Design Note

project BSF Camden

subject Fixed plant noise assessment

project no 025901

date 21 December 2012

| Revision | Description | Issued by | Date | Approved (signature) |
|----------|--|-----------|----------|----------------------|
| 00 | Fixed plant noise assessment, SCSS | IT | 21/12/12 | IT |
| 01 | Calculation reviewed, additional receiver included | IT | 13/02/13 | IT |

1.1 Scope & approach

This Design Note has been prepared by Buro Happold following a request by BAM Construction. It provides an estimate of the environmental noise levels created by the operation of fixed building services plant associated with the new Swiss Cottage Specialist SEN School (SCSSS) at Swiss Cottage, and assessment against the requirements for noise control included with Condition 10 of the planning permission.

Estimates of environmental noise levels due to operation of fixed plant have been prepared with reference to the details of the installed equipment, based on the construction drawings and the technical data sheets for individual plant and equipment items.

The sound level from each item of equipment has been evaluated, with appropriate corrections for source directivity, screening, attenuation with distance and local reflection at the façade.

Sound levels are calculated for the nearest noise sensitive façade. In the case of SCSSS two locations are considered, as indicated on the Figure below:

(1) houses in Avenue Road,

(2) rear of houses in Harley Road

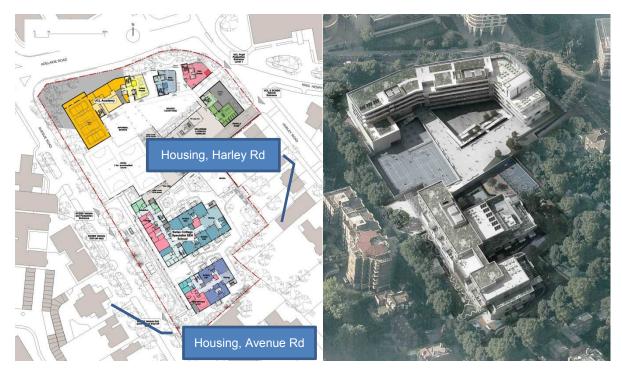


Figure 1 Site layout drawing (excerpt from AR-Arch 1000) and illustration of proposals in context

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1.1.1 External plant areas included within assessment

External plant area at Level 04

Roof plant area at Level 05

1.2 Calculations

Calculation sheets setting out the base data and assumptions made in calculation are appended to this Design Note for information.

1.3 Assessment

Receiver 1, Houses in Avenue Road.

From calculation, the daytime noise level from fixed plant is estimated to be 36 dBL_{Aeq} at 3.5m from the façade of the nearest housing.

The pre development noise survey ¹ reported ambient noise levels at the nearest housing in Avenue Road as follows (data as report Figure C3, position 1):

Daytime ambient noise levels at houses in Avenue Road, 3.5m from facade 68 dB L_{Aeq}/ 54dB L_{Aeq}

Night time ambient noise levels at houses in Avenue Road, 3.5m from facade not provided

The daytime design basis criterion for housing in Avenue Road is taken to be 49dB L_{A90} ie 5 dB below the measured background of 54 dB L_{A90} .

On the basis of the information reviewed, the noise level from operation of fixed plant is estimated to be 18 dB below the reported daytime background noise levels and the design condition is satisfied.

It is assumed that plant and equipment will not operate at night. At this stage no assessment has been made for the night time case.

Receiver 2, Rear of houses in Harley Road.

From calculation, the daytime noise level from fixed plant is estimated to be 33 dBL $_{Aeq}$ at 3.5m from the façade of the nearest housing.

The pre development noise survey reported ambient noise levels at the nearest housing as follows (data as report section 4.1 Table 4 and Figure C2):

Daytime ambient noise levels at nearest residential, 3.5m from facade 53

53 dB L_{Aea}/ 43dB L_{A90}

Night time ambient noise levels at nearest residential, 3.5m from facade

45 dB L_{Aeq} / $35dBL_{A90}$

The daytime design basis criterion for housing in Harley Road is taken to be 38dB L_{A90} ie 5 dB below the measured background of 43 dB L_{A90} .

On the basis of the information reviewed, the noise level from operation of fixed plant is estimated to be 5 dB below the design basis daytime background noise level and the design condition is satisfied.

It is assumed that plant and equipment will not operate at night. At this stage no assessment has been made against the night time noise criteria.

Supporting information

- 1. Calculation summary sheet
- 2. Calculations
- 3. Design drawings and equipment data

¹ Swiss Cottage School, Adelaide Road, London – Acoustic Strategy Report Rev 0 (prepared by Hoare Lee, issued 10 July 2008)

| | Project | | BSF Car | mden | | | Sheet: | | 4 | of | | | |
|------------------------------------|---------|-------------|------------------------------------|---------------------|------------|-----|----------|--------------------|--|-------|--------|--|--|
| | | | SCSSS External plant noise checks | | | | Prepared | IT | | date: | 20-Dec | | |
| | Area of | Project | | | | | Checked | | | | | | |
| | | | | | | | | | | | | | |
| | Elemer | Element | | Summary sheet | | | | | Revisions Feb 2013:calc revised, façade to +3.5r | | | | |
| Buro Happold | | Description | | | | | Notes | es | | | | | |
| | | | | | | | | From as built dwgs | | | | | |
| | | | | entre frequency, Hz | | | | | | | | | |
| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | |
| Receiver 1: Houses opposite, Aven | ue Road | | | | | | | | | | | | |
| SCSSS Plant L04 | do Noda | | | | | | | | | | | | |
| LP at 3.5m from façade | | | | 34 | 3 7 | 34 | 27 | 1 6 | 11 | | 34.0 | | |
| SCSSS Roof Plant | | | | | | | | | | | | | |
| Lp at 3.5m from façade | | | | 45 | 46 | 43 | 36 | 26 | 22 | | 32.1 | | |
| Total at 2 for from founds | | | | | | | | | | | 36 dB | | |
| Total at 3.5m from façade | | | | | | | | | | | 36 GB | | |
| Receiver 2: Rear of houses, Harley | Road | | | | | | | | | | | | |
| SCSSS plant L04 | | | | | | | | | | | | | |
| LP at 3.5m from façade | | | | 32 | 34 | 31 | 20 | 16 | 11 | | 30.6 | | |
| SCSSS roof plant | | | | | | | | | | | | | |
| Lp at 3.5m from façade | | | | 33 | 33 | 29 | 23 | 12 | 8 | | 29.8 | | |
| Total at 3.5m from façade | | | | | | | | | | | 33 dE | | |

| | | | | Area of Project | External | olant noise | checks | | Prepared | | | date: | | |
|----------------------|-------|-----------------------|-------------------|-----------------|----------|-------------|----------|----------|-----------|---------------|----------|-------|-------|--|
| S AHU 4 01 6 | | | | | External | olant noise | checks | | | 9 | | 100 | _ | |
| S AHU 4 01 6 | | | | | | | | | | | | | | |
| S AHU 4 01 6 | | | | Element | | | | | | Checked: date | | | | |
| S AHU 4 01 6 | | | | Element | | | - | | Revisions | | | | | |
| | | | | Description | SCSSS | oof plant L | 04 | | Notes | | | | | |
| | | | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| | | | | | | | | | | | | | | |
| Con maide allow have | extra | act fan | outlet | in duct Lw | | 81 | 84 | 84 | 80 | 75 | 71 | | | |
| end reflection, m2 | | | 1 | | | -1 | 0 | 0 | 0 | 0 | 0 | | | |
| Lw to environment | | | | | | 80 | 84 | 84 | 80 | 75 | 71 | | | |
| S AHU 4 01 s | supr | oly fan | inlet | in duct Lw | | 84 | 87 | 87 | 83 | 79 | 75 | | | |
| 270 401 | Jupp | , .u.i | | heat wheel | | -3 | -3 | -3 | -3 | -4 | -4 | | | |
| | | | | filter | | -3 | -5 -5 | -3 -7 | -8 | -8 | -8 | | | |
| | | | | coils | | -3 | -3 | -3 | -3 | -4 | -6 -4 | | | |
| end refn, m2 | | | | JOHA | | -3 -1 | 0 | -3 | 0 | 0 | 0 | | | |
| Lw to environment | | | | | | 74 | 76 | 74 | 69 | 63 | 59 | | | |
| _w to charoninent | | | | | | | 7.0 | | - 00 | - 00 | | | | |
| S AHU 4 02 | extra | act fan | outlet | in duct Lw | | 83 | 87 | 88 | 84 | 80 | 75 | | | |
| end reflection, m2 | | | 1 | | | -1 | 0 | 0 | 0 | 0 | 0 | | | |
| Lw to environment | | | | | | 82 | 87 | 88 | 84 | 80 | 75 | | | |
| | | | | | | | | | | | | | | |
| A AHU 4 02 | supp | oly fan | inlet | in duct Lw | | 82 | 86 | 87 | 83 | 79 | 74 | | | |
| | | | | heat wheel | | -3 | -3 | -3 | -3 | -4 | -4 | | | |
| | | | | filter | | -3 | -5 | -7 | -8 | -8 | -8 | | | |
| | | | | coils | | -3 | -3 | -3 | -3 | -4 | -4 | | | |
| end refn, m2 | | | | | | -1 | 0 | 0 | 0 | 0 | 0 | | | |
| Lw to environment | | | | | | 72 | 75 | 74 | 69 | 63 | 58 | | | |
| | | Assume 1/4 | | | | | | | | | | | | |
| Total Lw AHUs | | sphere radiation - | | | | 84.8 | 89.2 | 89.7 | 85.6 | 81.3 | 76.6 | | | |
| nearest façade, m | 60 | adjacent stair | Avenue Rd | -20logr-11 | | -47 | -47 | -47 | -47 | -47 | -47 | | | |
| | 4 | enclosure | <u> </u> | 9 | | 6 | 6 | 6 | 6 | 6 | 6 | | | |
| • | | n path ∆ | - | | | -10 | -12 | -15 | -18 | -25 | -25 | | | |
| Lp (free field) | | , | | | | 34 | 37 | 34 | 27 | 16 | 11 | | | |
| Façade correction | Asse | ess at 3.5 fro | m façade - no con | ection required | | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| LP at 3.5m from faç | | | | | | 34 | 37 | 34 | 27 | 16 | 11 | | 34 dl | |
| | | Assume hemi | 1 | | | | | | | | | | | |
| | | propagation | | | | | | | | | | | | |
| nearest façade, m | | this direction | rear Harley Rd | -20logr-11 | | -47 | -47 | -47 | -47 | -47 | -47 | | | |
| source directivity 2 | | | J' | | | 6 | 6 | 6 | 6 | 6 | 6 | | | |
| | 1.0n | ı path ∆ | | | | -12 | -15 | -18 | -25 | -25 | -25 | | | |
| Lp (free field) | | | | | | 32 | 34 | 31 | 20 | 16 | 11 | | | |
| Façade correction / | | | m façade - no con | ection required | | 0 | 0 | 0 | 0 | 0 | 0 | | L | |
| LP at 3.5m from faç | ade | | | | | 32 | 34 | 31 | 20 | 16 | 11 | | 31 dl | |
| | | | | | | | | | | | | | - | |

| <i>45</i> 3111111111 | | | | Project | BSF Can | iden | | | Sheet: | | 1 | of | |
|--|--|---|--|--------------------------------|----------|--|--|---|---|---|--|-------|--------------------|
| | | | | | | | | | Prepared | | | date: | |
| | | | | Area of Project | External | plant nois | e checks | | Checked | 4 | | date: | - |
| | | | | | | | | | = 1 7 | | | uate. | |
| | | | | Element | SCSSS r | nof plant | | | Revisions | | | | |
| Buro Happold | | | | Description | 303331 | ooi piant | | | Notes | | | | |
| | | | | | | | | | | | | | |
| | | | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| S TEF 5 01 | as R | 01 | | in duct Lw | | 85 | 77 | 77 | 64 | 63 | 61 | | |
| Atten | 900 0 | circ | | | | 5 | 7 | 10 | 15 | 10 | 7 | | |
| Lw to environment | | | | | | 80 | 70 | 67 | 49 | 53 | 54 | | |
| S TEF 5 02 | as R | n1 | | in duct Lw | | 81 | 76 | 77 | 82 | 79 | 77 | | |
| Atten | 900 0 | | | III duct Lw | | 5 | 70 | 10 | 15 | 10 | 7 | | |
| Lw to environment | | | | | | 76 | 69 | 67 | 67 | 69 | 70 | | |
| | | | | | | | | | | | | | |
| S TEF 5 03 | as R | | | in duct Lw | | 88 | 81 | 72 | 67 | 67 | 63 | | |
| Atten Lw to environment | 900 (| circ | | | | 5 83 | 7 74 | 10 62 | 15 52 | 10 57 | 7 56 | | |
| LW to environment | | | | | | 03 | 74 | 62 | 52 | 3/ | 36 | | |
| TotalLw, fans | | | | | | 85.3 | 76.3 | 70.6 | 67.2 | 69.4 | 70.3 | | |
| C AUII = 04 | OV4 | ot for | outlet | in duct I | | 70 | 02 | 00 | 70 | 75 | 74 | | |
| S AHU 5 01 end reflection, m2 | ехтга | ct fan | outlet | in duct Lw | | 78 -1 | 83 | 83 | 79 0 | 75 0 | 71 0 | | |
| w to environment | | | 1 | | | 77 | 83 | 83 | 79 | 75 | 71 | | |
| 3 | | | | | | | | | | | | | |
| S AHU 5 01 | supp | ly fan | inlet | in duct Lw | | 84 | 88 | 89 | 86 | 82 | 78 | | |
| | | | | heat wheel | | -3 | -3 | -3 | -3 | -4 | -4 | | |
| | | | | filter | | -3 -3 | -5 -3 | -7 -3 | -8 -3 | -8 -4 | -8 -4 | | |
| end refn, m2 | | | | coils | | -3 -1 | -3 | -3 0 | -3 0 | 0 | 0 | | |
| Lw to environment | | | | | | 74 | 77 | 76 | 72 | 66 | 62 | | |
| | | | | | | | | | | | | | |
| S AHU 5 02 | extra | ct fan | outlet | in duct Lw | | 84 | 87 | 87 | 83 | 79 | 74 | | |
| end reflection, m2 | | | 1 | | | -1 | 0 | 0 | 0 | 0 | 0 | | |
| Lw to environment | | | | | | 83 | 87 | 87 | 83 | 79 | 74 | | |
| S AHU 5 02 | sunn | ly fan | inlet | in duct Lw | | 85 | 90 | 90 | 87 | 83 | 79 | | |
| 5 A110 5 02 | зирр | iy idii | IIIICt | heat wheel | | -3 | -3 | -3 | -3 | -4 | -4 | | |
| | | | | filter | | -3 | -5 | -7 | -8 | -8 | -8 | | |
| | | | | coils | | -3 | -3 | -3 | -3 | -4 | -4 | | |
| end refn, m2 | | | | | | -1 | 0 | 0 | 0 | 0 | 0 | | |
| Lw to environment | | | | | | 75 | 79 | 77 | 73 | 67 | 63 | | |
| S AHU 5 03 | extra | ct fan | outlet | in duct Lw | | 79 | 84 | 84 | 81 | 77 | 72 | | |
| end reflection, m2 | CALLIC | ot 1011 | | III ddot Eli | | -1 | 0 | 0 | 0 | 0 | 0 | | |
| Lw to environment | | | | | | 78 | 84 | 84 | 81 | 77 | 72 | | |
| | | | | | | | | | | | | | |
| S AHU 5 03 | supp | ly fan | inlet | in duct Lw | | 82 | 87 | 87 | 83 | 79 | 74 | | |
| | | | | heat wheel filter | | -3 -3 | -3 -5 | -3 -7 | -3 -8 | -4 -8 | -4 -8 | | |
| | | | | coils | | -3 -3 | -3 -3 | -7 | -3 | -6 -4 | -6 -4 | | |
| end refn, m2 | | | | | | -1 | 0 | 0 | 0 | 0 | 0 | | |
| Lw to environment | | | | | | 72 | 76 | 74 | 69 | 63 | 58 | | |
| | | | | | | | | | | | | | |
| total Lw, AHUs 1&: | | | | | | 84.9 | 89.2 | 89 | 85 | 80.8 | 76.2 | | |
| Total Lw, AHU 03 total Lw, Ahus+ | | Assume | | | | 79 88.6 | 84.6 90.7 | 84.4 90.3 | 81.3 86.6 | 77.2 82.6 | 72.2 78.4 | | |
| | | hemi | | | | 30.0 | 30.1 | 30.3 | 30.0 | 52.0 | 70.4 | | |
| | | | Avenue Rd | -20log r -11 | | -47 | -47 | -47 | -47 | -47 | -47 | | |
| | 100 | radiation- | | | | | 3 | 3 | 3 | 3 | 3 | | |
| nearest façade, m Directivity, Q= | 2 | flat roof | | | | 3 | | | | | -25 | | |
| nearest façade, m Directivity, Q= screening | 2 | | 1 | | | -10 | -12 | -15 | -18 | -25 | _ | | |
| nearest façade, m Directivity, Q= screening Lp (free field) | 2 0.5m | flat roof path ∆ | m facado no como | otion required | | -10 35 | -12 35 | 32 | 25 | 14 | 10 | | |
| nearest façade, m Directivity, Q= screening _p (free field) Façade correction | 2 0.5m | flat roof path ∆ ess at 3.5 fro | m façade - no corre | ction required | | -10 35 0 | -12 35 0 | 32 0 | 25 0 | 14 0 | 10 0 | | 32 d |
| nearest façade, morectivity, Q= screening p (free field) raçade correction | 2 0.5m | flat roof path ∆ ess at 3.5 fro | m façade - no corre | ction required | | -10 35 | -12 35 | 32 | 25 | 14 | 10 | | 32 d |
| nearest façade, m Directivity, Q= screening _p (free field) =açade correction _P at 3.5m from fa | 2 0.5m Asse | path <u>A</u> ess at 3.5 fro Assume hemi radiation- | m façade - no corre Rear, Harley Rd | ction required -20log r -11 | | -10 35 0 | -12 35 0 | 32 0 | 25 0 | 14 0 | 10 0 | | 32 d |
| nearest façade, m Directivity, Q= screening _p (free field) =açade correction _P at 3.5m from fa nearest façade, m Directivity, Q= | 2 0.5m Asse cade | flat roof path ∆ ess at 3.5 fro Assume hemi radiation- flat roof | | | | -10 35 0 35 -49 3 | -12 35 0 35 -49 3 | 32 0 32 -49 3 | 25 0 25 -49 3 | 14 0 14 -49 3 | 10 0 10 -49 3 | | 32 d |
| nearest façade, m Directivity, Q= screening p. (free field) Façade correction P at 3.5m from fa nearest façade, m Directivity, Q= screening | 2 0.5m Asse cade | path <u>A</u> ess at 3.5 fro Assume hemi radiation- | | | | -10 35 0 35 -49 3 -10 | -12 35 0 35 -49 3 -12 | 32 0 32 -49 3 -15 | 25 0 25 -49 3 -18 | 14 0 14 -49 3 -25 | 10 0 10 -49 3 -25 | | 32 d |
| nearest façade, m Directivity, Q= screening Lp (free field) Façade correction LP at 3.5m from fa nearest façade, m Directivity, Q= screening Lp (free field) | 2 0.5m Asse çade 78 2 0.5m | flat roof path Δ ess at 3.5 fro Assume hemi radiation- flat roof path Δ | Rear, Harley Rd | -20log r -11 | | -10 35 0 35 -49 3 -10 | -12 35 0 35 -49 3 -12 33 | 32 0 32 -49 3 -15 29 | 25 0 25 -49 3 -18 23 | 14 0 14 -49 3 -25 | 10 0 10 -49 3 -25 8 | | 32 d |
| nearest façade, m Directivity, Q= screening _p (free field) -açade correction _P at 3.5m from fa nearest façade, m Directivity, Q= screening _p (free field) -açade correction | 2 0.5m Asse cade 78 2 0.5m | flat roof path Δ ess at 3.5 fro Assume hemi radiation- flat roof path Δ | | -20log r -11 | | -10 35 0 35 -49 3 -10 33 0 | -12 35 0 35 -49 3 -12 33 0 | 32 0 32 -49 3 -15 29 0 | 25 0 25 -49 3 -18 23 0 | 14 0 14 -49 3 -25 12 0 | 10 0 10 -49 3 -25 8 0 | | |
| nearest façade, m Directivity, Q= screening Lp (free field) Façade correction LP at 3.5m from fa nearest façade, m Directivity, Q= screening Lp (free field) Façade correction | 2 0.5m Asse cade 78 2 0.5m | flat roof path Δ ess at 3.5 fro Assume hemi radiation- flat roof path Δ | Rear, Harley Rd | -20log r -11 | | -10 35 0 35 -49 3 -10 | -12 35 0 35 -49 3 -12 33 | 32 0 32 -49 3 -15 29 | 25 0 25 -49 3 -18 23 | 14 0 14 -49 3 -25 | 10 0 10 -49 3 -25 8 | | |
| nearest façade, m Directivity, Q= screening Lp (free field) Façade correction LP at 3.5m from fa nearest façade, m Directivity, Q= screening Lp (free field) Façade correction | 2 0.5m Asse cade 78 2 0.5m | flat roof path Δ ess at 3.5 fro Assume hemi radiation- flat roof path Δ | Rear, Harley Rd | -20log r -11 | | -10 35 0 35 -49 3 -10 33 0 | -12 35 0 35 -49 3 -12 33 0 | 32 0 32 -49 3 -15 29 0 | 25 0 25 -49 3 -18 23 0 | 14 0 14 -49 3 -25 12 0 | 10 0 10 -49 3 -25 8 0 | | |
| nearest façade, m Directivity, Q= screening Lp (free field) Façade correction LP at 3.5m from fa nearest façade, m Directivity, Q= screening Lp (free field) Façade correction | 2 0.5m Asse cade 78 2 0.5m | flat roof path Δ ess at 3.5 fro Assume hemi radiation- flat roof path Δ | Rear, Harley Rd | -20log r -11 | | -10 35 0 35 -49 3 -10 33 0 | -12 35 0 35 -49 3 -12 33 0 | 32 0 32 -49 3 -15 29 0 | 25 0 25 -49 3 -18 23 0 | 14 0 14 -49 3 -25 12 0 | 10 0 10 -49 3 -25 8 0 | | |
| nearest façade, m Directivity, Q= screening _p (free field) -açade correction _P at 3.5m from fa nearest façade, m Directivity, Q= screening _p (free field) -açade correction | 2 0.5m Asse cade 78 2 0.5m | flat roof path Δ ess at 3.5 fro Assume hemi radiation- flat roof path Δ | Rear, Harley Rd | -20log r -11 | | -10 35 0 35 -49 3 -10 33 0 | -12 35 0 35 -49 3 -12 33 0 | 32 0 32 -49 3 -15 29 0 | 25 0 25 -49 3 -18 23 0 | 14 0 14 -49 3 -25 12 0 | 10 0 10 -49 3 -25 8 0 | | |
| nearest façade, m Directivity, Q= screening Lp (free field) Façade correction LP at 3.5m from fa nearest façade, m Directivity, Q= screening Lp (free field) | 2 0.5m Asse cade 78 2 0.5m | flat roof path Δ ess at 3.5 fro Assume hemi radiation- flat roof path Δ | Rear, Harley Rd | -20log r -11 | | -10 35 0 35 -49 3 -10 33 0 | -12 35 0 35 -49 3 -12 33 0 | 32 0 32 -49 3 -15 29 0 | 25 0 25 -49 3 -18 23 0 | 14 0 14 -49 3 -25 12 0 | 10 0 10 -49 3 -25 8 0 | | ⁷ 32 dl |