6.0 NOISE AND VIBRATION

6.1 INTRODUCTION

This Chapter assesses the impacts from noise and vibration that may arise as a result of the construction and operation of the Airport and Supporting Infrastructure. A detailed assessment is presented in Appendix 6, Volume 4. Many construction and operation phase activities have the potential to cause varying degrees of disturbance, depending on the scale of activity and proximity to sensitive receptors. Therefore, control and mitigation measures must be adopted through the use contractual requirements.

Potential impacts during the key phases of the development will include:

- Impact from **construction activities** – including construction of haul/access route, Rupert's Bay wharf and airport;
- Impact of **construction traffic movements** along haul/access routes and at the airport;
- Impact of **quarrying** operations in Rupert's Valley to provide materials for wharf construction; and
- Impact of the **operations** of the airport including aircraft.

6.2 METHODS

6.2.1 Policy Guidance

St Helena has little specific Island legislation or guidance on the assessment and control of noise. Consequently, in the absence of such local legislation or guidance, UK standards and guidelines have been applied to the extent possible.

Whilst UK research and studies may not be entirely representative of demographic, sociographic or even geographic conditions on St Helena, any differences in relation to similar low populated environments in the UK are likely to be marginal.

6.2.1 Disturbance Criteria

6.2.1.1 Construction Noise

In the UK, there are no statutory noise limits for construction activities. Criteria commonly applied to civil engineering contracts are shown in Table 6.1. Justification for these limit criteria is detailed in Section 6.2.1.3 of Volume 4 of this ES.

Table 6.1 Criteria for Evaluating the Impacts of Noise during Construction

Period	Day $L_{Aeq,11hour}$ (0700-1800)	Evening $L_{Aeq,5hour}$ (1800-2300)	Night $L_{Aeq,8hour}$ (2300-0700)
Noise level limit, dB	75	60	45

All values are in dB re 2μPa

6.2.1.2 Construction Vibration

Based on current guidance the recommended vibration level criteria for this project have been simplified in Table 6.2 below. Justification for these limit criteria and the

descriptions of the potential effects of vibration is detailed in Section 6.2.1.4 of Volume 4 of this ES.

Table 6.2 Vibration Control Limits for Protection of Persons and Buildings and Structures during works

Peak Particle Velocity (mm/sec)	Limit Value	Action
<1.5 day <0.5 night	Manage subjective response e.g. notify occupiers of building of commencement of works	Monitor and record vibration levels
7.5	Visually inspect during progress of works to check for damage	Monitor and record vibration levels
15	Stop works	-

6.2.1.3 Airport Operational Noise

Noise from airports can be categorised as being due to either groundside or airside operations. Most airport noise pollution problems are concerned with airside operations in general and take-off and landing operations in particular. However, given the infrequency of aircraft movements proposed, these activities will be much less significant, with other sources such as passenger and staff road traffic and other vehicle movements becoming more dominant.

The impacts of each of the various operations resulting from the airport have been assessed in a number of ways. As a starting point, it is common to begin by establishing the difference in noise level before and after the airport opens. Having deduced the change in noise level, the next step is to establish whether or not the change in noise level causes a noise impact, and to what degree that impact is significant. For a simple case, the judgement can be made on the basis of difference in noise levels and by determining:

- Whether the noise change is noticeable; or
- Whether, if the change is noticed, will it be large enough to cause a significant effect; or
- Whether it is a sufficiently large enough change that it would potentially cause a significant alteration in annoyance or disturbance.

Table 6.3 below provides a description of the potential significance of changes in noise level, as described above.

Table 6.3 Significance of Changes in Noise Level

Significance	Change in noise level (dBA)	Response
Negligible	(±) <3	Hardly noticeable
Positive or negative not significant impact - minor	(±) 3-5	Noticeable
Positive or negative moderately significant impact - moderate	(±) 6-10	Up to a doubling or halving of perceived loudness
Positive or negative substantially significant impact - major	(±)11-15 (±) >15	Over a doubling or halving of perceived loudness

All values are in dB re 2µPa
Adapted from Arup Environmental 1993 and Morris & Therivel 2001

In addition, the significance of changes in noise levels can generally also depend on the number of people affected and the degree to which they are affected.

6.3 EXISTING CONDITIONS

6.3.1 Description of Baseline Conditions

Due to its largely undeveloped nature, the existing acoustic climate on the island of St Helena is typically very quiet, and comparable with rural locations in the UK. The only notable anthropogenic noise sources include occasional road traffic, industrial/commercial activities and from the people themselves. In undeveloped and unpopulated areas, noise from birdsong, movement of vegetation in the wind and wave-breaking are the only other significant contributions to ambient acoustic climate.

Short-term measurements of the existing noise levels have been undertaken at eight locations representative of the main development areas associated with the scheme (see Figure 6.1, Volume 3). Noise monitoring data is provided in Appendix 6, Volume 4 of this ES.

6.4 IMPACT ASSESSMENT

6.4.1 Construction Impacts

Given the mostly undeveloped nature of the Island, the introduction of a large-scale construction project will clearly have adverse noise and vibration effects during that period. The effects will vary significantly at each receptor location as the phasing of construction progresses. The predicted impacts, however, are entirely restricted to the construction phase, and reversible once complete.

The initial phase will primarily affect sensitive receptors in Rupert's Valley, as it includes the construction of:

- A temporary jetty in Rupert's Bay.
- The haul road / permanent airport access road.
- The bulk fuel installation.
- The Rupert's Valley contractor compound areas.
- The temporary quarry.

During this initial period of construction when the wharf and access road are likely to be built and the quarry will be active, local residents and other sensitive receptors in Rupert's Valley will be exposed to short-term **moderate** impacts as access, enabling and other infrastructure works are undertaken. These impacts will primarily be due to noise from the movement of heavy vehicles accessing the temporary jetty site in Rupert's Bay, as well as very short duration blasting noise and vibration impacts from within the temporary quarry and as part of the haul road construction on Rupert's Hill. **Moderate** short-term vibration and air overpressure impacts are also predicted as a result of blasting operations, as receptors may notice minor motion of window panes or loose ornaments. These impacts will be managed by restricting working hours, and controlling timing and frequency of blasting events.

Although the wharf will continue to be used during construction for the landing of plant, personnel and materials the impacts within Rupert's Valley will reduce significantly.

Due to the more remote location of the airport site at Prosperous Bay Plain, the potential impacts on people during this phase of works will be of **minor** significance for the majority of the 30 month period. It is predicted that residents of Government Garage at Bradleys will be exposed to **negligible to minor** short-term impacts. These will primarily be associated with major earthworks (including blasting) during airfield site levelling and, to a lesser extent during construction of the contractor's compound north of Bradleys Government Garage (if required). Again, these impacts will be managed by controlling timing and frequency of blasting events. It has been assume that although the working hours on Prosperous Bay Plain are unrestricted it is expected that sources of night time noise would be limited to vehicles moving staff between the camp and the main airfield works site.

The identified noise and vibration impacts during the project construction phase are summarised in Table 6.4 below. Detailed assessments and discussion is provided in Section 6.4 of Volume 4.

Table 6.4 Construction Impacts/Mitigation/Monitoring and Residual Impacts

Development Phase	Description of Potential Impact	Classification of Potential Impact	Significance Without Mitigation	Proposed Mitigation Measures	Residual Impact
Temporary & Permanent Wharf	Noise from dump trucks delivering fill and rock armour	Short-term, temporary, reversible	Moderate adverse	Haul road sealing prior to use Repair of pot-holes. Restrictions on working hours.	**Moderate adverse**
	Vibration from dump trucks delivering fill and rock armour	Short-term, temporary, reversible	Minor adverse		**Minor adverse**
Contractor Compound Areas in Rupert's Valley	Noise from loading/unloading operations	Short-term, temporary, reversible	Minor adverse	Erection of 2.4m hoardings / barriers. Sensitive locating of loading/unloading sites. Plant maintenance. Restrictions on operating hours.	**Minor adverse**
Bulk Fuel Installation	Noise from delivery of building materials and plant	Short-term, temporary, reversible	Minor adverse	Haul road sealing prior to use. Repair of pot-holes. Restrictions on working hours.	**Minor adverse**
Temporary Quarry	Noise from normal quarry operations	Short-term, temporary, reversible	Negligible	Good plant maintenance. Restrictions on operating hours.	**Negligible**
	Noise from blasting operations	Short-term, temporary, reversible	Moderate adverse	Control of timing and frequency of events. Good communication.	**Moderate adverse**
	Vibration and air overpressure from blasting operations	Short-term, temporary, reversible	Moderate adverse	Control of timing and frequency of events. Good communication.	**Moderate adverse**

Development Phase	Description of Potential Impact	Classification of Potential Impact	Significance Without Mitigation	Proposed Mitigation Measures	Residual Impact
Access Haul Road	Noise at haul road construction sites	Short-term, temporary, reversible	Moderate to major adverse	Erection of temporary screens. Good plant maintenance. Limit plant idling. Sensitive locating of loading/unloading sites. Restrictions on working hours.	**Minor to moderate adverse**
	Vibration at haul road construction sites	Short-term, temporary, reversible	Minor adverse		**Minor adverse**
	Noise from blasting operations	Short-term, temporary, reversible	Moderate adverse	Control of timing and frequency of events. Good communication.	**Moderate adverse**
	Vibration from blasting operations	Short-term, temporary, reversible	Moderate adverse		**Moderate adverse**
	Noise from construction traffic	Short-term, temporary, reversible	Moderate adverse	Sealing roads near sensitive receptors. Repair of pot-holes. Restrictions on working hours.	**Minor adverse**
	Vibration from construction traffic	Short-term, temporary, reversible	Minor adverse		**Minor adverse**
Prosperous Bay Airfield	Noise from airfield construction	Short-term, temporary, reversible	Negligible	Good plant maintenance. Restrictions on working hours.	**Negligible**
	Noise from blasting operations	Short-term, temporary, reversible	Minor adverse	Control of timing and frequency of events. Good communication.	**Minor adverse**
	Vibration and air overpressure from blasting operations	Short-term, temporary, reversible	Minor adverse		**Minor adverse**
Construction Compound/ Camp	Noise from contractor's compound construction	Short-term, temporary, reversible	Moderate adverse	Erection of 2.4m hoardings / barriers and careful design of layout of compound.	**Minor adverse**
	Noise from general occupation of compound	Short-term, temporary, reversible	Minor adverse	Sensitive site layout, including locating of plant storage areas.	**Negligible**
	Noise from road traffic during compound occupation	Short-term, temporary, reversible	Negligible to minor adverse	None	**Negligible to minor adverse**
	Noise from construction of any temporary airstrip	Short-term, temporary, reversible	Negligible	Good plant maintenance. Restrictions on working hours.	**Negligible**
	Noise from use of any temporary airstrip	Short-term, temporary, reversible	Minor adverse	Restrictions on flight times and flight paths	**Negligible**
Water Supply	Noise from installation activities	Short-term, temporary, reversible	Negligible	Good plant maintenance. Restrictions on working hours.	**Negligible**

Development Phase	Description of Potential Impact	Classification of Potential Impact	Significance Without Mitigation	Proposed Mitigation Measures	Residual Impact
Ancillary Components	Noise from installation activities	Short-term, temporary, reversible	Negligible	Good plant maintenance. Restrictions on working hours.	**Negligible**

6.4.2 Operational Impacts

Once operational, noise and vibration impacts from aircraft movements, apron operations and generated road traffic would be negligible, given the proposed frequency of flights. Once fully constructed, it is proposed that initially one flight per week will operate out of the airport. Over the first 35 years of operation, it is forecast that this will increase steadily up to 10 flights per week. To support these operations, aviation fuel and gas oil, delivered to the Island by sea to Rupert's Bay and stored at the proposed bulk fuel installation, will be delivered overland by bowser trucks. In addition, it is forecast that passenger, staff and tourist traffic on the airport access road will increase from 400 to 1330 vehicles per day, as a maximum, over the same initial 35 year period. The predicted noise and vibration impacts on the human population of St Helena due to these noise sources, and all other ancillary infrastructure associated with the project, once operational would be negligible.

The identified noise and vibration impacts once the St Helena Airport and supporting infrastructure are fully operational are summarised in Table 6.5 below. Detailed assessments and discussion is provided in Section 6.5 of Volume 4.

Table 6.5 Operation Impacts/Mitigation/Monitoring and Residual Impacts

Development Phase	Description of Potential Impact	Classification of Potential Impact	Assessment of Significance Without Mitigation	Proposed Mitigation Measures	Residual Impact
Airborne Aircraft	Noise from aircraft landings, take-offs and flyovers on residents	Long-term, permanent, reversible	Minor adverse	Management of timing and frequency of flights. Use of Preferred Noise Routes.	**Negligible**
	Noise from aircraft landings, take-offs and flyovers on seabird colonies	Long-term, permanent, reversible	Minor adverse		**Minor adverse**
Airside Ground Noise	Noise from general apron operations	Long-term, permanent, reversible	Negligible	Good plant maintenance. Restrictions on working hours.	**Negligible**
Road Traffic Noise	Noise from passenger and staff vehicles accessing the airport	Long-term, permanent, reversible	Negligible	Management of timing and frequency of flights. Sealing of the airport access road.	**Negligible**

6.5 SUMMARY

During construction the most significant impacts are predicted to occur during the initial stages of construction at residential properties which are close to works in Rupert's Bay and Rupert's Valley. This is when the wharf and access road are likely to be built and the quarry will be active., **Moderate** adverse noise and vibration impacts are expected at sensitive receptor locations in Rupert's Valley and at Deadwood. For the remainder of the construction programme, **negligible to minor** impacts are predicted at all affected receptor locations. This is because the major construction activities will occur in more remote areas, primarily at the airport site on Prosperous Bay Plain. These impacts will be temporary and completely reversible. Where practicable, impacts will be minimised at source by good working practice in accordance with published guidance. However, some operations, e.g. blasting, will generate residual noise and vibration which will be significant given the lack of similar sources of noise on the Island. Disturbance impacts will be managed by a number of measures, including: control of working hours and, frequency and timing of blasting events.

Once constructed, it is predicted that operations at the airport, and all other built infrastructure included within this project, will have **negligible** noise and vibration impacts on people and buildings on the Island. This is because of: the low number of flights per week; the routes that aircraft will take to avoid flying over people's homes; the timing of flights to avoid periods when most people are sleeping; and the use of defined routes in and out of the airport to reduce traffic in residential areas.