it seems likely that the intention would be to recognise that whilst the noise levels are not desirable, planning consent should be granted provided that the noise can be mitigated and the intrusion reduced to a minimum. "Noticeable and Intrusive" noise occurs when:

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

Above the 'Significant Observed Adverse Effect Level ' - SOAEL – threshold, noise becomes 'Noticeable and Disruptive ' because

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

Noise which is "Noticeable and disruptive" should be avoided; however, it is the next level of disturbance "Noticeable and very disruptive" that should be prevented.

It can be seen that the NPPG noise guidance envisages that if properties are provided with alternative ventilation and acoustic glazing, designed to ensure "acceptable" internal noise levels, then internal noise levels would not exceed the "Significant Observed Adverse Effect Level" and that planning consent could be granted. The guidance states "If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout."

Equipment Used and Measurement Method

The noise levels were measured using a :

Bruel & Kjaer Type 2260 Sound Level Meter (Type 1 instrument)

Calibration was undertaken using a :
Bruel & Kjaer type 4231 calibrator

The measurements were carried out at the location shown at a height of 1500mm above the ground and away from reflecting surfaces.

The measurements were undertaken at the times stated in the results.

The location of the measurements are indicated on the plan above.

Results

Friday 28 April 2017 – Weather : Dry – Temperature = 11 degrees C – wind = 0.0 m/sec - cloud cover = 80% - No temperature inversion.

Location / Time	LA eq	LA 90
1 / 21.00 – 21.20	57.4	41.5
2 / 21.50 – 22.10	47.3	36.1

Tuesday 02 May 2017 – Weather : Dry – Temperature = 11 degrees C – wind = 0.0 m/sec - cloud cover = 40% - No temperature inversion.

Location / Time	LA eq	LA 90
2 / 21.00 – 21.20	51.2	37.7
1 / 21.50 – 22.10	58.1	40.9

Wednesday 03 May 2017 – Weather : Dry – Temperature = 8 degrees C – wind = 2.3 m/sec east - cloud cover = 20% - No temperature inversion.

Location / Time	LA eq	LA 90
2 / 06.55 – 07.15	41.7	36.6
1 / 07.20 – 07.40	47.2	38.2

The main noise source at the site is that of constant traffic movement on Preston New Road and the Beardwood itself which appears to be a busy access road to various residential properties.

The noise that the nearby residential properties will be subject to will originate from a number of sources : Activities in the Centre – Cars arriving and leaving the Centre – People talking outside the Centre.

It is understood that heating is provided by central heating – as is the case at the present time.

Activities within the Centre

Prayers

These will use the room identified on the submitted plan.

From previous measurements the noise level with a Mosque has been measured at **72.1 dBA** (this was for a greater number of worshippers than will use the Facility)– a Mosque is subject to certain acoustic requirements for prayer – namely – sound audibility – speech intelligibility – full perception of the spoken word and a naturalness to the internal sound.

To this end the Masjid is usually a reverberant enclosed space with only absorption being supplied by the carpeted floor and the people.

A number of different residances are potentially affected by the internal activities.

The following distances have been scaled from Google Earth :

Balmoral : 16m
The Bungalow : 27m
Newlands / Park Lodge Flats : 26m

The noise level at the residential property can be calculated using :

$$L_2 = L_1 - 6 - R + 10 \log S - 11 - 20 \log r + DI$$

Where

L_2 = Calculated level at distance r metres

L_1 = Measured Level – **72 dBA –** very much the 'worst case situation'.

R = the sound reduction index of the building element – window - which in this case is $\mathbf{R_w}$ = **29 dBA** – for standard 4 / 6 to 20mm / 4mm IGU's

S = surface Area of window on front facade – 2.0 x 1.0 x 2.0 = **4sq m**

.r= distance to houses = **16 m** (scaled off Google Earth)

DI= Directivity Index = **3**

Therefore $L_2 = 72 - 6 - 29 + 10\log 4 - 11 - 20\log 16 + 3$

L_2 = 11 (10.9)dBA. - this is the calculated noise level at Balmoral due to the usage of the Ladies Contemplation Room which directly faces Balmoral.

If the above is repeated for the usages of both the Mens Prayer Room and the Ladies Room at the nearby residential propertiess assuming the following window sizes :

Ladies Room = 4 sq m / wall
Mens Room = 2.25 sq m to Newlands and 3 sq m to The Bungalow.

	The Bungalow	Balmoral	Newlands
Ladies	6 dBA	11 dBA	0 dBA screened
Mens	5 dBA	0 dBA screened	4 dBA
Total	**9 dBA**	**11 dBA**	**4 dBA**

The above calculated level is for closed windows – It is usual that the window is closed during worship so that external noises do not enter the prayer room.

These calculated levels are compared to the measured background level at the proposed site – which is of the order of **36 dBA** – (lowest recorded level).

As can be seen the noise level due to prayers at the residential property is well below the measured background level.

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that – if the above case – *windows closed*

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No effect	No observed Effect	No Specific Measures required
Noticeable and not Intrusive	Noise can be heard – does not cause any change in behaviour or attitude	No Observed Adverse Impact	No Specific Measures required
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and / or attitude – affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Impact	Mitigate and reduce to a minimum.

The Perception at the residential property being highlighted

It is worth noting that that the prayer times are short – of the order of 5 to 15 minutes .

Traffic arriving at the Facility

The noise level from this source to some extent is determined by the number of vehicles accessing the site – there are effectively 2 different car parks available – both of which are on site.

A number of assumptions have been made with regard to the traffic noise - these are based on previous prayer activities at other Mosques surveyed - that they will all arrive and leave within a very short time period – usually around 15 minutes.

Also it is worth noting that the additional noise generated by the traffic movement on the car park is of a similar character to the existing noise environment and therefore may be regarded as not as obtrusive as introducing a new type of noise into the area**.**

From previous measurements undertaken on car movement of a car park the following levels were recorded - the following includes the car driving up – stopping – driver getting out and closing the car door – driver opening door getting back in and then closing door – starting engine and driving off.

Vehicle Type	LAeq	LA max
Rover 75	63.8	68.5
Transit Van	64.9	79.3

Volvo	63.8	71.4
Mercedes	66.1	78.7
BMW	67.8	78.7

All the above measurements were carried out at a height of 1.5m and at a distance of 2.0m from the source.

If it is assumed that one of the noisiest cars arrive / depart then the LA eq could be of the order of **68 dBA.**

The distance between the 'new northern' Car Park and the nearest residential property (The Bungalow) is scaled at 20.0 m this results in a calculated level of 68 – 20 log 20 / 2 = **48 dBA**

As the car movements will not take place continuously within a the 20 minute measurement period then above calculated LA eq can be regarded as the 'worst case' situation – the actual time of the above car noise could be of the order of 2 minutes in any 20 minute period - if this is related to the 20 minute measurement period then the calculated noise level reduces to **38 dBA –** however this is for 1 movement – each person arriving by car will also leave therefore the calculated level increases to **41 dBA** – below the measured LA eq at the site.

This is for only 1 car but if all 5 car park spaces are used at the simultaneously (very unlikely) then the following levels are calculated :

Number of Cars	Calculated LA eq
1	41
2	44
3	46
4	47
5	48

It is very unlikely that the above noise events will occur simultaneously - as calculated - if the number of cars are increased – therefore the noise level generated will be as calculated for a single car – at 41 dBA but will occur more frequently.

Whilst the above can only be regarded as an estimate it is worth noting that the actions detailed above are entirely in keeping with the existing noise environment – and there is no control over the cars on the nearby roads.

The actual car movement during and after parking will generate noise of the same character as the existing noise environment.

This 'new' parking location is screened from Balmoral by the property itself and therefore any activity on this 'new ' car park will not be audible at Balmoral due the attenuation due to the increased distance and the effects of the screening.

With respect to Balmoral then repeating the above the following levels are calculated – assuming that the distance between the existing car park and Balmoral is of the order of 8.0m

Number of Cars	Calculated LA eq
1	49
2	52
3	54
4	55
5	56
6	57

It is very unlikely that the above noise events will occur simultaniously -as calculated - if the number of cars are increased – therefore the noise level generated will be as calculated for a single car – at 49 dBA but will occur more frequently.

Whilst the above can only be regarded as an estimate it is worth noting that the actions detailed above are entirely in keeping with the existing noise environment – and there is no control over the cars on the nearby roads.

This location equates to measurememt position 2 in the above results – as the calculated noise level is in excess of the measured Laeq for this location then it would be advisable that this car park is not used for early morning and late evening prayers.

In addition to the above it is very likely that the people arriving / leaving will be talking.

Although it is difficult to determine the precise number of people at will use the facility the capacity is limited to around 30 people with the actual usage being typically around 12 - 15 people.

The noise level generated by people talking varies – according to BS 8233 the noise levels for various speech is :

Distance between Talker and listener - m	Noise Level dBA
	Normal Voice
1	57

The actual noise level of people in the proposed area will also depend upon the number of people there at any one time – this is determined from $L_1 = L_2 + 10 \log N$

Where :
L_1 = Resultant Level – dBA
L_2 = Assumed Level – dBA
N = number of people.

Therefore L1 = 57 + 10 log 1 = 57 dBA

The noise level at the nearest residential property will be attenuated by the distance between the noise source and the receiver – this has been scaled at 8.0 m (Reference : Google Earth). - from the existing car park to Balmoral.

Therefore the noise level at the residential property can be calculated using :

$L_2 = L_1 - 20 \log (r/ref)$

Where L_2 = level at distance r metres
L_1 = level of plant item = 57 dBA
r. = distance to residential property = 8.0m
ref = 1m

L2 = 57 – 20 log 8.0 / 1

L_2 = 39 dBA.

This assumes one person talking – which is likely.

It is worth noting that the above it will be of short duration as the worshippers will enter / leave quickly.

As the number of people increase then so will the noise level – as detailed below :

Number of People	Calculated Noise Level dBA
2 people - 1 talking	39
4 people - 2 talking	42
6 people – 3 talking	44

It is very likely that the worshippers will leave the Mosque quickly and depart on their way home and indeed will be encouraged to do so by the Imam in order to minimise any potential disturbance in the neighbourhood.

The calculated noise level at Balmoral (the worst case situation) is below the measured LA eq for this location (Location 2).

With respect to the other residential properties the calculated noise levels will be lower due to either increased distance or screening or a combination of the two.

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that *:*

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No effect	No observed Effect	No Specific Measures required
Noticeable and not Intrusive	Noise can be heard – does not cause any change in behaviour or attitude	No Observed Adverse Impact	No Specific Measures required
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and / or attitude – affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Impact	Mitigate and reduce to a minimum.

Recommendations

Whilst the above shows that there is no problem will be change of use of the existing premises to a Prayer Facility we would advise that notices are placed in the entrance hall requesting that the worshippers leave quietly either if they are on foot or in a car.

It would also be advantageous if this point would be mentioned occasionally at prayer times.

If worshippers do arrive by car then it is recommended that the new proposed car park for 5 cars is used first as this is screened from Balmoral by 55 Beardwood itself and therefore both the noise from the cars and people talking will be effectively attenuated – the gates to the existing car park could be locked to prevent access.

In view of the above we would recommend that approval be granted – with respect to noise – for the proposed change of use.

Pilkington **Optiphon™**

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Configuration single glazing										
6.8 mm Pilkington **Optiphon™**	21	26	31	35	37	38	35(-1;-3)	35	34	32
8.8 mm Pilkington **Optiphon™**	24	28	34	38	37	43	37(-1;-4)	37	36	33
10.8 mm Pilkington **Optiphon™**	28	31	36	38	39	47	38(-1;-2)	38	37	36
12.8 mm Pilkington **Optiphon™**	30	32	37	39	41	51	39(-0;-2)	39	39	37
16.8 mm Pilkington **Optiphon™**	29	34	37	39	46	55	40(-0;-2)	40	40	38
Configuration Insulating Glass Unit (IGU), thickness in mm										
6 / 6 to 20 mm / 6.8 Pilkington **Optiphon™**	23	24	34	42	43	52	38(-2;-5)	38	36	33
6 / 6 to 20 mm / 8.8 Pilkington **Optiphon™**	24	26	40	48	46	54	41(-3;-7)	41	38	34
6 / 6 to 20 mm / 10.8 Pilkington **Optiphon™**	23	28	41	47	45	55	42(-3;-7)	42	39	35
6 / 6 to 20 mm / 12.8 Pilkington **Optiphon™**	20	29	43	47	46	49	42(-3;-8)	42	39	34
8.8 Pilkington **Optiphon™** / 6 to 20 mm / 12.8 Pilkington **Optiphon™**	26	36	46	50	52	63	47(-2;-7)	47	45	40
16.8 Pilkington **Optiphon™** / 6 to 20 mm / 16.8 Pilkington **Optiphon™**	29	40	45	47	54	68	48(-2;-6)	48	46	42

The above IGUs with Pilkington **K Glass™** on one pane and a 16 mm 90 % Argon-filled cavity achieve a U value of 1.5 W/m² K
Further information on solar and thermal performance is available on the Pilkington website using the Spectrum program: www.pilkington.com/spectrum
Impact classification EN12600 Class 1(B)1 for all above Pilkington **Optiphon™** products
$R_w(C;C_{tr})$ are in accordance with EN717-1

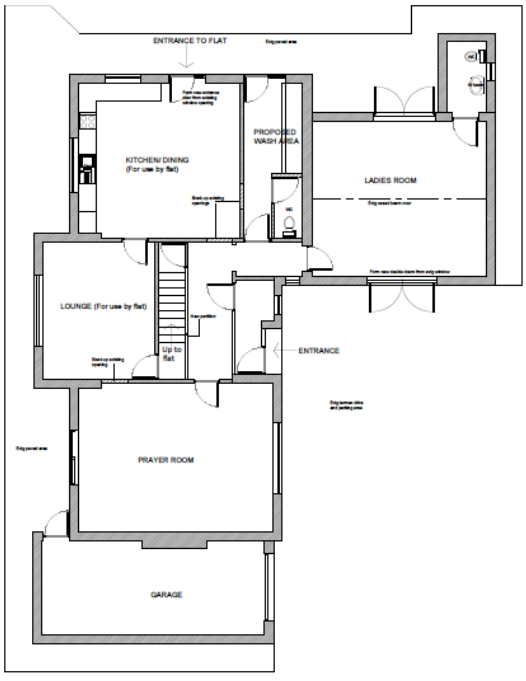
Non Pilkington Optiphon™ glass products. Figures from BS EN 12354

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Configuration single glazing										
4 mm Float Glass	17	20	26	32	33	26	29(-2;-3)	29	27	26
6 mm Float Glass	18	23	30	35	27	32	31(-2;-3)	31	29	28
8 mm Float Glass	20	24	29	34	29	37	32(-2;-3)	32	30	29
10 mm Float Glass	23	26	32	31	32	39	33(-2;-3)	33	31	30
12 mm Float Glass	27	29	31	32	38	47	34(-0;-2)	34	34	32
Configuration Insulating Glass Unit (IGU), Float glass, thickness in mm										
4 / 6 to 20 mm / 4	21	17	25	35	37	31	29(-1;-4)	29	28	25
6 / 6 to 20 mm / 6	20	18	28	38	34	38	31(-1;-4)	31	30	27
6 / 6 to 20 mm / 4	21	20	26	38	37	39	32(-2;-4)	32	30	28
10 / 6 to 20 mm / 4	24	21	32	37	42	43	35(-2;-5)	35	33	30
10 / 6 to 20 mm / 6	24	24	32	37	37	44	35(-1;-3)	35	34	32

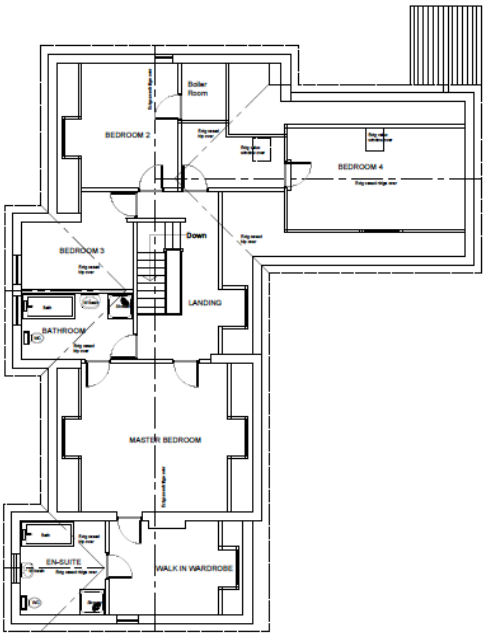
Note that these are conservative figures and cover all products by European glass manufacturers.
R_w = Weighted sound reduction. This scale allows for the response of the human ear and could be used for determining a suitable product to reduce noise such as voices.
C = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from music, radio, tv, high speed traffic and other medium to high frequencies.
C_{tr} = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from urban road traffic, disco music and other noises with a large component of low frequencies.
Note that a 3 dB difference is barely discernable, 5 dB is clearly discernable and 10 dB is a doubling or halving of the noise.

Roger Leach AMIOA

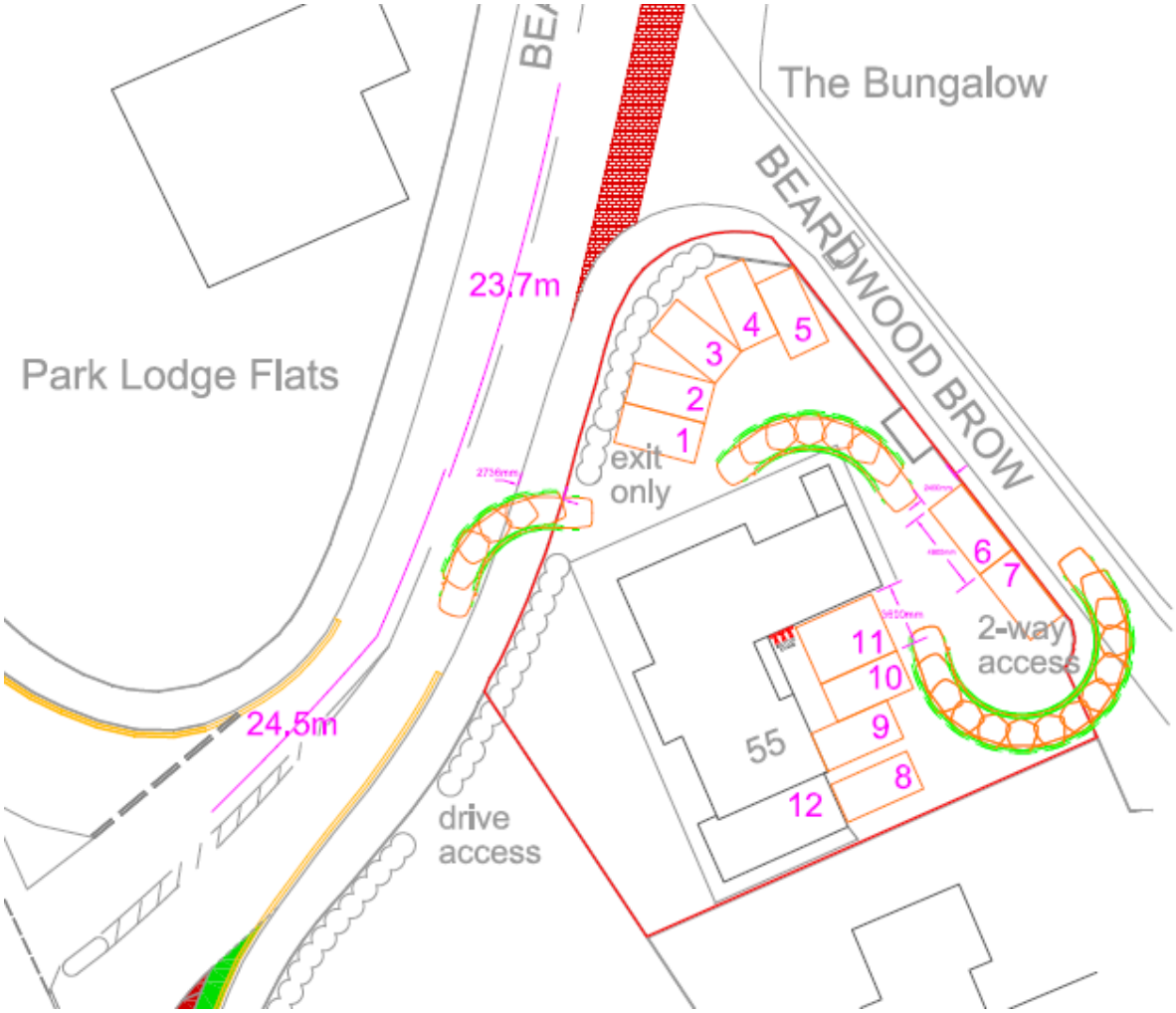
May 2017



PROPOSED GROUND FLOOR PLAN.
SCALE 1:50



PROPOSED FIRST FLOOR PLAN (AS EXISTING).
SCALE 1:50


The Bungalow
BEARDWOOD BROW
Park Lodge Flats
23.7m
24.5m
exit
only
drive
access
2-way
access
55
1
2
3
4
5
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