

Midland Metro

7.4

Noise and Vibration Impacts

7.4.1 Introduction

This section of the ES evaluates the noise and vibration impacts arising from the construction of the scheme. Criteria against which predicted noise and vibration levels are assessed have been derived using relevant, recognised national and international guidance.

Where noise and vibration predictions show a potential for significant impacts, mitigation measures are set out. Any residual impacts remaining after mitigation that have been applied are described.

7.4.2 Baseline Environment

Noise Sensitive Receivers

Figure 6.1 shows representative noise-sensitive receptors that may potentially be subject to noise impacts as a result of the construction of the scheme. The receptors are also listed in *Table 7.6* below and in *Section 6.4*. These have been identified on the basis of mapping and site visits.

Table 7.6 Noise Sensitive Receptors

Location	Approx. horizontal distance to works (m)	Approx no. of properties within 25 m	Nearest Building Usage(s)
<i>Existing Rail Corridor – Wednesbury to Tipton Road</i>			
1 - Potters Lane	75	0	Industrial
2 - Eyston Avenue	400	0	Industrial
3 - Bagnall Street	150	0	Industrial
4 - Solly Grove	100	0	Residential
5 - Moors Mill Lane	160	0	Residential
6 - Eagle Lane	15	10	Residential
7 - Eagle Lane (adjacent to stop)	16	10	Residential
8 - Market Place	131	0	Commercial
9 - Bramah Way/ St Helens Avenue	18	60	Residential
10 - Dovecote Close	18	15	Residential
11 - Heath Close	30	15	Residential
12 - Church Lane	25	5	Residential
13 - Park Lane East	17	2	Residential
14 - Keeling St / Dairy Close	20	2	Residential
15 - Station St / Smith Place	18	3	Residential

16 - Jays Avenue	37	0	Residential
17 - Tudor Court	11	15	Residential
18 - Harrowby Drive / Carnegie Avenue	13	40	Residential
19 - Peel Street / Victoria Road	26	0	Residential
20 - Peel Street (far houses)	62	0	Residential
21 - Binfield Street	25	2	Residential
22 - Binfield Street / Mayfair Gardens	10	5	Residential
23 - Boscobel Avenue	35	0	Residential
24 - Fernwood Croft	24	2	Residential
25 - Park Lane West	35	0	Residential
26 - Newcomen Drive	250	0	Residential
27 - Lindley Avenue	16	4	Residential
28 - Birmingham New Road	15	4	Residential
<i>Dudley Centre – Tipton Road to Blowers Green Road</i>			
29 – Dudley Freightliner Depot	150	Proposed Development	Mixed-used Development
30 - Guest Hospital Development Site	100	0	Residential/ Hospital
31 - Wolverton Road	220	0	Residential
32 - Castle Hill	14	20	Commercial/ Residential
33 - Dudley Central Mosque	10	1	Religious
34 - Bourne Street	35	0	Residential
35 - Hall Street	160	0	Commercial
36 - New Road (east)	55	0	Residential
37 - New Road (west)	80	0	Residential

38 - Shaw Road	75	0	Industrial
<i>Existing Rail Corridor – Blowers Green Road to Pensnett Canal</i>			
39 - Blowers Green Road	230	0	Industrial
40 – Parkhead Locks open space	10	0	Amenity
41 - Buxton Road / Kent Place	45	0	Residential
42 - Wood Street	45	0	Residential
43 - Cochrane Road	26	7	Residential
44 - Pedmore Road	45	0	Industrial
<i>Merry Hill – Pensnett Canal to Brierley Hill</i>			
45 - Waterfront Development	20	Major office development	Commercial/ Office
46 – Former Brier School Development	70	Proposed Development	Commercial/ Residential
47 – Buddhist Temple	25	1	Religious

The proximity of each receptor to areas of construction activity has been estimated based upon the distance between the most exposed façade of the receptor building and the approximate centre line of the nearest section of track or stop, or the approximate geometric centre of other construction works (eg demolition works and activities at worksites).

Baseline Noise Levels

Baseline noise levels are discussed in *Section 6.4.2*.

7.4.3 Noise Prediction Methodology

Approach

Construction noise has been predicted in accordance with the methodology outlined in British Standard (BS) 5228: Part 1: 1997 ⁽⁵⁾. This Standard sets out indicative noise level outputs for a wide range of construction plant items. The noise levels indicated, in terms of Sound Power Levels (L_{WA}) and Activity L_{Aeq} , are considered as typical for the specific activities set out in BS5228. The prediction framework allows the quoted noise levels to be extrapolated to potential noise-sensitive receptor positions (eg residential dwellings and schools) and $L_{Aeq, period}$ noise levels derived. Factors that are considered in the prediction methodology include:

- the sound power outputs of processes and plant;
- the periods of operation of process and plant;
- the distances between the noise source and the receptor;
- the presence of screening by barriers;
- the reflection of sound; and
- soft ground attenuation.

Construction works will involve a number of key activities, as described in *Section 2.7*. The noisiest phases of works are expected to include bridge works and sheet piling. Temporary sheet piling will be required prior to the construction of new bridge structures and also where bridge decks are replaced, in order to retain surrounding earthworks. In addition, temporary sheet piling will also be required to facilitate widening of the corridor at Ocker Hill, during construction of new retaining walls. Sheet piling works are expected to take around one to two weeks in each location.

In addition, where it is necessary to widen the railway cutting or construct a new bridge structure, bored concrete foundations will be built as part of the foundations to retaining walls. This will involve bored piling.

Bored piling may take place in the following areas:

- Wednesbury viaduct;
- River Tame underbridge;
- Tame Valley Canal underbridge;
- Gold's Green footbridge;
- Bagnall Street footbridge;
- New Road overbridge;
- Horseley Road overbridge;
- Lower Church Lane overbridge;
- Park Lane East overbridge;
- Sedgley Road East underbridge;
- Tipton Road overbridge;
- Pensnett Canal overbridge;
- Canal Street underbridge;
- Dudley Canal (North) underbridge; and
- Dudley canal (South) underbridge.

In total, works to bridge structures may take up to 11 months to complete in each location. However, works associated with bored piling are expected to last for approximately seven weeks in each location.

Where the proposed alignment crosses the Dudley canal adjacent to the Merry Hill centre, a piled retaining wall will be constructed. The construction of this structure is expected to last for around 4.5 months, although piling works will be completed within around three weeks.

Noise levels associated with enabling works and track laying are more typical of those that might be experienced on a day-to-day basis during the construction phase. It should also be noted that whilst enabling works and track-laying may affect receptors along the length of the proposed alignment, demolition works, bridge works and stop construction are only likely to affect those receptors located within the immediate vicinity of these works.

An inventory of construction site plant has been estimated for each phase of construction, from which an effective total sound power level (L_{WA}) has been calculated for each team of plant. This has been used to estimate noise levels ($L_{Aeq, period}$) at noise-sensitive receptors based on the distance of the receptor from the centre of the plant team.

Where the construction works area is in very close proximity to a noise-sensitive receptor, the total effective sound power of the construction plant team has been assumed to be at a distance of 10 m. This is to allow for the effect of plant moving around the works area within the time averaging period of the noise prediction. In addition, in practice a minimum distance will be maintained between the construction plant team and nearby properties, to allow for safe operation of plant.

For the purpose of this noise assessment, the following phases of construction have been assumed:

- enabling works including general earthworks, widening of the railway corridor and road breaking for on street sections;
- demolition works;
- temporary sheet piling works at bridge structures;
- bridge works including bored concrete piling;
- track laying including concreting for on street sections;
- construction of stops; and
- construction of accesses and park and ride sites.

The assumed construction plant inventories for each phase of the scheme are provided in *Appendix E*.

Temporary Work Areas

Temporary work areas will be required during the construction of the scheme for the storage of plant and materials, and to accommodate the site offices, as described in *Section 2.7.5*.

The location of each of these work areas is illustrated in *Figure 2.1*.

Midland Metro Depot

It will also be necessary to carry out construction works at the existing depot facility in Wednesbury, as described in *Section 2.6.6*. The construction works required to provide these facilities may potentially give rise to noise impacts. The site is located in a mainly industrial area. However, a site designated as a Wildlife Corridor and a Site of Local Importance for Nature Conservation (SLINC) in the Sandwell Unitary Development Plan that is used by anglers are located adjacent to the depot facility.

7.4.4 Assessment Methodology

Construction Noise

When considering the impacts of construction noise it is necessary to establish criteria above which some noticeable adverse effect may be

experienced and also the amount by which the criteria are exceeded. Both of these factors have been considered in this assessment.

A summary of the relevant criteria for assessing the impact of construction noise at all noise sensitive receptors is provided below in *Table 7.7*.

Table 7.7 Criteria for Evaluating the Significance of Noise During Construction

Period	Building/Location	Criteria for Assessment L_{Aeq}	Purpose
Daytime (0700 – 1900)	Dwellings/Offices (façade)	75 dB	To maintain speech intelligibility
	Educational Buildings (façade)	65 dB	To maintain speech intelligibility in classrooms
Evening (1900 – 2300)	Dwellings (façade)	65 dB	To avoid disturbance
Night-time (2300 – 0700)	Dwellings (façade)	45 dB ⁽¹⁾	To avoid sleep disturbance
⁽¹⁾ or equal to ambient L_{Aeq} levels if the ambient noise level is higher than 45 dB			

The noise criteria in *Table 7.7* apply at 1 m from the facades of neighbouring residential and commercial properties. These criteria are not aimed at providing noise limits for construction activities, but are proposed as criteria for the assessment of the significance of noise impacts associated with the construction programme.

The normal hours of work may vary from site to site depending upon the nature of the area through which works are being constructed. However, in accordance with the draft CoCP it has been assumed that normal hours of work will be:

- Monday to Friday 0700 hours to 1900 hours; and
- Saturdays 0700 hours to 1300 hours.

A copy of the draft CoCP is provided in *Appendix D*.

Work may be required outside these hours, and where this is the case, it will be subject to the approval of Sandwell MBC and Dudley MBC as appropriate.

For example, where works to the highway are required, these may be carried out outside of 0700 to 1900 hours, in order to avoid peak rush-hour traffic and to minimise the effects of the works on road-users.

The requirement for night-time working has also been identified in a number of areas, as described in *Table 2.2* in *Section 2.72*.

The draft CoCP sets limits on the permitted levels of noise for various periods. The Concessionaire will be contractually required to comply with the CoCP and to obtain a prior consent under Section 61 of the Control of Pollution Act 1974 from the local authority to carry out the works, so noise limits, mitigation and working hours will be reviewed during this process.

Where predicted noise levels are above the criteria in *Table 7.7* the significance of any impact has been described based on a simplified version of the terminology given in the Institute of Environmental Management and Assessment (IEMA) and Institute of Acoustics (IOA) Consultation Draft Guidelines for Noise Impacts Assessment ⁽⁶⁾ as summarised below in *Table 7.8*.

Table 7.8 Significance of Noise Level Above Impact Assessment Criterion

Amount by Which Noise Criterion is Exceeded - dB(A)	Impact
0	None
1 to 3	Slight
3 to 5	Moderate
5 to 10	Substantial
10 and above	Severe

Construction Vibration

Piling operations may cause some degree of vibration at nearby noise-sensitive receptors. There are two types of vibration impact that need consideration:

- the effects on people or equipment within buildings; and
- the effect on buildings (or other structures) themselves.

There is no standard predictive method for calculating vibration levels due to construction works. However, British Standard (BS) 5228: Part 4: 1992 ⁽¹⁷⁾ provides a case history of data on vibration levels measured during piling operations, using a range of piling techniques on a range of substrates.

For the purpose of this assessment, vibration levels measured during bored piling on substrates similar to those that occur within the area of the scheme have been used to assess the effect of piling operations at the nearest noise sensitive receptors. Data from bored piling on a substrate of fill, sand and clay indicates that a PPV of 0.4 mm/s is expected to occur at a distance of 10 m ⁽¹⁸⁾.

A summary of the relevant criteria for assessing the impact of vibration during construction is provided below in *Table 7.9* and described in more detail in *Appendix E*.

Table 7.9 Criteria for Evaluating the Significance of Vibration During Construction

Period	Building/Location	Criterion	Purpose (a)
Anytime	Any location	0.1 mm/s rms ^(b)	Limit of perception
Daytime (0700 – 2300)	Inside dwellings	0.4 m/s ^{1.75} VDV ^(c)	Annoyance threshold
Night-time (2300 – 0700)	Inside dwellings	0.13 m/s ^{1.75} VDV	Annoyance threshold
Anytime	Reinforced or framed buildings	50 mm/s PPV ^{(d)(e)}	Protection of building structure
Anytime	Un-reinforced or light framed buildings	15 mm/s PPV	Protection of building structure

(a) Equipment manufacturers should be consulted where sensitive equipment malfunction is possible.

(b) Root mean square velocity.

(c) VDV denotes vibration dose value, as given in BS 6472, 1992.

(d) PPV denotes peak particle velocity, as given in BS 7385 Part 2, 1993.

(e) The CoCP limits the vibration from construction to below these criteria.

7.4.5 Noise from Construction Traffic

This is considered in *Section 7.3* in relation to *Traffic and Transport Impacts*.

7.4.6 Measures to Mitigate Noise from Work Sites

Best practicable means ⁽¹⁹⁾ will be used during the construction of the scheme in order to reduce noise levels as far as possible. This approach will be delivered through enforcement of the CoCP and the use of the Section 61 process which requires the prior consent of the local authority who can then enforce the mitigation measures that are agreed before the works begin.

A potentially important means of reducing construction noise will be the use of mobile noise barriers (typically to a height of approximately 2.4 m). These will be used, as necessary, directly adjacent to areas of noisy ground level construction activity to minimise noise impacts at adjacent receptors. Barriers of this type, if located sufficiently close to construction plant activity, can reduce noise levels by 5 to 10 dB ⁽¹⁰⁾. Low noise construction plant will be used wherever possible, to further reduce noise levels.

7.4.7 Predicted Daytime Impacts

Predicted Noise Levels

Table 7.10 below summarises the worst case ⁽¹¹⁾ noise levels predicted for the main phases of the works associated with the construction of the

scheme, excluding the benefits of noise mitigation. It should be noted that the Concessionaire will determine details of the construction methodologies and plant to be used at a later stage in the project. Consequently, the noise levels presented in *Table 7.10* are based upon experience of other projects.

Table 7.10 Predicted Worst Case Daytime (Facade) Construction Noise Levels, in the Absence of Mitigation - dB

Location	Criterion dB L _{Aeq}	Enabling Works	Demolition Works	Sheet Piling	Bored Concrete Piling	Other Bridge Works	Track Laying	Construction of Stop
<i>Existing Railway Corridor – Wednesbury to Tipton Road</i>								
1 - Potters Lane	75	68	-	79	69	-	65	-
2 - Eyston Avenue	75	54	-	86	55	52	51	-
3 - Bagnall Street	75	62		73	63	61	59	50
4 - Solly Grove	75	66	-	77	67	64	63	52
5 - Moors Mill Lane	75	61	-	-	-	-	59	-
6 - Eagle Lane	75	82	-	-	-	-	79	70
7 - Eagle Lane (near station)	75	81	-	-	-	-	79	79
8 - Market Place	75	63	-	-	-	-	60	-
9 - Bramah Way/ St Helens Avenue	75	80		92	82	79	78	-
10 - Dovecote Close	75	80	-	92	82	79	78	75
11 - Heath Close	75	76	-	87	77	75	73	72
12 - Church Lane	75	77	-	89	79	76	75	65
13 - Park Lane East	75	80		92	82	80	78	77
14 - Keeling St / Dairy Close	75	79	-	91	-	78	77	75
15 - Station St / Smith Place	75	80	-	92	-	79	78	77
16 - Jays Avenue	75	74	-	85	-	72	71	61

17 - Tudor Court	75	84	-	-	-	-	82	-
18 - Harrowby Drive / Carnegie Avenue	75	83	-	94	84	82	81	59
19 - Peel Street / Victoria Road	75	77	-	-	-	-	74	-
20 - Peel Street (far houses)	75	70	-	-	-	-	67	-
21 - Binfield Street	75	77	-	89	79	76	75	74
22 - Binfield Street / Mayfair Gardens	75	84	-	97	87	84	82	79
23 - Boscobel Avenue	75	75	-	86	76	73	72	65
24 - Fernwood Croft	75	78	-	89	79	77	75	65
25 - Park Lane West	75	75	-	86	76	73	72	65
26 - Newcomen Drive	75	58	-	69	59	56	55	55
27 - Lindley Avenue	75	81	-	92	82	80	79	57
28 - Birmingham New Road	75	81	-	93	-	81	79	79
<i>Dudley Centre – Tipton Road to Blower's Green Road</i>								
29 - Dudley Freightliner Depot	75	72		-	-	-	66	62
30 - Guest Hospital	75	66	-	-	-	-	63	-
31 - Wolverton	75	59	-	-	-	-	56	-

Road	75	83	-	-	-	-	80	-
32 - Castle Hill	75	83	-	-	-	-	80	-
33 - Dudley Central Mosque	75	84	-	-	-	-	82	-
34 - Bourne Street	75	75	-	-	-	-	72	67
35 - Hall Street	75	61	-	-	-	-	59	56
36 - New Road (east houses)	75	71	-	-	-	-	62	62
37 - New Road (west houses)	75	67	-	-	-	-	61	61
38 - Shaw Road	75	68	-	-	-	-	65	65
<i>Existing Rail Corridor – Blower's Green Road to Pensnett Canal</i>								
39 - Blowers Green Road	75	58	-	-	-	-	56	55
40 - Parkhead Locks open space	75	84	-	-	-	84	82	-
41 - Buxton Road / Kent Place	75	72	-	83	-	71	70	53
42 - Wood Street	75	72	-	83	-	71	70	57
43 - Cochrane Road	75	77	-	88	-	76	74	63
44 – Pedmore Road	75	72	-	83	-	71	75	67
<i>Merry Hill – Pensnett Canal to Brierley Hill</i>								
45 – Waterfront Development	75	79	-	-	-	-	77	75
46 – Former Brier School Development Area	75	84	-	77	67	64	82	67

47 – Buddhist Temple	75	80	-	-	-	-	77	70
(-) Denotes area of construction activity not located within proximity of the receptor.								

Potential Impacts Common to all Route Sections

All sections of the route will be subject to enabling works and track laying, and the impacts associated with these works are discussed here. Demolition works, sheet piling, bored piling, bridge works and construction of stops will only be required in certain areas, and the impacts associated with these works are discussed below in relation to the four route sections. In the absence of mitigation, during enabling works (which includes general earthworks and works to widen the railway corridor), moderate noise impacts are expected to occur at properties located within around 10 to 15 m of construction works. This includes properties on:

- Eagle Lane;
- Tudor Court;
- Harrowby Drive/Carnegie Drive;
- Lindley Avenue;
- Birmingham New Road;
- Parkhead Locks;
- Castle Hill;
- Dudley Central Mosque; and
- the Buddhist Temple at Brierley Hill.

Slight noise impacts are expected at properties located within 15 to 20 m of enabling works. This includes properties in the following areas:

- Bramah Way/St Helen's Avenue;
- Park Lane East;
- Keeling Street/Dairy Close; and
- Station Street/Smith Place.

No impacts are expected to occur at properties located beyond around 20 m of the scheme alignment during enabling works.

Slight noise impacts are predicted to occur at receptors located within around 15 m of the alignment during track-laying. This includes properties in the following areas:

- Eagle Lane;
- Tudor Court;
- Harrowby Drive/Carnegie Drive;
- Lindley Avenue;
- Birmingham New Road;
- Castle Hill;
- Dudley Central Mosque;
- Parkhead Locks; and
- The Buddhist Temple in Brierley Hill.

Although these impacts will be temporary in nature, noise from construction works may be experienced for several weeks at any one particular receptor.

Mitigation measures will be adopted to minimise these impacts. It is our experience that the worst-case noise levels calculated can often be reduced by between 5 and 10 dB(A). With the implementation of mitigation measures, no impacts are expected during track-laying or during enabling works at distances of around 15 m from the alignment. However, where sensitive receptors are located within 15 m of areas of works (eg Tudor Court, Dudley Central Mosque and the Buddhist Temple at Brierley Hill), slight residual impacts may occur during normal daytime working hours, albeit for limited periods of time at any particular receptor as the works progress along the route.

Vibration from general construction works is usually imperceptible at distances greater than approximately 20 m. Hence, at the closest receptors ground vibration will be perceptible from time to time when the works are in the immediate vicinity. However, for general construction works vibration levels are not expected to risk damage to buildings.

Existing Rail Corridor – Wednesbury to Tipton Road

Bored piling will be required as part of bridge works in the following locations:

- Wednesbury viaduct;
- River Tame underbridge;
- Tame Valley Canal underbridge;
- New Road overbridge;
- Horseley Road overbridge;
- Lower Church Lane overbridge; and
- Sedgley Road overbridge.

Bored piling works are predicted to give rise to moderate noise impacts at receptors located adjacent to bridge works at Bramah Way/St Helen's Avenue, Dovecote Close, Church Lane, Park Lane East, Harrowby Drive/Carnegie Avenue, Binfield Street/Mayfair Gardens and Lindley Avenue. However, these impacts will be short term in nature and are expected to last for between three to six weeks in each location.

Sheet piling and bridge works will be required at all of the locations described above, in addition to the following:

- Walsall Canal underbridge;
- WCML/Birmingham Canal overbridge;
- Coneygre Road underbridge;
- Birmingham Canal underbridge; and
- Birmingham New Road underbridge.

Sheet piling is a particularly noisy activity and substantial noise impacts are expected to occur in the following areas:

- Bramah Way/St Helen's Avenue;
- Dovecote Close;
- Church Lane;
- Park Lane East;
- Keeling Street/Dairy Close;
- Station Street/Smith Place;
- Harrowby Drive/Carnegie Avenue;
- Binfield Street;
- Binfield Street/Mayfair Gardens;
- Fernwood Croft;
- Lindley Avenue; and
- Birmingham New Road.

In particular, the following receptors are located within close proximity to sheet piling works:

- 1 to 5 Bramah Way;
- 86 Lower Church Lane;
- 20 Station Street;
- 17 to 20 Mayfair Gardens;
- 2 to 4 Lindley Avenue; and
- 99 Birmingham New Road.

Sheet piling works are expected to last for around one to two weeks at each location. However, due to the severity of impacts predicted to occur, it may be necessary to relocate residents at the above locations for the duration of this activity. Eligibility for relocation will be established during the detailed design phase. These works will also give rise to vibration, and this is discussed in more detail below.

Other bridge works are predicted to give rise to moderate noise impacts at receptors located adjacent to bridge structures on Harrowby Drive/Carnegie Avenue, Binfield Street/Mayfair Gardens and Birmingham New Road. Although the works will be temporary in nature, they may persist for several weeks at any one location.

Stops are located in the following areas:

- Gold's Hill (provisional stop);
- Great Bridge (New Road);
- Horseley Road (also a Park and Ride site);
- Dudley Port (also a Park and Ride site);
- Sedgley Road East; and
- Birmingham New Road.

Slight noise impacts are expected to occur during stop construction at properties adjacent to works on Eagle Lane, Birmingham New Road, Binfield Street and Mayfair Gardens. No noise impacts are expected to occur at other receptors located adjacent to the scheme alignment.

As part of the scheme it will be necessary to expand the facilities at the existing depot in Wednesbury. The depot is situated in a predominantly industrial area with a repository site to the west. To the north of the depot are industrial facilities along Potters Lane along with industrial/commercial premises on Victoria Street, Stafford Street, Pery Street and Albert Street.

The area is therefore not strictly sensitive to the construction works required for the expansion of the depot. There is however a Wildlife Corridor and a Site of Local Importance for Nature Conservation adjacent to the depot and the waste repository, within which two ponds are used for angling, around 100 m from the site boundary.

An assessment of the predicted noise levels resulting from construction works at the depot has been completed in order to confirm that no noise impacts are likely. The results indicate that for the 75dB criterion to be exceeded, a noise-sensitive receptor would have to be within a distance of approximately 65 m from the construction work. The closest noise-sensitive receptor to the proposed works has been estimated as being situated on Albert Street, North of the depot, a distance of approximately 170 m away. The ponds of the nature reserve are a distance approximately 100 m from the depot. Therefore, no impacts are predicted although anglers may hear the works above ambient noise.

Dudley Centre – Tipton Road to Blower's Green Road

The following stops are located in this section of the route:

- Tipton Road;
- Station Drive (provisional stop);
- Dudley Bus Station;
- Flood Street (provisional stop);
- New Road stop (also a park and ride site); and
- Cinder Bank stop (also a park and ride site).

Stop construction is not expected to give rise to noise impacts at any receptors located within this section of the alignment.

It will also be necessary to demolish the King Street footbridge in this section of the route alignment. The footbridge is located within a primarily retail and commercial area of Dudley town centre. Properties located within around 15 m of the works will experience moderate noise impacts. The demolition of the footbridge is expected to take around four weeks to complete.

Existing Rail Corridor – Blower's Green Road to Pensnett Canal

The Parkhead Viaduct is located within this section of the alignment. Extensive reconstruction works are required which are expected to last for around nine months. These works will give rise to moderate noise impacts at locations within 10 m of the viaduct. Although the works will not affect residential receptors located in this area, users of the canal and the open space adjacent to the viaduct may be affected for short periods.

Sheet piling and other bridge works will be required at the Pedmore Road overbridge. However, no bored piling works will be carried out. Sheet piling works are predicted to give rise to significant to moderate noise impacts at receptors located adjacent to the works on Buxton Road, Wood Street, Cochrane Road and Pedmore Road. However, these works will be temporary in nature, lasting for around one to two weeks. No impacts are expected to occur as a result of other bridge works in this area.

The Pedmore Road stop is also located within this section of the alignment. However, the works associated with this are not expected to give rise to noise impacts at nearby noise sensitive receptors.

Merry Hill – Pensnett Canal to Brierley Hill

Bridge works and bored piling will be required during the construction of the following bridge structures in this area of the route:

- Pensnett Canal overbridge;
- Canal Street underbridge;
- Dudley Canal (North) underbridge; and
- Dudley Canal (South) underbridge.

No noise impacts are expected to occur during bored piling or other bridge works in this section of the route alignment.

Sheet piling works will also be required at all bridge locations described above, in addition to piling works associated with the construction of the retaining wall adjacent to Dudley Canal at the Merry Hill Centre. No impacts are predicted to occur at the Buddhist Temple.

A provisional stop is located at Canal Street. No significant noise impacts are expected to occur during the construction of this stop. Stops are also located adjacent to The Embankment and Dudley Canal, and at the terminus at Brierley Hill. Stop construction is not expected to give rise to noise impacts at the Buddhist Temple at Brierley Hill, although slight noise impacts are predicted to occur at other properties located within around 10 m of stop construction works (eg the Hearing Centre on Cottage Street).

Construction Vibration

For the purpose of this assessment, measured vibration levels provided in BS 5228: Part 4 have been used to assess the potential effect of piling operations at the nearest noise sensitive receptors. Temporary sheet piling will be required at all bridge structures, and a permanent piled retaining wall will be constructed in the Merry Hill area, adjacent to the Dudley Canal. Bored concrete piles will also be required at some bridge structures, as described above. The proposed alignment is underlain with shales, clays and well cemented sandstones, with no glacial tills (see *Section 7.10*).

Levels of vibration measured during sheet piling operations (on sand over clays) indicate that a peak particle velocity of approximately 10 mm/s would be experienced at receptors located 2 m away⁽¹²⁾. The nearest noise sensitive receptor to sheet piling operations include:

- 1 to 5 Bramah Way, located approximately 15 m from works to the New Road overbridge;
- 86 Lower Church Lane, located approximately 15 m from Lower Church Lane overbridge;
- 20 Station Street, located approximately 20 m from Park Lane East overbridge;
- 2 to 4 Lindley Avenue, located approximately 15 m from the construction of a retaining wall;
- 17 to 20 Mayfair Gardens, located approximately 15 m from Sedgley Road East underbridge; and
- 99 Birmingham New Road, located approximately 20 m from works to the underbridge.

Vibration from sheet piling works is likely to be perceptible at properties located within 15 m of the works, and may give rise to annoyance. These works will be temporary in nature, lasting for around one to two weeks. The predicted levels do not exceed the criteria described in *Table 7.10* for the protection of buildings, and hence, no impacts on the structural integrity of buildings are predicted to occur.

Vibration levels measured during bored piling operations (on fill, sand and clay) indicate that a peak particle velocity of approximately 0.4 mm/s would be experienced at a distance of 10 m. No sensitive receptors are located within 10 m of bored piling works and as a result, the criterion of 0.4 mm/s set for the threshold of annoyance will not be exceeded. Vibration from bored piling may be perceptible at properties located within around 15 to 20 m of the works, but no impacts are expected to occur.

7.4.8 Predicted Night-time Noise Impacts

Night-time works are required at a small number of locations during the construction phase, as described in *Section 2.7.2*. The potential for impacts are much greater during night-time works due to the lower background noise levels and lower assessment criteria. *Table 7.11* below describes the predicted noise levels resulting from night-time construction works.

Table 7.11 Predicted Worst Case (Facade) Construction Noise Levels in the Absence of Mitigation - dB

Location	Criterion dB LAeq	Description of Work	Receptor	Predicted Level dB

King Street	45	Demolition	King Street / Flood Street Commercial Properties	N/A
Birmingham New Road	45	Replace bridge deck	Birmingham New Road	74
Dudley Canal (North)	45	Replace bridge deck	Holly Hall Road	52
Dudley Canal (South)	45	Replace bridge deck	Holly Hall Road	52

Impacts are predicted at residential properties near the proposed night-time works at the Birmingham New Road and Dudley Canal sites. There are no known residential properties around the King Street site hence no impact is predicted. Night-time working is only required in instances where roads or waterways have to be closed and therefore only likely to be undertaken for a brief duration, possibly over one night or a weekend.

7.4.9 Construction Work Areas

Construction work areas will mainly be used for storage and movement of materials and lorry access to work areas. It is likely that equipment such as lorries, cranes and forklift trucks will be used at these sites and will generate noise on an intermittent basis. In general the plant will not be located at the edge of the site closest to the noise sensitive receptors, and the predictions for the construction activities take account of the equipment used to deliver materials to the area where work will take place. However, it may be necessary for construction equipment to operate close to the edge of the construction compound at times during the construction process. Temporary work sites have been identified in 14 locations, as described in *Section 2.7.5* and illustrated in *Figure 2.1* in *Volume 2*.

Many of these sites are located within industrial areas and as such, are far removed from any potentially sensitive noise receptors. However, noise sensitive receptors are located in the vicinity of the following work sites:

- Site 4 - Railway Street;
- Site 5 - Park Lane East;
- Site 6 - Coneygre playing fields;
- Site 10 - Thornleigh Trading Estate;
- Site 12 – former Hill and Smith site; and
- Site 14 – car park, Brierley Hill.

The following noise levels, described in *Table 7.12* below are predicted at receptors close to the work areas.

Table 7.12 Predicted Noise Levels from Temporary Works Areas

Noise-sensitive Receptor	Work Site	Distance to centre of site (m)	Noise Level (dB)
Bagnall Street	2	300	54
Worsey Drive	3	120	62
Dovecote Close	4	30	74
Station Street	5	40	72
Boscobel Avenue	6	65	68
Wolverton Road	7	220	57
New Road	8	290	55
New Road	9	190	58
Bowers Green Road	10	50	70
Holly Hall Road	11	160	60

Cochrane Road	12	400	52
Pedmore Road	13	320	54
Little Cottage Street	14	45	71

As discussed previously, the associated noise from plant operating within the site compound will be intermittent. Therefore a "percentage on time" of 20% has been attributed to the levels calculated and detailed above. Noise levels are within the recommended 75 dB are predicted for all the work areas.

When it is necessary to use construction compounds at night (on occasion, eg, for bridge deck replacement), the impacts have the potential to be significantly above the criterion at neighbouring buildings.

However, it should be noted that there are a wide range of mitigation measures that can be employed at the construction compounds including the following measures:

- locate equipment as far from noise sensitive receptors as possible;
- use electrical forklifts and cranes wherever possible to reduce noise levels dramatically;
- locate site offices so that they acoustically screen noisy activities;
- keep night-time work to a minimum;
- move materials required for night-time working as close as possible to the work area for which they are required during daytime;
- provide screening of lorry haul routes;
- screen or enclose particularly noisy activities; and
- maximise the use of pre-fabricated components.

7.4.10 Residual Impacts After Mitigation

The construction of the scheme has the potential to give rise to substantial and moderate noise impacts in a number of areas. The noisiest phases of construction are associated with sheet piling, bored piling, bridge works and enabling works. Mitigation measures will be adopted to minimise these impacts. It is our experience that the worst-case noise levels calculated can often be reduced by between 5 and 10 dB(A). This will reduce many of the moderate impacts such that no noise impacts occur.

However, due to proximity of some sensitive receptors to areas of works residual impacts may occur during normal daytime working hours, albeit for limited periods of time at any particular receptor as the works progress along the route.

During the construction works the Concessionaire will be required to give consideration to the use of quiet plant and equipment, noise barriers and other noise control techniques to minimise the impact of the construction works wherever possible. Careful phasing of construction operations will be required in the following areas:

- Eagle Lane;
- Bramah Way;
- Lower Church Lane;
- Station Street;
- Tudor Court;
- Harrowby Drive;
- Lindley Avenue;
- Mayfair Gardens;
- Birmingham New Road;
- Dudley Central Mosque; and
- Buddhist Temple at Brierley Hill.

All contractors will be required to adhere to the CoCP. This will provide the appointed Concessionaire with guidance relating to the appropriate methods of construction, choice of plant and equipment and the appropriate hours of work during construction. Other mitigation measures are available which will reduce significant and moderate impacts further, including the following generic measures, which will be developed in accordance with the CoCP:

- all vehicles and mechanical plant should be fitted with effective exhaust silencers and maintained in good and efficient working order;
- all compressors, generators and pumps should be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which should be kept closed whenever the machines are in use;
- all pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufactures;
- all machines in intermittent use should be shut down in the intervening periods between work, or throttled down to a minimum, and noise emitting equipment which is required to run continuously should be housed in a suitable acoustic enclosure;
- all items of plant should be maintained in good working condition to minimise extraneous noises arising from mechanical vibration;
- as far as practicable, demolition works should be carried out using equipment which breaks concrete by bending, in preference to percussive

methods;

- all pile driving should be carried out by plant equipped with a noise reducing system or be silent driving systems;
- where practicable, rotary drills and bursters actuated by hydraulic or electrical power should be used for excavating hard materials;
- noisy plant and equipment should be sited as far away as possible from noise sensitive receptors, and barriers should be used (eg site huts, acoustic sheds or partitions) to reduce the level of construction noise at the receptor wherever possible;
- care should be taken when loading or unloading vehicles, dismantling scaffolding or moving materials etc to reduce noise emissions; and
- access to work sites should be situated such that disturbance arising from site personnel and vehicles entering or leaving the site is kept to a minimum.

Sheet piling is a particularly noisy activity and also gives rise to vibration. An alternative such as vibratory sheet piling will be considered if feasible in the given ground conditions.

Due to the proximity of receptors to sheet piling operations vibration monitoring will be carried out at the start of construction works and appropriate action taken if the criteria described above are exceeded. A noise and vibration monitoring programme will be developed as part of the CoCP in order to test the effectiveness of noise mitigation measures adopted by the Concessionaire.

Whilst best practicable means will be adopted to minimise noise, the proximity of some of the receptors is such that slight noise impacts are likely even with the implementation of mitigation measures. These are however, likely to be temporary as the necessary works progress along the route.

[About Centro](#) | [Contact Us](#) | [Links](#) | [How to Find Us](#)
Copyright © 2002 Centro. All rights reserved.