10.0 NOISE AND VIBRATION

10.1 Introduction

This section of the Environmental Statement seeks to determine the existing noise environment along the proposed cut lines and to predict and assess the noise impact of the oil exploration and potential extraction activities and where possible, mitigate against any negative impacts.

10.2 Method of Assessment

This focus of this chapter is to assess the noise impacts associated with the seismic activities during the phase I Exploration Stage. Transportation noise is dealt as a separate topic (in **Chapter 9**). In terms of seismic activities the assessment is concerned with potential impacts to residences, population centers, wildlife and recreational users.

This assessment examined the effect of seismic activity and drilling for all properties within the 300m band of the cut lines, following the methodology of the *Design Manual for Roads and Bridges* (DMRB, 1994) with reference to Section 3, Part 7. DMRB Stage 3 noise assessment is used to predict the noise impact on the properties within the 300m band of the cut lines and to compare this impact with existing noise levels at these locations in terms of a change in noise level and potential nuisance. It can be assumed that because of sound attenuation inherent in further distance bands, noise impacts will fall well within acceptable limits for properties beyond 300m.

The methodology considers noise levels with regard to the $L_{A10,18h}$ index. This value is the noise level exceeded for 10% of the time, averaged over a period between 06:00-24:00, and this is widely considered to best represent the perceived noise impact at a location. Under low and intermittent conditions, such as the rural settings of the project area, there is no consistent relationship and L_{Aeq} values can be higher than equivalent L_{A10} values.

The consideration of noise nuisance indicates that an abrupt change in noise level will affect perceived nuisance more than the absolute level, and that a person will become more accustomed to the noise, such that there is a significantly lower threshold nuisance level in the steady state.

10.3 Baseline Conditions

All properties and noise sensitive locations within 300m of the existing and proposed cut lines have been identified within three 100 m wide bands. In general cut lines have avoided communities and populated centres entirely, however cut line SA-06-15 passes through the northwestern end of Midway Village (population 247) and cut line TE 06 03 passes through the SW end of Crique Sarco. A summary of the results of this assessment is shown in **Table 10.1** and the location where each assessment was taken is shown in **Figure 10.1**.

Table 10.1: Numbers of Residential Properties within 300m of Existing and Proposed Routes

Distance Bands	0-100 m	100-200 m	200-300 m	**Total**
Midway Village	3	2	1	**6**
Crique Sarco	0	0	2	**2**

NB: Measured from the centre of the cut line.

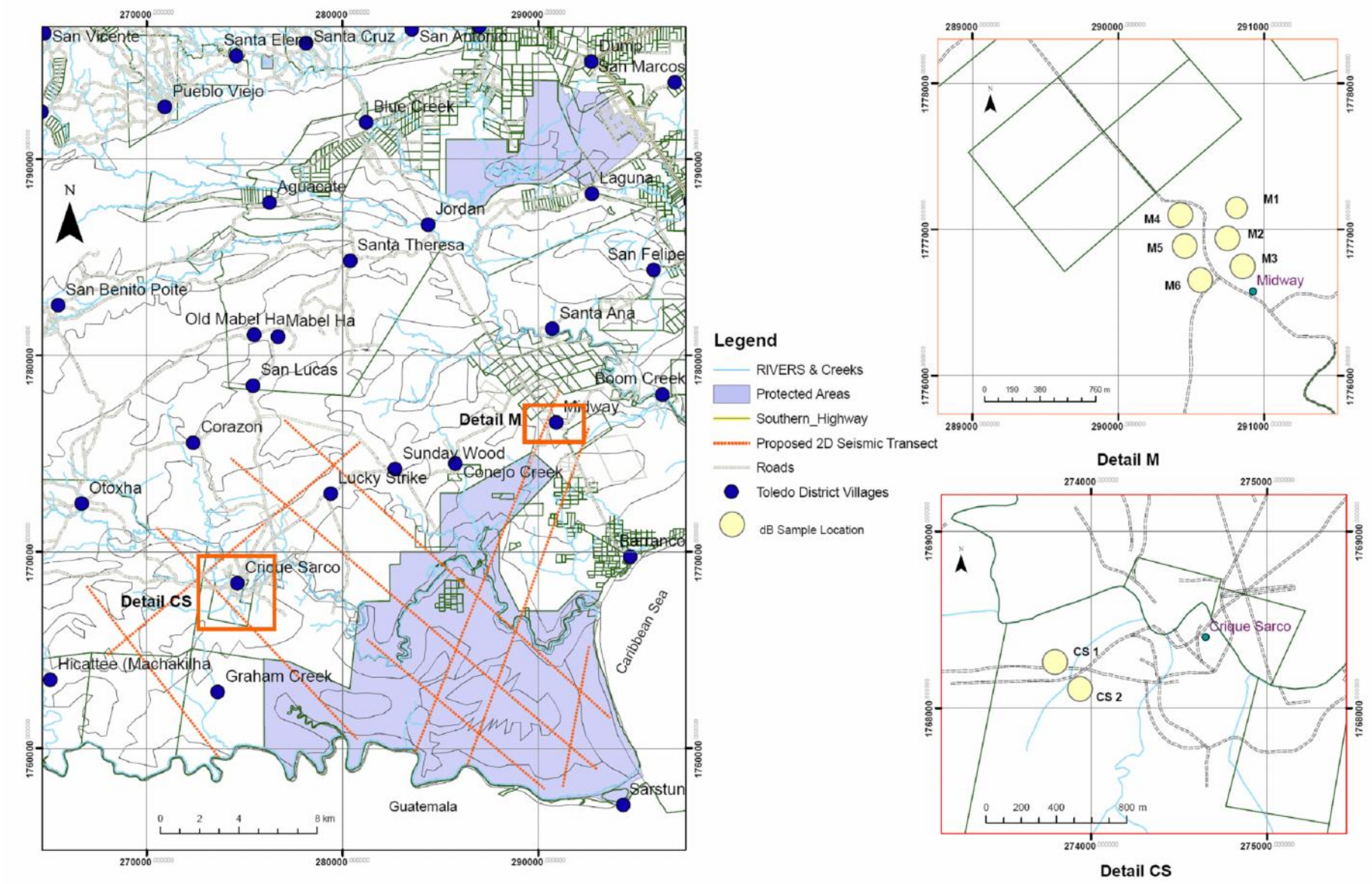

Figure 10.1: Location of residences where noise assessments were taken.

Properties closest to the lines and therefore representing the 'worst case' scenario have been identified and used to determine the noise impact of the proposed route.

Measurements presented in this report were obtained using Type 2 instrumentation, calibrated as required by the appropriate international standards and designed for the measurement of environmental noise.

The accuracy of measurements is partially dependent on weather conditions. Measurements were therefore taken when weather conditions were favourable, with all readings being recorded in dry conditions and low wind speeds. Measurements were taken over a period of approximately 15 minutes during which time the average and maximum readings were taken. Measurements were also taken at different distances from the individual residences within the 300 m band zones. The details and results of the measurements are given in **Table 10.2**.

The communities in which the measurements were taken had relatively low ambient noise levels compared to a more urbanized setting and typical of a low technology rural environment. Most noise detected was from audio devices from the homes, livestock and other domesticated animals and natural environmental actors such as birds and the wind.

Table 10.2: Noise Measurement Results of the Existing Environment

Location	Time	Run Time	Date	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
M1	10:22	00:15:05	29/03/2007	52.30	67.90	54.40	53.50
M2	10:55	00:16:04	29/03/2007	54.10	69.90	52.50	54.20
M3	11:21	00:16:01	29/03/2007	53.70	64.20	55.20	54.00
M4	11:45	00:16:22	29/03/2007	56.90	67.50	53.40	55.20
M5	12:05	00:16:14	29/03/2007	55.30	70.00	57.30	53.90
M6	14:28	00:15:01	29/03/2007	57.00	63.40	54.40	56.60
M7	15:05	00:15:02	29/03/2007	54.00	63.30	52.70	58.90
CS1	15:26	00:15:01	30/03/2007	57.90	68.20	56.90	57.60
CS2	15:43	00:15:02	30/03/2007	54.50	67.80	56.00	54.30

10.4 Potential Impacts of Proposed Scheme

Because of the calm rural setting noise levels did not decrease appreciably as one moved away from the houses but roughly remained the same. The high reading (L_{Amax}) was almost always attributable to motor vehicles passing on the road but these occurrences were infrequent and sparodic.

In assessing the noise level and potential nuisance, it is necessary to predict the noise levels due to the controlled explosions that will be used during the seismic testing and which may involve a large number of detonations being set off simultaneously according to the technical requirements of the site geologist.

The potential noise impact of the seismic survey will be compared to the ongoing noise impact of the existing background levels at the properties located at a distance from the cut lines. There are 8 typical locations which have been identified within the 300m band as shown in **Figure 10.1**, including the Midway Primary School. All other locations are residential properties with those in Midway engaged in diversified small scale agriculture while the properties affected in Crique Sarco are dedicated to cattle rearing.

10.4.1 Assessment of Seismic Noise Impact

Over the years there has been a revolution in seismic testing with the result that the operation leaves a smaller footprint and is less environmentally harmful. In terms of noise it is not expected that the noise from the explosion will be audible beyond a distance of 300m and the explosion itself will generate noise levels equivalent to 60db at a distance of 10m from the top of the drill hole.

The reason for the low noise level is on account of the fact that the hole for the charge is drilled down to a distance of approximately 7m after which the charge is placed and the hole above it compacted. This is to ensure that the impact from the seismic waves resulting from the explosion travels downwards to the rock layers and allow the testing equipment to gather necessary data to study the geological formations. As a result of this approach the noise from the explosion is muffled above ground and attenuated by the earth barrier and moisture within the ground.

10.4.2 Potential Vibration Impact

The ToR for this study requires that the effects of vibration levels are examined in terms of their impacts on the environment including human habitations. Because of the nature of the seismic survey (using underground charges instead of on-the-surface thumping) vibration impacts will be low. Since there will be few dwellings within 50m of the proposed drill sites any impact from this source on people and buildings will be negligible. In addition the wooden construction and resilient nature of the Maya construction methods to withstand vibration impacts should be noted.

Airborne vibration is more likely to cause disturbance than ground-borne vibration, but both sources of vibration will cause less disturbance than noise, and are applicable within a shorter distance from the detonation site. Empirical data suggests that vibration levels will be less than 0.5mm/s at the majority of properties and this should represent "low probability of adverse comment" by residents since this vibration level is not of a severity that might cause any structural damage to property.

10.5 Mitigation Measures

Mitigation Measures for Construction Noise and Vibration

There are a number of mitigation measures which are considered appropriate and of good working practice for all construction contracts which involve work producing noise and vibration impacts.

Choice of Plant

The contractor should take note of the control measures for relevant plant and apply the appropriate measures where practicable. The only potential source of disruptive noise from plant is from the electric generator. The electric generator will only be used to run the drill for the seismic holes if the air compressor mounted on the boat or in trucks is not able to reach certain locations. This is highly unlikely given the fact that it is possible to connect the compressors in series to reach beyond 2km from the first compressor. It is even more unlikely that even if generators are used that the location of use will be near to residences. However if they are used there is good probability that they can cause disturbance to wildlife

especially if used in the park. In the unlikely event that noise from the generator becomes an issue the following are forwarded as mitigation measures. These measures should include:

- Positioning of static plant as far as possible from residential properties, and utilising available screening by temporary structures, stock piles, etc.
- Use of well maintained plant, and where possible new plant manufactured under stricter guidelines as mandated under new regulations.
- Maintenance of silencers and moving components.

Screening

Since the cutlines run past residential homes and charges will be placed every 50m there is a higher probability of adverse impact from this activity. Temporary screening using sandbags, 20mm plywood sheeting or similar dense boarding may be required to reduce impact of explosion close to noise sensitive locations. Such measures can be best assessed during the contract by monitoring.

Appointment of a Responsible Person

It is recommended that the contractor should appoint or delegate a 'responsible person' who will be present on site and who will be willing to answer and act upon queries from the local public.

Night Works

It is not anticipated that the project will require works to take place outside normal hours. Although night work will not be required during the seismic study, it is quite likely that work will be extended outside normal hours. Where this occurs, activities during this out of hours period should not produce noise exceeding 45 dB LAeq whenever work must take place in the vicinity of residences. This level is based on the World Health Organisation criteria for undisturbed sleep, and assumes a resident may have a partially open window.

10.6 Summary and Conclusions

The potential noise impact of the seismic activity has been assessed and a number of mitigation measures and good practice guidelines provided to minimise noise impact.

The potential noise impact of the seismic test will generate noise well below the accepted upper limits that would require mitigation measures such as screening. Vibration impacts will be minimal and will not require any mitigation measures. Notwithstanding this, a set of good practice guidelines has been proposed for the developer and his cohorts to follow.