

VTS Track Technology Ltd

Proposed Dragonby Rail Assembly and Loading Facility:

Assessment of Airborne Noise

9 July 2012



Consultants in Acoustics Noise and Vibration Control

Spring Garden, Fairwarp, Nr Uckfield, E. Sussex, TN22 3BG

Telephone: 01825 712435 Fax: 01825 712542

e-mail: rmt@ruperttaylor.com
<http://www.ruperttaylor.com>

CONTENTS

1	Outline of Report	2
1.1	SCOPE	2
2	Guidance on assessment	3
2.1	BRITISH STANDARD 4142:1997	3
2.2	WORLD HEALTH ORGANIZATION (WHO).....	3
3	Description of activities at new facility	4
3.1	OVERVIEW.....	4
3.2	DELIVERIES	5
3.3	PLANT AND EQUIPMENT.....	6
4	Existing Noise Levels at Dragonby Village	8
4.1	DESCRIPTION OF AREA.....	8
4.2	RESULTS OF THE SURVEY.....	9
5	Prediction of noise from site operations.....	10
5.1	SOURCE NOISE LEVELS FOR PLANT AND OPERATIONS.....	10
5.2	PREDICTION OF NOISE LEVELS AT DRAGONBY	11
5.3	DURATION OF ACTIVITIES	11
5.4	LOCATIONS AND DISTANCES.....	12
5.5	GROUND CHARACTERISTICS AND SCREENING	13
5.6	RESULTS OF PREDICTIONS	13
5.7	OPERATION OF MORE THAN ONE LAYOUT AREA/WORKING ZONE	14
6	Conclusions.....	16
6.1	PREDICTED NOISE LEVELS.....	16
6.2	GUIDANCE ON NOISE LEVELS.....	16
6.3	COMPARISON OF PREDICTED NOISE LEVELS WITH THE GUIDANCE	16
6.4	CONCLUSION.....	17

1 OUTLINE OF REPORT

1.1 Scope

- 1.1.1 This report presents an assessment of the noise from activity at the proposed rail assembly facility at Dragonby sidings at the nearest noise sensitive location in Dragonby Village.
- 1.1.2 The report includes a description of the operation of the facility and predictions of the noise level from the key activities. Information on existing noise levels at Dragonby village and guidance on the assessment of noise levels are also provided.
- 1.1.3 Finally, an assessment is presented by comparing the predicted noise levels with the guidance.

2 GUIDANCE ON ASSESSMENT

2.1 British Standard 4142:1997

- 2.1.1 This standard is entitled 'Method for rating industrial noise in mixed residential and industrial areas' and sets out a method for assessing the potential for noise from fixed commercial installations to give rise to community response.
- 2.1.2 The method entails a comparison of the existing background noise level in the area (defined as the level exceeded for 90% of the time – the L_{A90}) with the noise level from the noise to be assessed expressed as a '*rating level*' - L_r .
- 2.1.3 To determine the rating level first the '*specific noise level*' for the new source is determined. The specific noise level is noise level from the new source averaged over a specified period (the L_{Aeq}); for the daytime, the averaging period is one hour.
- 2.1.4 To derive the rating level a correction factor of + 5 dB is applied to the specific noise level if one or more specified acoustic features are present. If none of the features are present the rating level is equal to the specific noise level.
- 2.1.5 Complaints are to be expected if the rating level exceeds the background L_{A90} by around 10 dB or more; excesses of around 5 dB are of marginal significance.

2.2 World Health Organization (WHO)

- 2.2.1 Guidance from the World Health Organization¹ reports that:
- “During the daytime, few people are highly annoyed at L_{Aeq} levels below 55 dB, and few are moderately annoyed at L_{Aeq} levels below 50 dB”.*
- 2.2.2 These levels are for outdoor living areas over a period of 16 hours.
- 2.2.3 The period over which the WHO criterion applies has the effect of changing the L_{Aeq} value for an activity that takes place over a period of less than 16 hours. For example, the L_{Aeq} value from an activity that occurs over a 4 hour period would be 6 dB lower when assessed over a 16-hour period.

¹ Guidelines for Community Noise, WHO, Geneva, 1999.

3 DESCRIPTION OF ACTIVITIES AT NEW FACILITY

3.1 Overview

- 3.1.1 The principal activities take place within an area protected by a 2.2m high concrete anti-intruder fence. (see **Figure 3.1** below).
- 3.1.2 The activity consists of rail components being delivered by rail and road into the secure area. These components are then assembled in a designated '**Layout Area**' where they are clipped together to form the defined rail layout.
- 3.1.3 Subsequently the assembled layouts are checked by inspectors against the drawings/specification. After inspection the layouts are partially disassembled and loaded onto the rail wagons (or road vehicles) for despatch.
- 3.1.4 There are two separate **Layout Areas** which can be operated independently and simultaneously. For the purposes of this report they have been designated **E** (ie, east) and **W** (ie, west) as shown in **Figure 3.1**, from which it can be seen that the Layout Areas where the assembly takes place is an area within the overall secure area.
- 3.1.5 The proposed working hours are 0800 to 1800 daily
- 3.1.6 There will be 2 train deliveries per week per Layout Area. The maximum number of lorry movements would be 20 per day but this would only occur once a week. The average number of lorry movements per day will be 8.
- 3.1.7 The sequence and frequency of activities for each Layout Area is set out in **Table 3.1**.

Table 3.1 Overview of operating sequence (for each layout area)

Step	Description	Duration	Frequency of use
1	Delivery		
	Rail components arrive by rail	10 mins	2 times per week
	Or by road	4 loads 3 minutes each	3 times per week
2	Setting out		
	Theodolites, tape measures, etc	About 4 hours	1 or 2 times per week
3	Unloading		
	Gantry crane lifts components from wagons to required positions	5 lifts/hr (not continuous) 20 lifts/day	4 hours per day 6 days per week
4	Assembly		
	Components are clipped together using hand lever tool	Continuous, 1 hour	2 hours per day 2 days per week
	Adjustment of positions of rails and bearers etc using 2 Fork Lift Trucks	15 mins/hr/truck 30 mins/hr total	Up to 3 hours per day 2 days per week

Table 3.1 Overview of operating sequence (for each layout area)

Step	Description	Duration	Frequency of use
5	Marking up assembly		
	Identification numbers painted onto rail components	About 4 hours	1 or 2 times per week
6	Inspection (Internal and by client)		
	No plant or tools in use	Whole shift	1 day per week
7	Disassembly		
	Extraction tool used to unclip components	Continuous 1 hour	Once per shift 1 hour per day 2 days per week
8	Loading		
	Gantry crane lifts components from layout area onto wagons	2 lifts per hour (not continuous)	10 lifts per shift 5 hours per day 2 days per week
9	Despatch		
	Rail components despatch by rail	10 mins	2 times week
	Rail components despatch by road	2 loads 3 minutes each	3 times per week

3.2 Deliveries

- 3.2.1 There are gates across the rail tracks at each end of the secure area which are opened and closed as necessary to provide access for the trains. These would be used (ie, one opening and closing operation) about four times per week (total for both layout areas combined) and operated during normal working hours.
- 3.2.2 The gates will be steel and not have any openings. They will normally be in the closed position and form a continuous barrier with the perimeter fence (ie, not an 'open' construction).
- 3.2.3 Initially there will be more road movements until deliveries via the rail network are fully developed.
- 3.2.4 For rail deliveries, the train is first deposited into a siding, the loco detaches and leaves. A small Unimog/shunter² then takes the train to the far north west corner and pushes it into the loading area. All the wagons are of modern construction so that they are fully and independently braked. Shunting noise is therefore minimised because the vehicles do not buffer together so easily.

² A Unimog/shunter is essentially a road-going lorry specially equipped to provide additional sets of wheels that enable it to operate on rails as an alternative and with a mechanism for switching between road and rail operation.

- 3.2.5 Note that because the sidings are off the main line and under the control of VTS, the train (wagons and loco) will be able to access the sidings when required and no extended periods of idling would occur. Similarly, moving the wagons by use of the Unimog/shunter vehicle to and from the loading/unloading area takes place on tracks within the control of Corus and off the main line.
- 3.2.6 The wagons are moved as a single 'train' and no coupling/decoupling of individual wagons occurs and so the movement from siding to layout area does not involve an extended series of train movements (ie, the 'shunting' operation is not like that which would occur in a freight yard).
- 3.2.7 The roads and entrances have been specified in **Table 3.1** to accommodate up to 20 HGV movements per day. However, this is a peak and sometimes there will only be two or four movements a day.
- 3.2.8 Road vehicles would enter via the site access roads and a typically a total of 40 HGVs vehicles/week are expected to enter (and leave) the site. Cars using the entrances would be employees' and customers'/suppliers' vehicles – approximately 20 vehicles entering and leaving during each shift.
- 3.2.9 Access to the secure area for road vehicles is provided by smaller gates across the roads at each end of the site and these would also normally be in the closed position.

3.3 Plant and equipment

- 3.3.1 Although the facility provides a similar function to the rail assembly work at the existing site in Scotter Road, the plant and operations used at the new site will differ in several respects and include the elimination of the noisiest activities by the use of alternative approaches.
- The rail cutting will be done in the factory at Hebden Road.
 - The modern construction of turnout now almost exclusively uses elastic clips that are pulled into position and removed by a hand lever.
 - The use of mobile plant will almost exclusively be limited to two 3t diesel fork lift trucks. These will be each be used for up to three hours per day and always within the concrete fence area.

Table 3.2 Principal equipment proposed for use at the new facility

Equipment	Description of use
Gantry cranes ¹	Loading/unloading rail components (The rails are laid onto bearers, not directly onto the ground.)
Fork lift trucks ²	Local adjustment for precise alignment of rail components, bearers etc ³ (Also used once per layout at start of assembly to move box of elastic rail clips to layout area from local storage point)
Hand and extraction tools	Removing elastic clips from rails when disassembling layouts. Adjusting rails/components, tightening joints.
Note	1 The gantry cranes will not be fitted with reversing/movement alarms 2 The fork lift trucks will be fitted with reversing alarms. 3 Also used once per layout at start of assembly to move box of elastic rail clips to layout area from local storage point.

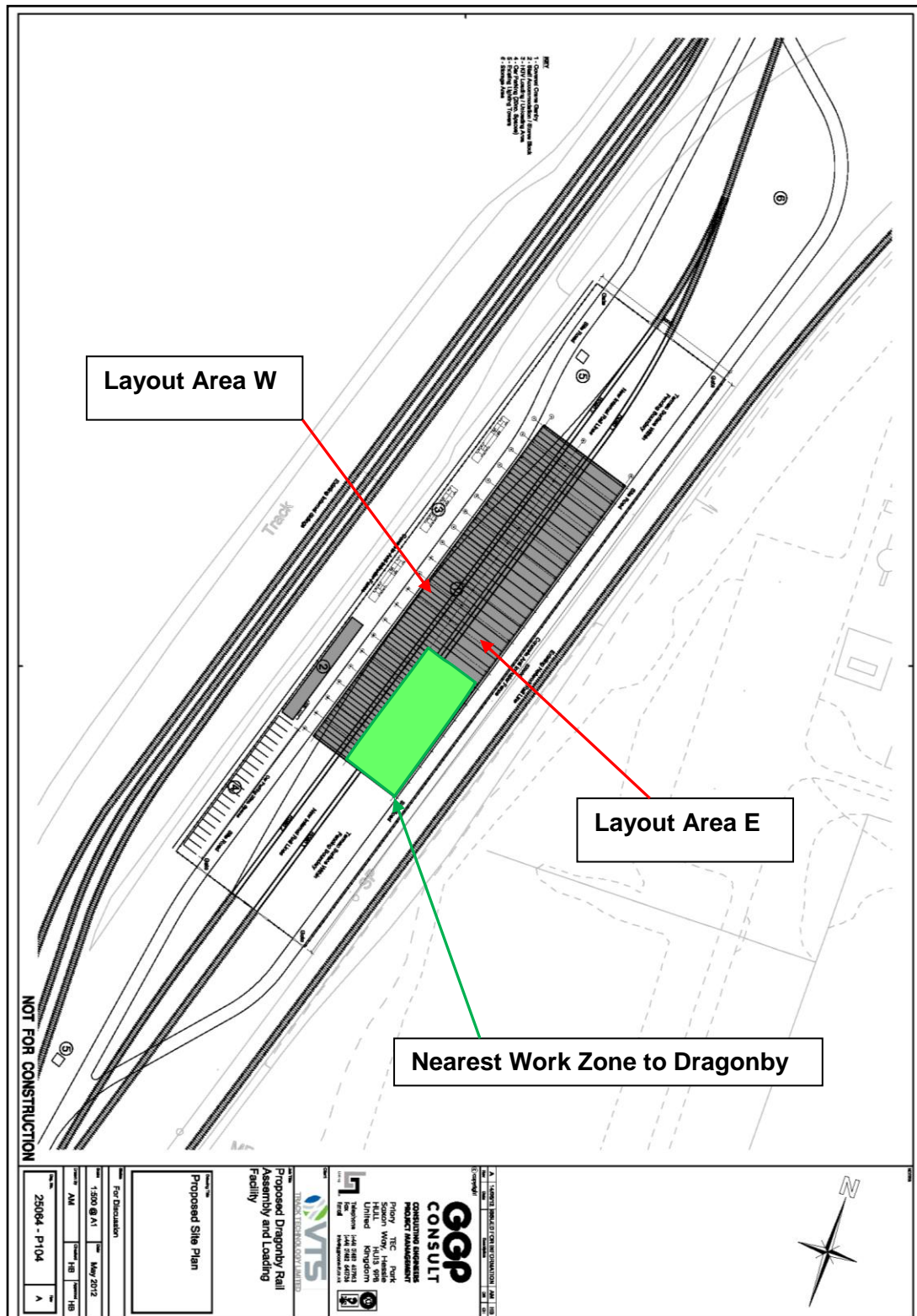


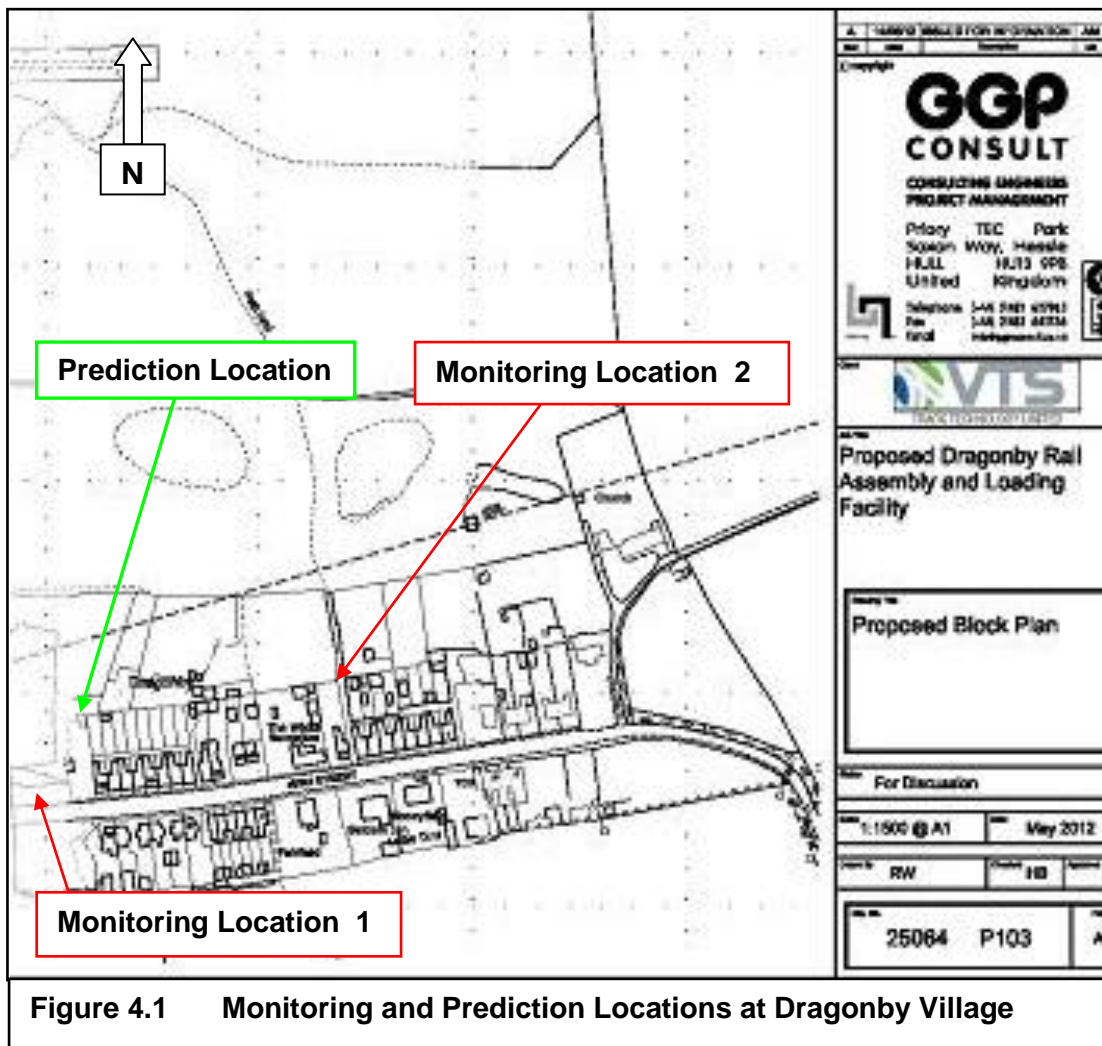
Figure 3.1 Site Plan – showing Layout Areas and nearest work ‘zone’

4 EXISTING NOISE LEVELS AT DRAGONBY VILLAGE

4.1 Description of area

4.1.1 Dragonby village consists of a single street about 250 m long consisting of around 45 houses/bungalows. The street is aligned approximately west to east. Its western end is just about 240 m from a Network Rail single track freight line; its eastern end is a similar distance from the A1077 (Winterton Road).

4.1.2 Short periods of attended monitoring were carried out at Locations 1 and 2 shown on **Figure 4.1**, during the afternoon, evening, late night, and early morning. Location 1 was on a grassed area at the west end of the High Street beyond the houses. Location 2 was at the end of a footpath between numbers 16 and 18 giving access to the open land to the north of the village. Location 2 is on the line of the foot of the gardens for the houses on the north side of the street (ie the points closest to the proposed facility which is to the north west of the village).



4.1.3 During the survey the weather was dry, mainly overcast, and with little or no wind. Noise sources heard included activity within the gardens/houses (dogs barking, voices, mowing of a lawn, a cockerel), noise in the street (local traffic, dogs) together with noise from trains on the railway, and road traffic from Winterton Road and other roads in the vicinity).

4.1.4 There is a wind farm about 1km north of the village but owing to the wind conditions no sound from it was heard (though residents commented that they hear it under some conditions). Although there was little or no wind, observation of the orientation of the wind turbines to the north of the village suggested that the underlying direction changed between the periods measured. It was also mentioned by residents that a speedway track which lies to the south west can be heard but it was not noticed during the survey.

4.2 Results of the survey

4.2.1 **Table 4.1** presents a summary of the noise levels recorded during the monitoring.

Table 4.1 Typical period noise levels¹: Dragonby 12 – 13 June 2012 – dB

Location	Period Time	Wind Direction	L _{Aeq}	L _{A10}	L _{A90}
Tuesday 12 June					
1	13:35 to 15:45	Northern Sector	45	47	37
2	16:50 to 18:00	NNE	44	48	36
1	23:00 to 23:30	WSE	33 41 (Train passing)	31 36	26 30
2	22:00 to 22:30	WSE	46 35	49 39	32 28
Wednesday 13 June					
1	05:40 to 06:30	W	46	48	37
2	05:30 to 06:50	W	43	46	37
Note	1	Free-field noise levels, 1.3 m above local ground level. Nominal monitoring periods were Tuesday: 15-minutes , Wednesday:10-minutes. The equipment used was a Norsonic 140 Sound Level Analyser and Norsonic 1251 acoustic calibrator. Both a Norsonic 1209 pre-amp and 2125 microphone and a Gras=41 AL/S outdoor microphone were used.			

4.2.2 Based on the above data a representative daytime background noise level (L_{A90}) of 37 dB has been assumed. The Local Authority has indicated that noise from the proposed facility should not exceed that value when expressed as a 'rating level' ie, the predicted L_{Aeq} value together with any correction necessary for the character of the noise.

5 PREDICTION OF NOISE FROM SITE OPERATIONS

5.1 Source noise levels for plant and operations

- 5.1.1 As noted in **Table 3.2**, the principal operations a layout area are the use of the gantry cranes, the fork lift trucks, and the fixing and releasing of the elastic clips that join the rail components together.
- 5.1.2 These activities all take place under the roof over the gantries.
- 5.1.3 The equipment for the proposed facility will be newly acquired for the purpose and so will incorporate changes in design and manufacture that reduce noise levels. The basis of the noise levels used for the predictions is described below.
- 5.1.4 Noise levels from the existing gantry crane at the Hebden Road site were measured during hoisting and horizontal travel in two directions have been used to predict noise levels from those operations. The new cranes utilise inverter drives which offers a smooth continuous acceleration and deceleration reducing noise from drive elements and gearboxes.
- 5.1.5 Fork lift trucks are subject to the EC Directive on Noise Emission in the Environment by Equipment for Use Outdoors (Directive 2000/14/EC as amended) and the noise limits in that directive were reduced by 3 dB between 2002 and 2006. Noise levels data received from the manufacturers indicates that their latest diesel/gas powered trucks produce a lower level than the limit set in the directive. The 2006 EC limit has been used in the predictions and the additional reduction expected has then been described.
- 5.1.6 The fork lift trucks would be fitted with reversing alarms. However, these would be of a design that, compared to traditional systems, incorporates two features to reduce both the noise level and the potential for it to be noticed at locations off the site. First, the noise output is not fixed at a standard level but automatically adjusts the output to reduce it when operating in quieter conditions. Secondly, instead of using a fixed pitch 'bleeper' sound the character of the noise spread over broad range of frequencies so that no one frequency or pitch dominates and it does not sound like a 'bleeper' alarm.
- 5.1.7 The hand lever tool used to fix the elastic clips does not generate any significant noise in comparison to these other sources. The technique for releasing these clips is to use the lever in reverse or tap them with a hammer.
- 5.1.8 Noise levels for the crane and fork lift truck at a standardised distance of 10m are shown in **Table 5.1**. In that table **Cross Travel** denotes the crane moving across the width of the gantry and **Long Travel** refers to movement along the length of the gantry.
- 5.1.9 For Cross Travel the crane is supported on a single beam that spans the two side members of the gantry. For Long Travel there crane is runs on wheels at each end of the cross beam and so there are sources at both ends of the cross beam during Long Travel.

Table 5.1 Free-field noise levels at 10 m from principal plant – dB

Plant/Activity	L_{Aeq}
Gantry Crane ¹	
Hoisting	60 ²
Cross-travel	72 ²
Long Travel	62 ² (per side) ³
Fork Lift Truck ⁴	
Combined drive-by and lifting weighted 0.7 drive-by:0.3 lifting	73
Notes	1 From measurements at Hebden Road 2 During transit of source – approximately 10 to 40 seconds 3 For predictions, two rails are used as sources 4 From Sound Power Level in Directive (101dB) adjusted to 10m (over reflecting ground plane)

5.2 Prediction of noise levels at Dragonby

5.2.1 Following discussion with the Local Authority, noise levels from the above activities at Dragonby Village have been predicted in terms of the average over a period of one hour (ie, $L_{Aeq, 1-hr}$). An indication of the noise levels over shorter periods (eg during actual operations) is also provided, as requested.

5.2.2 The factors affecting the average noise level include the following³:

- noise output of the source/activity when in operation
- duration of activity within an hour
- location(s) of the activity on the site
- distance between the source location(s) and the prediction point in the village
- the nature of the intervening ground
- the presence of barriers and screens

5.2.3 The noise output of the principal plant is provided in **Table 5.1**, the other data are described below.

5.3 Duration of activities

5.3.1 The overall process has been summarised in **Table 3.1** but the actual assembly process is variable and that affects the activity from day to day and in the course of the day. The approach taken has therefore been to identify the most frequent or common operations, assess each activity, and finally to consider which of those activities might occur at the same time.

³ Atmospheric absorption has not been included.

- 5.3.2 The starting point it to appreciate that rail assemblies do not normally occupy the whole of a Layout Area but only about one-third of the total length. Consequently, activity tends to be confined to one of these three 'zones' when rail components are being moved and assembled.
- 5.3.3 The location of the nearest zone to Dragonby village is shown on **Figure 3.1**. It is at the southern end of the Eastern Layout Area; there are two more similar zones north of it in the Eastern Layout Area. The Western Layout area is also operated as three work zones. (Note that the Eastern Layout area is wider than the Eastern Layout Area.)
- 5.3.4 Based on the distances within one of the 'zones' in the Eastern Layout Area and the speed of travel of the crane at Hebden Road, it has been estimated that the total operating time for the three kinds of crane movements (**Table 5.1**) to carry out 5 lifts in one hour is:
- Hoisting 7 minutes
 - Cross travel (west to east) < 4 minutes
 - Long Travel (north to south) about 2 minutes
 - **Total** < **13 minutes**
- 5.3.5 The period within a hour for which the fork lift trucks operate during the assembly phase has already been provided in **Table 5.1** as 30 minutes (combined total for the two trucks).

5.4 Locations and distances

- 5.4.1 It was explained above that each layout area tends to operate in three 'zones' and so the activities described under **Duration of Activities** will be carried out in one of those sub-areas.
- 5.4.2 For the purpose of predicting the noise at Dragonby Village the nearest of these zones to the Village has been used (ie, the area under the roof in the south-east corner – **Figure 3.1**. Furthermore, the predictions have been made for the nearest point of the village to that zone – the bottom of the garden of the first house (number 38); that point is shown on **Figure 4.1**.
- 5.4.3 The shortest plan distance from the prediction point to the working area under the roof (SE corner) is 310 m⁴. The plan distance to the furthest point in the nearest zone (ie, to a point about one-third of the length up the building on the furthest side from Dragonby) is 354m⁵.
- 5.4.4 Crane activity has been assessed based on the durations noted above and for movement within that nearest zone to the prediction at Dragonby.
- 5.4.5 Similarly, during the assembly phase both the fork lift trucks have been assumed to operate at locations within that zone (two on the eastern edge of the roof and one on the southern edge near the centre).

⁴ To the point C21 on the steelwork grid.

⁵ To the point B14 on the steelwork grid.

5.5 Ground characteristics and screening

- 5.5.1 When sound travels over ground that is acoustically 'hard' (eg, concrete, water) the noise level is lower at greater distances owing to the effect of the spreading of the wavefront. If the intervening ground is 'porous' then additional reduction in the sound level at a given distance can occur as a result of interaction of the sound wave with the ground. This phenomenon – ground attenuation – occurs when the ground is covered by grass, trees or other vegetation such as farmland.
- 5.5.2 Another means by which sound levels can be reduced is the presence of barriers or screens that interrupt the direct line of sight between the noise source and the reception/prediction point. This screening can be caused by purpose built barriers or by natural banks that are part of the landform.
- 5.5.3 In the case of the new facility the intervening ground consists mainly of grassland – only the area within the site will be 'hard' ground. There is therefore the potential for ground attenuation to reduce the noise level from the site at Dragonby Village.
- 5.5.4 The proposal includes a 2.2m high concrete boundary fence which, since it has no holes, can function as a noise barrier. That would screen some of the activity on the site from the prediction point.
- 5.5.5 Prediction procedures specify that the effect of screening and ground attenuation are not additive and normally only one or other of these effects (the greater one) is included in noise predictions.
- 5.5.6 Although the 2.2m high fence would screen some of the site from the prediction point at the nearest location in the village the screening might be less effective at points further away from the site because they are at a higher elevation than the prediction and might be less well screened from the site.
- 5.5.7 However, the effect of ground attenuation is less affected by the increased elevation of the further points in the village and they are expected to receive a reduction the same as or greater than the value at the nearest point.
- 5.5.8 Consequently, screening of the site by the boundary fence has not been taken into consideration when determining the noise level at the nearest prediction point even though it might provide a greater reduction than the ground effect for some source locations.
- 5.5.9 Among the parameters that affect the amount of ground attenuation are the heights of the source and receiver/prediction point. The relevant heights in this case are (all with respect to local ground level):
- | | | |
|--------------------|-------|---------------------------------|
| • Gantry Crane | 11 m | (Local ground level 31.2 m AOD) |
| • Fork Lift Truck | 1.5 m | (Local ground level 31.2 m AOD) |
| • Prediction point | 1.5 m | (Local ground level 40.0m AOD) |

5.6 Results of predictions

- 5.6.1 The specific noise levels at the prediction point shown on **Figure 4.1** from the activities described in **Table 5.1** are shown in **Table 5.2**.

5.6.2 The predictions include the effect of ground attenuation using the method in ISO 9631-2:1996⁶ and are for meteorological conditions favourable to the propagation of noise from the site to Dragonby village.

Table 5.2 Free-field L_{Aeq} values at prediction point from principal plant

Plant/Activity	L _{Aeq} 1 hour dB	L _{Aeq} during activity – dB (Indicative duration within one hour)
Unloading Phase		
Gantry Crane ¹		
Hoisting	16	26 (7 minutes)
Cross-travel	26	38 (4 minutes)
Long Travel (Both Rails)	18	32 (2 minutes)
Combined	26	39 (2 minutes if simultaneous)
Assembly Phase		
Fork Lift Truck (FLT) ²		
(2 trucks all locations)	32	35 one truck (up to 30 minutes) 38 two trucks (up to 15 minutes)
Notes	1	Includes ground attenuation factor of 4 dBA
	2	Includes ground attenuation factor of 5 dBA

5.6.3 The loading phase uses the same plant as for the unloading phase but, as **Table 3.1** shows, there are fewer lifts per hour (2 instead of 5) and so the hourly L_{Aeq} from that activity will be lower than for the unloading phase by approximately 4 dB.

5.6.4 It has been estimated that the noise output from the fork lift trucks proposed for the new facility would be about 5 dB lower than the value in **Table 5.2** which was used for the predictions above.

5.6.5 The noise sources above would not include any of the acoustic features defined in the first two parts of the list in BS 4142 (see paragraph **Error! Reference source not found.**). The fork lift trucks operate between them for about half of the time in a given hour, the crane for about a quarter of the period. No acoustic feature correction has been applied to the values in the table and so the rating levels are equal to the noise levels in **Table 5.2**.

5.7 Operation of more than one Layout Area/Working Zone

5.7.1 The levels in the above table are those predicted for successive phases of activity in a single working zone. Consequently, those operations would not occur simultaneously for that zone. Although up to four working zones might be in use simultaneously the operations for which the noise levels have been predicted in **Table 5.2** would only occur in up to two of them at a time. The activities would not be synchronised (ie, there is no requirement for them to undertake the same phase of activity together).

⁶ For A-weighted levels

- 5.7.2 Several aspects of the operations affect the determination of noise levels arising from activity in two working zones.
- 5.7.3 First, there would only be one pair of fork lift trucks and so noise from their use in the Assembly operation could not exceed the values determined for one working zone. There could be simultaneous Loading/Unloading in two zones. However, the cranes used for these activities only operate for a proportion of the hours in a day (and as noted above for a proportion of each hour).
- 5.7.4 Secondly, the worst-case noise level from combined activities that could arise would therefore be from simultaneous Assembly in one zone and Unloading in another. However, the fork lift trucks are only used for a combined total of half-an-hour during up to 3 hours per day on 2 days per week and, as noted above, the cranes are not operated throughout the day when Unloading takes place. Thus, combining the noise levels from these two activities would not represent the typical situation.
- 5.7.5 A third matter to note is that the noise levels in **Table 5.2** were predicted for activity in the nearest working zone to the nearest point at Dragonby Village. Noise levels from activity in other working zones would therefore result in noise levels lower than the values in **Table 5.2**.
- 5.7.6 The result of combining the noise levels from each activity when operating in the nearest working zone to Dragonby village is 33 dB (L_{Aeq} , 1-hr, free-field). However, this is an over-prediction since both these activities would not occur simultaneously in the nearest working zone.

6 CONCLUSIONS

6.1 Predicted noise levels

6.1.1 The following free-field values of 1-hour L_{Aeq} at the nearest point at Dragonby Village from working in the nearest working zone to the site under favourable noise conditions have been predicted as follows:

- Unloading (gantry crane) 26 dB⁷
- Assembly (2 fork lift trucks) 32 dB

6.1.2 The noise level from the simultaneous undertaking of Assembly and Unloading in the nearest working zone to the nearest point at Dragonby Village is 33 dB. However, in practice these activities would not be carried out in the same zone and so one activity would be further away which would result in a lower combined noise level from the two activities.

6.1.3 These noise levels have been predicted using the noise level of the current crane at Hebden Road and the 2006 value for the maximum fork lift truck noise output under the EC Directive on Noise Emission in the Environment by Equipment for Use Outdoors. In practice the new equipment employed at the site will be more recent and is expected to have lower noise output.

6.2 Guidance on noise levels

6.2.1 The following guidance is provided by British Standard 4142 and by the World Health Organization:

- British Standard Site noise not more than 37 dB over a 1-hr period (Rating level not to exceed value of current L_{A90})
- WHO Site noise below 50 dB over a 16-hr period (Few people moderately annoyed)

6.3 Comparison of predicted noise levels with the guidance

6.3.1 Noise levels (L_{Aeq} 1hour free-field) from the principal activities are predicted to be at least 5 dB below the existing daytime L_{A90} when considering the nearest working zone and the nearest point at Dragonby Village.

6.3.2 When two working areas are operating together the noise level at that point for the worst-case combination of activities would be at least 4 dB below existing daytime L_{A90} there.

6.3.3 The guideline noise level based on BS 4142 can therefore be met.

6.3.4 All these predicted **hourly** noise levels are substantially below the noise level **averaged over 16 hours** below which WHO advises that few people are moderately annoyed.

⁷ The noise level from the loading operation will be lower, see paragraph 5.6.3.

6.3.5 The current L_{Aeq} measured in Dragonby Village during the daytime is about 45 dB (**Table 4.1**). This is about 5 dB below the 16 hour guideline level from WHO (50 dB) relating to moderate annoyance. The worst-case noise level (33 dB L_{Aeq} 1-hour) from the new site activities is more than 10 dB below that.

6.4 Conclusion

6.4.1 Prediction of the worst-case noise levels for the principal activities shows that the guideline level based on BS4142 can be met and they are substantially lower than the guideline level from the WHO below which few people are moderately annoyed.

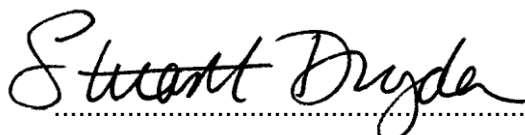
Rupert Taylor FIOA

NOISE REPORT

Date of this version:

9 July 2012

Signed



.....

Stuart Dryden

Sr Consultant
Rupert Taylor FIOA

Dated

9 July 2012