Thurrock Flexible Generation Plant

Preliminary Environmental Information Report
Appendix 11.3: Construction Noise Assessment Methodology and Results

Date: September 2018

Environmental Impact Assessment

Preliminary Environmental Information Report

Volume 6

Appendix 11.3

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Summary

This Appendix provides supporting information on the assessment methodology and modelling results regarding construction noise impacts associated with Thurrock FGP. Discussion of the results presented within this Appendix, is presented in Chapter 11: Noise and Vibration.

Qualifications

This document has been prepared by Jon Baldwin, a Senior Acoustic Consultant and full Member of the Institute of Acoustics, who has six years' experience of environmental noise impact assessment.

It has been checked by Stephen Scott, a Senior Acoustic Consultant and full member of the Institute of Acoustics, who has 20 years' experience of environmental noise impact assessment.

It has been authorised by Simon Stephenson, a Technical Director within the Acoustics Team and full member of the Institute of Acoustics, who has 20 years' experience of environmental noise impact assessment.

1. Construction Noise

1.1 Calculations and Modelling

Noise source data & noise model methodology

1.1.1 Information on the construction phasing is presented in Volume 2, Chapter 2: Project Description. It is understood that construction will be split into 3 phases, with each phase lasting up to 18 months. Therefore, for the purpose of this assessment, unless specifically stated, each activity is considered to be of longer than one month duration.

1.1.2 The assessment has been undertaken based on the maximum design envelope parameters summarised in Volume 3, Chapter 11: Noise and Vibration.

1.1.3 The following activities have been modelled in the assessment of construction noise impact:

- general activity within site compounds within Zones C and D;
- construction of haul roads within Zones C, I and J;
- site clearance within Zone A;
- earthworks and foundations within Zone A;
- piling within Zone A;
- trenching for gas pipelines within Zones C, D and E;
- Horizontal Directional Drilling (HDD) drilling for gas pipeline under water courses and hedges within Zone C;
- installation of plant items within Zone A;
- erection and fit-out of buildings and enclosures within Zone A; and
- construction of above ground gas compound within Zone E;

1.1.4 Activities have been modelled in multiple positions across the associated zones in order to determine the greatest noise impact upon the surrounding receptors.

1.1.5 It is assumed that during the peak construction period there will be a maximum peak flow of 60 heavy good vehicles (HGV) movements per day. For the purpose of the noise assessment, HGV movements have been split across construction Zones A, C, D, E, I and J.

1.1.6 Details on the assumed plant items used within the noise model for each activity is presented in Table 1.1 to Table 1.11.

Table 1.1: General activity within site compounds - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Portable generators	BS 5228-1 Table C.4 #85 Diesel Generator (4 kW, 18 kg)	66	1	100	1	94
Dumper trucks (empty)	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	1	50	1.5	109
Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	50	1.5	102
Road Sweeper	BS 5228-1 Table C.4 #90 Road Sweeper (70 kW)	76	1	50	1.5	104

Table 1.2: Construction of haul roads - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Dumper trucks (empty)	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	1	50	1.5	109
Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	50	1.5	102
JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	2	50	1.5	96
Compactor	BS 5228-1 Table C.2 #37/38 Roller (145 kW, 18 t)	79	2	25	1.5	107

Table 1.3: Site clearance - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Portable generators	BS 5228-1 Table C.4 #85 Diesel Generator (4 kW, 18 kg)	66	1	100	1	94
JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	2	50	1.5	96
Dumper trucks (empty)	BS 5228-1 Table C.2 #33 Articulated Dump Truck (187 kW, 23 t)	81	3	50	1.5	109
Dumper trucks (tipping fill)	BS 5228-1 Table C.2 #32 Articulated Dump Truck (187 kW, 23 t)	74	1	50	1.5	102
Compactor	BS 5228-1 Table C.2 #37/38 Roller (145 kW, 18 t)	79	2	25	1	107

Table 1.4: Earthworks and foundations - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
360 excavator idling	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	2	50	1.5	91
Dumper trucks (idling)	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	2	50	1.5	91
Ready mix delivery (discharging)	BS 5228-1 Table C.4 #18 Cement Mixer Truck	75	2	25	1.5	103
Ready mix delivery (idling)	BS 5228-1 Table C.4 #19 Cement Mixer Truck	71	2	25	1.5	99
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	2	50	1.5	107

Table 1.5: Piling - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Piling rig	BS 5228-1 Table C.3 #2 Hydraulic Hammer Rig (186 kW, 4 t)	87	1	75	1.5	115
Concrete delivery Lorries	BS 5228-1 Table C.11 #14 Lorry (254 kW, 32 t)	79	1	25	1.5	107
Vibration compaction plant	BS 5228-1 Table C.5 #29 Vibratory compactor (asphalt) (3 kW, 60 kg)	82	1	50	1	110
Compressor	BS 5228-1 Table C.5 #5 Compressor for hand held pneumatic breaker (1 t)	65	1	25	1	93
JCB	BS 5228-1 Table C.2 #8 Backhoe Loader (62 kW, 8 t)	68	1	50	1.5	96

Table 1.6: Trenching for gas pipeline - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	1	50	1.5	91
Dumper trucks (idling)	BS 5228-1 Table C.4 #5 Dumper (75 kW, 9 t)	63	2	50	1.5	91

Table 1.7: HDD drilling for gas pipeline - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Drilling rig (advanced grouting)	BS 5228-1:2009+A1:2014 Table C.6 #35 tracked hydraulic drilling rig	86	1	80	1.5	114

Table 1.8: Installation of plant items - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	2	50	1.5	107
Crane	BS 5228-1 Table C.3 #28 Tracked mobile crane (184 kW, 110 t)	67	1	50	1.5	95

Table 1.9: Erection and fit-out of buildings and enclosures - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	2	50	1.5	107
Scissor lift	BS 5228-1 Table C.4 #59 Diesel scissor lift	78	2	50	1.5	106

Table 1.10: Construction of above ground gas compound - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Telehandler	BS 5228-1 Table C.4 #54 Telescopic Handler (76 kW, 4 t)	79	1	50	1.5	107
Scissor lift	BS 5228-1 Table C.4 #59 Diesel scissor lift	78	1	50	1.5	106
360 excavator	BS 5228-1 Table C.2 #6 Tracked Excavator (72 kW, 16 t)	63	1	50	1.5	91

Table 1.11: On-site HGV movements (per zone) - assumed plant list.

Plant description	Data source	Sound pressure level at 10 m dB L_{Aeq}	Number	Percentage on-time	Height m	Sound power level dB L_w
Lorry	BS 5228-1 Table C.6 #21 Road Lorry Full - 39t	80	10	10	1.5	108

1.2 Results

Construction noise

1.2.1 The predicted noise levels from the proposed construction activities are presented in Table 1.12 below. The highest predicted noise level at the worst affected receptor for each activity is presented. Noise impact from construction activity on ecological receptors has been addressed within Volume 3, Chapter 9: Ecology.

Table 1.12: Predicted noise levels from construction activities at the façade of most affected receptor.

Construction activity	Receptor	Predicted noise level dB $L_{Aeq,T}$
General activity within site compounds within Zones C and D	Dwelling off Station Road	57
Construction of haul roads within Zones C, I and J	Dwellings on Biggin Lane	66
Site clearance within Zone A	Havers Lodge	50
Earthworks and foundations within Zone A	Havers Lodge	44
Piling within Zone A	Havers Lodge	50
Trenching for gas pipelines within Zones C, D and E	Goshems farm	43
HDD drilling for gas pipeline under water courses and hedges within Zone C	Dwelling off Station Road	59
Installation of plant items within Zone A	Havers Lodge	42
Erection and fit-out of buildings and enclosures within Zone A	Havers Lodge	47
Construction of above ground gas compound within Zone E	Dwellings on the junction of Station Road/Love Lane	55

1.2.2 In addition to the receptors listed in Table 1.12, predicted noise levels at the two high sensitivity receptors identified within the study area for construction noise are given below in Table 1.13.

Table 1.13: Predicted noise levels from construction activities at the façade of high sensitivity receptors.

Receptor	Predicted noise level dB $L_{Aeq,T}$	Construction activity
Gateway Academy	43	Construction of haul roads within Zone J
St James' Church	47	Construction of haul roads within Zone I

1.3 Summary of results

1.3.1 During the construction phase, predicted noise levels at the worst affected receptors during all proposed construction activities will be below the lower cut-off value during the day as given in BS 5228:2009+A1:2014. Predictions have shown that the highest predicted noise levels are likely to arise during the construction of haul roads, with levels of 66 dB $L_{Aeq,T}$ predicted at dwellings along Biggin Lane. All other construction activities would result in predicted noise levels of below 60 dB $L_{Aeq,T}$ at the worst affected receptors for that activity.

1.3.2 The highest predicted noise level at the Gateway Academy is 43 dB L_{Aeq} during the construction of haul roads within Zone J. At St James' Church, the highest predicted noise level is 47 dB L_{Aeq} during the construction of haul roads within Zone I. Both of these receptors have been identified as high sensitivity.

1.3.3 In accordance with the maximum design envelope parameters for this assessment, construction working hours are considered as normal daytime working hours of Monday to Friday 08:00 to 18:00, and Saturday 08:00 to 13:00. Whilst certain activities may require continuous operation throughout the 24 hour period, such as HDD drilling and concrete pouring, these activities are limited to a continuous operation of no more than 10 days per phase. As such, in accordance with BS 5228:2009+A1:2014, activities of less than one month in duration are considered to result in a negligible impact, unless works of a shorter duration are likely to result in significant effect.

1.3.4 The determination of magnitude of impact at the identified receptors from proposed construction activity and corresponding significance is detailed in Volume 3, Chapter 11: Noise and Vibration.

2. Construction Traffic

2.1 Calculations and modelling

2.1.1 Road traffic on the public highway has been modelled using a noise change procedure based on the methodology in the 'Calculation of Road Traffic Noise' (CRTN) (Department for Transport, 1988). This considers the increase in noise from individual road links, based on the change in flow, speed and HGV composition. Within the assessment, HGVs and heavy duty vehicles (HDVs) are regarded as having comparable noise emissions.

2.1.2 Traffic data has been provided for 15 links around the proposed development, as detailed in Table 2.1. The study area has been limited to those receptors for whom traffic on those links is, or could become, the dominant noise source. For receptors for which this is not the case, any change in noise arising from these road links will not have any significant change in their noise environment. The location of the road links that have been assessed are shown in Volume 3, Chapter 10: Traffic and Transport.

Table 2.1: Road links considered within construction traffic noise assessment.

Link ID	Road/Link Description
1	A13 between M25 junction 30 and A126
2	A13 between A126 and A1012
3	A13 between A1089 and A1012
4	A1089,between Marshfoot Road roundabout and A13
5	Marshfoot Road between A1089 slip road and Marshfoot Road junction
6	Marshfoot Road, between Marshfoot Road junction and A1089 roundabout
7	Marshfoot Road, between Marshfoot Road junction and Gateway Academy roundabout
8	Marshfoot Road, between Gateway Academy roundabout and St. Chads Road
9	St. Chads Road, between Marshfoot Road and Gateway Academy roundabout
10	Gun Hill Road, between Coopers Shaw Road and Turnpike Lane
11	Coopers Shaw Road / Church Road / Station Road, between Gun Hill Road and EMR East Tilbury junction
12	Turnpike Lane, between Gun Hill Road and Linford Road
13	Linford Road, between Turnpike Lane and Muckingford Road
14	Brentwood Road, between High House Lane and Orsett Cock roundabout
15	A13, between Orsett Cock roundabout and A1089

2.1.3 The temporary impact of increased vehicles on the existing road network associated with construction works may affect receptors sensitive to noise. As discussed in Volume 3, Chapter 11: Noise and Vibration, it is not considered that vibration effects from construction traffic will have an adverse effect at sensitive receptors located along affected road links and as such, this has been scoped out of further assessment.

2.1.4 The construction works will result in additional vehicle movements on the existing road network. A high proportion of these additional vehicles will be HGVs and HDVs.

2.1.5 Traffic flows have been provided by the proposed development's transport consultant. Noise change calculations follow the protocol within CRTN. Calculations allow for changes in flow, HGV composition and speed. The noise change assessment has been based on a comparison between the base year (2021) without construction and the base year with peak construction flows. An additional assessment of peak construction flows with cumulative traffic flows from other proposed developments has also been undertaken. The traffic data modelled for the three scenarios are provided in Table 2.2 to Table 2.4 below.

Table 2.2: Traffic flow data – 2021 base year without construction.

Link ID	18 hr Day AAWT			8 hr Night AADT		
	Vehicle Flow	*% HGV*	*Speed (kph)*	*Vehicle Flow*	*% HGV*	*Speed (kph)*
1	112714	11.08%	113	16488	11.05%	113
2	95761	12.74%	113	15211	12.70%	113
3	100524	11.95%	113	14854	11.91%	113
4	30139	28.36%	113	4378	33.01%	113
5	5523	5.41%	97	227	2.51%	97
6	11071	3.16%	81	455	1.47%	81
7	8110	2.51%	81	333	1.16%	81
8	8110	2.51%	81	333	1.16%	81
9	11860	1.81%	48	488	0.84%	48
10	1962	0.00%	97	81	0.00%	97
11	1080	23.89%	97	42	9.03%	97
12	1962	0.00%	97	81	0.00%	97
13	5465	1.01%	97	222	0.47%	97

Link ID	18 hr Day AAWT			8 hr Night AADT		
	Vehicle Flow	*% HGV*	*Speed (kph)*	*Vehicle Flow*	*% HGV*	*Speed (kph)*
14	9842	4.34%	81	404	2.02%	81
15	100486	10.11%	113	14618	11.80%	113

Table 2.3: Traffic flow data – 2021 base year with peak construction flows.

Link ID	18 hr Day AAWT			8 hr Night AADT		
	Vehicle Flow	*% HGV*	*Speed (kph)*	*Vehicle Flow*	*% HGV*	*Speed (kph)*
1	112955	11.11%	113	16527	11.03%	113
2	96002	12.77%	113	15250	12.67%	113
3	100765	11.98%	113	14893	11.88%	113
4	30380	28.33%	113	4417	32.72%	113
5	5643	5.83%	97	246	2.31%	97
6	11191	3.40%	81	475	1.41%	81
7	8351	3.15%	81	372	1.04%	81
8	8351	3.15%	81	372	1.04%	81
9	12101	2.27%	48	527	0.78%	48
10	2203	2.72%	97	120	0.00%	97
11	1321	24.08%	97	81	4.70%	97
12	2203	2.72%	97	120	0.00%	97
13	5706	2.02%	97	261	0.40%	97
14	10083	4.84%	81	443	1.84%	81
15	100727	10.14%	113	14657	11.77%	113

Table 2.4: Traffic flow data – 2021 base year with peak construction and cumulative flows.

Link ID	18 hr Day AAWT			8 hr Night AADT		
	Vehicle Flow	*% HGV*	*Speed (kph)*	*Vehicle Flow*	*% HGV*	*Speed (kph)*
1	115285	12.19%	113	16807	12.32%	113
2	98332	13.99%	113	15530	14.04%	113
3	103095	13.17%	113	15172	13.30%	113
4	33259	31.91%	113	4808	36.94%	113
5	6035	5.45%	97	246	2.31%	97
6	11583	3.28%	81	475	1.41%	81
7	9135	2.88%	81	372	1.04%	81
8	9135	2.88%	81	372	1.04%	81
9	12174	2.26%	48	536	0.76%	48
10	2203	2.72%	97	120	0.00%	97
11	1321	24.08%	97	81	4.70%	97
12	2203	2.72%	97	120	0.00%	97
13	7071	1.63%	97	261	0.40%	97
14	11013	4.43%	81	443	1.84%	81
15	102116	10.50%	113	14769	12.24%	113

2.1.6 Whilst construction activity associated with the proposed development will only take place during the day, there will be an increase in vehicle flows during the night-time period during the construction phase. The increase in traffic flow during the night is assumed to be from construction staff travelling to work during the morning shoulder period (06:00 to 07:00). There are no anticipated HGV movements during this period.

2.2 Results

2.2.1 Noise change calculations have been undertaken for each of the fifteen links where traffic data has been provided. The calculations consider total 18-hour average flows, percentage HGV/HDV and average speed, using the formula from CRTN. The noise changes forecast in Table 2.5 to Table 2.8 represent the expected noise change at any NSR for which that traffic link is already the dominant noise source. For NSRs where a link contributes only a portion towards their overall existing noise environment, the noise change reported for that link forms an upper limit to the noise change which a NSR might experience due to the increased traffic flows.

Table 2.5: Predicted noise change – 2021 base year with no construction against base year with peak construction flows - daytime.

Link ID	Base year without construction $L_{A10, 18hr}$	Base year with peak construction flows $L_{A10, 18hr}$	Noise change dB
1	85.1	85.1	0.0
2	84.6	84.6	0.0
3	84.7	84.7	0.0
4	81.1	81.1	0.0
5	69.8	69.9	0.1
6	71.0	71.0	0.0
7	69.5	69.6	0.1
8	69.5	69.6	0.1
9	67.6	67.7	0.1
10	64.3	64.8	0.5
11	65.2	65.6	0.4
12	64.3	64.8	0.5
13	68.9	69.1	0.2
14	70.7	70.8	0.1
15	84.4	84.4	0.0

Table 2.6: Predicted noise change – 2021 base year with no construction against base year with peak construction flows – night-time.

Link ID	Base year without construction $L_{A10, 18hr}$	Base year with peak construction flows $L_{A10, 18hr}$	Noise change dB
1	78.3	78.3	0.0
2	78.1	78.1	0.0
3	77.9	77.9	0.0
4	74.7	74.7	0.0
5	57.0	57.3	0.3
6	58.3	58.4	0.1
7	56.8	57.3	0.5
8	56.8	57.3	0.5
9	54.9	55.2	0.3
10	52.0	53.7	1.7
11	50.8	52.9	2.1
12	52.0	53.7	1.7
13	56.5	57.2	0.7
14	57.9	58.2	0.3
15	77.8	77.9	0.1

Table 2.7: Predicted noise change – 2021 base year with no construction against base year with peak construction and cumulative flows – daytime.

Link ID	Base year without construction $L_{A10, 18hr}$	Base year with peak construction flows $L_{A10, 18hr}$	Noise change dB
1	85.1	85.3	0.2
2	84.6	84.8	0.2
3	84.7	84.9	0.2
4	81.1	81.8	0.7
5	69.8	70.2	0.4
6	71.0	71.2	0.2

Link ID	Base year without construction $L_{A10, 18hr}$	Base year with peak construction flows $L_{A10, 18hr}$	Noise change dB
7	69.5	70.1	0.6
8	69.5	70.1	0.6
9	67.6	67.8	0.2
10	64.3	65.3	1.0
11	65.2	66.1	0.9
12	64.3	65.3	1.0
13	68.9	70.2	1.3
14	70.7	71.2	0.5
15	84.4	84.6	0.2

Table 2.8: Predicted noise change – 2021 base year with no construction against base year with peak construction and cumulative flows – night-time.

Link ID	Base year without construction $L_{A10, 18hr}$	Base year with peak construction flows $L_{A10, 18hr}$	Noise change dB
1	78.3	78.5	0.2
2	78.1	78.4	0.3
3	77.9	78.2	0.3
4	74.7	75.4	0.7
5	57.0	57.3	0.3
6	58.3	58.4	0.1
7	56.8	57.3	0.5
8	56.8	57.3	0.5
9	54.9	55.3	0.4
10	52.0	53.7	1.7
11	50.8	52.9	2.1
12	52.0	53.7	1.7
13	56.5	57.2	0.7
14	57.9	58.2	0.3
15	77.8	77.9	0.1

2.3 Summary of results

2.3.1 Predictions have shown that during the peak construction period for the proposed development, noise levels will increase on links 10, 11 and 12 by up to 2.1 dB during the night. On all other road links, predicted noise levels will not increase by more than 1 dB during both the day and night-time periods.

2.3.2 Predictions of the cumulative effects from construction traffic associated with Thurrock Flexible Generation Plant and other proposed developments have shown that the greatest noise increase will be seen on link 13 during the day and link 11 during the night.

2.3.3 The determination of magnitude of impact at receptors located along the assessed road links as a result of construction traffic associated with the proposed development is detailed in Volume 3, Chapter 11: Noise and Vibration.

3. References

British Standards Institution (BSI) BS 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites. Noise.