

Appendix 12A Noise Modelling Methodology

12A. INTRODUCTION

12A. Noise Modelling Software

12A.1.1. CadnaA® is a sophisticated noise modelling software package that predicts noise levels based on the appropriate input data e.g. location and orientation of equipment and sound power data. The software package can take into account a variety of information about the site including topography, buildings, and operational demolition and construction noise sources.

Noise Modelling Assumptions

12A.1.2. The following assumptions, which are typical when calculating the propagation of noise, have been made when producing the noise model:

- the ground conditions around the site are mainly roads and buildings therefore the ground has been modelled as semisoft;
- air temperature was assumed to be 10 degrees and humidity 70%;
- it is assumed that all building façades are smooth facades therefore they have been given an absorption coefficient of 0.21; and
- one order of reflection was modelled.

Construction Noise Predictions

12A.1.3. CadnaA noise mapping software was used to predict construction noise levels at the selected receptors. The construction noise model followed the procedures for prediction of construction noise set out in British Standard 5228-1:2009.

12A.1.4. Sound power levels for each of the following construction activities have been calculated:

- site clearance;
- piling and foundation works;
- building and general site activity;
- fit out; and
- landscaping.

12A.1.5. A full list of plant associated with each construction phase and associated sound power data from BS 5228 is presented in Table 12A.1. This list of plant was sourced from the FM1 Environmental Statement as it has been considered that activities involved in the construction of FM2 are comparable with those carried out for FM1.

12A.1.6. The total sound power level applied to area sources within the construction noise model for these activities have been summarised in Table 12A.2. These calculations are based on the assumption a work site area of 100 m x 100 m and that plant will be, on average, operational for approximately 60% of the time.

Table 12A.1 Plant & Equipment Associated with the Demolition and Construction Stages of Work

Plant / Equipment	Sound Power Level (dB) Ref. from BS 5228	Number of Plant/Equipment Items at each Stage of Work				
		Site Clearance	Piling and Foundation Works	Building and General Site Activities	Fit Out	Landscaping
Compressors	108	3	6	6	6	0
Hand Held Pneumatic Breaker	111	3	0	0	0	0
Dump Truck (tipping fill)	107	2	2	0	0	0
Dump Truck (pass-by)	115	3	3	0	0	0
Wheeled Loader	108	0	0	2	0	0
Lorry (delivery and collection)	108	4	10	10	10	0
Water Pump (20 kW)	93	0	0	1	0	0
Pre-Cast Concrete Piling Hydraulic Hammer Rig	117	0	4	0	0	0
Hand-Held Welder (welding piles)	101	0	1	0	0	0
Generator for Welding	101	0	1	0	0	0
Dumper (idling)	91	0	0	1	0	0
Wheeled Backhoe Loader	95	0	0	2	0	0
Tracked Excavator	99	5	5	5	0	0
Concrete Mixer Truck	108	6	25	25	0	0
Truck Mounted Concrete Pump and Boom Arm	108	0	3	3	0	0
Poker Vibrator	106	0	0	1	0	0
Wheeled Mobile Telescopic Crane	106	2	4	4	4	0
Tower Crane	105	1	2	2	2	0
Lorry with Lifting Boom	105	1	0	0	1	0
Lifting Platform	95	0	0	0	1	0
Roller	101	0	0	0	0	2
Diesel Generator for Site Cabins	94	2	4	4	4	1

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Plant / Equipment	Sound Power Level (dB) Ref. from BS 5228	Number of Plant/Equipment Items at each Stage of Work				
		Site Clearance	Piling and Foundation Works	Building and General Site Activities	Fit Out	Landscaping
Diesel Generator for Site Lighting	93	1	2	2	2	1
Road Sweeper	96	1	1	1	1	1
Angle Grinder	108	1	1	1	1	0
Hand-Held Cordless Nail Gun	101	0	0	0	1	0
Road Planer (road construction)	110	0	0	1	0	0
Vibratory Compactor (asphalt)	110	0	0	1	0	0
Asphalt Paver + Tipper Lorry	105	0	0	1	0	0
Electric Water Pump	96	2	2	2	2	0

Table 12A.2: Summary of Construction Phase Noise Levels

Phase	Total L _w dB(A)	Site width/length m	Site area m ²	L _w per m ² dB(A)	60% on time correction dB(A)
Site Clearance	124	100	10000	84	82
Piling and Foundation Works	128	100	10000	88	86
Building and General Site Activity	127	100	10000	87	85
Fit Out	124	100	10000	84	82
Landscaping	112	100	10000	72	70

Operational Site Modelling

12A.1.7. Noise from the operational FM2 site has been modelled with CadnaA® using International Standards Organisation (ISO) 9613 Acoustics – Attenuation of Sound during Propagation Outdoors noise prediction methodology (Ref. 12A-1). This methodology is accepted as the industry standard for modelling outside noise.

12A.1.8. The impact of noise sources of nearby receptors has been assessed using the noise data as presented in Table 12A.3 below. The assumed layout of FM2 showing the location of noise sources and buildings is presented in Figure 1, below. The final layout may be subject to further revisions; however, the location of

the stack is fixed and any revision of building layout will not reduce the amount of screening that receptors receive from air cooled condenser (ACC) noise.

12A.1.9. Noise modelling has been carried out using maximum parameters as this is considered to be worst case scenario i.e. larger buildings that radiate noise result in higher noise levels. It is considered that any reduction in screening that may occur due to minimum parameters is marginal in comparison to the reduction in building noise source size.

12A.1.10. It has been assumed that the building envelopes will attenuate noise by 25 dB. A value of this magnitude assumes that the building is effectively covered by ventilation, which is considered to be the weakest point of the building envelope. In reality, this is a very conservative assumption and the building envelope is likely to provide a greater level of sound reduction; however, the use of a conservative sound reduction assumption is considered to represent a worst case scenario where building ventilation is oriented towards nearby noise sensitive receptors.

12A.1.11. It should be noted that the minimum amount of building attenuation required so noise levels do not exceed the measured background noise is 22 dB.

Table 12A.3: Noise Source Data

Source	Sound Power Level dB(A)	Source Type
Stack	96	Point
ID Fans	95	Point
Air Cooled Condensers	105	Area
Deliveries	103	Line
Boiler House	85*	Area
Transformer Building	80*	Area
Turbine Building	85*	Area
Fuel Delivery Door	85**	Area

Table Notes:

*indoor sound pressure level with assumed building attenuation of 25 dB

**indoor sound pressure level with assumed building attenuation of 10 dB

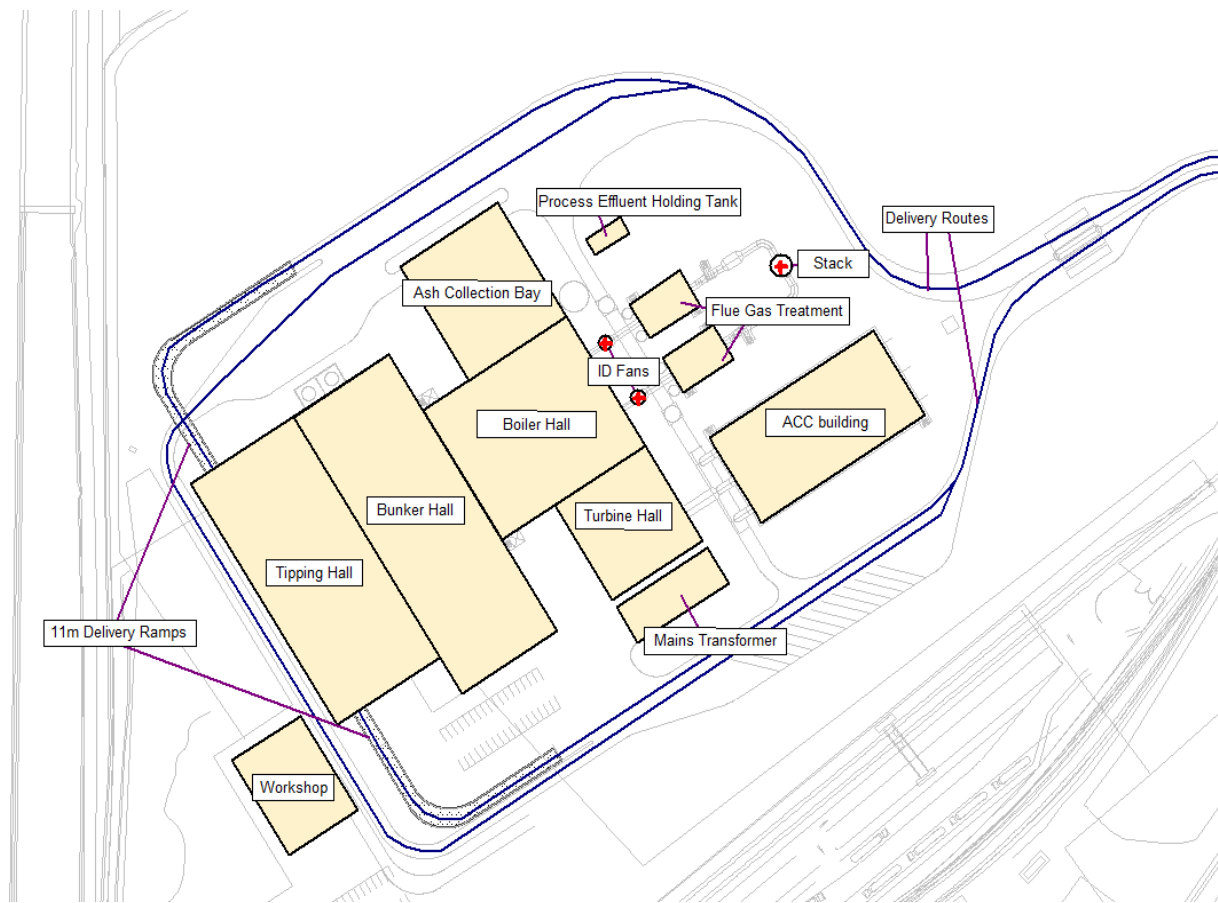


Figure 1: FM2 Assumed Concept Layout (based on maximum parameters)

12A.2. References

- Ref 12A-1 International Standards Organisation (ISO) 9613 Acoustics, *Attenuation of Sound during Propagation Outdoors*, Part 2 General Method of Calculation