

Appendix 7C: Operational Noise

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7C. On-Site Operational Noise Levels and Assumptions

7C.1 Noise Model Settings

7C.1.1 SoundPlan (version 8.2) 3-dimensional acoustic modelling software has been used to predict the L_{Aeq} noise levels from the on-site operational activities of the Proposed Phillips 66 Development and the Proposed VPI Development individually and cumulatively. Operational noise is predicted using the method described in ISO 9613-2:1996 ‘Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation’.

7C.1.2 The following noise modelling parameters, data and assumptions have been used for both Sites:

- The 3D digital terrain model (DTM) has been created using LiDAR data from www.environment.data.gov.uk [Downloaded 27/05/22].
- Acoustically hard ground which includes roads, other areas of hardstanding and water have been modelled to reflect sound. Acoustically soft ground which includes areas covered in vegetation have been modelled to absorb sound.
- All existing building outlines were taken from the OS MasterMap provided by the client. Existing building heights have been determined using a combination of OS MasterMap Building height data and a survey of images from Google Earth and Google ‘Streetview’.
- The predicted noise levels at the NSRs were at 1.5 m above the ground during the day. For night-time predictions 4 m above ground, representative of first floor level, at Church Lane and Clarkes Road. Night-time predicted noise levels at Hazeldene were at 6.5m representative of third floor level.
- Operational noise from site activities has been modelled using spectral data to allow more accurate prediction of sound propagation. Spectral data have been estimated from the in-built SoundPlan library, BS 5228 measured levels and measured levels from other AECOM projects. The overall sound pressure level at 1m for each source has been provided by the client for each item of plant.
- Where the location of equipment is unknown or uncertain, a worst-case position on the closest boundary of each “block” or “zone” to the closest receptor has been used.
- Proposed Development stack exhausts have been modelled as individual point sources, located 0.1 m above the top of each stack.
- The different noise levels for same/similar equipment (e.g. fans and pumps) for each development are due to differences in design, specification or size.

7C.2 Proposed Phillips 66 Development Noise Modelling

7C.2.1 The following noise modelling parameters, data and assumptions have been used for the Proposed Phillips 66 Development:

- The layout of the Proposed Phillips 66 Development is based upon drawing Project Model Annotation – Main Process Island Annotation (10th Aug 2022).pdf provided by the Worley design team.
- The heights of the proposed sources have been taken from the Navisworks model Phillips 66 Humber Zero Project Model – In Progress Model (AECOM – 10th Aug 2022).nwd provided by Worley. Some sources were not present on the model but dimensions of these have been provided by the Worley design team.

7C.2.2 Details of source assumptions for the Phillips 66 Site are provided in Table 7C.1.

Table 7C.1: Noise data inputs for the Proposed Phillips 66 Development.

| Plant ref. | Plant Item | Quantity | Noise Level at 1 m <i>L</i> _{Aeq,T} dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|----------|---|---|------------------------|---|
| P66-1 | P66 H01 Heater Flue Gas Booster Fan | 2 | 80 | 2.7 m x 1.3 m x 3.2 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-2 | P66 H01 WHE Sootblower Package | 1 | 80 | 2.8 m x 15.2 m x 11.3 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-3 | P66 H01 Selective Catalytic Reduction (SCR) Package | 1 | 80 | 4 m x 2 m x 6 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-4 | P66 H01 Ammonia Injection Package | 1 | 80 | 2 m x 2 m x 2 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-5 | P66 H01 BFW Dosing Package | 1 | 80 | 2 m x 2 m x 2 m | Point source | SoundPlan library ref 160 Cooling Tower |
| P66-6 | P66 H01 Condensate Transfer Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-7 | P66 H01 Boiler Feed Water Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-8 | P66 H01 Deaerator | 1 | 80 | 2 m x 5.5 m x 2 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-9 | P66 H01 600# Steam Waste Heat Exchanger | 1 | 80 | 8.7 m x 2.5 m x 1.6 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-10 | P66 H01 BFW Preheat Economiser | 1 | 80 | 1.1 m x 4.5 m x 2.4 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-11 | P66 H01 Replacement Bagging House | 1 | 80 | 3 m x 4.5 m x 5.2 m | Industrial Building | BS 5228 Table C2.45 Water pump |
| P66-12 | P66 H02/H04/H05 Analyser House | 1 | 80 | 2 m x 2 m x 2.5 m | Point source | BS 5228 Table C2.45 Water pump |

| Plant ref. | Plant Item | Quantity | Noise Level at 1 m <i>L</i> _{Aeq,T} dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|---|----------|---|---|------------------------|--|
| P66-13 | P66 H02 – Piperack (E/W) B&W - Slurry Cooler | 16 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-14 | P66 H02 – PTU B&W - Oxidation Blower | 2 | 80 | 0.5 m x 1.7 m x 1 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-15 | P66 H02 – PTU B&W - Oxidation Recirculation Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-16 | P66 H02 – PTU B&W - Treated Water Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-17 | P66 H02 – PTU B&W - Sump Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-18 | P66 H02 – PTU B&W - Clarifier Unit | 1 | 80 | 6.7 m x 6.7 m x 2.7 m | Industrial Building | BS 5228 Table C2.45 Water pump |
| P66-19 | P66 H02 – PTU B&W - Oxidation Unit | 1 | 80 | 4 m x 4 m x 6.8 m | Industrial Building | BS 5228 Table C2.45 Water pump |
| P66-20 | P66 H02 – PTU B&W - Coagulant Make-up and Dosing Package | 1 | 80 | 1 m x 1 m x 1.8 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-21 | P66 H02 – PTU B&W - Flocculant Make-up and Dosing Package | 1 | 80 | 1.7 m x 1.7 m x 2 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-22 | P66 H02 – PTU B&W - Sulphite Oxidation Tank | 1 | 80 | 4 m x 4 m x 5.2 m | Industrial Building | BS 5228 Table C2.45 Water pump |
| P66-23 | P66 H02 – WGS B&W - Slurry Recirculation Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-24 | P66 H02 – WGS B&W - Wet Gas Scrubber Stack Exhaust | 1 | 80 | 2.6 m x 2.6 m x 16.6 m | Point source | SoundPlan library ref 160 Cooling tower |

| Plant ref. | Plant Item | Quantity | Noise Level at 1 m <i>L</i> _{Aeq,T} dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|----------|---|---|------------------------|--|
| P66-25 | P66 H02 – WGS B&W - Wet Electrostatic Precipitator | 1 | 80 | 6 m x 6 m x 48 m | Industrial Building | SoundPlan library ref 160 Cooling tower |
| P66-26 | P66 H03 – Abs Shell - Anti-foam Injection System | 1 | 80 | 2 m x 2 m x 2 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-27 | P66 H03 – Abs Shell - CO ₂ Absorber Inter Cooler Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-28 | P66 H03 – Abs Shell - Wash Water Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-29 | P66 H03 – Abs Shell - Solvent Drain Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-30 | P66 H03 – Abs Shell - CO ₂ Absorber – Stack Exhaust | 1 | 80 | Point at 66.5 m | Point source | SoundPlan library ref 160 Cooling tower |
| P66-31 | P66 H03 – Abs Shell - Solvent Drain Vessel | 1 | 80 | 3.7 m x 1.6 m x 0.75 m | Point source | SoundPlan library ref 160 Cooling tower |
| P66-32 | P66 H03 – Abs Shell - CO ₂ Absorber | 1 | 80 | 8.15 m x 8.15 m x 53.6 m | Industrial Building | SoundPlan library ref 160 Cooling tower |
| P66-33 | P66 H03 – Piperack (E/W) Shell - Lean Solvent Cooler | 22 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-34 | P66 H03 – Piperack (Main N/S) Shell - CO ₂ Absorber Inter Cooler | 28 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-35 | P66 H03 – Piperack (Main N/S) Shell – Wash Water Cooler | 8 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |

| Plant ref. | Plant Item | Quantity | Noise Level at 1 m <i>L</i> _{Aeq,T} dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|----------|---|---|---------------------|---|
| P66-36 | P66 H03 – Piperack (Main N/S) Shell – Lean Solvent Cooler | 10 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-37 | P66 H03 – Piperack (Small N/S) Shell - Thermal Reclaimer Condenser | 4 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-38 | P66 H03 – Solvent Shell - Rich Solvent Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-39 | P66 H03 – Strip Shell - MVR Compressor | 1 | 90 | 5.4 m x 1.8 m x 4.9 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-40 | P66 H03 – Strip Shell - Lean Solvent Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-41 | P66 H03 – Strip Shell - CO ₂ Stripper Reflux Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-42 | P66 H03 – Strip Shell - Stripper Condensate Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-43 | P66 H03 – Strip Shell - CO ₂ Stripper | 1 | 80 | 5.4 m x 5.4 m x 32 m | Industrial Building | SoundPlan library ref 160 Cooling tower |
| P66-44 | P66 H03 – Strip Shell - CO ₂ Stripper exhaust | 1 | 80 | Point at 32 m | Point source | SoundPlan library ref 160 Cooling tower |
| P66-45 | P66 H03 – Strip Shell - Desuperheater | 1 | 80 | 1 m x 1 m x 1 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-46 | P66 H03 – TRU Shell - Thermal Reclaimer Vacuum Package | 1 | 80 | 1 m x 5.5 m x 1 m | Industrial Building | SoundPlan library ref 892 Manure trailer - vacuum pump |

| Plant ref. | Plant Item | Quantity | Noise Level at 1 m <i>L</i> _{Aeq,T} dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|---|----------|---|---|------------------------|--|
| P66-47 | P66 H03 – TRU Shell - Thermal Reclaimer Reflux Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-48 | P66 H03 – TRU Shell - Thermal Reclaimer Bottom Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-49 | P66 H03 – TRU Shell - Thermal Reclaimer Degraded Solvent Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-50 | P66 H03 – TRU Shell - Thermal Reclaimer Column | 1 | 80 | 0.84 m x 0.84 m x 13.5 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-51 | P66 H04 – Piperack (E/W) Shell - CO ₂ Stripper Condenser | 4 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-52 | P66 H04 – Piperack (E/W) LP Compression Aftercooler | 6 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-53 | P66 H05 Recovered Water Distribution Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-54 | P66 H05 Dehydration Unit | 1 | 80 | 2.1 m x 2.1 m x 7 m | Industrial Building | SoundPlan library ref 11 Power station (boiler & coal mill room) |
| P66-55 | P66 H05 – Piperack (E/W) Dehydration Unit Cooler | 4 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-56 | P66 H06 HP Compression (Including Ancillaries) | 1 | 90 | 2.3 m x 1.7 m x 4.2 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-57 | P66 H06 LP Compression (Including Ancillaries) | 1 | 90 | 2.3 m x 1.7 m x 4.2 m | Point source | 5228 Table C5.5 Compressor for hand-held pneumatic breaker |

| Plant ref. | Plant Item | Quantity | Noise Level at 1 m <i>L</i> _{Aeq,T} dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|----------|---|---|--------------|---|
| P66-58 | P66 H06 – Piperack (N/S) HP Compression Aftercooler | 6 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-59 | P66 H09 Pretreatment Caustic Feed Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-60 | P66 H09 Caustic transfer pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-61 | P66 H09 Thermal Reclaimer Caustic Feed Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-62 | P66 H10 Shell - Fresh Solvent Unloading Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-63 | P66 H10 Shell - Fresh Solvent Make- up Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-64 | P66 H10 Shell - Solvent Transfer Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-65 | P66 H11 Air Compressor | 2 | 80 | 2.3 m x 1.7 m x 4.2 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-66 | P66 H11 Chiller Package | 1 | 80 | 2.2 m x 6 m x 6.1 m | Point source | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| P66-67 | P66 H11 Closed Loop Cooling Water Air Cooler | 2 fans | 82* | 3.3 m x 3.3 m x 0.85 m | Point source | SoundPlan library ref 90 Axial flow fan |
| P66-68 | P66 H11 Cooling Water Supply Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |
| P66-69 | P66 H11 Chilled Water Supply Pump | 1 | 80 | 0.5 m x 1.6 m x 0.5 m | Point source | BS 5228 Table C2.45 Water pump |

| Plant ref. | Plant Item | Quantity | Noise Level at 1 m $L_{Aeq,T}$ dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|---------------------------------------|----------|---|---|--------------|---|
| P66-70 | P66 H11 Steam Electrical Generator | 1 | 90 | 2.2 m x 2.9 m x 7.2 m | Point source | SoundPlan library ref 10 Power Station (generator turbine hall) |

7C.3 Proposed VPI Development Noise Modelling

7C.3.1 The following noise modelling parameters, data and assumptions have been used for the Proposed VPI Development:

- The layout of the Proposed VPI Development is based upon the following drawings:

415000-00201-8530-79-0001_B.pdf;

415000-00201-8530-79-0002_B.pdf;

415000-00201-8530-79-0003_B.pdf;

415000-00201-8530-79-0004_B.pdf;

415000-00201-8820-01-0001.pdf;

415000-00201-8820-01-0002.pdf;

415000-00201-8820-01-0003.pdf;

415000-00201-8820-01-0004.pdf;

415000-00201-8820-01-0005.pdf;

415000-00201-8820-01-0006.pdf;

415000-00201-8820-01-0007.pdf;

415000-00201-8820-01-0008.pdf;

415000-00201-8820-01-0009.pdf;

415000-00201-8820-01-0010.pdf;

415000-00201-8820-01-0011.pdf;

415000-00201-8820-01-0012.pdf;

415000-00201-8820-01-0013.pdf;

415000-00201-8820-01-0014.pdf;

415000-00201-8820-01-0015.pdf;

415000-00201-8820-01-0016.pdf;

415000-00201-8820-01-0017.pdf; and

415000-00201-8820-01-0018.pdf.

- The heights of the proposed sources have been taken from the 3d CAD model *3D_OUTPUT2.nwd* provided by Worley.

7C.3.2 Details of source assumptions for the VPI Site are provided in Table 7C.2.

Table 7C.2: Noise data input for the Proposed VPI Development.

| Plant ref. | Equipment Description | Quantity | Noise Level at 1 m $L_{Aeq,T}$ dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|------------------------|-----------------------------------|--|---------------------|--|
| VPI-2 | CO ₂ absorber exhaust (point source) | 2 (1 per train) | 85 | Point at 110.1 m | Point Source | SoundPlan library ref 160 Cooling tower |
| VPI-5 | MVR compressor | 2 (1 per train) | 80 | 10 m x 19.35 m x 12.4 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| VPI-15 | CO ₂ dehydration package | 2 (1 per train) | 85 | 7 m x 8 m x 6 m | Industrial Building | SoundPlan library ref 11 Power station (boiler & coal mill room) |
| VPI-19 | CO ₂ compressor | 2 (1 per train) | 85 | 42 m x 27.89 m x 24 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| VPI-20 | Hydrogen generation package | 2 (1 per train) | 85 | 2.45 m x 12.2 m x 2.6 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-held pneumatic breaker |
| VPI-21 | CO ₂ compressor 1st stage intercooler | 6 fans (3 per train) | 71 | 4.267 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-22 | CO ₂ stripper condenser | 32 fans (16 per train) | 71 | 3.353 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-23 | Lean solvent cooler | 72 fans (36 per train) | 71 | 4.877 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |

| Plant ref. | Equipment Description | Quantity | Noise Level at 1 m $L_{Aeq,T}$ dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|--------------------------------------|-----------------------------------|--|---------------------|---|
| VPI-24 | Wash water Cooler | 60 fans (30 per train) | 71 | 4.267 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-25 | DCC water cooler | 132 fans (66 per train) | 71 | 4.267 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-29 | DCC water circulating pump | 2 (1 per train) | 85 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-31 | Wash water pump | 2 (1 per train) | 85 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-32 | Rich solvent pump | 3 (2 on one train, 1 on other train) | 85 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-34 | Lean solvent pump | 4 (2 per train) | 85 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-36 | Stripper condensate pump | 4 (2 per train) | 85 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-39 | CO ₂ stripper reflux pump | 2 (1 per train) | 85 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-41 | CO ₂ compression condensate return pump | 2 (1 per train) | 70 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-42 | Solvent drain pump | 4 (2 per train) | 65 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-45 | Anti foam dosing package | 2 (1 per train) | 80 | 1.95 m x 1.8 m x 0.9 m | Industrial Building | BS 5228 Table C2.45 Water pump |
| VPI-46 | Solvent transfer pump | 2 | 85 | 1.2 m x 2 m x 1.2 m | Industrial Building | BS 5228 Table C2.45 Water pump |
| VPI-48 | Solvent make up pump | 1 | 85 | 1.2 m x 2 m x 1.2 m | Industrial Building | BS 5228 Table C2.45 Water pump |

| Plant ref. | Equipment Description | Quantity | Noise Level at 1 m $L_{Aeq,T}$ dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|----------------------|-----------------------------------|--|---------------------|---|
| VPI-49 | Steam turbine | 1 | 80 | 5.6 m x 20 m x 9.8 m | Industrial Building | SoundPlan library ref 10 Power Station (generator turbine hall) |
| VPI-54 | Thermal reclaimer vacuum package | 1 | 85 | 10 m x 4 m x 3 m | Industrial Building | SoundPlan ref 898 Manure trailer - vacuum pump |
| VPI-55 | Reclaimer bottom pump | 2 | 70 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-57 | Thermal reclaimer reflux pump | 1 | 75 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-59 | Refrigeration package | 1 | 74 | 2.2 m x 13.518 m x 2.562 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-hled pneumatic breaker |
| VPI-64 | Fresh solvent container pump | 1 | 70 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-70 | IA Compressor (Instrument Air) | 1 | 79 | 12 m x 11 m x 6 m | Industrial Building | BS 5228 Table C5.5 Compressor for hand-hled pneumatic breaker |
| VPI-71 | CO ₂ compressor 3rd stage intercooler | 6 fans (3 per train) | 71 | 4.267 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-74 | Thermal reclaimer condenser | 4 fans | 71 | 3.353 m diameter | Point Source | BS 5228 Table C5.5 Compressor for hand-hled pneumatic breaker |
| VPI-75 | GT Flue gas blower | 2 | 85 | 3.8 m x 7.4 m x 7 m | Point Source | SoundPlan library ref 90 Axial Flow Fan |

| Plant ref. | Equipment Description | Quantity | Noise Level at 1 m $L_{Aeq,T}$ dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|--|----------------------|-----------------------------------|--|---------------------|---|
| VPI-77 | Aux boiler flue gas blower | 2 | 82 | 3.9 m x 2.9 m x 4 m | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-79 | Thermal reclaimers degraded solvent pump | 1 | 74 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| VPI-88 | CO ₂ compressor 4th stage intercooler | 6 fans (3 per train) | 71 | 2.743 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-89 | CO ₂ compressor 5th stage intercooler | 2 fans (1 per train) | 71 | 1.585 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-91 | CO ₂ compressor 2nd stage intercooler | 6 fans (3 per train) | 71 | 4.267 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-92 | CO ₂ compressor after cooler | 6 fans (3 per train) | 71 | 4.267 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-43 | Recycle cooler | 2 fans (1 per train) | 71 | 2.743 m diameter | Point Source | SoundPlan library ref 90 Axial Flow Fan |
| VPI-94 | Caustic pump | 1 | 68 | 1.2 m x 2 m x 1.2 m | Point Source | BS 5228 Table C2.45 Water pump |
| Plant ref. | Equipment Description | Quantity | Sound Power Level L_w dBA | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
| VPI-99a | Substation-04 TR3-02 | 1 | 102.5 | 8 m x 6 m x 6m | Industrial Building | AECOM measurement |
| VPI-99b | Substation-04 TR4-01A/01B | | 95.6 | 8 m x 4.6 m x 5 m | Industrial Building | AECOM measurement |

| Plant ref. | Equipment Description | Quantity | Noise Level at 1 m $L_{Aeq,T}$ dB | Dimensions of Source (width x length x height) | Source type | Spectrum reference |
|------------|---------------------------|----------|-----------------------------------|--|---------------------|--------------------|
| VPI-99c | Substation-04 TR4-02A/02B | | 95.6 | 8 m x 4.6 m x 5 m | Industrial Building | AECOM measurement |
| VPI-99d | Substation-04 TR3-01A/01B | | 94.5 | 8 m x 4.6 m x 5 m | Industrial Building | AECOM measurement |
| VPI-100 | Substation-05 TR5-01A/01B | | 80.4 | 3.5 m x 3.5 m x 3.5 m | Industrial Building | AECOM measurement |
| VPI-101a | Substation-06 TR5-01A/01B | | 80.4 | 3.5 m x 3.5 m x 3.5 m | Industrial Building | AECOM measurement |
| VPI-101b | Substation-06 TR5-02A/02B | | 80.4 | 3.5 m x 3.5 m x 3.5 m | Industrial Building | AECOM measurement |
| VPI-101c | Substation-06 TR5-03A/03B | | 80.4 | 3.5 m x 3.5 m x 3.5 m | Industrial Building | AECOM measurement |
| VPI-102a | Substation-07 TR5-01A/01B | | 80.4 | 3.5 m x 3.5 m x 3.5 m | Industrial Building | AECOM measurement |
| VPI-102b | Substation-07 TR5-02A/02B | | 80.4 | 3.5 m x 3.5 m x 3.5 m | Industrial Building | AECOM measurement |
| VPI-102c | Substation-07 TR5-03A/03B | | 80.4 | 3.5 m x 3.5 m x 3.5 m | Industrial Building | AECOM measurement |
| VPI-112 | Transformer-01 | 1 | 104.9 | 9.97 m x 14.6 m x 5 m | Industrial Building | AECOM measurement |
| VPI-113 | Transformer-02 | 1 | 104.9 | 9.97 m x 14.6 m x 5 m | Industrial Building | AECOM measurement |