



**UPDATE OF NOISE DATABASE FOR  
PREDICTION OF NOISE  
ON CONSTRUCTION AND OPEN SITES**

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## **UPDATE OF NOISE DATABASE FOR PREDICTION OF NOISE ON CONSTRUCTION AND OPEN SITES**

Hepworth Acoustics Ltd was commissioned by the Department for Environment, Food and Rural Affairs (Defra) to produce an up-to-date database of noise emissions from equipment used on construction and open sites [An existing construction plant noise database is contained in Annex C, Part 1 of British Standard 5228 'Noise and vibration control on construction and open sites']. The report was completed in December 2004, and the database is presented by Defra herein.

The objective of the project was to obtain measurements of noise from plant and equipment currently used on construction and open sites in the UK, and to prepare a database of the information. As well as obtaining data for equipment put into operation since the publication of BS 5228 in 1977, the database extends on the data in that standard by presenting octave band noise levels, and by including data for plant used on waste disposal (landfill) sites.

The data were obtained by field measurement for items of plant in actual use on construction and open sites in the UK. Levels quoted in the database are based on an average (logarithmic) of measured sound levels, and where appropriate have been derived from more than one model of similarly sized plant to simplify the database.

The results are presented as un-weighted octave band activity  $L_{eq}$  levels, and overall A-weighted activity  $L_{eq}$  values in dB. Where relevant, pass-by measurements were made for moving sources, and these are presented as un-weighted octave band activity  $L_{max}$  levels, and overall A-weighted  $L_{max}$  values in dB. All sound pressure levels are standardized to 10 metres from the plant. Weights for machines, where given, relate to the usual weight references used in the construction industry (weights for machines such as bulldozers, excavators, rollers, etc, are the actual weights of the machines; weights for dump trucks and dumpers are the load capacity weights; and weights for cranes are the lifting capacity weights).

The database is presented with the intention that it may be useful to the practitioner, as it represents a recent inventory of construction noise sources. Where possible measurements of the actual plant in operation on site should be used, however this data could provide an alternative to manufacturer-quoted noise levels. The data has been gathered in a rigorous manner, but it should be understood that it is provided as an *indication* of the noise emission of various types of plant, and should be applied as such, accepting that many factors will influence the output of any particular item of plant (e.g. condition, model, environment, load, etc.). Defra requests that if any issues arise with the application of the database, or if there are any comments relating to the data, that the user contact the department through either of the channels below:

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**Table 1 Sound level data on demolition**

| Ref No.                              | Equipment                               | Power rating kW | Equipment size, weight (mass), capacity             | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level, L <sub>Aeq</sub> dB |
|--------------------------------------|---|-----------------|---|--|-----|-----|-----|----|----|----|----|--|
|                                      |   |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |  |
| <b>Breaking Up Concrete</b>          |   |                 |   |  |     |     |     |    |    |    |    |  |
| 1                                    | Breaker Mounted on Wheeled Backhoe      | 59              | (7.4 t) 380 kg / 1700 mm tool / 74 mm dia / 125 bar | 79                                     | 82  | 81  | 82  | 86 | 86 | 86 | 85 | <b>92</b>  |
| 2                                    | Breaker Mounted on Wheeled Backhoe      | -               | 380 kg / 1700mm tool / 74 mm dia / 125 bar          | 79                                     | 84  | 82  | 84  | 88 | 85 | 84 | 82 | <b>92</b>  |
| 3                                    | Pulverizer Mounted on Excavator         | -               | -   | 85                                     | 76  | 74  | 75  | 74 | 75 | 70 | 65 | <b>80</b>  |
| 4                                    | Pulverizer Mounted on Excavator         | 147             | 30 t  | 75                                     | 72  | 71  | 73  | 70 | 69 | 66 | 59 | <b>76</b>  |
| 5                                    | Pulverizer Mounted on Excavator         | 143             | 29 t  | 73                                     | 73  | 69  | 70  | 67 | 64 | 58 | 51 | <b>72</b>  |
| 6                                    | Hand-held Pneumatic Breaker             | -               | -   | 83                                     | 83  | 81  | 74  | 73 | 76 | 78 | 77 | <b>83</b>  |
| 7                                    | Hand-held Hydraulic Breaker             | -               | 20 kg / 69 bar                                      | 82                                     | 81  | 87  | 87  | 88 | 86 | 83 | 87 | <b>93</b>  |
| 8                                    | Hydraulic Breaker Power Pack            | 6               | 63 kg/ 138 bar                                      | 77                                     | 72  | 73  | 69  | 68 | 66 | 64 | 60 | <b>74</b>  |
| <b>Breaking Up Brick Foundations</b> |   |                 |   |  |     |     |     |    |    |    |    |  |
| 9                                    | Breaker Mounted on Excavator            | 121             | (15 t) 1650 kg breaker                              | 88                                     | 88  | 86  | 89  | 83 | 83 | 80 | 76 | <b>90</b>  |
| <b>Dumping Brick Rubble</b>          |   |                 |   |  |     |     |     |    |    |    |    |  |
| 10                                   | Tracked Excavator (Loading Dump Truck)  | 228             | 44 t  | 82                                     | 78  | 82  | 81  | 81 | 78 | 72 | 64 | <b>85</b>  |
| 11                                   | Articulated Dump Truck (Dumping Rubble) | 250             | 28 t  | 94                                     | 76  | 77  | 75  | 76 | 73 | 68 | 63 | <b>80</b>  |
| <b>Breaking and Spreading Rubble</b> |   |                 |   |  |     |     |     |    |    |    |    |  |
| 12                                   | Tracked Excavator                       | 228             | 44 t  | 79                                     | 81  | 83  | 79  | 77 | 75 | 70 | 62 | <b>82</b>  |
| 13                                   | Tracked Excavator                       | 205             | 40 t  | 81                                     | 80  | 80  | 83  | 82 | 79 | 76 | 73 | <b>86</b>  |
| <b>Crushing Concrete / Rubble</b>    |   |                 |   |  |     |     |     |    |    |    |    |  |
| 14                                   | Tracked Crusher                         | 172             | 47 t  | 93                                     | 86  | 79  | 81  | 75 | 71 | 66 | 59 | <b>82</b>  |
| 15                                   | Tracked Crusher                         | -               | -   | 86                                     | 84  | 84  | 81  | 78 | 75 | 71 | 66 | <b>84</b>  |
| <b>Breaking Up / Cutting Steel</b>   |   |                 |   |  |     |     |     |    |    |    |    |  |
| 16                                   | Tracked Excavator                       | 205             | 40 t  | 75                                     | 74  | 77  | 80  | 78 | 74 | 67 | 61 | <b>82</b>  |
| 17                                   | Tracked Excavator                       | 74              | 14 t  | 79                                     | 77  | 76  | 77  | 78 | 78 | 73 | 66 | <b>83</b>  |
| 18                                   | Gas Cutter                              | -               | -   | 72                                     | 72  | 69  | 72  | 73 | 72 | 71 | 71 | <b>79</b>  |
| <b>Breaking Stud Partition</b>       |   |                 |   |  |     |     |     |    |    |    |    |  |
| 19                                   | Lump Hammer                             | -               | -   | 66                                     | 66  | 68  | 68  | 63 | 57 | 55 | 51 | <b>69</b>  |
| <b>Breaking Windows</b>              |   |                 |   |  |     |     |     |    |    |    |    |  |
| 20                                   | Lump Hammer                             | -               | -   | 77                                     | 75  | 71  | 72  | 74 | 74 | 75 | 73 | <b>81</b>  |

**Table 2 Sound level data on site preparation**

| Ref No.                               | Equipment                       | Power rating kW | Equipment size, weight (mass), capacity | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level $L_{Aeq}$ dB |
|---------------------------------------|---------------------------------|-----------------|---|--|-----|-----|-----|----|----|----|----|--|
|                                       |                                 |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |  |
| <b>Clearing Site</b>                  |                                 |                 |   |  |     |     |     |    |    |    |    |  |
| 1                                     | Dozer Ж                         | 142             | 20 t                                    | 79                                     | 77  | 76  | 74  | 68 | 67 | 60 | 59 | <b>75 Ж</b>                                  |
| 2                                     | Tracked Excavator               | 301             | 71 t                                    | 75                                     | 84  | 78  | 74  | 70 | 68 | 64 | 61 | <b>77</b>                                    |
| 3                                     | Tracked Excavator               | 102             | 22 t                                    | 80                                     | 83  | 76  | 73  | 72 | 70 | 69 | 66 | <b>78</b>                                    |
| 4                                     | Tracked Excavator (Idling)      | 102             | 22 t                                    | 59                                     | 49  | 45  | 45  | 49 | 46 | 39 | 31 | <b>52</b>                                    |
| 5                                     | Tracked Excavator               | 72              | 16 t                                    | 78                                     | 70  | 72  | 68  | 67 | 66 | 73 | 65 | <b>76</b>                                    |
| 6                                     | Tracked Excavator (Idling)      | 72              | 16 t                                    | 64                                     | 62  | 64  | 62  | 56 | 53 | 47 | 39 | <b>63</b>                                    |
| 7                                     | Tracked Excavator               | 69              | 14 t                                    | 74                                     | 70  | 68  | 67  | 64 | 62 | 58 | 50 | <b>70</b>                                    |
| 8                                     | Wheeled Backhoe Loader          | 62              | 8 t                                     | 74                                     | 66  | 64  | 64  | 63 | 60 | 59 | 50 | <b>68</b>                                    |
| 9                                     | Wheeled Backhoe Loader (Idling) | 62              | 8 t                                     | 60                                     | 53  | 49  | 52  | 51 | 48 | 43 | 33 | <b>55</b>                                    |
| <b>Ground Excavation / Earthworks</b> |                                 |                 |   |  |     |     |     |    |    |    |    |  |
| 10                                    | Dozer                           | 239             | 41 t                                    | 89                                     | 90  | 81  | 73  | 74 | 70 | 68 | 64 | <b>80</b>                                    |
| 11                                    | Dozer                           | 179             | 28 t                                    | 75                                     | 79  | 77  | 77  | 74 | 71 | 65 | 57 | <b>79</b>                                    |
| 12                                    | Dozer                           | 142             | 20 t                                    | 85                                     | 74  | 76  | 73  | 72 | 78 | 62 | 56 | <b>81</b>                                    |
| 13                                    | Dozer                           | 82              | 11 t                                    | 74                                     | 83  | 78  | 74  | 74 | 70 | 67 | 62 | <b>78</b>                                    |
| 14                                    | Tracked Excavator               | 226             | 40 t                                    | 85                                     | 78  | 77  | 77  | 73 | 71 | 68 | 63 | <b>79</b>                                    |
| 15                                    | Tracked Excavator               | 173             | 32 t                                    | 77                                     | 85  | 70  | 73  | 70 | 68 | 63 | 57 | <b>76</b>                                    |
| 16                                    | Tracked Excavator               | 170             | 30 t                                    | 72                                     | 71  | 74  | 73  | 69 | 66 | 63 | 58 | <b>75</b>                                    |
| 17                                    | Tracked Excavator               | 162             | 28 t                                    | 78                                     | 78  | 75  | 71  | 72 | 68 | 63 | 55 | <b>76</b>                                    |
| 18                                    | Tracked Excavator               | 134             | 27 t                                    | 81                                     | 77  | 74  | 70  | 70 | 66 | 60 | 56 | <b>75</b>                                    |
| 19                                    | Tracked Excavator               | 125             | 25 t                                    | 95                                     | 84  | 79  | 73  | 70 | 68 | 64 | 57 | <b>77</b>                                    |
| 20                                    | Tracked Excavator (Idling)      | 125             | 25 t                                    | 80                                     | 76  | 65  | 65  | 63 | 58 | 53 | 49 | <b>68</b>                                    |
| 21                                    | Tracked Excavator               | 107             | 22 t                                    | 75                                     | 76  | 72  | 68  | 65 | 63 | 57 | 49 | <b>71</b>                                    |
| 22                                    | Tracked Excavator               | 96              | -                                       | 78                                     | 74  | 68  | 68  | 67 | 66 | 61 | 53 | <b>72</b>                                    |
| 23                                    | Tracked Excavator               | 92              | -                                       | 79                                     | 81  | 68  | 69  | 66 | 65 | 61 | 52 | <b>73</b>                                    |
| 24                                    | Tracked Excavator               | 71              | 15 t                                    | 77                                     | 74  | 71  | 70  | 68 | 66 | 60 | 54 | <b>73</b>                                    |
| 25                                    | Tracked Excavator               | 66              | 14 t                                    | 77                                     | 65  | 67  | 67  | 63 | 61 | 57 | 47 | <b>69</b>                                    |

Ж Drive-by maximum sound pressure level in  $L_{max}$  (Octave Bands) and  $L_{Amax}$  (Overall Level)

| <b>Loading Lorries</b>               |   |     |                                    |    |    |    |    |    |    |    |    |             |  |
|--------------------------------------|---|-----|------------------------------------|----|----|----|----|----|----|----|----|-------------|--|
| 26                                   | Wheeled Loader                                    | 209 | -                                  | 87 | 82 | 77 | 78 | 73 | 70 | 64 | 57 | <b>79</b>   |  |
| 27                                   | Wheeled Loader                                    | 193 | -                                  | 85 | 83 | 76 | 75 | 75 | 72 | 72 | 61 | <b>80</b>   |  |
| 28                                   | Wheeled Loader                                    | 170 | -                                  | 86 | 82 | 77 | 74 | 70 | 66 | 62 | 55 | <b>76</b>   |  |
| 29                                   | Tracked Excavator                                 | 75  | 15 t                               | 80 | 79 | 76 | 77 | 73 | 70 | 66 | 59 | <b>79</b>   |  |
| <b>Distribution of Material</b>      |   |     |                                    |    |    |    |    |    |    |    |    |             |  |
| 30                                   | Dump Truck (Tipping Fill)                         | 306 | 29 t                               | 85 | 74 | 78 | 73 | 73 | 74 | 67 | 63 | <b>79</b>   |  |
| 31                                   | Dump Truck (Empty) Ж                              | 306 | 29 t                               | 86 | 79 | 79 | 79 | 79 | 84 | 69 | 60 | <b>87 Ж</b> |  |
| 32                                   | Articulated Dump Truck (Tipping Fill)             | 187 | 23 t                               | 80 | 76 | 73 | 70 | 69 | 66 | 63 | 58 | <b>74</b>   |  |
| 33                                   | Articulated Dump Truck Ж                          | 187 | 23 t                               | 85 | 87 | 77 | 75 | 76 | 73 | 69 | 62 | <b>81 Ж</b> |  |
| 34                                   | Lorry Ж   | -   | 4-axle wagon                       | 73 | 78 | 78 | 78 | 74 | 73 | 68 | 66 | <b>80 Ж</b> |  |
| 35                                   | Telescopic Handler                                | 60  | 10 t                               | 85 | 79 | 69 | 67 | 64 | 62 | 56 | 47 | <b>71</b>   |  |
| <b>Rolling and Compaction</b>        |   |     |                                    |    |    |    |    |    |    |    |    |             |  |
| 36                                   | Dozer (Towing Roller)                             | 142 | 20 t                               | 83 | 77 | 77 | 76 | 76 | 75 | 68 | 56 | <b>81</b>   |  |
| 37                                   | Roller (Rolling fill) Ж                           | 145 | 18 t                               | 72 | 75 | 81 | 78 | 74 | 70 | 63 | 55 | <b>79 Ж</b> |  |
| 38                                   | Roller Ж  | 145 | 18 t                               | 80 | 75 | 77 | 72 | 67 | 62 | 54 | 46 | <b>73 Ж</b> |  |
| 39                                   | Vibratory Roller Ж                                | 29  | 4 t                                | 88 | 83 | 69 | 68 | 67 | 65 | 62 | 59 | <b>74 Ж</b> |  |
| 40                                   | Vibratory Roller Ж                                | 20  | 3 t                                | 82 | 78 | 67 | 71 | 67 | 64 | 60 | 57 | <b>73 Ж</b> |  |
| 41                                   | Vibratory Plate (Petrol)                          | 3   | 62 kg                              | 70 | 74 | 71 | 78 | 74 | 75 | 63 | 58 | <b>80</b>   |  |
| 42                                   | Hydraulic Vibratory Compactor (Tracked Excavator) | -   | 225 kg / 193 bar / 17,500 N        | 81 | 76 | 72 | 73 | 72 | 72 | 68 | 63 | <b>78</b>   |  |
| <b>Ground Investigation Drilling</b> |   |     |                                    |    |    |    |    |    |    |    |    |             |  |
| 43                                   | Cable Percussion Drilling Rig                     | 18  | 2 t / 150 mm diameter / 75 m depth | 77 | 77 | 67 | 66 | 70 | 68 | 62 | 56 | <b>74</b>   |  |
| <b>Directional Drilling</b>          |   |     |                                    |    |    |    |    |    |    |    |    |             |  |
| 44                                   | Directional Drill (Generator)                     | 106 | -                                  | 67 | 80 | 74 | 72 | 72 | 72 | 68 | 61 | <b>77</b>   |  |
| <b>Pumping Water</b>                 |   |     |                                    |    |    |    |    |    |    |    |    |             |  |
| 45                                   | Water Pump  | 20  | 6"                                 | 73 | 68 | 62 | 62 | 61 | 56 | 53 | 41 | <b>65</b>   |  |
| 46                                   | Water Pump  | -   | 4"                                 | 75 | 74 | 60 | 54 | 54 | 53 | 48 | 46 | <b>62</b>   |  |

Ж Drive-by maximum sound pressure level in  $L_{max}$  (Octave Bands) and  $L_{Amax}$  (Overall Level)

**Table 3 Sound level data on piling and ancillary operations**

| Ref No.  | Equipment                                   | Power rating kW | Equipment size, weight (mass), capacity         | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level, L <sub>Aeq</sub> dB |
|--|---|-----------------|---|--|-----|-----|-----|----|----|----|----|--|
|  |   |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |  |
| <b>Pre-cast Concrete Piling - Hydraulic Hammer</b>   |   |                 |   |  |     |     |     |    |    |    |    |  |
| 1  | Hydraulic Hammer Rig                        | 145             | 16 m length / 5 t hammer / plywood dolly        | 82                                     | 82  | 82  | 89  | 83 | 78 | 75 | 70 | <b>89</b>  |
| <b>Tubular Steel Piling - Hydraulic Hammer</b>       |   |                 |   |  |     |     |     |    |    |    |    |  |
| 2  | Hydraulic Hammer Rig                        | 186             | 4 t hammer                                      | 80                                     | 87  | 88  | 84  | 83 | 78 | 74 | 65 | <b>87</b>  |
| 3  | Hydraulic Hammer Rig                        | -               | 240 mm diameter                                 | 87                                     | 93  | 85  | 87  | 83 | 80 | 75 | 72 | <b>88</b>  |
| 4  | Hydraulic Hammer Rig                        | -               | (1 t) 2 m length / 300 mm diameter              | 73                                     | 65  | 65  | 64  | 70 | 72 | 72 | 68 | <b>77</b>  |
| 5  | Drop Hammer Pile Rig Power Pack             | 23              | -   | 79                                     | 65  | 60  | 59  | 66 | 63 | 53 | 46 | <b>69</b>  |
| <b>Tubular Steel Piling - Hydraulic Jacking</b>      |   |                 |   |  |     |     |     |    |    |    |    |  |
| 6  | Piling                                      | 2800 kN         | 10 t / 13 m length / 900 mm width / soil        | 80                                     | 74  | 70  | 65  | 61 | 57 | 49 | 43 | <b>68</b>  |
| 7  | Power Pack                                  | 147             | 6 t   | 77                                     | 78  | 73  | 66  | 63 | 57 | 50 | 42 | <b>70</b>  |
| <b>Sheet Steel Piling - Vibratory</b>                |   |                 |   |  |     |     |     |    |    |    |    |  |
| 8  | Vibratory Piling Rig                        | -               | 52 t / 14 m length / soft clay                  | 83                                     | 82  | 79  | 82  | 84 | 82 | 77 | 67 | <b>88</b>  |
| <b>Sheet Steel Piling - Hydraulic Jacking</b>        |   |                 |   |  |     |     |     |    |    |    |    |  |
| 9  | Piling                                      | 1500 kN         | 10 t / 7.4 m length / 600 mm width / sandy clay | 74                                     | 71  | 63  | 60  | 56 | 54 | 50 | 44 | <b>63</b>  |
| 10   | Power Pack                                  | 147             | 6 t   | 80                                     | 75  | 69  | 67  | 61 | 55 | 49 | 43 | <b>68</b>  |
| 11   | Piling                                      | 980 kN          | 7.4 t / 12 m length / 500 mm width              | 68                                     | 60  | 59  | 57  | 51 | 50 | 45 | 44 | <b>59</b>  |
| 12   | Rig Power Pack                              | -               | 5 t   | 74                                     | 70  | 66  | 60  | 54 | 51 | 46 | 42 | <b>63</b>  |
| 13   | Water Jet Pump                              | -               | -   | 75                                     | 75  | 62  | 58  | 55 | 54 | 48 | 40 | <b>63</b>  |
| <b>Rotary Bored Piling - Cast in Situ</b>            |   |                 |   |  |     |     |     |    |    |    |    |  |
| 14   | Large Rotary Bored Piling Rig               | -               | 110 t / 20 m deep / 1.2 m diameter              | 84                                     | 92  | 81  | 80  | 78 | 76 | 68 | 61 | <b>83</b>  |
| 15   | Tracked Drilling Rig with Hydraulic Drifter | 104             | 12.5 t  | 75                                     | 79  | 76  | 73  | 74 | 79 | 74 | 69 | <b>82</b>  |
| 16   | Crane Mounted Auger                         | -               | -   | 87                                     | 86  | 77  | 73  | 75 | 72 | 67 | 59 | <b>79</b>  |
| 17   | Mini Piling Rig                             | 29              | 5.4 t / auger 10 m deep x 450 mm diameter piles | 87                                     | 77  | 72  | 73  | 71 | 69 | 65 | 57 | <b>76</b>  |
| 18   | Mini Piling Rig                             | -               | Auger 12 m deep x 250 mm diameter piles         | 74                                     | 72  | 65  | 71  | 70 | 68 | 63 | 57 | <b>75</b>  |
| 19   | Compressor for Mini Piling                  | 45              | 1 t   | 75                                     | 71  | 65  | 70  | 71 | 69 | 62 | 57 | <b>75</b>  |
| 20   | Mini Tracked Excavator                      | 17              | 2.8 t   | 76                                     | 73  | 62  | 66  | 62 | 59 | 54 | 49 | <b>68</b>  |
| <b>Continuous Flight Auger Piling - Cast in Situ</b> |   |                 |   |  |     |     |     |    |    |    |    |  |
| 21   | Crawler Mounted Rig                         | 150             | 35 t  | 81                                     | 81  | 78  | 76  | 74 | 72 | 68 | 63 | <b>79</b>  |

|  |  |     |                                  |    |    |    |    |    |    |    |    |           |
|--|--|-----|----------------------------------|----|----|----|----|----|----|----|----|-----------|
| 22   | Crawler Mounted Rig                                  | 126 | 33 t                             | 79 | 79 | 78 | 78 | 75 | 71 | 66 | 56 | <b>80</b> |
| 23   | Tracked Excavator                                    | -   | -                                | 84 | 76 | 67 | 64 | 62 | 59 | 53 | 43 | <b>68</b> |
| 24   | Tracked Excavator (Inserting Cylindrical Metal Cage) | -   | 20 t                             | 79 | 75 | 73 | 69 | 69 | 67 | 60 | 52 | <b>74</b> |
| 25   | Concrete Pump  | 59  | 2.8 t / 180 mm diameter / 59 bar | 84 | 76 | 70 | 71 | 73 | 73 | 66 | 58 | <b>78</b> |
| 26   | Concrete Pump  | 25  | 120 mm diameter / 50 bar         | 82 | 82 | 72 | 71 | 69 | 68 | 62 | 54 | <b>75</b> |
| <b>Vibro Stone Columns</b>                               |  |     |                                  |    |    |    |    |    |    |    |    |           |
| 27   | Vibrodisplacement and Compaction of Stone Columns    | 60  | 17 t                             | 91 | 84 | 79 | 77 | 74 | 69 | 70 | 59 | <b>80</b> |
| <b>Craneage for Piling (lifting piles, casings, etc)</b> |  |     |                                  |    |    |    |    |    |    |    |    |           |
| 28   | Tracked Mobile Crane                                 | 184 | 110 t                            | 81 | 77 | 66 | 62 | 59 | 57 | 51 | 46 | <b>67</b> |
| 29   | Tracked Mobile Crane                                 | 132 | 55 t                             | 81 | 77 | 69 | 67 | 62 | 60 | 61 | 51 | <b>70</b> |
| 30   | Wheeled Mobile Crane                                 | -   | 70 t                             | 80 | 72 | 71 | 67 | 65 | 62 | 57 | 49 | <b>70</b> |
| <b>Welding / Cutting Steel Piles</b>                     |  |     |                                  |    |    |    |    |    |    |    |    |           |
| 31   | Hand-Held Welder (Welding Piles)                     | -   | -                                | 67 | 68 | 69 | 68 | 69 | 66 | 61 | 56 | <b>73</b> |
| 32   | Generator for Welding                                | -   | -                                | 75 | 72 | 67 | 68 | 70 | 66 | 62 | 60 | <b>73</b> |
| 33   | Generator for Welding                                | 6   | 508 kg                           | 75 | 67 | 59 | 52 | 48 | 44 | 41 | 33 | <b>57</b> |
| 34   | Gas Cutter (Cutting Top of Pile)                     | -   | 230 bar                          | 74 | 74 | 72 | 61 | 60 | 58 | 56 | 56 | <b>68</b> |
| 35   | Hand-held Gas Cutter                                 | -   | 230 bar                          | 74 | 76 | 66 | 58 | 56 | 56 | 55 | 55 | <b>65</b> |



**Table 4 Sound level data on general site activities**

| Ref No.                          | Equipment   | Power rating kW | Equipment size, weight (mass), capacity | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level, L <sub>Aeq</sub> dB |   |
|----------------------------------|---|-----------------|---|--|-----|-----|-----|----|----|----|----|--|---|
|                                  |   |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |  |   |
| <b>Distribution of Materials</b> |   |                 |   |  |     |     |     |    |    |    |    |  |   |
| 1                                | Articulated Dump Truck Ж                                    | 194             | 25 t                                    | 90                                     | 87  | 77  | 79  | 75 | 73 | 67 | 63 | <b>81</b>  | Ж |
| 2                                | Articulated Dump Truck Ж                                    | 187             | 23 t                                    | 85                                     | 80  | 77  | 72  | 74 | 70 | 65 | 58 | <b>78</b>  | Ж |
| 3                                | Dumper Ж  | 81              | 7 t                                     | 84                                     | 81  | 74  | 73  | 72 | 68 | 61 | 53 | <b>76</b>  | Ж |
| 4                                | Dumper Ж  | 75              | 9 t                                     | 82                                     | 76  | 75  | 74  | 68 | 68 | 64 | 55 | <b>76</b>  | Ж |
| 5                                | Dumper (Idling)   | 75              | 9 t                                     | 73                                     | 64  | 55  | 55  | 60 | 56 | 50 | 43 | <b>63</b>  |   |
| 6                                | Dumper Ж  | 60              | 6 t                                     | 89                                     | 86  | 77  | 74  | 72 | 72 | 66 | 62 | <b>79</b>  | Ж |
| 7                                | Dumper Ж  | 56              | 5 t                                     | 90                                     | 86  | 72  | 71  | 71 | 71 | 66 | 59 | <b>78</b>  | Ж |
| 8                                | Dumper (Idling)   | 56              | 5 t                                     | 68                                     | 56  | 47  | 49  | 52 | 50 | 41 | 32 | <b>56</b>  |   |
| 9                                | Dumper Ж  | 32              | 3 t                                     | 82                                     | 82  | 78  | 77  | 69 | 67 | 61 | 53 | <b>77</b>  | Ж |
| 10                               | Wheeled Excavator   | 90              | 18 t                                    | 64                                     | 60  | 63  | 64  | 62 | 57 | 51 | 45 | <b>66</b>  |   |
| 11                               | Wheeled Excavator (Idling)                                  | 90              | 18 t                                    | 61                                     | 59  | 57  | 57  | 58 | 52 | 42 | 34 | <b>61</b>  |   |
| 12                               | Wheeled Excavator Ж   | 63              | 14 t                                    | 84                                     | 82  | 77  | 75  | 72 | 68 | 60 | 52 | <b>77</b>  | Ж |
| 13                               | Wheeled Loader Ж  | 75              | 37 t                                    | 83                                     | 72  | 70  | 69  | 65 | 64 | 57 | 49 | <b>71</b>  | Ж |
| 14                               | Wheeled Backhoe loader                                      | 62              | 9 t                                     | 68                                     | 67  | 63  | 62  | 62 | 61 | 54 | 47 | <b>67</b>  |   |
| 15                               | Fuel Tanker Lorry Ж   | -               | 11 t                                    | 79                                     | 73  | 71  | 75  | 72 | 67 | 59 | 50 | <b>76</b>  | Ж |
| 16                               | Fuel Tanker Pumping   | -               | 25,000 litre                            | 75                                     | 70  | 67  | 67  | 69 | 66 | 60 | 53 | <b>72</b>  |   |
| 17                               | Tracked Excavator   | 41              | 8 t                                     | 81                                     | 72  | 68  | 68  | 66 | 64 | 60 | 55 | <b>71</b>  |   |
| <b>Mixing Concrete</b>           |   |                 |   |  |     |     |     |    |    |    |    |  |   |
| 18                               | Cement Mixer Truck (Discharging)                            | -               | -                                       | 80                                     | 69  | 66  | 70  | 71 | 69 | 64 | 58 | <b>75</b>  |   |
| 19                               | Cement Mixer Truck (Idling)                                 | -               | -                                       | 77                                     | 71  | 65  | 65  | 66 | 66 | 60 | 51 | <b>71</b>  |   |
| 20                               | Concrete Mixer Truck  | -               | -                                       | 83                                     | 74  | 66  | 69  | 70 | 78 | 60 | 55 | <b>80</b>  |   |
| 21                               | Large Lorry Concrete Mixer                                  | 216             | -                                       | 80                                     | 71  | 65  | 72  | 71 | 72 | 68 | 56 | <b>77</b>  |   |
| 22                               | Large Concrete Mixer  | 167             | 26 t                                    | 72                                     | 73  | 79  | 72  | 69 | 67 | 63 | 60 | <b>76</b>  |   |
| 23                               | Small Cement Mixer  | 2               | -                                       | 61                                     | 65  | 58  | 58  | 57 | 53 | 51 | 49 | <b>61</b>  |   |
| <b>Pumping Concrete</b>          |   |                 |   |  |     |     |     |    |    |    |    |  |   |
| 24                               | Concrete Pump + Cement Mixer Truck (Discharging)            | 223             | 8 t / 350 bar                           | 69                                     | 64  | 64  | 66  | 63 | 59 | 53 | 47 | <b>67</b>  |   |
| 25                               | Concrete Pump + Concrete Mixer Truck (Pumping to 5th Floor) | 171             | 6 t / 350 bar / 150 mm diameter         | 83                                     | 81  | 78  | 79  | 77 | 74 | 71 | 66 | <b>82</b>  |   |

Ж Drive-by maximum sound pressure level in L<sub>max</sub> (Octave Bands) and L<sub>Amax</sub> (Overall Level)

|                         |   |     |                                      |    |    |    |    |    |    |    |    |           |
|-------------------------|---|-----|--------------------------------------|----|----|----|----|----|----|----|----|-----------|
| 26                      | Concrete Pump + Concrete Mixer Truck (Idling)                 | 171 | 6 t / 350 bar / 150 mm diameter      | 75 | 76 | 71 | 70 | 71 | 68 | 64 | 60 | <b>75</b> |
| 27                      | Concrete Mixer Truck  | -   | -                                    | 84 | 74 | 74 | 73 | 73 | 75 | 65 | 59 | <b>79</b> |
| 28                      | Concrete Mixer Truck (Discharging) & Concrete Pump (Pumping)  | -   | 26 t (capacity) / 7 cu m + 22 m boom | 79 | 80 | 73 | 72 | 69 | 68 | 59 | 53 | <b>75</b> |
| 29                      | Truck Mounted Concrete Pump + Boom Arm                        | -   | 26 t                                 | 83 | 77 | 75 | 75 | 74 | 75 | 67 | 63 | <b>80</b> |
| 30                      | Truck Mounted Concrete Pump + Boom Arm                        | -   | 17 t                                 | 71 | 76 | 71 | 76 | 76 | 72 | 66 | 62 | <b>79</b> |
| 31                      | Truck Mounted Concrete Pump + Boom Arm (Idling)               | -   | 22 m boom                            | 84 | 75 | 71 | 70 | 70 | 69 | 61 | 52 | <b>75</b> |
| 32                      | Concrete Mixer Truck + Truck Mounted Concrete Pump + Boom Arm | -   | -                                    | 73 | 73 | 77 | 76 | 72 | 70 | 65 | 62 | <b>78</b> |
| <b>Concreting Other</b> |   |     |                                      |    |    |    |    |    |    |    |    |           |
| 33                      | Poker Vibrator  | -   | -                                    | 82 | 80 | 80 | 73 | 69 | 72 | 70 | 65 | <b>78</b> |
| 34                      | Poker Vibrator  | 2.2 | -                                    | 62 | 70 | 70 | 64 | 62 | 61 | 59 | 56 | <b>69</b> |
| 35                      | Vibratory Tamper  | 1.1 | 15 kg                                | 59 | 71 | 54 | 56 | 57 | 55 | 55 | 49 | <b>63</b> |
| 36                      | Pump Boom + Vibrating Poker                                   | -   | -                                    | 71 | 68 | 68 | 67 | 65 | 64 | 59 | 56 | <b>71</b> |
| 37                      | Concrete Placing Boom   | -   | 142 mm diameter / 24 m reach         | 63 | 68 | 65 | 62 | 59 | 53 | 53 | 49 | <b>65</b> |
| <b>Lifting</b>          |   |     |                                      |    |    |    |    |    |    |    |    |           |
| 38                      | Wheeled Mobile Telescopic Crane                               | 610 | 400 t                                | 80 | 79 | 73 | 74 | 73 | 73 | 64 | 55 | <b>78</b> |
| 39                      | Mobile Telescopic Crane                                       | 315 | 80 t                                 | 87 | 82 | 78 | 74 | 71 | 67 | 60 | 52 | <b>77</b> |
| 40                      | Mobile Telescopic Crane (Idling)                              | 315 | 80 t                                 | 75 | 72 | 65 | 62 | 61 | 60 | 52 | 45 | <b>66</b> |
| 41                      | Mobile Telescopic Crane                                       | 280 | 100 t                                | 73 | 71 | 68 | 70 | 66 | 63 | 54 | 49 | <b>71</b> |
| 42                      | Mobile Telescopic Crane (Idling)                              | 280 | 100 t                                | 71 | 67 | 64 | 61 | 60 | 56 | 50 | 41 | <b>64</b> |
| 43                      | Wheeled Mobile Crane  | 275 | 35 t                                 | 80 | 76 | 71 | 63 | 64 | 63 | 56 | 50 | <b>70</b> |
| 44                      | Wheeled Mobile Crane (Idling)                                 | 275 | 35 t                                 | 73 | 66 | 55 | 56 | 56 | 53 | 45 | 36 | <b>60</b> |
| 45                      | Mobile Telescopic Crane                                       | 260 | 55 t                                 | 90 | 81 | 78 | 74 | 77 | 76 | 69 | 61 | <b>82</b> |
| 46                      | Mobile Telescopic Crane                                       | 240 | 50 t                                 | 78 | 69 | 67 | 64 | 62 | 57 | 49 | 40 | <b>67</b> |
| 47                      | Mobile Telescopic Crane (Idling)                              | 240 | 50 t                                 | 67 | 66 | 59 | 58 | 56 | 53 | 44 | 35 | <b>61</b> |
| 48                      | Tower Crane   | 88  | 22 t                                 | 82 | 77 | 80 | 76 | 66 | 66 | 56 | 50 | <b>76</b> |
| 49                      | Tower Crane   | 51  | 12 t                                 | 84 | 79 | 80 | 76 | 70 | 63 | 57 | 51 | <b>77</b> |
| 50                      | Tracked Mobile Crane  | 390 | 600 t / 125 m                        | 68 | 71 | 68 | 62 | 66 | 66 | 55 | 46 | <b>71</b> |
| 51                      | Tracked Mobile Crane (Idling)                                 | 390 | 600 t / 125 m                        | 66 | 67 | 60 | 61 | 62 | 61 | 50 | 40 | <b>66</b> |
| 52                      | Tracked Mobile Crane  | 240 | 105 t                                | 73 | 71 | 66 | 67 | 74 | 66 | 58 | 49 | <b>75</b> |
| 53                      | Lorry with Lifting Boom                                       | 50  | 6 t                                  | 81 | 78 | 76 | 74 | 72 | 69 | 64 | 56 | <b>77</b> |
| 54                      | Telescopic Handler  | 76  | 4 t                                  | 79 | 73 | 66 | 65 | 78 | 66 | 54 | 47 | <b>79</b> |
| 55                      | Telescopic Handler  | 75  | 3.7 t                                | 82 | 72 | 63 | 65 | 67 | 64 | 56 | 49 | <b>70</b> |
| 56                      | Wheeled Excavator   | 63  | 14 t                                 | 87 | 84 | 80 | 81 | 78 | 75 | 69 | 67 | <b>83</b> |
| 57                      | Lifting Platform  | 35  | 8 t                                  | 78 | 76 | 62 | 63 | 60 | 59 | 58 | 49 | <b>67</b> |

|   |   |     |                          |    |    |    |    |    |    |    |    |             |
|---|---|-----|--------------------------|----|----|----|----|----|----|----|----|-------------|
| 58  | Lifting Platform (Idling)                                 | 35  | 8 t                      | 72 | 71 | 59 | 59 | 56 | 56 | 52 | 45 | <b>63</b>   |
| 59  | Diesel Scissor Lift                                       | 24  | 6 t                      | 80 | 77 | 74 | 74 | 74 | 71 | 65 | 63 | <b>78</b>   |
| 60  | Diesel Scissor Lift (idling)                              | 24  | 6 t                      | 74 | 72 | 68 | 68 | 64 | 61 | 57 | 56 | <b>70</b>   |
| 61  | Caged Material Hoist (Electric)                           | -   | 500 kg                   | 64 | 64 | 65 | 65 | 63 | 61 | 59 | 52 | <b>68</b>   |
| 62  | Site Lift for Workers                                     | -   | -                        | 68 | 63 | 64 | 63 | 59 | 60 | 58 | 51 | <b>66</b>   |
| <b>Trenching</b>                              |   |     |                          |    |    |    |    |    |    |    |    |             |
| 63  | Tracked Excavator   | 223 | 40 t                     | 77 | 86 | 75 | 75 | 71 | 69 | 64 | 55 | <b>77</b>   |
| 64  | Tracked Excavator   | 107 | 22 t                     | 74 | 80 | 75 | 73 | 69 | 66 | 60 | 51 | <b>75</b>   |
| 65  | Tracked Excavator   | 95  | 21 t                     | 76 | 74 | 68 | 70 | 65 | 63 | 59 | 55 | <b>71</b>   |
| 66  | Wheeled Backhoe Loader                                    | 63  | 8 t                      | 72 | 63 | 67 | 67 | 63 | 62 | 56 | 50 | <b>69</b>   |
| 67  | Mini Tracked Excavator                                    | -   | 5 t                      | 87 | 79 | 76 | 70 | 68 | 64 | 57 | 48 | <b>74</b>   |
| 68  | Mini Tracked Excavator                                    | 30  | 5 t                      | 71 | 71 | 66 | 59 | 59 | 58 | 54 | 48 | <b>65</b>   |
| <b>Core Drilling Concrete</b>                 |   |     |                          |    |    |    |    |    |    |    |    |             |
| 69  | Core Drill (Electric)                                     | -   | 250 mm diameter bit      | 75 | 74 | 75 | 72 | 74 | 75 | 80 | 80 | <b>85</b>   |
| <b>Cutting Concrete Floor Slab</b>            |   |     |                          |    |    |    |    |    |    |    |    |             |
| 70  | Petrol Hand-held Circular Saw                             | 3   | 9 kg / 300 mm diameter   | 72 | 89 | 81 | 80 | 80 | 82 | 86 | 85 | <b>91</b>   |
| <b>Cutting Concrete Blocks / Paving Slabs</b> |   |     |                          |    |    |    |    |    |    |    |    |             |
| 71  | Circular Bench Saw (Petrol - Cutting Concrete Blocks)     | -   | -                        | 85 | 74 | 72 | 70 | 72 | 76 | 82 | 77 | <b>85</b>   |
| 72  | Hand-held Circular Saw (Petrol - Cutting Concrete Blocks) | 3   | 9 kg                     | 69 | 75 | 77 | 74 | 71 | 70 | 74 | 69 | <b>79</b>   |
| 73  | Hand-held Circular Saw (Cutting Paving Slabs)             | 1.5 | 7.6 kg / 235 mm diameter | 73 | 67 | 70 | 68 | 73 | 78 | 78 | 77 | <b>84</b>   |
| <b>Moving Equipment</b>                       |   |     |                          |    |    |    |    |    |    |    |    |             |
| 74  | Tractor (Towing Equipment) Ж                              | 100 | -                        | 79 | 71 | 78 | 75 | 78 | 70 | 61 | 55 | <b>80 Ж</b> |
| 75  | Tractor (Towing Trailer) Ж                                | 71  | 3.5 t                    | 93 | 86 | 76 | 76 | 73 | 72 | 64 | 59 | <b>79 Ж</b> |
| <b>Power for Site Cabins</b>                  |   |     |                          |    |    |    |    |    |    |    |    |             |
| 76  | Diesel Generator  | 6.5 | -                        | 80 | 74 | 57 | 54 | 53 | 48 | 45 | 37 | <b>61</b>   |
| 77  | Diesel Generator  | -   | -                        | 70 | 62 | 62 | 57 | 53 | 52 | 48 | 41 | <b>60</b>   |
| 78  | Diesel Generator  | -   | -                        | 64 | 67 | 68 | 65 | 58 | 54 | 49 | 42 | <b>66</b>   |
| 79  | Diesel Generator  | -   | -                        | 69 | 71 | 68 | 61 | 57 | 51 | 46 | 44 | <b>64</b>   |
| 80  | Diesel Generator  | -   | -                        | 54 | 64 | 59 | 56 | 55 | 52 | 49 | 45 | <b>60</b>   |
| 81  | Petrol Generator  | -   | 2 t                      | 63 | 57 | 58 | 53 | 51 | 46 | 38 | 33 | <b>56</b>   |
| 82  | Diesel Generator  | -   | 2 t                      | 64 | 61 | 59 | 53 | 49 | 47 | 42 | 35 | <b>56</b>   |
| 83  | Diesel Generator  | 3   | 210 kg                   | 57 | 71 | 65 | 61 | 60 | 56 | 52 | 44 | <b>65</b>   |
| 84  | Diesel Generator  | -   | -                        | 75 | 72 | 76 | 70 | 69 | 65 | 56 | 47 | <b>74</b>   |

Ж Drive-by maximum sound pressure level in  $L_{max}$  (Octave Bands) and  $L_{Amax}$  (Overall Level)

| <b>Power for Welder</b>                |  |      |                   |    |    |    |    |    |    |    |    |           |  |
|--|--|------|-------------------|----|----|----|----|----|----|----|----|-----------|--|
| 85                                     | Diesel Generator   | 4    | 18 kg             | 69 | 69 | 67 | 60 | 59 | 60 | 56 | 53 | <b>66</b> |  |
| <b>Power for Lighting</b>              |  |      |                   |    |    |    |    |    |    |    |    |           |  |
| 86                                     | Diesel Generator   | 15   | -                 | 78 | 71 | 66 | 62 | 59 | 55 | 56 | 49 | <b>65</b> |  |
| 87                                     | Diesel Generator   | 7.5  | 6 kVA / 3000 rpm  | 77 | 72 | 64 | 60 | 59 | 57 | 54 | 42 | <b>65</b> |  |
| <b>Pumping Water</b>                   |  |      |                   |    |    |    |    |    |    |    |    |           |  |
| 88                                     | Water Pump (Diesel)  | 10   | 100 kg            | 70 | 65 | 66 | 64 | 64 | 63 | 56 | 46 | <b>68</b> |  |
| 89                                     | Water Tanker Extracting Water (Vacum Pump)                 | -    | -                 | 81 | 82 | 67 | 72 | 71 | 74 | 73 | 66 | <b>79</b> |  |
| <b>Sweeping &amp; Dust Suppression</b> |  |      |                   |    |    |    |    |    |    |    |    |           |  |
| 90                                     | Road Sweeper   | 70   | -                 | 80 | 75 | 69 | 75 | 71 | 67 | 61 | 58 | <b>76</b> |  |
| 91                                     | Dust Suppression Unit Trailer                              | -    | -                 | 78 | 73 | 74 | 80 | 70 | 68 | 60 | 56 | <b>78</b> |  |
| <b>Miscellaneous</b>                   |  |      |                   |    |    |    |    |    |    |    |    |           |  |
| 92                                     | Mounting Supports for Directional Drill (Hydraulic Hammer) | -    | -                 | 77 | 83 | 73 | 68 | 73 | 80 | 84 | 77 | <b>87</b> |  |
| 93                                     | Angle Grinder (Grinding Steel)                             | 2.3  | 4.7 kg            | 57 | 51 | 52 | 60 | 70 | 77 | 73 | 73 | <b>80</b> |  |
| 94                                     | Petrol Generator for Hand-held Grinder                     | 3.75 | 105 kg            | 77 | 74 | 71 | 70 | 69 | 68 | 66 | 62 | <b>75</b> |  |
| 95                                     | Handheld Cordless Nail Gun                                 | -    | 15 to 50 mm nails | 63 | 65 | 65 | 66 | 65 | 69 | 64 | 61 | <b>73</b> |  |
| 96                                     | Directional Drill (Generator)                              | 106  | -                 | 67 | 80 | 74 | 72 | 72 | 72 | 68 | 61 | <b>77</b> |  |

**Table 5 Sound level data on road construction works**

| Ref No.                             | Equipment                                  | Power rating kW | Equipment size, weight (mass), capacity   | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level, $L_{Aeq}$ dB |
|-------------------------------------|--|-----------------|---|--|-----|-----|-----|----|----|----|----|---|
|                                     |  |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |   |
| <b>Breaking Road Surface</b>        |  |                 |   |  |     |     |     |    |    |    |    |   |
| 1                                   | Backhoe Mounted Hydraulic Breaker          | 67              | -   | 86                                     | 80  | 78  | 77  | 81 | 83 | 82 | 81 | <b>88</b>                                     |
| 2                                   | Mini Excavator with Hydraulic Breaker      | -               | (1.5 t) 44 mm diameter / 115 bar / 120 kg | 79                                     | 75  | 73  | 74  | 77 | 77 | 75 | 70 | <b>83</b>                                     |
| 3                                   | Road Breaker (Hand-held Pneumatic)         | -               | -   | 82                                     | 75  | 73  | 68  | 63 | 67 | 80 | 69 | <b>82</b>                                     |
| 4                                   | Road Breaker (Hand-held Pneumatic)         | -               | -   | 84                                     | 84  | 74  | 75  | 73 | 77 | 83 | 81 | <b>86</b>                                     |
| 5                                   | Compressor for Hand-held Pneumatic Breaker | -               | 1 t                                       | 84                                     | 73  | 64  | 59  | 57 | 55 | 58 | 47 | <b>65</b>                                     |
| <b>Breaking Concrete</b>            |  |                 |   |  |     |     |     |    |    |    |    |   |
| 6                                   | Hand-held Pneumatic Breaker                | -               | -   | 90                                     | 79  | 75  | 78  | 78 | 83 | 91 | 92 | <b>95</b>                                     |
| <b>Road Planing</b>                 |  |                 |   |  |     |     |     |    |    |    |    |   |
| 7                                   | Road Planer                                | 185             | 17 t                                      | 81                                     | 87  | 79  | 77  | 77 | 74 | 70 | 67 | <b>82</b>                                     |
| 8                                   | Road Planer (Idling )                      | 185             | 17 t                                      | 67                                     | 59  | 58  | 60  | 59 | 49 | 46 | 38 | <b>62</b>                                     |
| 9                                   | Mini Planer                                | 32              | 3 t                                       | 72                                     | 67  | 70  | 65  | 62 | 56 | 53 | 48 | <b>68</b>                                     |
| 10                                  | Mini Planer (Idling)                       | 32              | 3 t                                       | 67                                     | 53  | 58  | 50  | 47 | 45 | 42 | 39 | <b>54</b>                                     |
| <b>Removing Broken Road Surface</b> |  |                 |   |  |     |     |     |    |    |    |    |   |
| 11                                  | Wheeled Excavator                          | 112             | 17 t                                      | 78                                     | 74  | 68  | 71  | 68 | 64 | 59 | 52 | <b>73</b>                                     |
| <b>Spreading Chipping/Fill</b>      |  |                 |   |  |     |     |     |    |    |    |    |   |
| 12                                  | Dozer                                      | 104             | 14 t                                      | 80                                     | 78  | 71  | 70  | 74 | 68 | 65 | 61 | <b>77</b>                                     |
| 13                                  | Dozer                                      | 68              | 11 t                                      | 82                                     | 84  | 76  | 75  | 78 | 76 | 70 | 62 | <b>82</b>                                     |
| <b>Earthworks</b>                   |  |                 |   |  |     |     |     |    |    |    |    |   |
| 14                                  | Bulldozer Ж                                | 250             | 35 t                                      | 77                                     | 86  | 75  | 75  | 82 | 80 | 73 | 67 | <b>86 Ж</b>                                   |
| 15                                  | Bulldozer Ж                                | 134             | 24 t                                      | 83                                     | 81  | 76  | 77  | 82 | 70 | 65 | 58 | <b>83 Ж</b>                                   |
| 16                                  | Articulated Dump Truck Ж                   | 194             | 25 t                                      | 88                                     | 90  | 80  | 79  | 76 | 71 | 65 | 61 | <b>81 Ж</b>                                   |
| 17                                  | Articulated Dump Truck Ж                   | 187             | 23 t                                      | 85                                     | 88  | 77  | 75  | 77 | 74 | 69 | 63 | <b>81 Ж</b>                                   |
| 18                                  | Tracked Excavator                          | 172             | 35 t                                      | 76                                     | 79  | 75  | 75  | 76 | 73 | 70 | 65 | <b>80</b>                                     |
| <b>Rolling and Compaction</b>       |  |                 |   |  |     |     |     |    |    |    |    |   |
| 19                                  | Road Roller Ж                              | 95              | 22 t                                      | 87                                     | 85  | 75  | 73  | 75 | 73 | 69 | 63 | <b>80 Ж</b>                                   |
| 20                                  | Vibratory Roller                           | 98              | 8.9 t                                     | 90                                     | 82  | 73  | 72  | 70 | 65 | 59 | 54 | <b>75</b>                                     |
| 21                                  | Vibratory Roller Ж                         | 95              | 12 t                                      | 90                                     | 84  | 77  | 81  | 73 | 68 | 65 | 61 | <b>80 Ж</b>                                   |

Ж Drive-by maximum sound pressure level in  $L_{max}$  (Octave Bands) and  $L_{Amax}$  (Overall Level)

|                                       |                                    |     |                         |    |    |    |    |    |    |    |    |           |          |
|---------------------------------------|------------------------------------|-----|-------------------------|----|----|----|----|----|----|----|----|-----------|----------|
| 22                                    | Vibratory Roller Ж                 | 92  | 12 t                    | 92 | 83 | 75 | 79 | 77 | 70 | 67 | 61 | <b>81</b> | <b>Ж</b> |
| 23                                    | Vibratory Roller (Not Vibrating) Ж | -   | 12 t                    | 83 | 77 | 75 | 84 | 76 | 72 | 66 | 61 | <b>83</b> | <b>Ж</b> |
| 24                                    | Vibratory Roller Ж                 | 53  | 12 t                    | 89 | 82 | 76 | 77 | 72 | 74 | 81 | 61 | <b>84</b> | <b>Ж</b> |
| 25                                    | Vibratory Roller                   | 32  | 4.5 t                   | 80 | 75 | 72 | 75 | 69 | 66 | 62 | 57 | <b>75</b> |          |
| 26                                    | Vibratory Roller                   | -   | 4 t                     | 84 | 84 | 78 | 70 | 70 | 70 | 67 | 61 | <b>77</b> |          |
| 27                                    | Vibratory Roller                   | 20  | 3 t                     | 85 | 70 | 62 | 62 | 61 | 59 | 53 | 45 | <b>67</b> |          |
| 28                                    | Vibratory Roller                   | 12  | 1.5 t                   | 82 | 80 | 76 | 73 | 70 | 70 | 63 | 59 | <b>77</b> |          |
| 29                                    | Vibratory Compacter (Asphalt)      | 3   | 60 kg                   | 76 | 78 | 74 | 77 | 77 | 77 | 73 | 70 | <b>82</b> |          |
| <b>Paving</b>                         |                                    |     |                         |    |    |    |    |    |    |    |    |           |          |
| 30                                    | Asphalt Paver (+ Tipper Lorry)     | 112 | 12 t hopper             | 78 | 77 | 72 | 72 | 71 | 69 | 62 | 56 | <b>75</b> |          |
| 31                                    | Asphalt Paver (+ Tipper Lorry)     | 94  | 18 t                    | 72 | 77 | 74 | 72 | 71 | 70 | 67 | 60 | <b>77</b> |          |
| 32                                    | Asphalt Paver (+ Tipper Lorry) Ж   | 94  | 18 t                    | 87 | 84 | 81 | 80 | 79 | 76 | 74 | 65 | <b>84</b> | <b>Ж</b> |
| 33                                    | Asphalt Paver (+ Tipper Lorry)     | 78  | 18 t                    | 82 | 82 | 78 | 72 | 69 | 67 | 61 | 54 | <b>75</b> |          |
| <b>Trenching</b>                      |                                    |     |                         |    |    |    |    |    |    |    |    |           |          |
| 34                                    | Wheeled Excavator                  | 51  | 7 t                     | 72 | 66 | 62 | 70 | 63 | 62 | 57 | 53 | <b>70</b> |          |
| 35                                    | Tracked Excavator                  | 27  | -                       | 82 | 72 | 71 | 69 | 69 | 70 | 61 | 54 | <b>74</b> |          |
| <b>Cutting Concrete Slabs</b>         |                                    |     |                         |    |    |    |    |    |    |    |    |           |          |
| 36                                    | Hand-held Circular Saw (Petrol)    | 3   | 300mm diameter / 9.2 kg | 84 | 86 | 78 | 78 | 77 | 78 | 82 | 80 | <b>87</b> |          |
| <b>Lifting Formwork for Underpass</b> |                                    |     |                         |    |    |    |    |    |    |    |    |           |          |
| 37                                    | Wheeled Mobile Crane               | 315 | 80 t                    | 85 | 73 | 67 | 71 | 72 | 69 | 63 | 56 | <b>76</b> |          |
| 38                                    | Wheeled Mobile Crane (Idling)      | 315 | 80 t                    | 71 | 62 | 57 | 59 | 63 | 60 | 54 | 46 | <b>66</b> |          |
| <b>Pumping Water</b>                  |                                    |     |                         |    |    |    |    |    |    |    |    |           |          |
| 40                                    | Electric Water Pump                | 15  | 6"                      | 71 | 64 | 64 | 67 | 63 | 57 | 54 | 49 | <b>68</b> |          |

Ж Drive-by maximum sound pressure level in  $L_{max}$  (Octave Bands) and  $L_{Amax}$  (Overall Level)

**Table 6 Sound level data on opencast coal sites**

| Ref No.                         | Equipment                        | Power rating kW | Equipment size, weight (mass), capacity | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level, L <sub>Aeq</sub> dB |
|---------------------------------|----------------------------------|-----------------|---|--|-----|-----|-----|----|----|----|----|--|
|                                 |                                  |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |  |
| <b>Breaking Out and Loading</b> |                                  |                 |   |  |     |     |     |    |    |    |    |  |
| 1                               | Tracked Excavator                | 1680            | 505 t                                   | 91                                     | 86  | 80  | 81  | 80 | 78 | 77 | 70 | <b>85</b>  |
| 2                               | Tracked Excavator                | 1008            | 240 t                                   | 88                                     | 91  | 87  | 86  | 83 | 81 | 76 | 68 | <b>89</b>  |
| 3                               | Tracked Excavator                | 870             | 213 t                                   | 89                                     | 92  | 83  | 81  | 82 | 78 | 73 | 65 | <b>86</b>  |
| 4                               | Tracked Excavator                | 382             | 89 t                                    | 86                                     | 90  | 78  | 74  | 75 | 70 | 62 | 60 | <b>80</b>  |
| 5                               | Tracked Excavator                | 380             | 90 t                                    | 91                                     | 92  | 83  | 84  | 80 | 78 | 77 | 70 | <b>86</b>  |
| 6                               | Tracked Excavator                | 172             | 35 t                                    | 77                                     | 80  | 79  | 76  | 76 | 75 | 70 | 63 | <b>81</b>  |
| 7                               | Tracked Excavator                | 128             | 35 t                                    | 84                                     | 80  | 75  | 74  | 70 | 67 | 64 | 56 | <b>76</b>  |
| 8                               | Tracked Excavator                | 128             | 28 t                                    | 83                                     | 83  | 77  | 77  | 75 | 72 | 67 | 61 | <b>80</b>  |
| 9                               | Tracked Excavator                | 128             | 23 t                                    | 78                                     | 85  | 77  | 72  | 69 | 68 | 64 | 61 | <b>76</b>  |
| 10                              | Tracked Excavator                | 107             | 22 t                                    | 83                                     | 79  | 78  | 76  | 74 | 71 | 65 | 60 | <b>79</b>  |
| 11                              | Tracked Excavator                | 103             | 19 t                                    | 82                                     | 84  | 75  | 69  | 69 | 67 | 62 | 57 | <b>75</b>  |
| 12                              | Tracked Excavator                | 71              | 13 t                                    | 84                                     | 74  | 71  | 71  | 68 | 66 | 61 | 55 | <b>74</b>  |
| <b>Haulage</b>                  |                                  |                 |   |  |     |     |     |    |    |    |    |  |
| 13                              | Dump Truck Ж                     | 1417            | 160 t                                   | 97                                     | 95  | 91  | 91  | 86 | 84 | 79 | 75 | <b>92 Ж</b>  |
| 14                              | Dump Truck Ж                     | 783             | 158 t                                   | 89                                     | 94  | 89  | 85  | 83 | 81 | 76 | 71 | <b>89 Ж</b>  |
| 15                              | Dump Truck Ж                     | 746             | 90 t                                    | 94                                     | 91  | 91  | 87  | 84 | 83 | 77 | 70 | <b>90 Ж</b>  |
| 16                              | Articulated Dump Truck (Empty) Ж | 287             | 40 t                                    | 93                                     | 90  | 85  | 84  | 83 | 81 | 77 | 69 | <b>88 Ж</b>  |
| 17                              | Articulated Dump Truck Ж         | 247             | 28 t                                    | 86                                     | 84  | 86  | 83  | 79 | 76 | 72 | 67 | <b>85 Ж</b>  |
| 18                              | Articulated Dump Truck Ж         | 240             | 35 t                                    | 91                                     | 90  | 83  | 83  | 81 | 79 | 70 | 61 | <b>86 Ж</b>  |
| 19                              | Road Lorry (Empty) Ж             | 320             | 39 t                                    | 81                                     | 79  | 75  | 70  | 70 | 70 | 68 | 65 | <b>76 Ж</b>  |
| 20                              | Road Lorry (Empty) Ж             | 313             | 39 t                                    | 81                                     | 76  | 79  | 70  | 71 | 68 | 64 | 60 | <b>76 Ж</b>  |
| 21                              | Road Lorry (Full) Ж              | 270             | 39 t                                    | 96                                     | 82  | 74  | 73  | 77 | 72 | 71 | 64 | <b>80 Ж</b>  |
| 22                              | Road Lorry (Empty) Ж             | 260             | 39 t                                    | 97                                     | 85  | 81  | 83  | 76 | 71 | 69 | 64 | <b>83 Ж</b>  |
| 23                              | Rigid Road Lorry Ж               | -               | -                                       | 88                                     | 86  | 80  | 78  | 75 | 73 | 76 | 68 | <b>82 Ж</b>  |
| <b>Dumping Load</b>             |                                  |                 |   |  |     |     |     |    |    |    |    |  |
| 24                              | Dump Truck                       | 783             | 158 t                                   | 79                                     | 84  | 81  | 84  | 81 | 80 | 75 | 68 | <b>86</b>  |
| 25                              | Dump Truck                       | 746             | 90 t                                    | 85                                     | 86  | 86  | 82  | 81 | 79 | 77 | 68 | <b>86</b>  |

Ж Drive-by maximum sound pressure level in L<sub>max</sub> (Octave Bands) and L<sub>Amax</sub> (Overall Level)

|                              |                                 |     |                    |    |    |    |    |    |    |    |    |             |
|------------------------------|---------------------------------|-----|--------------------|----|----|----|----|----|----|----|----|-------------|
| 26                           | Articulated Dump Truck          | 287 | 40 t               | 88 | 84 | 75 | 73 | 75 | 72 | 68 | 60 | <b>79</b>   |
| 27                           | Articulated Dump Truck          | 250 | 51 t               | 77 | 77 | 76 | 72 | 71 | 69 | 64 | 54 | <b>76</b>   |
| <b>Bulldozing</b>            |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 28                           | Crawler Mounted Dozer           | 354 | 48 t               | 80 | 84 | 76 | 77 | 79 | 81 | 69 | 59 | <b>85</b>   |
| 29                           | Crawler Mounted Dozer           | 250 | 38 t               | 83 | 84 | 80 | 77 | 79 | 76 | 86 | 75 | <b>88</b>   |
| 30                           | Crawler Mounted Dozer           | 250 | 35 t               | 79 | 87 | 79 | 78 | 82 | 80 | 73 | 66 | <b>86</b>   |
| <b>Levelling Haul Road</b>   |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 31                           | Grader Ж                        | 205 | 25 t               | 88 | 87 | 83 | 79 | 84 | 78 | 74 | 65 | <b>86 Ж</b> |
| <b>Front End Loaders</b>     |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 32                           | Wheeled Loader (Loading Hopper) | 198 | 23 t               | 83 | 77 | 70 | 70 | 70 | 68 | 64 | 58 | <b>75</b>   |
| 33                           | Wheeled Loader (Loading Lorry)  | 190 | 25 t               | 92 | 84 | 83 | 77 | 76 | 74 | 71 | 62 | <b>82</b>   |
| 34                           | Wheeled Loader                  | 184 | 23 t               | 82 | 82 | 71 | 73 | 69 | 67 | 66 | 58 | <b>76</b>   |
| <b>Drilling</b>              |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 35                           | Tracked Hydraulic Drilling Rig  | -   | 100 mm bore        | 85 | 93 | 78 | 79 | 80 | 79 | 76 | 74 | <b>86</b>   |
| <b>Diesel Bowser</b>         |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 36                           | Diesel Bowser Ж                 | -   | -                  | 80 | 81 | 84 | 81 | 84 | 85 | 76 | 66 | <b>89 Ж</b> |
| <b>Water Bowser</b>          |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 37                           | Water Bowsers (Discharging)     | -   | -                  | 80 | 81 | 75 | 79 | 73 | 74 | 70 | 65 | <b>81</b>   |
| 38                           | Tractor (Towing Water Bowser) Ж | -   | -                  | 78 | 86 | 84 | 78 | 78 | 77 | 70 | 69 | <b>83 Ж</b> |
| <b>Power for Site Cabins</b> |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 39                           | Diesel Generator                | 120 | 150 kVA, 1500 rpm  | 79 | 74 | 67 | 64 | 55 | 51 | 45 | 40 | <b>65</b>   |
| <b>Pumping Water</b>         |                                 |     |                    |    |    |    |    |    |    |    |    |             |
| 41                           | Diesel water pump               | -   | 300 kPa / 1645 rpm | 83 | 76 | 70 | 73 | 74 | 72 | 65 | 58 | <b>78</b>   |

Ж Drive-by maximum sound pressure level in L<sub>max</sub> (Octave Bands) and L<sub>Amax</sub> (Overall Level)



**Table 7 Sound level data on dredging**

| Ref No.                      | Equipment                    | Power rating kW | Equipment size, weight (mass), capacity | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level, L <sub>Aeq</sub> dB |  |
|------------------------------|------------------------------|-----------------|---|--|-----|-----|-----|----|----|----|----|--|--|
|                              |                              |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |  |  |
| <b>Digging Out River Bed</b> |                              |                 |   |  |     |     |     |    |    |    |    |  |  |
| 1                            | Long Reach Tracked Excavator | 178             | 21m arm / 39 t                          | 74                                     | 83  | 76  | 75  | 70 | 71 | 63 | 57 | <b>78</b>  |  |
| <b>Dredging Harbour</b>      |                              |                 |   |  |     |     |     |    |    |    |    |  |  |
| 2                            | Grab Hopper Dredging Ship    | 2461            | 2136 t                                  | 83                                     | 91  | 80  | 78  | 78 | 73 | 66 | 58 | <b>82</b>  |  |

**Table 8 Sound level data on waste disposal sites**

| Ref No.                               | Equipment                             | Power rating kW | Equipment size, weight (mass), capacity | Octave Band Sound Pressure Levels (Hz) |     |     |     |    |    |    |    | A-weighted Sound Pressure Level, L <sub>Aeq</sub> dB |
|---------------------------------------|---------------------------------------|-----------------|---|--|-----|-----|-----|----|----|----|----|--|
|                                       |                                       |                 |   | 63                                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k |  |
| <b>Tipping Area</b>                   |                                       |                 |   |  |     |     |     |    |    |    |    |  |
| 1                                     | Waste Compactor                       | 392             | 54 t                                    | 70                                     | 78  | 79  | 72  | 77 | 68 | 66 | 62 | <b>80</b>  |
| 2                                     | Waste Compactor                       | 298             | -                                       | 66                                     | 74  | 78  | 76  | 74 | 70 | 66 | 62 | <b>79</b>  |
| 3                                     | Waste Compactor                       | 283             | 37 t                                    | 79                                     | 83  | 71  | 75  | 78 | 70 | 67 | 67 | <b>80</b>  |
| 4                                     | Waste Compactor                       | -               | -                                       | 72                                     | 76  | 76  | 70  | 69 | 67 | 63 | 58 | <b>75</b>  |
| 5                                     | Waste Compactor                       | 226             | -                                       | 73                                     | 75  | 70  | 66  | 68 | 64 | 58 | 50 | <b>71</b>  |
| 6                                     | Dozer                                 | 138             | 24 t                                    | 81                                     | 80  | 75  | 77  | 74 | 69 | 63 | 58 | <b>78</b>  |
| 7                                     | Dozer                                 | 138             | 21 t                                    | 73                                     | 79  | 73  | 72  | 69 | 67 | 61 | 57 | <b>75</b>  |
| 8                                     | Dozer                                 | 134             | 50 t                                    | 74                                     | 76  | 73  | 71  | 71 | 68 | 64 | 58 | <b>75</b>  |
| 9                                     | Dozer                                 | 104             | 20 t                                    | 76                                     | 78  | 71  | 70  | 71 | 65 | 60 | 55 | <b>74</b>  |
| 10                                    | Tracked Excavator                     | 96              | 24 t                                    | 67                                     | 70  | 67  | 65  | 63 | 62 | 60 | 55 | <b>69</b>  |
| <b>Cell Excavation Area</b>           |                                       |                 |   |  |     |     |     |    |    |    |    |  |
| 11                                    | Tracked Excavator                     | 228             | 45 t                                    | 73                                     | 81  | 75  | 76  | 73 | 70 | 65 | 60 | <b>78</b>  |
| 12                                    | Tracked Excavator                     | 96              | 24 t                                    | 78                                     | 80  | 71  | 70  | 68 | 67 | 63 | 58 | <b>74</b>  |
| 13                                    | Articulated Dump Truck Ж              | 327             | 25 t                                    | 92                                     | 89  | 83  | 84  | 79 | 75 | 68 | 64 | <b>85 Ж</b>  |
| 14                                    | Articulated Dump Truck Ж              | 250             | 23 t                                    | 88                                     | 84  | 82  | 73  | 75 | 71 | 66 | 60 | <b>80 Ж</b>  |
| 15                                    | Articulated Dump Truck Ж              | 227             | 21 t                                    | 91                                     | 81  | 76  | 77  | 73 | 72 | 70 | 62 | <b>79 Ж</b>  |
| 16                                    | Articulated Dump Truck Ж              | 198             | 30 t                                    | 84                                     | 84  | 81  | 79  | 76 | 73 | 69 | 64 | <b>81 Ж</b>  |
| 17                                    | Dozer                                 | 142             | 20 t                                    | 82                                     | 88  | 81  | 80  | 75 | 72 | 63 | 57 | <b>81</b>  |
| <b>Waste Delivery Vehicles</b>        |                                       |                 |   |  |     |     |     |    |    |    |    |  |
| 18                                    | Refuse Wagon Ж                        | -               | -                                       | 82                                     | 79  | 78  | 75  | 71 | 72 | 66 | 62 | <b>78 Ж</b>  |
| 19                                    | Refuse Wagon Ж                        | 283             | 44 t                                    | 88                                     | 81  | 79  | 76  | 72 | 70 | 64 | 60 | <b>78 Ж</b>  |
| 20                                    | Tipper Lorry Ж                        | -               | -                                       | 88                                     | 82  | 74  | 74  | 74 | 73 | 70 | 67 | <b>79 Ж</b>  |
| 21                                    | Skip Wagon Ж                          | -               | -                                       | 82                                     | 84  | 78  | 75  | 71 | 70 | 65 | 59 | <b>78 Ж</b>  |
| <b>Pumping Water</b>                  |                                       |                 |   |  |     |     |     |    |    |    |    |  |
| 22                                    | Diesel Surface Water Pump             | -               | 4"                                      | 70                                     | 75  | 60  | 58  | 65 | 66 | 59 | 62 | <b>71</b>  |
| 23                                    | Diesel Generator for Submersible Pump | -               | -                                       | 81                                     | 73  | 57  | 56  | 52 | 49 | 49 | 42 | <b>62</b>  |
| <b>Power for Temporary Site Cabin</b> |                                       |                 |   |  |     |     |     |    |    |    |    |  |
| 24                                    | Diesel Generator                      | -               | -                                       | 82                                     | 57  | 63  | 48  | 45 | 44 | 40 | 33 | <b>59</b>  |

Ж Drive-by maximum sound pressure level in L<sub>max</sub> (Octave Bands) and L<sub>Amax</sub> (Overall Level)