

equipment which will be operating during commissioning phase. This indicates a total of nine (9) airborne noise monitoring locations during commissioning phase.

The airborne noise level monitored shall comply with the *NEA's Technical Guideline on Boundary Noise Limits for Air Conditioning and Mechanical Ventilation Systems in Non-Industrial Building*, however, noise criteria for biodiversity shall follow a "no worse off than baseline criteria" shall be complied. The current set of Project-specific noise criteria based on baseline noise monitoring in Year 2020 is provided in Table 13-10 below for reference and/or basis of comparison if there is no further update hereafter.

Table 13-10 Project-Specific Noise Criteria for Commissioning Phase (Baseline Measured in Year 2020)

No.	Types of Affected Receptors	L _{Aeq} (15 min), dB		
		7am-7pm	7pm-11pm	11pm-7am
Maju Forest	Ecologically sensitive receptors	48	49	42
Clementi Forest (Southern)		48	49	42
Clementi Forest (Northern)		66	66	60
*Notes: 1. Ecological receptor noise impact to be assessed against the baseline noise level as the noise criterion. 2. If there are any noise monitoring works being conducted hereafter, i.e. during actual pre-construction phase (i.e. before actual site clearance) and/or pre-commissioning phase, this Project-specific noise criteria (no worse off than baseline approach) shall be updated accordingly and be complied on site.				

13.10.3 Operational Phase

During operational phase, airborne noise monitoring and audit are not required. General housekeeping and environmental management measures shall be applied.

In general, the Rail Operator shall ensure the implementation of minimum control measures according to the relevant legislations (i.e. *NEA's Technical Guideline on Boundary Noise Limits for Air Conditioning and Mechanical Ventilation Systems in Non-Industrial Building* and *Technical Guideline for Land Traffic Noise Impact Assessment*), as well as the proposed mitigation measures where the key ones are summarised in Section 13.13.3. If there are any noise monitoring works to be carried out at Maju Forest and Clementi Forest during operational phase in future, the same no worse-off than baseline noise criteria (see Section 13.10.2) shall be complied.

13.11 Ground-borne Vibration EMMP Requirements

This section details ground-borne vibration EMMP requirements during construction, commissioning and operational phases.

13.11.1 Construction Phase

During the construction phase, the Contractor shall control construction vibration levels using the best available techniques (BAT). The Contractor shall ensure that the vibration levels for any construction activities at Maju Forest and Clementi Forest (excluding the worksite area) do not exceed Peak Particle Velocity, PPV, 8 mm/s.

Additional requirements are required during rock breaking and excavation stage (Stage 2) and tunnel boring (Stage 2) planned for the worksites at Maju and Clementi Forest as outlined in Section 13.11.1.1 below.

13.11.1.1 EMMP for Structural Integrity of Burrows

The Contractor shall control construction vibration levels using the best available techniques (BAT). The construction activities include tunnel boring and rock breaking and excavation during Stage 2. The Contractor shall ensure that the vibration levels for any construction activities at Maju Forest and Clementi Forest (excluding the worksite area) do not exceed Peak Particle Velocity, PPV, 8 mm/s.

A ground-borne vibration monitoring program will need to be implemented before commencement of construction works (for 1 week period) and throughout rock breaking and excavation, piling and tunnel boring activities during construction phase, please refer to Table 13-11.

Table 13-11 Recommended Monitoring Program during Construction Phase (Ground-borne Vibration)

Location (see Figure 13-16)	Parameters	Frequency and Duration
Clementi and Maju Forest: One (1) monitoring location each at Clementi and Maju Forest	Peak Particle Velocity, PPV, mm/s	<ul style="list-style-type: none"> • Prior to site clearance: To conduct one-time (i.e. 1-week period) continuous vibration monitoring (Triaxial with 3G remote communication) at these locations to re-establish the baseline vibration levels for reference/comparison purposes before any construction works commence. • During construction phase: Continuous monitoring at this location during rock breaking and excavation, piling and tunnel boring activities.

Additionally, an Ecologist and Environmental Officer shall be present to survey for burrows before any construction activities. If burrows are detected within the Biodiversity Study Areas, camera traps should be deployed to assess fauna activity. If there are no burrows or fauna activity detected, construction works can continue.

13.11.1.2 EMMP for Behavioural Impacts of Ecologically Sensitive Species

During rock breaking and excavation stage (Stage 2) and tunnel boring (Stage 2), the Ecologist shall monitor for any fauna behaviour (e.g. dashing onto the road) resulting in road-kill incidents for at least thirty (30) minutes after the event. In addition, there shall be Ecologists present to observe fauna movements during these construction activities. Suppose fauna is seen trying to dash onto the road. In that case, construction activities will be immediately suspended, and mitigation measures should be applied to prevent such events from happening in the future.

At Maju and Clementi Forest, before the construction activities commence, a 220 m long temporary barrier (e.g. water-filled barrier of 1 m height) shall also be set up at specific locations along Clementi Road for pipe jacking (Advance Works). The Client has confirmed on 31st May 2022 that Brookvale Drive will still be under construction during Advance Works. Hence, existing hoardings will be present to replace water barriers during this stage. Where there are no hoardings from Brookvale Drive leading to Clementi Road, water barriers have to be implemented. More water barriers will have to be added along Clementi Road at Stage 2 when rock breaking and excavation, and tunnel boring begin. At this stage, the temporary barrier should have a total length of 480 m. In addition, 635 m of the permanent BRC fences along Brookvale Drive from a residential project must also be covered with canvas sheets. At Advance Works and Stage 2, hoardings must be included at the worksites, and canvas sheets must be added onto existing railings (220 m long) along Clementi Road to cover holes on the railings. These potentially mitigate roadkills due to the impacted fauna trying to dash onto a road during construction. The temporary barriers are shown in Figure 13-16.

Lastly, no night work should be conducted after 7 pm for all non-safety critical activities since the site is next to the sensitive receptors.