



# **Noise & Vibration Assessment for a Proposed Residential Development at Phase 2 – Lowfield Rd, Bolton-Upon-Dearne**

**Report ref.**

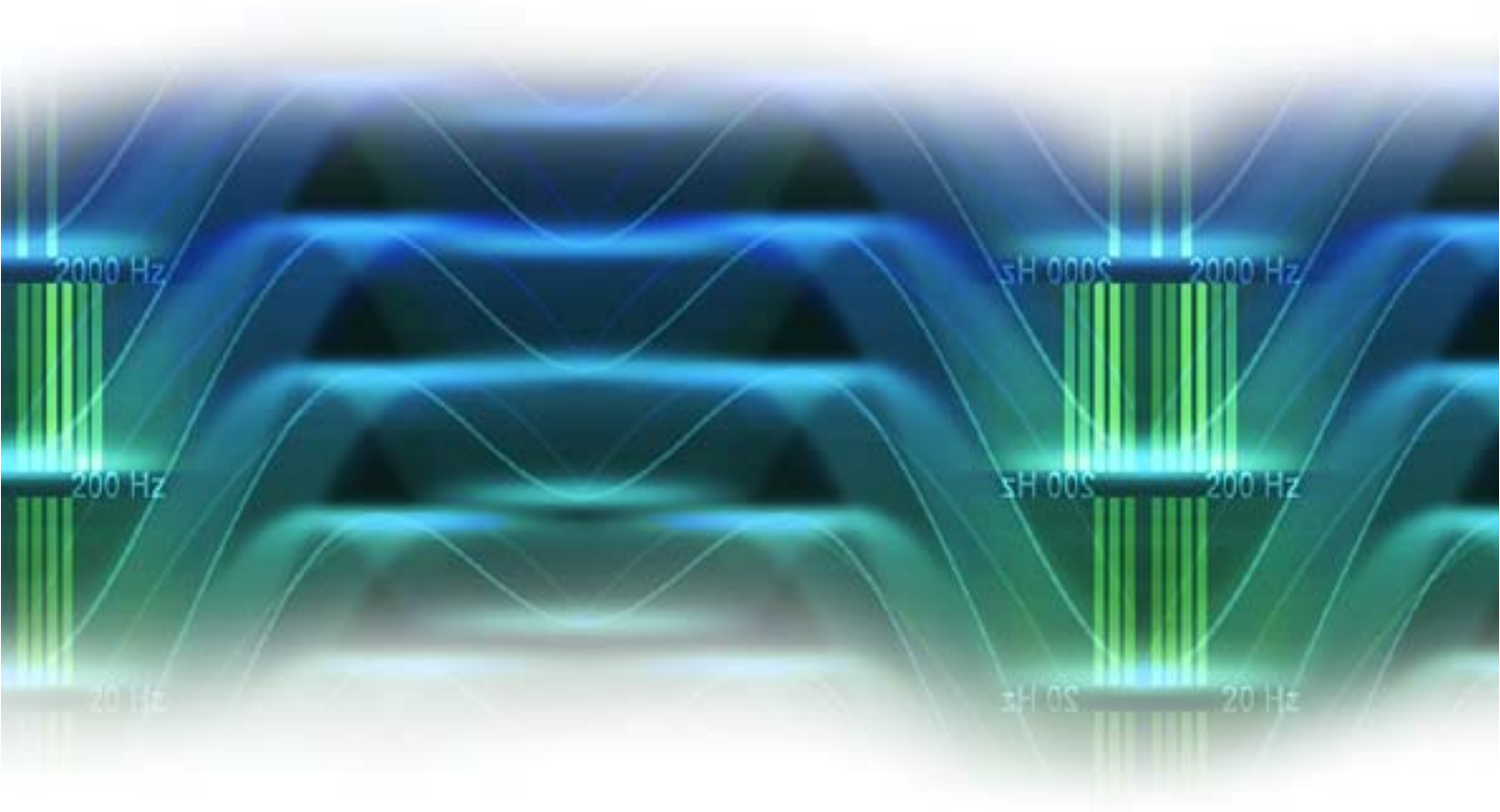
RK1041/13076

**Date**

March 2013

**Issued to**

Gleeson Regeneration & Homes

**Issued by**

Rob Kirkaldy BSc (Hons) AMIOA  
Consultant



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## 1. INTRODUCTION

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Gleeson Regeneration and Homes have recently been granted planning permission for a 60 unit residential scheme (Phase 1) at land located off Lowfield Road in Bolton-Upon-Deane. Spectrum Acoustic Consultants were commissioned by Gleeson Regeneration and Homes to undertake a noise and vibration assessment to form part of the original planning application for the development. Gleeson now wish to develop currently vacant land adjacent to Phase 1, by constructing a further 47 residential properties to form Phase 2. Accordingly, Spectrum Acoustic Consultants have been commissioned to provide a new noise and vibration assessment covering Phase 2.

The assessment of Phase 2 includes the results and observations taken from the original noise and vibration measurement survey completed at Phase 1 from Wednesday 13 to Thursday 14 July 2011. The noise and vibration data previously used in the original assessment report covering Phase 1 has been used in this instance, as it is sufficiently representative and comprehensive enough for the purpose of the assessment covering Phase 2.

A façade sound insulation specification has also been provided, in connection with the noise assessment.

## 2. SITE DESCRIPTION

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The Phase 2 site is situated on disused land immediately to the south of the Phase 1 site in Bolton-Upon-Deane, Yorkshire. Lowfield Road runs along the northern boundary of the Phase 1. A railway line is situated along the entire western boundary of the site which runs from Sheffield to Leeds. Bolton-Upon-Deane station is located approximately 250 meters from the site to the north. There are a number of existing residential properties immediately beyond the railway line further to the west. There are also a number of other existing residential properties immediately to the north east of the site, located off Lowfield Road, on Lowfield Meadows.

Approximately 150 meters to the south of Phase 2 is a water treatment plant. The intervening land between the water treatment plant and nearest residential properties will consist of public open space. Observations made whilst previously visiting the site in 2011 concluded that noise emanating from the plant was minimal, and the Local Planning Authority have not asked for this to be assessed.

The dominant noise source affecting the site is from rail movements from passenger and freight trains along the adjacent railway line.

The site location plan, with the noise and vibration measurement positions are shown on the Google Earth plan included in Appendix A. The proposed scheme layout plan is also included in Appendix B.



### 3. CRITERIA FOR ACCEPTABILITY

#### 3.1 PLANNING POLICY GUIDANCE 24: PLANNING AND NOISE

Planning Policy Guidance 24: Planning and noise (PPG24) has now been withdrawn and replaced with NPPF (2012). However, NPPF (2012) gives less specific advice on noise issues. Therefore, PPG 24 guidance will be used in the assessment of noise for this proposed development, as it provides a clearly defined assessment methodology, and is consistent with the previous assessment carried out for Phase 1, as requested by the Local Planning Authority.

PPG 24 outlines the considerations to be taken into account in determining planning applications both for noise-sensitive developments and for those activities which will generate noise. In the case of residential developments, PPG24 introduces the concept of Noise Exposure Categories (NEC) and advocates their use to provide a method for assessing the suitability of land. PPG24 also advises on the use of conditions to minimise the impact of noise.

For proposed residential use, PPG24 sets out a precise, quantifiable process to assist the Local Authority in determining the application.

Four NECs are defined which rate the importance of noise when considering permission for a new residential development. The advice for each category is given below in Table 1.

| NEC | Description                                                                                                                                                                                                                                                                |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A   | Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.                                                                                |
| B   | Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.                                                                                              |
| C   | Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise. |
| D   | Planning permission should normally be refused.                                                                                                                                                                                                                            |

**Table 1:** Description of NECs

The noise levels corresponding to each category is given in Table 2.

| Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings LAeq,T dB |           |                         |       |       |     |
|-----------------------------------------------------------------------------------------|-----------|-------------------------|-------|-------|-----|
| Noise Source                                                                            |           | Noise Exposure Category |       |       |     |
|                                                                                         |           | A                       | B     | C     | D   |
| Road traffic:                                                                           | 0700-2300 | <55                     | 55-63 | 63-72 | >72 |
|                                                                                         | 2300-0700 | <45                     | 45-57 | 57-66 | >66 |
| Rail traffic:                                                                           | 0700-2300 | <55                     | 55-66 | 66-74 | >74 |
|                                                                                         | 2300-0700 | <45                     | 45-59 | 59-66 | >66 |
| Air traffic:                                                                            | 0700-2300 | <57                     | 57-66 | 66-72 | >72 |
|                                                                                         | 2300-0700 | <48                     | 48-57 | 57-66 | >66 |
| Mixed sources:                                                                          | 0700-2300 | <55                     | 55-63 | 63-72 | >72 |
|                                                                                         | 2300-0700 | <45                     | 45-57 | 57-66 | >66 |

**Table 2:** Noise level ranges for each NEC (free field noise levels)



Where maximum noise levels (measured as  $L_{A\max}$ ) regularly exceed 82 dB during the night, PPG24 states the site should be classified as NEC C, unless otherwise in NEC D by virtue of the  $L_{Aeq,8hr}$ .

### 3.2 BS8233:1999 SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS. CODE OF PRACTICE

PPG24 refers to BS8233 “Sound insulation and noise reduction for buildings – code of practice” in relation to specifying acceptable indoor and outdoor noise levels. Therefore, complying with BS8233 is, in turn, in accordance with the guidance in PPG24.

BS8233 advises that the main criteria are to provide reasonable resting/sleeping conditions in bedrooms, and good listening conditions in other rooms.

BS8233 recommends internal noise levels in bedrooms at night of  $L_{Aeq,8\text{ hour}}$  30-35 dB and  $L_{A\max}$  45 dB. In living areas during the day, this should be  $L_{Aeq,16\text{ hour}}$  30-40 dB.

BS8233 also suggests that as well as protection for the building, noise levels in gardens and balconies should be considered. Whilst this is a secondary concern, it advises a guideline of  $L_{Aeq,16\text{ hour}}$  of no more than 55 dB during the day.

These guidelines levels are a reflection of those set out in “Guidelines for Community Noise - World Health Organization, 1999” (WHO). WHO sets out these values as table 4.1, and lists them as being Guideline values for community noise. The preface to WHO states that community noise includes road, rail and air traffic, industries, construction and public work, and the neighbourhood.

### 3.3 BS6472-1:2008 “GUIDE TO EVALUATION OF HUMAN EXPOSURE TO VIBRATION IN BUILDINGS. VIBRATION SOURCES OTHER THAN BLASTING”

The acceptability of vibration on the proposed development site has been assessed in accordance with BS6472-1:2008 ‘Guide to the Evaluation of Human Exposure to Vibration in Buildings’. This Standard uses the concept of Vibration Dose Value (VDV) to classify exposure to vibration in terms of an adverse comment rating. Vibration dose value takes account of both vibration level and duration of vibration, thereby giving additional weight to vibration levels that are frequent, or continuous.

Table 3 provides the vibration dose values above which various degrees of adverse comment may be expected in residential houses, as taken from this Standard.

| Vibration dose values ( $m/s^{1.75}$ ) above which various degrees of adverse comment may be expected in office buildings |                                                                 |                                          |                                                       |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------|-------------------------------------------------------|
| Place and time                                                                                                            | Low probability of adverse comment <sup>1</sup><br>$m/s^{1.75}$ | Adverse comment possible<br>$m/s^{1.75}$ | Adverse comment probable <sup>2</sup><br>$m/s^{1.75}$ |
| Residential buildings<br>16 h day                                                                                         | 0.2 to 0.4                                                      | 0.4 to 0.8                               | 0.8 to 1.6                                            |
| Residential buildings<br>8 h night                                                                                        | 0.1 to 0.2                                                      | 0.2 to 0.4                               | 0.4 to 0.8                                            |

**Table 3:** Rating of VDV values in accordance with table 1 of BS6472-1 2008

Notes: 1 Below this range adverse comment is not expected

2 Above this range adverse comment is very likely



## **4. NOISE AND VIBRATION SURVEY**

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### **4.1 MEASUREMENT PROCEDURE**

As mentioned previously, the noise and vibration measurement data previously used in the original assessment report covering Phase 1 provided by Spectrum has been used in this instance, as it is sufficiently representative and comprehensive enough for the purpose of the assessment covering Phase 2. Network Rail have also confirmed that since the previous assessment was carried out, there have been no significant increases in rail traffic movements through Bolton-Upon-Dearne, nor are there any planned changes.

Noise and vibration measurements were completed at the site from the 13 to 14 July 2011. These were typical working weekdays. Throughout the survey, weather conditions were mild and dry with low wind speeds.

The parameters recorded during the noise measurement survey included LAeq and LAFmax. In addition, a full range of statistical parameters (LA10, LA90 etc.) were also recorded. Both overall and octave band measurements were also stored for later analysis.

For the duration of the survey, a remote noise logger was utilised for recording continuous 5-minute period measurements at position 1. Attended measurements were also conducted during the afternoon and night time periods at positions 2 and 3. The noise measurement locations are detailed as follows:

Position 1 – 3m above ground representative of the proposed plot 61 façade facing the railway line at the far north west corner of the site

Position 2 – 1.5m above ground representative of the proposed plot 70 façade facing Lowfield Road at the far south east corner of the site

Position 3 – 1.5m above ground representative of the proposed plot 92 façade facing Lowfield Road at the far south west corner of the site

Vibration measurements were taken at Position 1 at ground level.

A site location plan, showing the noise and vibration measurement positions, is shown on the plan included in Appendix A.

### **4.2 MEASUREMENT EQUIPMENT**

The following equipment was used during the survey:

- Bruel & Kjaer Type 2260 Sound Level Meter s/n 2120238
- Bruel & Kjaer type 4189 Microphone s/n 2385826
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2115516
  
- Bruel & Kjaer Type 2260 Sound Level Meter s/n 2027587
- Bruel & Kjaer Type 4189 Microphone s/n 2643123
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2229825



- Svan 958 Type 1 Sound & Vibration Analyser s/n 15173
- Dytran tri-axial accelerometer Type 3233a s/n 415

Before and after the survey, the sound level meters were field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The meter, microphone and field calibrator are laboratory calibrated biennially in accordance with UKAS procedures or to traceable National Standards.

### 4.3 RESULTS AND OBSERVATIONS

Noise levels at the site are dominated by occasional rail movements from passenger and freight trains on the adjacent railway line. Other audible sources include road traffic noise from Lowfield Road and other surrounding roads.

A graphical representation of the daytime and night time noise logger profile at position 1 is included in Appendix C of this report.

A summary of the noise data taken at position 1 over the daytime and night time period, is included in Table 4. At position 1, the overall daytime 0700-2300 LAeq noise level has been taken from the average of both the daytime noise measurement periods. Note that PPG 24 requires noise measurements to be conducted at a height of 1.5m above ground. Measurements taken at position 1 were at 3m height; therefore the measured noise levels at this position are a conservative over-estimate.

PPG 24 states that if L<sub>Amax</sub> values regularly exceed 82dB at night, the site is automatically classified as NEC C, unless it is otherwise in NEC D. World Health Organisation (WHO) guidelines for community noise, define regular as not more than 10-15 events per night. Therefore the L<sub>Amax</sub> levels for the night time period have been sorted from highest to lowest. It is then possible to read off the 10-15<sup>th</sup> highest L<sub>Amax</sub> level during the night which is regarded as being typical. These typical highest L<sub>Amax</sub> values for the night-time period obtained in this survey are shown in Table 4.

| Position | Time Period                    | Noise level over period (dB) |                     |                     |
|----------|--------------------------------|------------------------------|---------------------|---------------------|
|          |                                | LAeq                         | LAFmax <sup>2</sup> | LASmax <sup>2</sup> |
| 1        | Daytime 1300-2300              | 58                           | -                   | -                   |
|          | Daytime 0700-1100              | 55                           | -                   | -                   |
|          | Daytime 0700-2300 <sup>1</sup> | 58                           | -                   | -                   |
|          | Night time 2300-0700           | 56                           | 80                  | 79                  |

**Table 4:** Summary of noise data recorded from logger

- Notes: 1 Daytime 0700-2300 taken from log average over periods 1 and 2  
 2 The L<sub>Amax</sub> data is only relevant to the night time period

Site noise levels, established at position 1, are LAeq, 16 hour 58dB during the day and LAeq, 8 hour 56dB during the night.

Environmental noise record sheets detailing the attended measurements at positions 2 and 3 during the daytime and night time periods are included in Appendix C. The measured noise levels at these locations were typically below LAeq, 16 hour 55dB during the day and LAeq, 8 hour 45dB during the night.



During the night time period, maximum noise levels did not regularly exceed  $L_{A\max}$  82dB at any of the measurement positions across the site. At position 1,  $L_{A\max}$  levels only exceeded 82dB 3 times during night time.

The full list VDV measurement data is detailed in Appendix D. The VDV levels were very low and during the survey period vibration from trains was not subjectively perceptible.

## 5. ASSESSMENT OF NOISE AND VIBRATION LEVELS

### 5.1 NOISE

Noise levels at the site are dominated by rail movements. Accordingly, the 'rail traffic' NEC classification should be applied in line with PPG24

The aspect of the site represented by position 1 is in NEC B for both the daytime and night time periods. For NEC B, PPG24 states *"Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise."*

The overall daytime (16 hour) and night time (8-hour)  $L_{Aeq}$  values, together with the night time  $L_{AFmax}$  level, used for the specification of facade sound insulation requirements of the properties closest to the railway line will be taken from the measurements taken at position 1. The noise data used for the specification of facade sound insulation requirements of the remaining properties will be taken from the short term attended measurements carried out at position 2.

A mitigation scheme is provided in section 6 that satisfies internal noise levels in accordance with BS 8233:1999 requirements.

### 5.2 VIBRATION

Each train event generates a similar level of vibration. Therefore as vibration has been measured from each train event, the 16 hour and 8 hour VDV can be calculated as the samples of each event are known using equation 2 of BS6472-1:2008. The logged VDV data is listed in Appendix D. The number of rail movements through Bolton-Upon-Deane station previously advised by Network rail is also included in Appendix E.

| Train Details<br>Type    | Calculated VDV $m.s^{1.75}$ |      |      |
|--------------------------|-----------------------------|------|------|
|                          | X                           | Y    | Z    |
| Daytime (07:00-23:00)    | 0.01                        | 0.01 | 0.03 |
| Night-time (23:00-07:00) | 0.01                        | 0.02 | 0.03 |

**Table 5:** Day and night calculated VDV's based on the measured levels from individual train pass events

The measured VDV's detailed in the above table are very low and are significantly below the range which indicates a low probability of adverse comment.



## 6. MITIGATION

### 6.1 NUMERIC SPECIFICATION OF FAÇADE SOUND INSULATION

Internal noise levels can be calculated from the measured site external noise level, taking into account the size and construction of the elements of the building façade, including glazing and ventilation. BS8233 sets out a method of calculating the internal noise levels, based on the external noise levels, areas of wall, glazing and ventilator.

The proposed sound insulation scheme will be designed to meet the recommendations of BS8233 LAeq,16 hour 35dB for living rooms during the day (between the good and reasonable standard) and the good standard of LAeq,8 hour 30dB for bedrooms during the night time.

The BS8233 defined requirement for LAFmax values in bedrooms at night, is that individual events should not regularly exceed 45dB.

The façade insulation requirements for the living rooms and bedrooms are detailed in Table 6 as follows.

| Position                                                             | Parameter    | Room        | External Noise Level dB(A) | Indoor target dB (A) | Reduction Required dB(A) |
|----------------------------------------------------------------------|--------------|-------------|----------------------------|----------------------|--------------------------|
| Plots 61-64, 85-92 facing the railway line represented by position 1 | LAeq,16 hour | Living Room | 58                         | 35                   | 23                       |
|                                                                      | LAeq,8 hour  | Bedrooms    | 56                         | 30                   | 26                       |
|                                                                      | LAFmax       | Bedrooms    | 80                         | 45                   | 35                       |
| All other properties represented by position 2                       | LAeq,2 hour  | Living Room | 46                         | 35                   | 11                       |
|                                                                      | LAeq,2 hour  | Bedrooms    | 41                         | 30                   | 11                       |
|                                                                      | LAFmax       | Bedrooms    | 61                         | 45                   | 16                       |

**Table 6:** Numeric sound insulation requirements for sensitive rooms in each property

Note: Sensitive rooms are living rooms and bedrooms

Therefore for properties along the west boundary of the site which face the railway line, an overall required reduction of 23dB(A) will be used for living rooms, and 35dB(A) for bedrooms when recommending a façade specification.

For all other properties, an overall required reduction of 11dB(A) will be used for living rooms, and 16dB(A) for bedrooms when recommending a façade specification.

### 6.2 MATERIALS SPECIFICATION

Based on the required overall façade sound insulation (column 5 'Reduction Required' in Table 6 above), an individual sound insulation specification has been determined for the three main elements of the façade (window, wall and ventilator). Spectrum has had extensive experience in providing façade sound insulation specifications for residential developments. The specification listed below is typical for a site of this nature. It should be noted that the performance of the window may be lower than the overall façade requirement, as the wall element provides a higher sound insulation performance to compensate.



Table 7 below details the sound insulation specification for all the proposed properties at the development.

| Property                                   | Room         | Wall type   | Window Performance<br>Rw+Ctr dB | Vent Performance<br>Dn,e,w+Ctr dB |
|--------------------------------------------|--------------|-------------|---------------------------------|-----------------------------------|
| Plots 61-64, 85-92 facing the railway line | Living Rooms | Brick/block | 25                              | 32                                |
|                                            | Bedrooms     | Brick/block | 34                              | 44                                |
| All other properties                       | Living Rooms | Brick/block | 25                              | 32                                |
|                                            | Bedrooms     | Brick/block | 25                              | 32                                |

**Table 7:** Sound insulation specification for the proposed development site

For plots 61-64 and 85-92 that face the adjacent railway line, acoustic performances in living rooms which also benefit from screening, can be achieved by standard double glazing (typically this can be achieved by a double glazed unit comprising 4mm float glass with a 12mm cavity and another layer of 4mm float glass), together with 2 hit or miss trickle ventilators (rated at Dn,e w + Ctr 32dB). Acoustic performances in bedrooms can be achieved by acoustic double glazing (typically this can be achieved by a double glazed unit comprising 10mm float glass with a 12mm cavity and another layer of 6.4mm float glass), together with an acoustic air brick ventilator (rated at Dn,e w + Ctr 44dB).

For all other properties, acoustic performances in living rooms and bedrooms can be achieved by standard double glazing (typically this can be achieved by a double glazed unit comprising 4mm float glass with a 12mm cavity and another layer of 4mm float glass), together with 2 hit or miss trickle ventilators (rated at Dn,e w + Ctr 32dB).

### 6.3 OUTDOOR AMENITY AREAS

Noise levels measured at position 1, representative of the plots 61-64 and plots 85-92 nearest to the railway line are LAeq,16 hour 58dB. The scheme layout plans included in Appendix B indicate a 2m high acoustic barrier fence will be constructed along the entire western boundary of the site. Due to the elevated nature of the railway line, achieving the recommended guideline noise level advised by BS 8233:1999 of LAeq 55dB in the gardens of plots 61-64 and 85-92 be will be very difficult. This was also echoed in the previous Phase 1 noise assessment carried out for plots 25-39.

However, for plots 25-39 in Phase 1 which face the railway line, Steve Billcliffe, Senior Environmental Health Officer for Barnsley Council stated that a 3dB difference would not justify recommending refusal of the application.

It should also noted that section 7.6.1.2 of BS 8233:1999 states that the main [acoustic] criteria are reasonable resting/sleeping conditions in bedrooms, and good listening conditions in other rooms. Therefore external areas are a secondary matter when it comes to assessing amenity.

For the remaining properties, noise levels in gardens will be comfortably below the recommended guideline noise level advised by BS 8233:1999 of LAeq 55dB.



## 7. CONCLUSIONS

Gleeson Regeneration and Homes has commissioned Spectrum Acoustic Consultants to complete a noise and vibration assessment for a proposed residential development (Phase 2) at land off Lowfield Road, Bolton-Upon-Dearne.

This report provides an assessment of site noise and determines sound insulation requirements by reference to Planning Policy Guidance 24: Planning and noise (PPG 24), BS 8233:1999 Sound insulation and noise reduction for buildings. Code of practice and Guidelines for Community Noise - World Health Organization, 1999 (WHO).

This report also provides an assessment of site vibration levels by reference to BS6472-1:2008 “guide to evaluation of human exposure to vibration in buildings. vibration sources other than blasting”.

Rail noise is the dominant noise source at the proposed development site. A mitigation scheme is provided that satisfies internal noise levels in accordance with the national amenity guidelines. Noise levels in the gardens of the properties nearest to the railway line just exceed the guideline noise level of  $L_{Aeq}$  55dB suggested by BS 8233:1999. However, external areas are a secondary matter when it comes to assessing amenity. Noise levels in gardens of the remaining properties across the site will be comfortably below the recommended guideline noise level of  $L_{Aeq}$  55dB.

The measured VDV levels at the site are very low, and are significantly below the range which indicates a low probability of adverse comment.

## 8. SUPPLIERS

Where required, acoustic glazing, together with proprietary acoustic and standard ventilation systems, designed specifically for the purpose of incorporating into a façade or whole-building ventilation scheme, are available from the following suppliers:

| Supplier               | Product                         | Phone Number |
|------------------------|---------------------------------|--------------|
| Pilkington Glass       | Acoustic Laminate Glass         | 01744 692000 |
| Titon                  | Sonair Acoustic Wall vents      | 01206 713800 |
| Passivent Ltd          | Passivent Acoustic wall vents   | 01732 355519 |
| Rytons                 | Acoustic AirCore vent           | 01536 511874 |
| Silavent               | Acoustic wall vents             | 01252 878272 |
| Greenwood window vents | Through-frame ventilation units | 01903 777137 |

Report Code: A/D/EH



## **A P P E N D I X   A**

Existing Site Location Plan with Measurement Positions





## **A P P E N D I X   B**

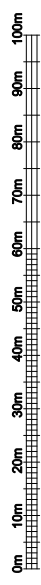
Proposed Scheme Layout

- NOT FOR USE ON SITE -  
PROVISIONAL LAYOUT DRAWING, SUBJECT TO  
PLANNING APPROVAL

- Existing trees to be removed
- Existing trees to be retained and protected during construction to British Standard BS5836:1999.
- Areas of new tree planting are scheduled for species
- New street/ access cover planting
- Grass to final option
- Private drive access paths to level threshold for principal entrance. Gradient not to exceed 1 in 12 for minimum 5.00m length
- Private drives
- 1.80m high screen wall
- SW loaded vertical access fences 1.80m high 100 x 12mm boards with 22mm gaps. 190 x 12mm rails. (OO's 100mm posts @ 1250mm centres).
- As above, height reduced to 1.20m
- Pile driven fence, post & wire
- House type code reference number
- Pile number
- Material code reference refer to schedule
- Garage location
- Parking loop
- Proposed floor levels subject to a tolerance of +7/-0.5m



| HOUSE TYPE | code                 | type | no |
|------------|----------------------|------|----|
| 201        | 2 bed semi det/ terr | 8    | 3  |
| 202        | 2 bed semi det       | 13   | 8  |
| 301        | 5 bed semi det       | 7    | 13 |
| 302        | 5 bed semi det       | 4    | 7  |
| 303        | 5 bed semi det       | 3    | 4  |
| 304        | 5 bed detached       | 13   | 3  |
| 309        | 5 bed semi det       | 2    | 13 |
| 310        | 5 bed detached       | 2    | 2  |
| 400        | 4 bed detached       | 1    | 2  |
| 403        | 4 bed detached       | 4    | 1  |
| 404        | 4 bed detached       | 4    | 4  |
| 406        | 4 bed detached       | 2    | 2  |
| TOTAL      |                      |      | 62 |



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**LOWFIELD ROAD  
BOLTON ON DEARNE 2**

**planning layout  
GLEESON  
HOMES & REGENERATION**

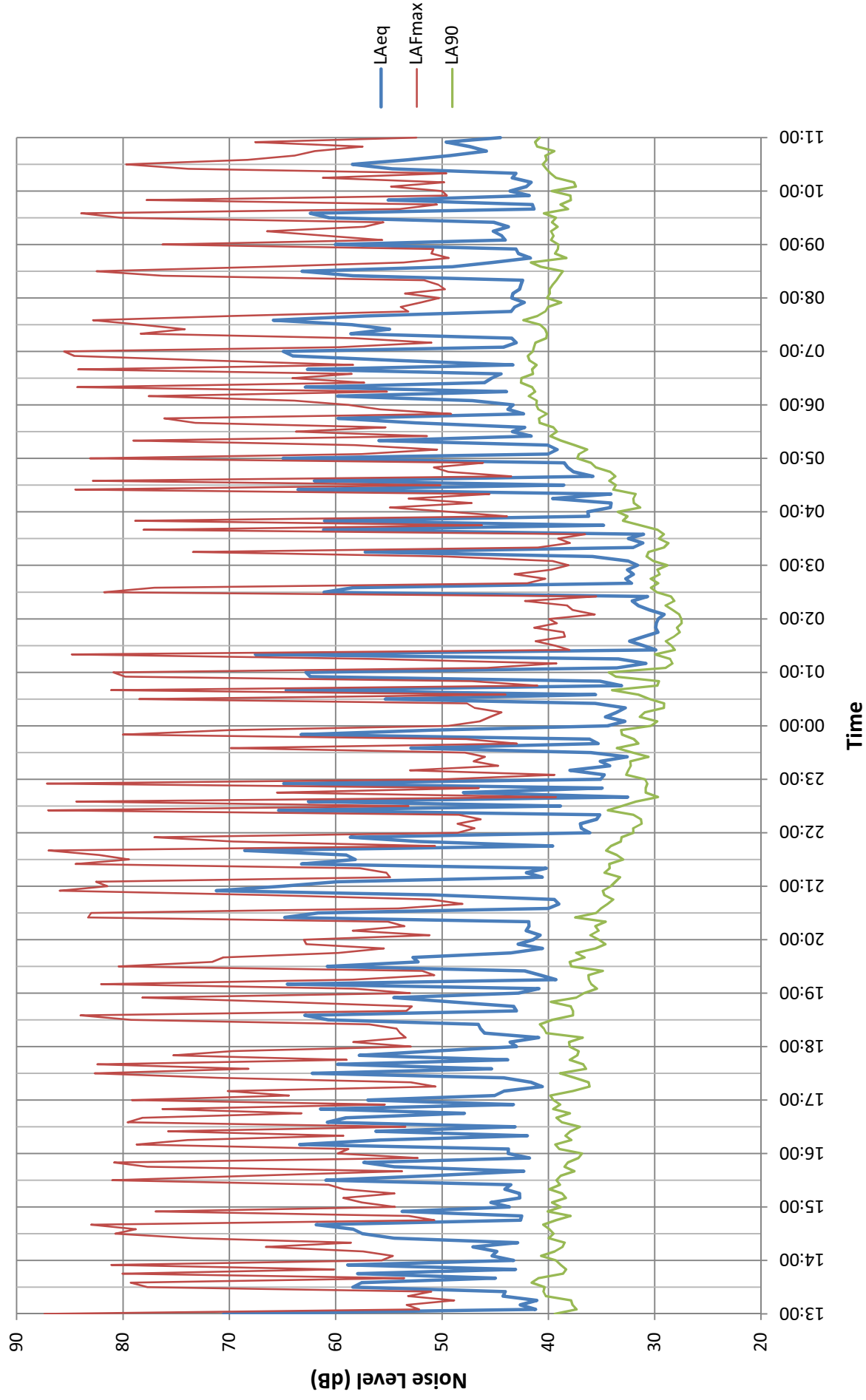
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at A1  
Date  
02.11.12  
Drawn  
3732A



## **A P P E N D I X   C**

Noise Logger Chart and Environmental Noise Record Sheets

# Lowfield Road, Bolton-Upon-Dearne - P1 Noise Logger Chart - 13th-14th July 2011





## ENVIRONMENTAL NOISE RECORD SHEET

Sheet 1 of 2  
RK712/11196

**Location:** Position 2 – Far south east corner of site

**Date:** 13/07/2011

**Calibration Times:** 13:00, 16:00, 23:00, 00:30

**Project:** Lowfield Road, Bolton-Upon-Dearne

**Instrumentation:** B&K 2260

**Plant Operating Condition:** -

| Date       | Time  |             | Weather        |            | Noise Level dB(A) |     |     |     |                  | L <sub>Aeq</sub> | Comments<br>(Including description of noise (eg whine, hiss, rumble, impact, vehicle rain, vegetation, or animal noise)). |                                                         |
|------------|-------|-------------|----------------|------------|-------------------|-----|-----|-----|------------------|------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|            | Start | Dur'n (Min) | Wind Speed m/s | Wind Dir'n | Cloud (%)         | L10 | L50 | L90 | L <sub>MAX</sub> |                  |                                                                                                                           | L <sub>MIN</sub>                                        |
| 13/07/2011 | 13:33 | 15          | Low            | -          | 100               | 47  | 42  | 39  | 60               | 37               | 45                                                                                                                        | Occasional road traffic, passenger train, wind in trees |
| 13/07/2011 | 14:31 | 15          | Low            | -          | 100               | 48  | 41  | 39  | 66               | 36               | 48                                                                                                                        | Occasional road traffic, passenger train, wind in trees |
| 13/07/2011 | 15:14 | 15          | Low            | -          | 100               | 45  | 40  | 38  | 64               | 36               | 42                                                                                                                        | Occasional road traffic, passenger train, wind in trees |
| 13/07/2011 | 23:04 | 15          | Low            | -          | 100               | 38  | 35  | 33  | 51               | 30               | 37                                                                                                                        | Occasional road traffic, passenger train                |
| 13/07/2011 | 23:37 | 15          | Low            | -          | 100               | 44  | 36  | 33  | 61               | 30               | 43                                                                                                                        | Occasional road traffic, passenger train                |

| Date       | Time        | L <sub>Aeq</sub><br>dB(A) | Octave Band Pressure Level |    |     |     |     |    |    |    | Comments |          |
|------------|-------------|---------------------------|----------------------------|----|-----|-----|-----|----|----|----|----------|----------|
|            |             |                           | 31                         | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k       |          |
| 13/07/2011 | 13:33-13:48 | 45                        | 63                         | 57 | 50  | 44  | 39  | 40 | 37 | 30 | 22       | As above |
| 13/07/2011 | 14:31-14:46 | 48                        | 62                         | 57 | 52  | 46  | 42  | 45 | 39 | 32 | 24       | "        |
| 13/07/2011 | 15:14-15:29 | 42                        | 62                         | 55 | 47  | 40  | 37  | 37 | 33 | 28 | 19       | "        |
| 13/07/2011 | 23:04-23:19 | 37                        | 44                         | 49 | 41  | 32  | 32  | 34 | 28 | 17 | 12       | "        |
| 13/07/2011 | 23:37-23:52 | 43                        | 49                         | 50 | 48  | 40  | 38  | 39 | 36 | 27 | 15       | "        |



## ENVIRONMENTAL NOISE RECORD SHEET

Sheet 2 of 2  
RK712/11196

**Location:** Position 3 – Far south west corner of site

**Date:** 13/07/2011

**Calibration Times:** 13:00, 16:00, 23:00, 00:30

**Project:** Lowfield Road, Bolton-Upon-Dearne

**Instrumentation:** B&K 2260

**Plant Operating Condition:** -

| Date       | Time  |             | Weather        |            | Cloud (%) |    | Noise Level dB(A) |     |     |      |      | LAeq                                                    |  | Comments |
|------------|-------|-------------|----------------|------------|-----------|----|-------------------|-----|-----|------|------|---------------------------------------------------------|--|----------|
|            | Start | Dur'n (Min) | Wind Speed m/s | Wind Dir'n |           |    | L10               | L50 | L90 | LMAX | LMIN |                                                         |  |          |
| 13/07/2011 | 13:56 | 15          | Low            | -          | 100       | 45 | 40                | 38  | 71  | 35   | 47   | Occasional road traffic, passenger train, wind in trees |  |          |
| 13/07/2011 | 14:55 | 15          | Low            | -          | 100       | 46 | 41                | 38  | 69  | 36   | 46   | Occasional road traffic, passenger train, wind in trees |  |          |
| 13/07/2011 | 15:39 | 15          | Low            | -          | 100       | 44 | 40                | 37  | 70  | 34   | 46   | Occasional road traffic, passenger train, wind in trees |  |          |
| 13/07/2011 | 23:23 | 15          | Low            | -          | 100       | 35 | 32                | 30  | 49  | 29   | 34   | Occasional road traffic, passenger train                |  |          |
| 13/07/2011 | 23:53 | 15          | Low            | -          | 100       | 51 | 34                | 30  | 74  | 27   | 53   | Occasional road traffic, passenger + freight train      |  |          |

| Date       | Time        | L <sub>Aeq</sub><br>dB(A) | Octave Band Pressure Level |    |     |     |     |    |    |    | Comments |          |
|------------|-------------|---------------------------|----------------------------|----|-----|-----|-----|----|----|----|----------|----------|
|            |             |                           | 31                         | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k       |          |
| 13/07/2011 | 13:56-14:11 | 47                        | 60                         | 54 | 51  | 40  | 43  | 42 | 38 | 35 | 29       | As above |
| 13/07/2011 | 14:55-15:10 | 46                        | 59                         | 56 | 48  | 40  | 40  | 39 | 37 | 33 | 28       | "        |
| 13/07/2011 | 15:39-15:54 | 46                        | 59                         | 54 | 49  | 41  | 42  | 41 | 38 | 34 | 28       | "        |
| 13/07/2011 | 23:23-23:38 | 34                        | 43                         | 47 | 37  | 28  | 30  | 31 | 23 | 16 | 14       | "        |
| 13/07/2011 | 23:53-00:08 | 53                        | 60                         | 60 | 60  | 48  | 49  | 47 | 43 | 38 | 28       | "        |



## **A P P E N D I X   D**

Logged Vibration VDV raw data



The logged VDV data is shown as follows:

| Measurement No. | Time and date       | Measured<br>VDV $\text{m/s}^{1.75}$ |       |       |
|-----------------|---------------------|-------------------------------------|-------|-------|
|                 |                     | x                                   | y     | z     |
| 1               | 13/07/2011 13:07:08 | 0.005                               | 0.011 | 0.029 |
| 2               | 13/07/2011 13:12:08 | 0.001                               | 0.001 | 0.001 |
| 3               | 13/07/2011 13:17:08 | 0.001                               | 0.001 | 0.001 |
| 4               | 13/07/2011 13:22:08 | 0.001                               | 0.001 | 0.001 |
| 5               | 13/07/2011 13:27:08 | 0.001                               | 0.001 | 0.001 |
| 6               | 13/07/2011 13:32:08 | 0.001                               | 0.001 | 0.001 |
| 7               | 13/07/2011 13:37:08 | 0.005                               | 0.007 | 0.019 |
| 8               | 13/07/2011 13:42:08 | 0.005                               | 0.009 | 0.022 |
| 9               | 13/07/2011 13:47:08 | 0.001                               | 0.001 | 0.001 |
| 10              | 13/07/2011 13:52:08 | 0.004                               | 0.005 | 0.009 |
| 11              | 13/07/2011 13:57:08 | 0.001                               | 0.001 | 0.001 |
| 12              | 13/07/2011 14:02:08 | 0.001                               | 0.001 | 0.001 |
| 13              | 13/07/2011 14:07:08 | 0.002                               | 0.003 | 0.005 |
| 14              | 13/07/2011 14:12:08 | 0.001                               | 0.001 | 0.001 |
| 15              | 13/07/2011 14:17:08 | 0.001                               | 0.001 | 0.001 |
| 16              | 13/07/2011 14:22:08 | 0.001                               | 0.001 | 0.001 |
| 17              | 13/07/2011 14:27:08 | 0.001                               | 0.001 | 0.001 |
| 18              | 13/07/2011 14:32:08 | 0.001                               | 0.001 | 0.001 |
| 19              | 13/07/2011 14:37:08 | 0.002                               | 0.003 | 0.006 |
| 20              | 13/07/2011 14:42:08 | 0.006                               | 0.007 | 0.020 |
| 21              | 13/07/2011 14:47:08 | 0.010                               | 0.002 | 0.003 |
| 22              | 13/07/2011 14:52:08 | 0.010                               | 0.006 | 0.014 |
| 23              | 13/07/2011 14:57:08 | 0.001                               | 0.001 | 0.001 |
| 24              | 13/07/2011 15:02:08 | 0.003                               | 0.003 | 0.008 |
| 25              | 13/07/2011 15:07:08 | 0.001                               | 0.001 | 0.001 |
| 26              | 13/07/2011 15:12:08 | 0.001                               | 0.001 | 0.001 |
| 27              | 13/07/2011 15:17:08 | 0.001                               | 0.001 | 0.001 |
| 28              | 13/07/2011 15:22:08 | 0.001                               | 0.001 | 0.001 |
| 29              | 13/07/2011 15:27:08 | 0.001                               | 0.001 | 0.001 |
| 30              | 13/07/2011 15:32:08 | 0.001                               | 0.001 | 0.001 |
| 31              | 13/07/2011 15:37:08 | 0.003                               | 0.006 | 0.008 |
| 32              | 13/07/2011 15:42:08 | 0.004                               | 0.006 | 0.021 |
| 33              | 13/07/2011 15:47:08 | 0.001                               | 0.002 | 0.003 |
| 34              | 13/07/2011 15:52:08 | 0.001                               | 0.001 | 0.001 |
| 35              | 13/07/2011 15:57:08 | 0.004                               | 0.004 | 0.009 |
| 36              | 13/07/2011 16:02:08 | 0.002                               | 0.003 | 0.006 |



| Measurement No. | Time and date       | Measured<br>VDV $\text{m/s}^{-1.75}$ |       |       |
|-----------------|---------------------|--------------------------------------|-------|-------|
|                 |                     | x                                    | y     | z     |
| 37              | 13/07/2011 16:07:08 | 0.001                                | 0.001 | 0.001 |
| 38              | 13/07/2011 16:12:08 | 0.001                                | 0.001 | 0.001 |
| 39              | 13/07/2011 16:17:08 | 0.007                                | 0.012 | 0.021 |
| 40              | 13/07/2011 16:22:08 | 0.001                                | 0.001 | 0.001 |
| 40              | 13/07/2011 16:27:08 | 0.011                                | 0.007 | 0.014 |
| 41              | 13/07/2011 16:32:08 | 0.001                                | 0.001 | 0.001 |
| 42              | 13/07/2011 16:37:08 | 0.001                                | 0.003 | 0.004 |
| 43              | 13/07/2011 16:42:08 | 0.011                                | 0.007 | 0.014 |
| 44              | 13/07/2011 16:47:08 | 0.007                                | 0.006 | 0.012 |
| 45              | 13/07/2011 16:52:08 | 0.002                                | 0.003 | 0.007 |
| 46              | 13/07/2011 16:57:08 | 0.004                                | 0.007 | 0.017 |
| 47              | 13/07/2011 17:02:08 | 0.002                                | 0.003 | 0.004 |
| 48              | 13/07/2011 17:07:08 | 0.011                                | 0.005 | 0.012 |
| 49              | 13/07/2011 17:12:08 | 0.001                                | 0.001 | 0.001 |
| 50              | 13/07/2011 17:17:08 | 0.001                                | 0.001 | 0.001 |
| 51              | 13/07/2011 17:22:08 | 0.001                                | 0.001 | 0.001 |
| 52              | 13/07/2011 17:27:08 | 0.001                                | 0.001 | 0.001 |
| 53              | 13/07/2011 17:32:08 | 0.001                                | 0.001 | 0.001 |
| 54              | 13/07/2011 17:37:10 | 0.001                                | 0.001 | 0.001 |
| 55              | 13/07/2011 17:42:10 | 0.006                                | 0.008 | 0.017 |
| 56              | 13/07/2011 17:47:10 | 0.006                                | 0.009 | 0.022 |
| 57              | 13/07/2011 17:52:10 | 0.003                                | 0.007 | 0.013 |
| 58              | 13/07/2011 17:57:10 | 0.001                                | 0.002 | 0.002 |
| 59              | 13/07/2011 18:02:10 | 0.001                                | 0.002 | 0.004 |
| 60              | 13/07/2011 18:07:10 | 0.005                                | 0.002 | 0.004 |
| 61              | 13/07/2011 18:12:10 | 0.001                                | 0.001 | 0.001 |
| 62              | 13/07/2011 18:17:10 | 0.001                                | 0.001 | 0.001 |
| 63              | 13/07/2011 18:22:10 | 0.001                                | 0.001 | 0.001 |
| 64              | 13/07/2011 18:27:10 | 0.001                                | 0.001 | 0.001 |
| 65              | 13/07/2011 18:32:10 | 0.001                                | 0.001 | 0.001 |
| 66              | 13/07/2011 18:37:10 | 0.001                                | 0.001 | 0.001 |
| 67              | 13/07/2011 18:42:10 | 0.010                                | 0.008 | 0.018 |
| 68              | 13/07/2011 18:47:10 | 0.001                                | 0.001 | 0.001 |
| 69              | 13/07/2011 18:52:10 | 0.001                                | 0.001 | 0.001 |
| 70              | 13/07/2011 18:57:10 | 0.001                                | 0.001 | 0.001 |
| 71              | 13/07/2011 19:02:10 | 0.003                                | 0.005 | 0.009 |
| 72              | 13/07/2011 19:07:10 | 0.001                                | 0.001 | 0.001 |
| 73              | 13/07/2011 19:12:10 | 0.001                                | 0.001 | 0.001 |
| 74              | 13/07/2011 19:17:10 | 0.005                                | 0.008 | 0.014 |



| Measurement No. | Time and date       | Measured<br>VDV m/s <sup>-1.75</sup> |       |       |
|-----------------|---------------------|--------------------------------------|-------|-------|
|                 |                     | x                                    | y     | z     |
| 75              | 13/07/2011 19:22:10 | 0.001                                | 0.001 | 0.001 |
| 76              | 13/07/2011 19:27:10 | 0.001                                | 0.001 | 0.001 |
| 77              | 13/07/2011 19:32:10 | 0.001                                | 0.001 | 0.001 |
| 78              | 13/07/2011 19:37:10 | 0.001                                | 0.001 | 0.001 |
| 79              | 13/07/2011 19:42:10 | 0.007                                | 0.007 | 0.012 |
| 80              | 13/07/2011 19:47:10 | 0.001                                | 0.002 | 0.003 |
| 81              | 13/07/2011 19:52:10 | 0.001                                | 0.001 | 0.001 |
| 82              | 13/07/2011 19:57:10 | 0.001                                | 0.001 | 0.001 |
| 83              | 13/07/2011 20:02:10 | 0.001                                | 0.001 | 0.001 |
| 84              | 13/07/2011 20:07:10 | 0.001                                | 0.001 | 0.001 |
| 85              | 13/07/2011 20:12:10 | 0.001                                | 0.001 | 0.001 |
| 86              | 13/07/2011 20:17:10 | 0.001                                | 0.001 | 0.001 |
| 87              | 13/07/2011 20:22:10 | 0.001                                | 0.001 | 0.001 |
| 88              | 13/07/2011 20:27:10 | 0.001                                | 0.001 | 0.001 |
| 89              | 13/07/2011 20:32:10 | 0.001                                | 0.001 | 0.002 |
| 90              | 13/07/2011 20:37:10 | 0.006                                | 0.006 | 0.016 |
| 91              | 13/07/2011 20:42:10 | 0.006                                | 0.010 | 0.024 |
| 92              | 13/07/2011 20:47:10 | 0.006                                | 0.001 | 0.001 |
| 93              | 13/07/2011 20:52:10 | 0.006                                | 0.001 | 0.001 |
| 94              | 13/07/2011 20:57:10 | 0.001                                | 0.003 | 0.003 |
| 95              | 13/07/2011 21:02:10 | 0.001                                | 0.001 | 0.001 |
| 96              | 13/07/2011 21:07:10 | 0.006                                | 0.011 | 0.026 |
| 97              | 13/07/2011 21:12:10 | 0.007                                | 0.012 | 0.025 |
| 98              | 13/07/2011 21:17:10 | 0.001                                | 0.001 | 0.001 |
| 99              | 13/07/2011 21:22:10 | 0.001                                | 0.001 | 0.001 |
| 100             | 13/07/2011 21:27:10 | 0.001                                | 0.001 | 0.001 |
| 101             | 13/07/2011 21:32:10 | 0.005                                | 0.008 | 0.017 |
| 102             | 13/07/2011 21:37:10 | 0.001                                | 0.003 | 0.003 |
| 103             | 13/07/2011 21:42:10 | 0.007                                | 0.009 | 0.021 |
| 104             | 13/07/2011 21:47:10 | 0.001                                | 0.001 | 0.001 |
| 105             | 13/07/2011 21:52:10 | 0.006                                | 0.009 | 0.018 |
| 106             | 13/07/2011 21:57:10 | 0.001                                | 0.002 | 0.002 |
| 107             | 13/07/2011 22:02:10 | 0.001                                | 0.003 | 0.003 |
| 108             | 13/07/2011 22:07:10 | 0.001                                | 0.003 | 0.003 |
| 109             | 13/07/2011 22:12:10 | 0.001                                | 0.001 | 0.001 |
| 110             | 13/07/2011 22:17:10 | 0.001                                | 0.001 | 0.001 |
| 111             | 13/07/2011 22:22:10 | 0.001                                | 0.001 | 0.001 |



| Measurement No. | Time and date       | Measured<br>VDV $\text{m/s}^{-1.75}$ |       |       |
|-----------------|---------------------|--------------------------------------|-------|-------|
|                 |                     | x                                    | y     | z     |
| 112             | 13/07/2011 22:27:10 | 0.001                                | 0.001 | 0.001 |
| 113             | 13/07/2011 22:32:10 | 0.001                                | 0.001 | 0.001 |
| 114             | 13/07/2011 22:37:10 | 0.006                                | 0.006 | 0.015 |
| 115             | 13/07/2011 22:42:10 | 0.001                                | 0.001 | 0.001 |
| 116             | 13/07/2011 22:47:10 | 0.006                                | 0.008 | 0.019 |
| 117             | 13/07/2011 22:52:10 | 0.001                                | 0.002 | 0.002 |
| 118             | 13/07/2011 22:57:10 | 0.001                                | 0.001 | 0.001 |
| 119             | 13/07/2011 23:02:10 | 0.001                                | 0.001 | 0.001 |
| 120             | 13/07/2011 23:07:10 | 0.005                                | 0.007 | 0.016 |
| 121             | 13/07/2011 23:12:10 | 0.001                                | 0.001 | 0.001 |
| 122             | 13/07/2011 23:17:10 | 0.001                                | 0.001 | 0.001 |
| 123             | 13/07/2011 23:22:10 | 0.001                                | 0.001 | 0.001 |
| 124             | 13/07/2011 23:27:10 | 0.001                                | 0.001 | 0.001 |
| 125             | 13/07/2011 23:32:10 | 0.001                                | 0.001 | 0.001 |
| 126             | 13/07/2011 23:37:10 | 0.001                                | 0.001 | 0.001 |
| 127             | 13/07/2011 23:42:10 | 0.001                                | 0.002 | 0.002 |
| 128             | 13/07/2011 23:47:10 | 0.001                                | 0.001 | 0.001 |
| 129             | 13/07/2011 23:52:10 | 0.001                                | 0.001 | 0.001 |
| 130             | 13/07/2011 23:57:10 | 0.001                                | 0.001 | 0.001 |
| 131             | 14/07/2011 00:02:10 | 0.008                                | 0.004 | 0.007 |
| 132             | 14/07/2011 00:07:10 | 0.001                                | 0.002 | 0.003 |
| 133             | 14/07/2011 00:12:10 | 0.001                                | 0.001 | 0.001 |
| 134             | 14/07/2011 00:17:10 | 0.001                                | 0.001 | 0.001 |
| 135             | 14/07/2011 00:22:10 | 0.001                                | 0.001 | 0.001 |
| 136             | 14/07/2011 00:27:10 | 0.001                                | 0.001 | 0.001 |
| 137             | 14/07/2011 00:32:10 | 0.001                                | 0.001 | 0.001 |
| 138             | 14/07/2011 00:37:10 | 0.002                                | 0.003 | 0.007 |
| 139             | 14/07/2011 00:42:10 | 0.001                                | 0.001 | 0.001 |
| 140             | 14/07/2011 00:47:10 | 0.006                                | 0.017 | 0.028 |
| 141             | 14/07/2011 00:52:10 | 0.001                                | 0.001 | 0.001 |
| 142             | 14/07/2011 00:57:10 | 0.001                                | 0.001 | 0.001 |
| 143             | 14/07/2011 01:02:10 | 0.005                                | 0.010 | 0.015 |
| 144             | 14/07/2011 01:07:10 | 0.001                                | 0.001 | 0.001 |
| 145             | 14/07/2011 01:12:10 | 0.003                                | 0.005 | 0.010 |
| 146             | 14/07/2011 01:17:10 | 0.001                                | 0.001 | 0.001 |
| 147             | 14/07/2011 01:22:10 | 0.001                                | 0.001 | 0.001 |
| 148             | 14/07/2011 01:27:10 | 0.006                                | 0.008 | 0.019 |
| 149             | 14/07/2011 01:32:10 | 0.004                                | 0.007 | 0.012 |



| Measurement No. | Time and date       | Measured<br>VDV $\text{m/s}^{-1.75}$ |       |       |
|-----------------|---------------------|--------------------------------------|-------|-------|
|                 |                     | x                                    | y     | z     |
| 150             | 14/07/2011 01:37:10 | 0.001                                | 0.001 | 0.001 |
| 151             | 14/07/2011 01:42:10 | 0.001                                | 0.001 | 0.001 |
| 152             | 14/07/2011 01:47:10 | 0.001                                | 0.001 | 0.001 |
| 153             | 14/07/2011 01:52:10 | 0.001                                | 0.001 | 0.001 |
| 154             | 14/07/2011 01:57:10 | 0.001                                | 0.001 | 0.001 |
| 155             | 14/07/2011 02:02:10 | 0.001                                | 0.001 | 0.001 |
| 156             | 14/07/2011 02:07:10 | 0.001                                | 0.001 | 0.001 |
| 157             | 14/07/2011 02:12:10 | 0.001                                | 0.001 | 0.001 |
| 158             | 14/07/2011 02:17:10 | 0.001                                | 0.001 | 0.001 |
| 159             | 14/07/2011 02:22:10 | 0.001                                | 0.001 | 0.001 |
| 160             | 14/07/2011 02:27:10 | 0.001                                | 0.001 | 0.001 |
| 161             | 14/07/2011 02:32:10 | 0.001                                | 0.001 | 0.001 |
| 162             | 14/07/2011 02:37:10 | 0.001                                | 0.001 | 0.001 |
| 163             | 14/07/2011 02:42:10 | 0.004                                | 0.014 | 0.026 |
| 164             | 14/07/2011 02:47:10 | 0.001                                | 0.001 | 0.001 |
| 165             | 14/07/2011 02:52:10 | 0.001                                | 0.001 | 0.001 |
| 166             | 14/07/2011 02:57:10 | 0.001                                | 0.001 | 0.001 |
| 167             | 14/07/2011 03:02:10 | 0.001                                | 0.001 | 0.001 |
| 168             | 14/07/2011 03:07:10 | 0.001                                | 0.001 | 0.001 |
| 169             | 14/07/2011 03:12:10 | 0.001                                | 0.001 | 0.001 |
| 170             | 14/07/2011 03:17:10 | 0.001                                | 0.001 | 0.001 |
| 171             | 14/07/2011 03:22:10 | 0.004                                | 0.010 | 0.016 |
| 172             | 14/07/2011 03:27:10 | 0.001                                | 0.001 | 0.001 |
| 173             | 14/07/2011 03:32:10 | 0.001                                | 0.001 | 0.001 |
| 174             | 14/07/2011 03:37:10 | 0.001                                | 0.001 | 0.001 |
| 175             | 14/07/2011 03:42:10 | 0.001                                | 0.001 | 0.001 |
| 176             | 14/07/2011 03:47:10 | 0.003                                | 0.010 | 0.013 |
| 177             | 14/07/2011 03:52:10 | 0.001                                | 0.001 | 0.001 |
| 178             | 14/07/2011 03:57:10 | 0.001                                | 0.001 | 0.001 |
| 179             | 14/07/2011 04:02:10 | 0.009                                | 0.005 | 0.009 |
| 180             | 14/07/2011 04:07:10 | 0.001                                | 0.001 | 0.001 |
| 181             | 14/07/2011 04:12:10 | 0.001                                | 0.001 | 0.001 |
| 182             | 14/07/2011 04:17:10 | 0.001                                | 0.001 | 0.001 |
| 183             | 14/07/2011 04:22:10 | 0.001                                | 0.001 | 0.001 |
| 184             | 14/07/2011 04:27:10 | 0.001                                | 0.001 | 0.001 |
| 185             | 14/07/2011 04:32:10 | 0.001                                | 0.001 | 0.001 |
| 186             | 14/07/2011 04:37:10 | 0.007                                | 0.009 | 0.021 |



| Measurement No. | Time and date       | Measured<br>VDV m/s <sup>-1.75</sup> |       |       |
|-----------------|---------------------|--------------------------------------|-------|-------|
|                 |                     | x                                    | y     | z     |
| 187             | 14/07/2011 04:42:10 | 0.001                                | 0.001 | 0.001 |
| 188             | 14/07/2011 04:47:10 | 0.005                                | 0.007 | 0.014 |
| 189             | 14/07/2011 04:52:10 | 0.001                                | 0.001 | 0.001 |
| 190             | 14/07/2011 04:57:10 | 0.001                                | 0.001 | 0.001 |
| 191             | 14/07/2011 05:02:10 | 0.001                                | 0.001 | 0.001 |
| 192             | 14/07/2011 05:07:10 | 0.005                                | 0.007 | 0.021 |
| 193             | 14/07/2011 05:12:10 | 0.001                                | 0.001 | 0.001 |
| 194             | 14/07/2011 05:17:10 | 0.001                                | 0.001 | 0.001 |
| 195             | 14/07/2011 05:22:10 | 0.001                                | 0.001 | 0.001 |
| 196             | 14/07/2011 05:27:10 | 0.002                                | 0.002 | 0.006 |
| 197             | 14/07/2011 05:32:10 | 0.001                                | 0.001 | 0.001 |
| 198             | 14/07/2011 05:37:10 | 0.001                                | 0.001 | 0.001 |
| 199             | 14/07/2011 05:42:10 | 0.001                                | 0.001 | 0.001 |
| 200             | 14/07/2011 05:47:10 | 0.002                                | 0.001 | 0.001 |
| 201             | 14/07/2011 05:52:10 | 0.005                                | 0.004 | 0.012 |
| 202             | 14/07/2011 05:57:10 | 0.003                                | 0.008 | 0.010 |
| 203             | 14/07/2011 06:02:10 | 0.010                                | 0.001 | 0.001 |
| 204             | 14/07/2011 06:07:10 | 0.010                                | 0.001 | 0.001 |
| 205             | 14/07/2011 06:12:10 | 0.001                                | 0.001 | 0.001 |
| 206             | 14/07/2011 06:17:10 | 0.001                                | 0.001 | 0.001 |
| 207             | 14/07/2011 06:22:10 | 0.003                                | 0.004 | 0.009 |
| 208             | 14/07/2011 06:27:10 | 0.001                                | 0.001 | 0.001 |
| 209             | 14/07/2011 06:32:10 | 0.006                                | 0.009 | 0.020 |
| 210             | 14/07/2011 06:37:10 | 0.001                                | 0.001 | 0.001 |
| 211             | 14/07/2011 06:42:10 | 0.001                                | 0.001 | 0.001 |
| 212             | 14/07/2011 06:47:10 | 0.007                                | 0.008 | 0.020 |
| 213             | 14/07/2011 06:52:10 | 0.001                                | 0.001 | 0.001 |
| 214             | 14/07/2011 06:57:10 | 0.001                                | 0.001 | 0.001 |
| 215             | 14/07/2011 07:02:10 | 0.002                                | 0.003 | 0.003 |
| 216             | 14/07/2011 07:07:10 | 0.010                                | 0.009 | 0.029 |
| 217             | 14/07/2011 07:12:10 | 0.008                                | 0.009 | 0.019 |
| 218             | 14/07/2011 07:17:10 | 0.001                                | 0.001 | 0.001 |
| 219             | 14/07/2011 07:22:10 | 0.001                                | 0.001 | 0.001 |
| 220             | 14/07/2011 07:27:10 | 0.006                                | 0.008 | 0.019 |
| 221             | 14/07/2011 07:32:10 | 0.003                                | 0.004 | 0.009 |
| 222             | 14/07/2011 07:37:10 | 0.006                                | 0.005 | 0.009 |
| 223             | 14/07/2011 07:42:10 | 0.003                                | 0.006 | 0.010 |
| 224             | 14/07/2011 07:47:10 | 0.008                                | 0.012 | 0.024 |



| Measurement No. | Time and date       | Measured<br>VDV m/s <sup>-1.75</sup> |       |       |
|-----------------|---------------------|--------------------------------------|-------|-------|
|                 |                     | x                                    | y     | z     |
| 225             | 14/07/2011 07:52:10 | 0.004                                | 0.007 | 0.008 |
| 226             | 14/07/2011 07:57:10 | 0.001                                | 0.001 | 0.001 |
| 227             | 14/07/2011 08:02:10 | 0.001                                | 0.001 | 0.001 |
| 228             | 14/07/2011 08:07:10 | 0.001                                | 0.001 | 0.001 |
| 229             | 14/07/2011 08:12:10 | 0.001                                | 0.001 | 0.001 |
| 230             | 14/07/2011 08:17:10 | 0.001                                | 0.001 | 0.001 |
| 231             | 14/07/2011 08:22:10 | 0.001                                | 0.001 | 0.001 |
| 232             | 14/07/2011 08:27:10 | 0.001                                | 0.001 | 0.001 |
| 233             | 14/07/2011 08:32:10 | 0.001                                | 0.001 | 0.001 |
| 234             | 14/07/2011 08:37:10 | 0.006                                | 0.006 | 0.015 |
| 235             | 14/07/2011 08:42:10 | 0.008                                | 0.007 | 0.011 |
| 236             | 14/07/2011 08:47:10 | 0.001                                | 0.002 | 0.003 |
| 237             | 14/07/2011 08:52:10 | 0.001                                | 0.001 | 0.001 |
| 238             | 14/07/2011 08:57:10 | 0.001                                | 0.001 | 0.001 |
| 239             | 14/07/2011 09:02:10 | 0.001                                | 0.001 | 0.001 |
| 240             | 14/07/2011 09:07:10 | 0.001                                | 0.002 | 0.001 |
| 241             | 14/07/2011 09:12:10 | 0.009                                | 0.011 | 0.015 |
| 242             | 14/07/2011 09:17:10 | 0.001                                | 0.001 | 0.001 |
| 243             | 14/07/2011 09:22:10 | 0.001                                | 0.001 | 0.001 |
| 244             | 14/07/2011 09:27:10 | 0.001                                | 0.002 | 0.001 |
| 245             | 14/07/2011 09:32:10 | 0.001                                | 0.001 | 0.001 |
| 246             | 14/07/2011 09:37:10 | 0.005                                | 0.011 | 0.018 |
| 247             | 14/07/2011 09:42:10 | 0.002                                | 0.004 | 0.003 |
| 248             | 14/07/2011 09:47:10 | 0.006                                | 0.016 | 0.019 |
| 249             | 14/07/2011 09:52:10 | 0.001                                | 0.001 | 0.001 |
| 250             | 14/07/2011 09:57:10 | 0.001                                | 0.002 | 0.001 |
| 251             | 14/07/2011 10:02:10 | 0.002                                | 0.002 | 0.004 |
| 252             | 14/07/2011 10:07:10 | 0.001                                | 0.002 | 0.001 |
| 253             | 14/07/2011 10:12:10 | 0.001                                | 0.001 | 0.001 |
| 254             | 14/07/2011 10:17:10 | 0.001                                | 0.002 | 0.001 |
| 255             | 14/07/2011 10:22:10 | 0.001                                | 0.002 | 0.001 |
| 256             | 14/07/2011 10:27:10 | 0.001                                | 0.002 | 0.001 |
| 257             | 14/07/2011 10:32:10 | 0.001                                | 0.001 | 0.001 |
| 258             | 14/07/2011 10:37:10 | 0.007                                | 0.009 | 0.014 |
| 259             | 14/07/2011 10:42:10 | 0.008                                | 0.008 | 0.013 |
| 260             | 14/07/2011 10:47:10 | 0.001                                | 0.002 | 0.002 |
| 261             | 14/07/2011 10:52:10 | 0.001                                | 0.001 | 0.001 |



| Measurement No. | Time and date       | Measured<br>VDV $\text{m/s}^{-1.75}$ |       |       |
|-----------------|---------------------|--------------------------------------|-------|-------|
|                 |                     | x                                    | y     | z     |
| 262             | 14/07/2011 10:57:10 | 0.001                                | 0.001 | 0.001 |
| 263             | 14/07/2011 11:02:10 | 0.001                                | 0.002 | 0.001 |
| 264             | 14/07/2011 11:07:10 | 0.001                                | 0.001 | 0.001 |
| 265             | 14/07/2011 11:12:10 | 0.001                                | 0.002 | 0.001 |
| 266             | 13/07/2011 13:07:08 | 0.005                                | 0.011 | 0.029 |



## **A P P E N D I X   E**

Typical rail movements through Bolton-Upon-Dearne Station

## TRAINS WHICH STOP AT BOLTON-UPON-DEARNE (24 hours)

|       |       |      |            |       |            |       |     |     |
|-------|-------|------|------------|-------|------------|-------|-----|-----|
| 05:45 | 05:46 | 2N10 | SHEFFIELD  | 05:22 | LEEDS      | 06:30 | WTT | SX  |
| 06:17 | 06:18 | 2N11 | LEEDS      | 05:33 | SHEFFFIELD | 06:44 | WTT | SX  |
| 06:55 | 06:56 | 2N12 | SHEFFFIELD | 06:28 | LEEDS      | 07:40 | WTT | SX  |
| 07:25 | 07:26 | 2N13 | LEEDS      | 06:43 | SHEFFFIELD | 07:54 | WTT | SX  |
| 07:38 | 07:39 | 2N14 | SHEFFFIELD | 07:15 | LEEDS      | 08:30 | WTT | SX  |
| 08:30 | 08:31 | 2N15 | LEEDS      | 07:48 | SHEFFFIELD | 08:58 | WTT | SX  |
| 08:40 | 08:41 | 2N16 | SHEFFFIELD | 08:15 | LEEDS      | 09:30 | WTT | SX  |
| 09:30 | 09:31 | 2N17 | LEEDS      | 08:48 | SHEFFFIELD | 09:59 | WTT | SX  |
| 09:40 | 09:41 | 2N18 | SHEFFFIELD | 09:15 | LEEDS      | 10:30 | WTT | SX  |
| 10:30 | 10:31 | 2N19 | LEEDS      | 09:48 | SHEFFFIELD | 10:59 | WTT | SX  |
| 10:40 | 10:41 | 2N20 | SHEFFFIELD | 10:14 | LEEDS      | 11:30 | WTT | SX  |
| 11:30 | 11:31 | 2N21 | LEEDS      | 10:48 | SHEFFFIELD | 11:59 | WTT | SX  |
| 11:40 | 11:41 | 2N22 | SHEFFFIELD | 11:14 | LEEDS      | 12:30 | WTT | SX  |
| 12:30 | 12:31 | 2N23 | LEEDS      | 11:48 | SHEFFFIELD | 12:59 | WTT | SX  |
| 12:40 | 12:41 | 2N24 | SHEFFFIELD | 12:14 | LEEDS      | 13:29 | WTT | SX  |
| 13:30 | 13:31 | 2N25 | LEEDS      | 12:48 | SHEFFFIELD | 13:59 | WTT | SX  |
| 13:40 | 13:41 | 2N26 | SHEFFFIELD | 13:14 | LEEDS      | 14:28 | WTT | SX  |
| 14:30 | 14:31 | 2N27 | LEEDS      | 13:48 | SHEFFFIELD | 14:59 | WTT | SX  |
| 14:40 | 14:41 | 2N28 | SHEFFFIELD | 14:14 | LEEDS      | 15:30 | WTT | SX  |
| 15:30 | 15:31 | 2N29 | LEEDS      | 14:48 | SHEFFFIELD | 15:59 | WTT | SX  |
| 15:39 | 15:40 | 2N30 | SHEFFFIELD | 15:14 | LEEDS      | 16:30 | WTT | SX  |
| 16:30 | 16:31 | 2N31 | LEEDS      | 15:48 | SHEFFFIELD | 16:59 | WTT | SX  |
| 16:39 | 16:40 | 2N32 | SHEFFFIELD | 16:14 | LEEDS      | 17:31 | WTT | SX  |
| 17:30 | 17:31 | 2N33 | LEEDS      | 16:48 | SHEFFFIELD | 17:59 | WTT | SX  |
| 17:40 | 17:41 | 2N34 | SHEFFFIELD | 17:14 | LEEDS      | 18:29 | WTT | SX  |
| 18:30 | 18:31 | 2N35 | LEEDS      | 17:48 | SHEFFFIELD | 18:59 | WTT | SX  |
| 18:40 | 18:41 | 2N36 | SHEFFFIELD | 18:14 | LEEDS      | 19:29 | WTT | SX  |
| 19:30 | 19:31 | 2N37 | LEEDS      | 18:48 | SHEFFFIELD | 19:58 | WTT | SX  |
| 19:43 | 19:44 | 2N38 | SHEFFFIELD | 19:19 | LEEDS      | 20:33 | WTT | FSX |
| 20:30 | 20:31 | 2N39 | LEEDS      | 19:48 | SHEFFFIELD | 20:59 | WTT | FSX |
| 20:54 | 20:55 | 2N40 | SHEFFFIELD | 20:27 | LEEDS      | 21:43 | WTT | SX  |
| 21:31 | 21:32 | 2N41 | LEEDS      | 20:48 | SHEFFFIELD | 21:59 | WTT | SX  |
| 21:55 | 21:56 | 2N42 | SHEFFFIELD | 21:30 | LEEDS      | 22:43 | WTT | FSX |
| 22:30 | 22:31 | 2N43 | LEEDS      | 21:48 | SHEFFFIELD | 23:00 | WTT | SX  |
| 22:50 | 22:51 | 2N44 | SHEFFFIELD | 22:24 | LEEDS      | 23:36 | WTT | SX  |
| 23:40 | 23:41 | 2N46 | SHEFFFIELD | 23:15 | LEEDS      | 00:29 | WTT | FSX |
| 23:51 | 23:52 | 2N45 | LEEDS      | 23:09 | SHEFFFIELD | 00:17 | WTT | SX  |

**TRAINS THROUGH BOLTON-UPON-DEARNE (0700 - 2300) (note timings are for Moorthorpe)**

|       |       |      |           |       |           |       |     |       |
|-------|-------|------|-----------|-------|-----------|-------|-----|-------|
| 07:06 | 07:06 | 2N12 | SHEFFIELD | 06:28 | LEEDS     | 07:40 | WTT | SX    |
| 07:14 | 07:15 | 2N13 | LEEDS     | 06:43 | SHEFFIELD | 07:54 | WTT | SX    |
| PASS  | 07:27 | 1S90 | BHAMNEWST | 06:00 | GLASGOW C | 12:14 | WTT | SX    |
| PASS  | 07:27 | 1V46 | YORK      | 06:32 | PLYMOUTH  | 12:50 | WTT | MSX   |
| PASS  | 07:32 | 6V67 | REDCAR OT | 03:53 | MARGAM TC | 15:39 | WTT | MSX   |
| PASS  | 07:37 | 0G16 | BHILUS2 3 | 07:05 | MIDLANDRD | 08:23 | STP | MSX   |
| 07:49 | 07:54 | 2N14 | SHEFFIELD | 07:15 | LEEDS     | 08:30 | WTT | SX    |
| 08:19 | 08:20 | 2N15 | LEEDS     | 07:48 | SHEFFIELD | 08:58 | WTT | SX    |
| PASS  | 08:20 | 4E01 | SOTON M T | 01:52 | LEEDS FLT | 09:25 | VAR | TWO   |
| PASS  | 08:33 | 1V48 | NCATLCEN  | 06:44 | PLYMOUTH  | 13:43 | WTT | SX    |
| PASS  | 08:37 | 1S61 | BHAMNEWST | 07:03 | EDINBURGH | 12:03 | WTT | SX    |
| 08:51 | 08:52 | 2N16 | SHEFFIELD | 08:15 | LEEDS     | 09:30 | WTT | SX    |
| PASS  | 09:03 | 6F70 | CLITHERCC | 05:34 | LEIC PBRD | 11:47 | WTT | MSX   |
| 09:19 | 09:20 | 2N17 | LEEDS     | 08:48 | SHEFFIELD | 09:59 | WTT | SX    |
| PASS  | 09:33 | 1V50 | EDINBURGH | 06:06 | PLYMOUTH  | 14:50 | WTT | SX    |
| PASS  | 09:37 | 1S71 | BATH SPA  | 06:09 | GLASGOW C | 14:12 | WTT | SX    |
| 09:51 | 09:53 | 2N18 | SHEFFIELD | 09:15 | LEEDS     | 10:30 | WTT | SX    |
| 10:00 | 10:01 | 2Y80 | SHEFFIELD | 09:29 | YORK      | 10:55 | WTT | SX    |
| 10:19 | 10:20 | 2N19 | LEEDS     | 09:48 | SHEFFIELD | 10:59 | WTT | SX    |
| PASS  | 10:24 | 4E90 | RATCLIFFE | 08:31 | MILFORDWS | 11:11 | STP | WTHO  |
| PASS  | 10:33 | 1V52 | GLASGOW C | 06:01 | PLYMOUTH  | 15:43 | WTT | SX    |
| PASS  | 10:37 | 1S98 | PLYMOUTH  | 05:20 | EDINBURGH | 14:10 | WTT | SX    |
| 10:52 | 10:53 | 2N20 | SHEFFIELD | 10:14 | LEEDS     | 11:30 | WTT | SX    |
| 11:19 | 11:20 | 2N21 | LEEDS     | 10:48 | SHEFFIELD | 11:59 | WTT | SX    |
| PASS  | 11:33 | 1V54 | DUNDEE    | 06:32 | PLYMOUTH  | 16:50 | WTT | SX    |
| PASS  | 11:37 | 1S33 | PLYMOUTH  | 06:25 | GLASGOW C | 16:23 | WTT | SX    |
| 11:52 | 11:53 | 2N22 | SHEFFIELD | 11:14 | LEEDS     | 12:30 | WTT | SX    |
| 11:59 | 11:59 | 2Y87 | YORK      | 11:06 | SHEFFIELD | 12:33 | WTT | SX    |
| 12:19 | 12:20 | 2N23 | LEEDS     | 11:48 | SHEFFIELD | 12:59 | WTT | SX    |
| PASS  | 12:33 | 1V56 | GLASGOW C | 07:50 | PLYMOUTH  | 17:43 | WTT | SX    |
| PASS  | 12:37 | 1S31 | PLYMOUTH  | 07:25 | EDINBURGH | 16:05 | WTT | SX    |
| 12:51 | 12:53 | 2N24 | SHEFFIELD | 12:14 | LEEDS     | 13:29 | WTT | SX    |
| PASS  | 12:56 | 4O55 | LEEDS FLT | 12:15 | SOTON M T | 21:38 | VAR | MSX   |
| PASS  | 13:00 | 4E69 | SOTNWDKS  | 05:10 | WAKEFEURO | 13:45 | WTT | MSX   |
| 13:19 | 13:20 | 2N25 | LEEDS     | 12:48 | SHEFFIELD | 13:59 | WTT | SX    |
| PASS  | 13:33 | 1V58 | GLASGOW C | 09:00 | PENZANCE  | 20:52 | WTT | FSX   |
| PASS  | 13:37 | 1S35 | PENZANCE  | 06:28 | GLASGOW C | 18:16 | WTT | SX    |
| 13:51 | 13:53 | 2N26 | SHEFFIELD | 13:14 | LEEDS     | 14:28 | WTT | SX    |
| PASS  | 13:58 | 6J71 | TEESDK EB | 10:52 | ALDWKE NS | 14:24 | WTT | MSX   |
| 14:00 | 14:01 | 2Y82 | SHEFFIELD | 13:29 | YORK      | 14:54 | WTT | SX    |
| 14:19 | 14:20 | 2N27 | LEEDS     | 13:48 | SHEFFIELD | 14:59 | WTT | SX    |
| PASS  | 14:33 | 1V60 | ABERDEEN  | 08:20 | PENZANCE  | 21:42 | WTT | SX    |
| PASS  | 14:37 | 1S39 | PLYMOUTH  | 09:25 | ABERDEEN  | 20:43 | WTT | SX    |
| 14:51 | 14:53 | 2N28 | SHEFFIELD | 14:14 | LEEDS     | 15:30 | WTT | SX    |
| 15:19 | 15:20 | 2N29 | LEEDS     | 14:48 | SHEFFIELD | 15:59 | WTT | SX    |
| PASS  | 15:33 | 1V62 | GLASGOW C | 10:59 | PENZANCE  | 22:43 | WTT | SX    |
| PASS  | 15:37 | 1S43 | PENZANCE  | 08:28 | GLASGOW C | 20:15 | WTT | SX    |
| PASS  | 15:42 | 6Z66 | WOLSINGHM | 12:03 | RATCLIFFE | 17:00 | STP | TWO   |
| 15:50 | 15:50 | 2Y89 | YORK      | 15:01 | SHEFFIELD | 16:24 | WTT | SX    |
| 15:50 | 15:53 | 2N30 | SHEFFIELD | 15:14 | LEEDS     | 16:30 | WTT | SX    |
| PASS  | 15:56 | 6M11 | KILLOCH C | 04:38 | RATCLIFE  | 19:12 | VAR | MSX   |
| PASS  | 16:02 | 6E89 | DAWMILL   | 12:53 | DRAX FLT  | 18:45 | WTT | MTWFO |
| PASS  | 16:10 | 6V66 | REDCAR OT | 12:07 | MARGAM TC | 00:46 | VAR | FSX   |
| 16:19 | 16:20 | 2N31 | LEEDS     | 15:48 | SHEFFIELD | 16:59 | WTT | SX    |
| PASS  | 16:33 | 1V64 | EDINBURGH | 13:06 | PLYMOUTH  | 21:44 | WTT | FSX   |
| PASS  | 16:36 | 1S47 | PLYMOUTH  | 11:25 | DUNDEE    | 21:42 | WTT | SX    |
| 16:50 | 16:53 | 2N32 | SHEFFIELD | 16:14 | LEEDS     | 17:31 | WTT | SX    |
| PASS  | 17:01 | 1V96 | NCATLCEN  | 15:03 | READNG    | 20:08 | WTT | SX    |
| PASS  | 17:08 | 6F94 | STPANC CC | 11:03 | CLITHERCC | 21:03 | WTT | SX    |

|       |       |      |           |       |           |       |     |       |
|-------|-------|------|-----------|-------|-----------|-------|-----|-------|
| 17:19 | 17:20 | 2N33 | LEEDS     | 16:48 | SHEFFIELD | 17:59 | WTT | SX    |
| PASS  | 17:25 | 6E77 | WESTRLEGH | 11:41 | PTCLARNCP | 19:36 | WTT | WO    |
| PASS  | 17:33 | 1V66 | GLASGOW C | 12:51 | PLYMOUTH  | 22:45 | WTT | SX    |
| PASS  | 17:37 | 1S51 | PLYMOUTH  | 12:23 | GLASGOW C | 22:27 | WTT | SX    |
| PASS  | 17:46 | 0E23 | MIDLANDRD | 17:00 | BHILUS2 3 | 18:27 | STP | WO    |
| 17:51 | 17:53 | 2N34 | SHEFFIELD | 17:14 | LEEDS     | 18:29 | WTT | SX    |
| PASS  | 18:03 | 1S52 | STHAMPTON | 13:46 | EDINBURGH | 21:35 | WTT | SX    |
| 18:19 | 18:20 | 2N35 | LEEDS     | 17:48 | SHEFFIELD | 18:59 | WTT | SX    |
| PASS  | 18:32 | 1V68 | EDINBURGH | 15:08 | PLYMOUTH  | 23:44 | WTT | SX    |
| PASS  | 18:37 | 1S55 | PLYMOUTH  | 13:23 | EDINBURGH | 22:16 | WTT | SX    |
| 18:51 | 18:53 | 2N36 | SHEFFIELD | 18:14 | LEEDS     | 19:29 | WTT | SX    |
| PASS  | 18:56 | 6M87 | ATTRCFDBS | 18:20 | ALEXANDDK | 22:54 | VAR | FSX   |
| PASS  | 19:12 | 4O52 | WAKEFEURO | 18:29 | SOTNWDKS  | 03:15 | VAR | TWTHO |
| PASS  | 19:18 | 4E66 | MARGAM TC | 08:55 | REDCAR OT | 22:10 | VAR | MSX   |
| 19:19 | 19:20 | 2N37 | LEEDS     | 18:48 | SHEFFIELD | 19:58 | WTT | SX    |
| PASS  | 19:32 | 1V70 | GLASGOW C | 15:00 | BRISTOLTM | 23:15 | VAR | SX    |
| PASS  | 19:41 | 1S59 | PLYMOUTH  | 14:25 | EDINBURGH | 23:04 | VAR | MWTHO |
| 19:57 | 20:00 | 2N38 | SHEFFIELD | 19:19 | LEEDS     | 20:33 | WTT | FSX   |
| PASS  | 20:04 | 0G15 | BHILUS2 3 | 19:20 | MIDLANDRD | 21:07 | STP | WO    |
| PASS  | 20:15 | 4Z66 | RATCLIFFE | 19:00 | WOLSINGHM | 22:31 | VAR | TWO   |
| 20:19 | 20:20 | 2N39 | LEEDS     | 19:48 | SHEFFIELD | 20:59 | WTT | FSX   |
| PASS  | 20:34 | 1V71 | EDINBURGH | 17:08 | BRISTOLTM | 00:14 | VAR | SX    |
| PASS  | 20:36 | 1E63 | PLYMOUTH  | 15:23 | LEEDS     | 21:05 | WTT | SX    |
| PASS  | 20:59 | 4O07 | LEEDS FLT | 20:20 | MBRKFLT   | 03:26 | VAR | WTHO  |
| 21:05 | 21:05 | 2N40 | SHEFFIELD | 20:27 | LEEDS     | 21:43 | WTT | SX    |
| PASS  | 21:16 | 6V02 | TEES YARD | 18:43 | MARGAM TC | 04:34 | VAR | FSX   |
| PASS  | 21:16 | 4E35 | MARGAM TC | 13:15 | REDCAR OT | 23:45 | WTT | SX    |
| 21:20 | 21:21 | 2N41 | LEEDS     | 20:48 | SHEFFIELD | 21:59 | WTT | SX    |
| PASS  | 21:31 | 5F63 | SHEFFIELD | 21:12 | NEVHILL D | 22:45 | WTT | FSX   |
| PASS  | 21:33 | 1M81 | GLASGOW C | 16:52 | BHAMNEWST | 23:27 | WTT | SX    |
| PASS  | 21:37 | 1E67 | PLYMOUTH  | 16:25 | LEEDS     | 22:02 | WTT | SX    |
| PASS  | 21:45 | 1D62 | STPANCRA  | 18:15 | LEEDS     | 22:17 | WTT | SX    |
| PASS  | 21:59 | 6V49 | TEES YARD | 19:34 | ALEXDK JN | 07:07 | VAR | TWO   |
| 22:06 | 22:06 | 2N42 | SHEFFIELD | 21:30 | LEEDS     | 22:43 | WTT | FSX   |
| PASS  | 22:10 | 5D90 | DERBY     | 20:51 | NEVHILL D | 22:56 | WTT | FSX   |
| 22:19 | 22:20 | 2N43 | LEEDS     | 21:48 | SHEFFIELD | 23:00 | WTT | SX    |
| PASS  | 22:21 | 6E17 | PK FOR SL | 19:53 | STOURTON  | 23:52 | WTT | FSX   |
| PASS  | 22:37 | 1F70 | STPANCRA  | 19:55 | LEEDS     | 23:03 | WTT | FSX   |
| PASS  | 22:46 | 1E73 | PLYMOUTH  | 17:23 | LEEDS     | 23:15 | WTT | SX    |

### TRAINS THROUGH BOLTON-UPON-DEARNE (2300 - 0700) (note timings are for Moorthorpe)

|       |       |      |           |       |           |       |     |       |
|-------|-------|------|-----------|-------|-----------|-------|-----|-------|
| 23:01 | 23:01 | 2N44 | SHEFFIELD | 22:24 | LEEDS     | 23:36 | WTT | SX    |
| PASS  | 23:05 | 1D69 | STPANCRA  | 19:30 | LEEDS     | 23:40 | WTT | FSX   |
| PASS  | 23:35 | 6E91 | EARLS SDS | 21:56 | DEWSBURYC | 00:25 | STP | FSX   |
| 23:40 | 23:41 | 2N45 | LEEDS     | 23:09 | SHEFFIELD | 00:17 | WTT | SX    |
| 23:51 | 23:52 | 2N46 | SHEFFIELD | 23:15 | LEEDS     | 00:29 | WTT | FSX   |
| PASS  | 00:05 | 4E70 | SOTNWDKS  | 16:10 | WAKEFEURO | 00:34 | WTT | MWO   |
| PASS  | 00:38 | 5L70 | WAKEFLD W | 00:21 | SHEFFIELD | 01:12 | WTT | MSX   |
| PASS  | 00:50 | 6E30 | MARGAM TC | 16:23 | HARTLPLSW | 05:24 | WTT | FSX   |
| PASS  | 00:55 | 4E76 | SOTON M T | 19:01 | LEEDS FLT | 01:33 | WTT | FSX   |
| PASS  | 01:01 | 6E12 | CARDF HCB | 17:12 | PTCLARNCP | 03:35 | STP | WO    |
| PASS  | 01:05 | 3Q28 | NEVHILL D | 21:51 | DERBY RTC | 03:26 | WTT | WO    |
| PASS  | 01:20 | 4M24 | LEEDS FLT | 00:45 | BASFDHALL | 04:43 | VAR | MSX   |
| PASS  | 02:02 | 6E25 | DOWLOW FL | 23:22 | FERRYBGEC | 02:23 | WTT | WO    |
| PASS  | 02:30 | 6F49 | TYNEDK FL | 22:20 | COTTAM PS | 06:39 | WTT | TWTHO |
| PASS  | 02:58 | 6M92 | GREENBURN | 09:56 | RATCLIFFE | 06:25 | STP | TWO   |
| PASS  | 03:55 | 4M17 | STOURTON  | 03:15 | PK FOR SL | 05:29 | WTT | MSX   |
| PASS  | 04:16 | 6E36 | MARGAM TC | 21:39 | LACKENBY  | 07:15 | WTT | FSX   |
| PASS  | 04:22 | 6D14 | ALDWKE NS | 03:57 | SHIPLEYCR | 05:58 | WTT | THO   |

|       |       |      |           |       |           |       |     |      |
|-------|-------|------|-----------|-------|-----------|-------|-----|------|
| PASS  | 04:27 | 6J86 | HLV MILLS | 04:00 | ATTRCFDBS | 05:29 | WTT | TTHO |
| PASS  | 04:34 | 6E47 | ALEXDK JN | 20:36 | TEES YARD | 06:43 | VAR | FSX  |
| PASS  | 04:35 | 6M04 | PTCLARNCP | 01:49 | BEDWORTHM | 10:50 | WTT | THO  |
| PASS  | 04:45 | 5C11 | NEVHILL D | 04:12 | SHEFFIELD | 05:04 | WTT | MSX  |
| PASS  | 04:47 | 4E67 | MARGAM TC | 22:00 | REDCAR OT | 07:37 | VAR | FSX  |
| PASS  | 04:54 | 5C93 | NEVHILL D | 04:16 | SHEFFIELD | 05:12 | WTT | MSX  |
| PASS  | 05:01 | 4O53 | WAKEFEURO | 04:33 | SOTNWDKS  | 12:43 | WTT | MSX  |
| PASS  | 05:25 | 6M38 | EARLS SDS | 04:30 | BRUNTHILL | 11:13 | WTT | TTHO |
| PASS  | 05:35 | 3L05 | SHEFFIELD | 05:05 | WAKEFLD K | 05:55 | WTT | MSX  |
| PASS  | 05:49 | 0M66 | MIDLANDRD | 05:15 | BHILUS2 3 | 06:25 | STP | MSX  |
| 05:56 | 05:57 | 2N10 | SHEFFIELD | 05:22 | LEEDS     | 06:30 | WTT | SX   |

