



# Western Rail Coal Unloader

## Submissions Report - Sleep Disturbance Assessment



March 2008





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## SLEEP DISTURBANCE ASSESSMENT

- Final
- March 2008

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## **1. Background**

Delta Electricity is proposing to build a coal unloading facility to service the needs of Mount Piper Power Station in future years. The proposed rail loop, coal unloader and conveyor system would be built on land owned by Delta in the area known as Pipers Flat, located between Portland and Wallerawang townships.

It is proposed that the development would source coal from the north, resulting in increased train movements along the Wallerawang – Mudgee Main Line to the unloader site at Pipers Flat.

In response to clarifications requested by the Department of Planning (DoP) regarding potential sleep disturbance noise impacts in the Pipers Flat area the following assessment has been undertaken.

## **2. Assessment of Sleep Disturbance Noise Impacts**

The DoP has requested a noise assessment of peak noise events such as train bunching / stretching and horn noise and its effect on sleep disturbance. The assessment has been undertaken in accordance with Industrial Noise Policy (INP) – Application Notes, 2006.

Peak noise level events have the potential to cause sleep disturbance. While the potential for high noise level events at night and effects on sleep should be addressed in noise assessments for both the construction and operational phases of a development, the INP does not specifically address sleep disturbance from high noise level events.

The proposed site for the rail loop and coal unloader lies between Pipers Flat Road and the base of the ridgeline that forms Mount Piper. It comprises a cleared flat area that is traversed by Pipers Flat Creek, a tributary of the Coxs River. The Wallerawang - Mudgee Main Line is located in close proximity to the project site, running almost parallel with Pipers Flat Road, and is crossed by three level crossing on Pipers Flat (sites 1, 4 and 6 in Figure 1). The planned facility is proposed to be available for receipt of coal deliveries 24 hours a day, although Delta will, in seeking coal supplies, state its preference for rail deliveries to the WRCU to be made during day and evening hours.

Background and other noise data used in this report are derived from the *Western Rail Coal Unloader Environmental Assessment, April 2007*.

## 2.1 Existing Noise Levels

Existing noise influences in this area are mainly from road traffic along Pipers Flat Road, which carries a small amount of local traffic. Occasional rail noise from the existing Wallerawang – Mudgee main Line is also a feature of the area. This line carries predominantly coal trains as well as daily freight trains.

Current train movements along the Wallerawang – Mudgee Main Line consist of approximately eight to ten movements per day, with one movement (Train number CB95) scheduled to occur between 10pm and 7am each day.

Background noise levels were measured at locations near the proposed coal unloading facility between July and August 2006. The sites selected for monitoring were based on availability of residents and their proximity to the proposed coal unloader. The locations of the noise loggers are shown in **Figure 1**.

The unattended monitoring was undertaken with automatic noise loggers that measure environmental noise and store the results in memory. The loggers used were ARL type 316 and 215 and had been NATA tested by the manufacturer within the previous 12 months. The loggers were set to record a range of noise indices at 15 minute intervals. These data were used to determine the median values for the  $LA_{eq}$ ,  $LA_{90}$ ,  $LA_{10}$  and  $LA_1$  descriptors for the day, evening and night time period. The  $LA_{eq}$  results of this monitoring have been provided in **Table 1**.

The Rating Background Level (RBL) is the overall, single-figure, background level representing each of the day, evening or night assessment periods over the whole monitoring period. The RBL is the tenth percentile of the background noise environment evaluated in the absence of industrial noise from the development in question. This is usually assessed prior to the commencement of operations. This is the level used for assessment purposes. It is defined as the median value of all the day, evening or night assessment background levels over the monitoring period.

■ **Table 1 - Summary of Unattended Noise Survey**

Location (refer to Fig 1)	Date	Rating Background Level (RBL)			LAeq over the assessment period		
		Day	Evening	Night	Day	Evening	Night
<b>Irondale Rd</b>	25/07/06 – 07/08/06	27	25	23	43	43	38
<b>Residence</b>	25/07/06 – 07/08/06	28	25	22	55	39	37

Source: Western Rail Coal Unloader, Environmental Assessment, April 2007

As the monitoring locations are representative of noise impacts on both sides of the Wallerawang – Mudgee Main Line, it is expected that these noise levels would be representative of all nearby sensitive receivers and have been adopted at all locations.

## 2.2 Sleep Disturbance Criteria

DECC reviewed research on sleep disturbance in the NSW Environmental Criteria for Road Traffic Noise (ECRTN) (EPA, 1999). This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance.

From the research, DECC recognised that the current sleep disturbance criterion of an LA<sub>1</sub>, (1 minute) not exceeding the LA<sub>90</sub>, (15 minute) by more than 15 dB(A) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, DECC will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis may be required.

Under the DECC Industrial Noise Policy, ‘Where the existing background noise level is below 30dB(A), the figure of 30dB(A) should be assumed to be the background level.’. Therefore LA<sub>1</sub> noise criteria of 45dB(A) would apply to this development for the assessment of sleep disturbance.

## 2.3 Noise Impact Assessment

### 2.3.1 Horn Noise Impacts

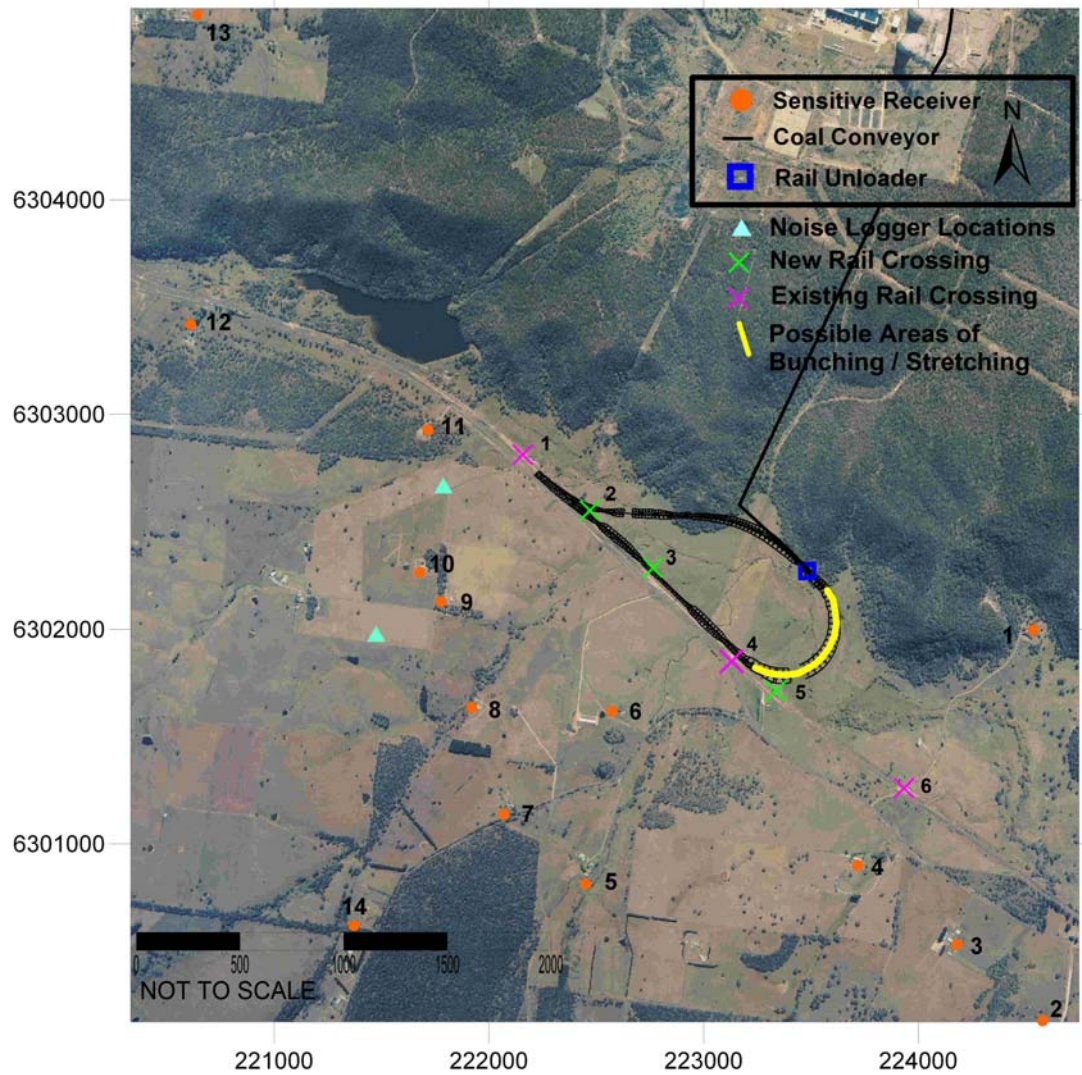
Three separate level crossings exist along the main train line in the vicinity of Pipers Flat. These crossings are encountered by all trains passing through the section. Under ARTC Operating Condition ANTR 408, trains are required to sound their horn at all level crossings, although this is not necessarily a requirement on private rail sidings or loops. For the purposes of this assessment, we have assumed that Delta will require operators to adhere to the ARTC operating condition.

Under the existing ARTC Standard Working Timetable, a single coal train is planned to pass from Wallerawang to Charbon Colliery via Pipers Flat between the hours of 23:45 and 02:26, six nights per week. It is the intention of Delta Electricity to state its preference for rail deliveries to be made during the hours of 7am to 10pm. This may not always be possible and the passing of coal trains through the coal unloading loop at night (after 10 pm) may occur. Nevertheless, the rail unloader project is not expected to result in substantial sleep disturbance impacts from horn sounding.

In any event, as horn sounding already exists during night time hours at Pipers Flat, the possible increased frequency of trains which may as a result of this development would not be expected to increase the  $LA_1$  noise level of horn blasts from trains approaching existing level crossing when assessed at nearby residential locations. The proposal will upgrade the existing crossing on to the Delta property (Site 4 on Figure 1) and provide new crossings of the loop line at the provisioning facility (Site 3), at the Y junction with the main line (Site 2) and near the wagon maintenance facility (Site 5). The crossing at the wagon maintenance facility would be located where the wagons are reversed into the shed for minor repair works and this does not appear to constitute a formal level crossing. These are shown on **Figure 1**.

Calculations have been carried out using measurements of horn blast events from coal train locomotives on the Hunter Valley Rail Network, and results calculated from each crossing have been tabled below (refer **Table 2**).

■ Figure 1 – Pipers Flat, Locality Map



■ **Table 2 - Horn LA<sub>max</sub> Predictions at Nearest Residences**

<b>Location (refer to Fig 1)</b>	<b>Predicted LA<sub>1</sub> from Y junction crossing</b>	<b>Predicted LA<sub>1</sub> from provisioning facility crossing</b>
<b>6</b>	39	42
<b>8</b>	39	38
<b>9</b>	48	38
<b>10</b>	45	37
<b>11</b>	53	35

Consideration has been given to the two level crossings that may require the horn to be sounded by trains which pass through the coal unloading loop. The Y junction crossing is close to an existing noise source (ie the existing western crossing on the main line), and it is anticipated a single horn blast will sound with both crossings. As such the proposal will not increase LA<sub>1</sub> noise levels from this location.

The development will also involve construction of the level crossing associated with the Provisioning Facility, which will be a new noise source to the area. From the calculations contained in **Table 2**, it can be seen that LA<sub>1</sub> noise levels as a result of warning horns sounded at the proposed crossing are expected to comply with the sleep disturbance guidelines at all nearby residences.

From examination of the predictions made for the Y junction level crossing, it can be seen that LA<sub>1</sub> noise levels as a result of a horn event may equal the guideline noise levels for sleep disturbance of 45dB(A) at Location 10 and exceed the guidelines at Locations 9 and 11. LA<sub>1</sub> noise levels at all other nearby residents are expected to comply with sleep disturbance guidelines.

In summary, existing residences are already exposed to train horn sounding which may result in sleep disturbance impacts and this impact will not be further increased in terms of maximum noise impacts as a result of the project. In addition the rail loop project is not introducing a new source of horn noise to the area and noise levels are not significantly above sleep disturbance criteria. Therefore the impact from this source is considered acceptable.

### 2.3.2 Bunching / Stretching Impacts

Typically bunching / stretching noise occurs during rapid deceleration or acceleration from a standing start on a downwards facing slope. Additionally bunching and stretching can occur on flat track sections during abrupt speed changes.

Operating conditions for the coal unloading loop instruct drivers to maintain a steady 1kph speed throughout the loop. Trains will slow as they enter the loop and accelerate when leaving the loop in order to rejoin the main Gulgong to Wallerawang train line.

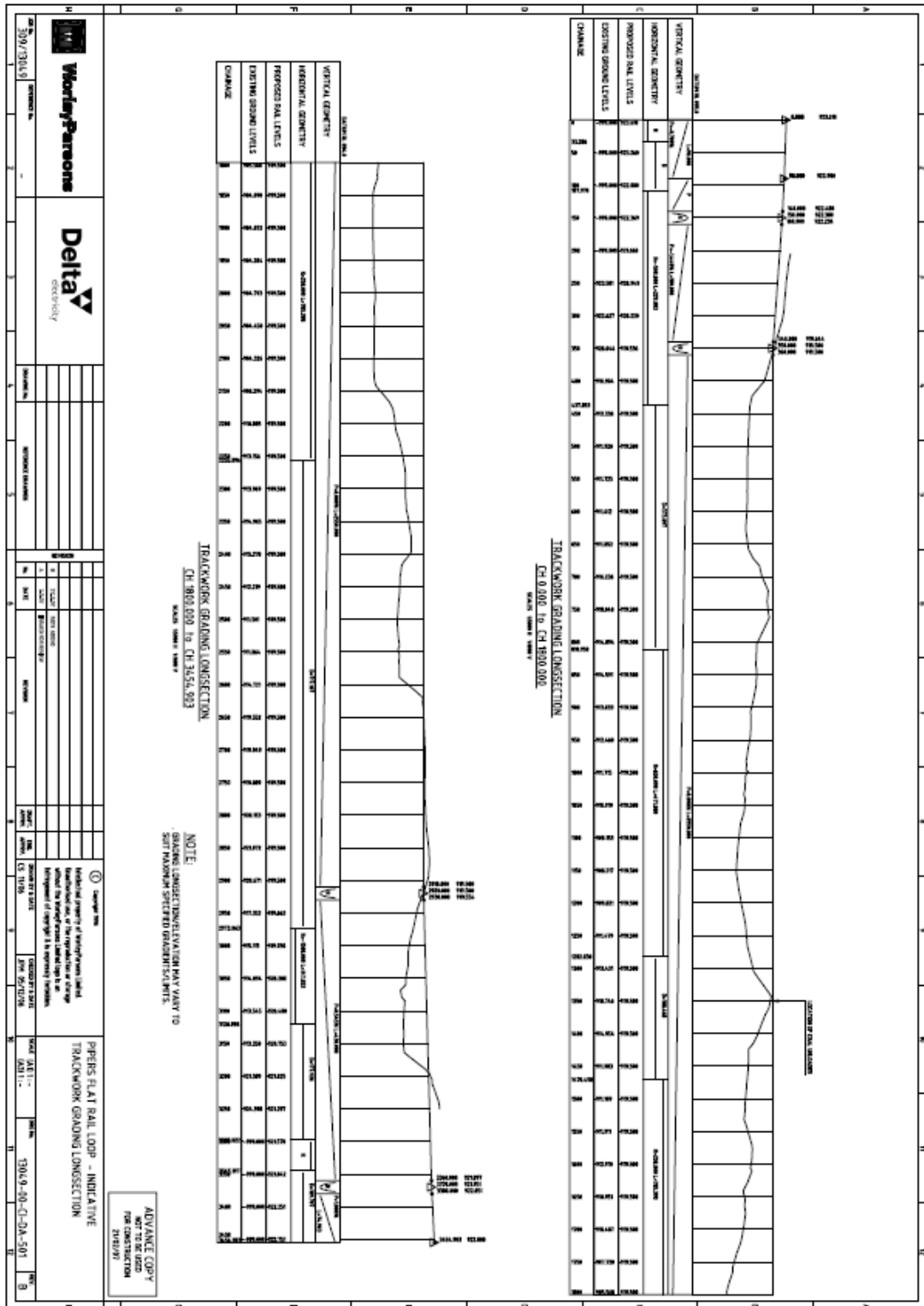
**Figure 2** shows the level diagram for the crossing loop. It can be seen that cutting and filling will be undertaken in order to maintain a minimal slope throughout the length of the loop. As the train enters the loop, it will decelerate to 1 kph on a 0.7% downhill slope. The track then levels out for approximately 2.5km. After unloading the train will accelerate out of the loop up a 0.6% slope.

As can be seen there is a potential for some low level bunching noise to occur as the train enters and exits the coal unloading facility. Stretching noise is considered unlikely as the train exits the loop, as the wagons are moving and therefore already stretched. If the train is required to stop before exiting the loop, it is unlikely that bunching/stretching noise will occur as train will stop and start on the incline near the end of the loop. Noise assessments have therefore been based on the area where bunching/stretching noise is likely to occur, that is on the curved section of track to the east of the unloading facility

Bunching and stretching noise, like the locomotive horn is predicted as a  $LA_1$  noise level. The magnitude of these types of impacts is highly variable. However, from measurements of similar low level bunching/stretching events taken from coal train wagons on the Hunter Valley Rail Network, noise levels from these events are likely to be in the range of 70dB(A) at 7 metres. The results of noise evaluation using frequency based attenuation techniques for an  $LA_1$  of this magnitude have been calculated, and estimated as below 30dB(A) at all locations.

It is noted that noise levels associated with train bunching/stretching events can be highly variable. Based on the layout and proposed operation of the proposed rail loop it is considered reasonable to assume low level noise impacts from bunching/stretching, as has been assumed in this assessment. The assessment predicts maximum  $LA_1$  noise levels of the order of 30dB(A), similar to existing background noise levels and 15dB(A) below sleep disturbance guidelines. Even where bunching/stretching noise is significantly higher than that assumed (which is considered very unlikely) impacts would be expected to be within the guideline level of 45dB(A).

■ Figure 2 – Piper's Flat Loop – Track Elevations



### **3. Conclusion**

In summary, horn noise is already a feature of the night time noise environment of Pipers Flat, and the proposed development is unlikely to contribute to this during normal operating hours. It may be necessary for a train to operate during night time hours, and if this is so there is potential for sleep disturbance guideline to be exceeded at the nearest residence to the proposed level crossing associated with the Provisioning Facility. It should be noted, however, that these properties are already subjected to a noise event of this magnitude and in some cases higher each night from a timetabled coal train.

Due to the design of the coal unloading loop, noise from bunching and stretching is unlikely to occur to any significant extent. If it is necessary to run a train after 10pm, and if a bunching and stretching event does also occur, it is unlikely that this would be audible at the most nearby residents. In an even more unlikely scenario, should a severe bunching/stretching event take place during night time hours, the associated noise impact may approach sleep disturbance guidelines at the nearest residences, but an exceedance would be unlikely.