

මධ්‍යම පරිසර අධිකාරිය  
மத்திய சுற்றாடல் அதிகாரசபை  
Central Environmental Authority



පරිසර පියස, 104, ඩෙන්සිල් කොබ්බෑකඩුව මාවත, බත්තරමුල්ල, ශ්‍රී ලංකාව.

“பரிசர பியச”, 104, டென்சில் கொப்பேகடுவ மாவத்தை, பத்தரமுல்லை, இலங்கை.

"Parisara Piyasa", 104, Denzil Kobbekaduwa Mawatha, Battaramulla, Sri Lanka. Web: www.cea.lk

අපේ යොමුව  
எமது தொடர்பு }  
Our Ref.

08/EIA/TRANS/01/2017

ඔබේ යොමුව  
உமது தொடர்பு }  
Your Ref.

දිනය  
திகதி }  
Date

24 July 2018

Secretary  
Ministry of Megapolis & Western Development  
17<sup>th</sup> Floors, "Suhurupaya "  
Battaramulla.

**PROPOSED COLOMBO LIGHT RAIL TRANSIT (LRT) PROJECT  
FROM COLOMBO FORT TO MALABE**

This is to inform you that the Central Environmental Authority (CEA), after study of the Environmental Impact Assessment (EIA) report dated April 2018 of the above project, review of the comments received from the public and your responses to such comments dated 05<sup>th</sup> and 11<sup>th</sup> July 2018 and your responses for the clarifications sought by the Technical Evaluation Committee (TEC) appointed by the CEA submitted as an Addendum dated 18<sup>th</sup> July 2018, has decided in terms of regulation 13 of the National Environmental (procedure for approval of projects) Regulations No. 01 of 1993 to grant approval for implementation of the above project subject to the following conditions.

**1. GENERAL CONDITIONS**

- 1.1. This environmental approval is valid for implementation of the proposed Colombo Light Rail Transit Project by the Ministry of Megapolis & Western Development (MM&WD) as described in the EIA report dated April 2018 and the Addendum dated 18<sup>th</sup> July 2018.
- 1.2. This approval is valid for three years from the date of issue of this letter unless upon written application to the CEA within thirty days prior to the expiry date, the validity period is extended.
- 1.3. The railway track, the depot and the stations should be sited as described in Figure 2.2 of the EIA report dated April 2018.
- 1.4. The MM&WD should where necessary obtain fresh approval, in respect of any alterations that are intended to be made to the project as described in the EIA report dated April 2018 and the Addendum dated 18<sup>th</sup> July 2018.

<b>Chairman</b>	Tel : 2872361, 2872348 Fax : 2872347	<b>Director General</b>	Tel : 2872359 Fax : 2872608	<b>General Office</b>	Tel : 2872278, 2873447, 2873448 7877277-280	Complaint: 2888999 Compliance Monitoring: 2076152
<b>Deputy Director Generals</b>	<b>HRD. Admin. &amp; Finance</b> Tel : 2865296 Fax : 2877515	<b>Envt. Pollution Control</b> Tel : 2873453 Fax : 2872605	<b>Envt. Mgt. &amp; Assess.</b> Tel : 2872388 Fax : 2872296	<b>Envt. Edu. &amp; Awareness</b> Tel : 2872297 Fax : 2872609	<b>Waste Mgt.</b> Te: 287249 Fax: 2882152	



- 1.5. Any physical development of the site should have prior approvals of the Road Development Authority (RDA), Urban Development Authority (UDA) and Municipal Councils of Colombo, Sri Jayawardanapura-Kotte and Kaduwela.
- 1.6. The MM&WD shall ensure that the terms and conditions stipulated in this environmental approval letter are adhered to and shall have full control over a third party that may be involved in project implementation. The CEA should have access to the agreements/contract documents pertaining to environmental aspects entered into by the MM&WD and any third party.
- 1.7. The MM&WD shall intimate to the CEA the date of commencement of construction activities of the project inclusive of the implementation schedule.
- 1.8. A copy of this environmental approval and the EIA report dated April 2018 and the Addendum dated 18<sup>th</sup> July 2018 should be kept at the project site/s for the purposes of perusal by concerned agencies.
- 1.9. It is the duty of the MM&WD to inform the CEA of any adverse environmental impacts which may arise during implementation of the project which are not anticipated at this stage. In such an event, the relevant guidelines and necessary mitigation measures should be implemented by the MM&WD as directed by the CEA. The MM&WD should ensure that such impacts are properly assessed and addressed even at a later stage of project implementation.
- 1.10. The CEA reserves the right to cancel/ suspend/ withdraw this environmental approval in the event of major environmental and/or social problems arise due to implementation of the project or in a situation where the surrounding environment has been altered or changed due to natural factor or otherwise.
- 1.11. This approval is granted on the basis that all information provided by the MM&WD is true and accurate. If at any time it is found that any information furnished by the MM&WD in the EIA report dated April 2018 and the Addendum dated 18<sup>th</sup> July 2018 is incorrect, this authority reserves the right to cancel the approval.
- 1.12. The MM&WD should bear the cost incurred in complying with the conditions stipulated in this environmental approval and/or in complying with any additional conditions stipulated by the CEA as and when required during implementation of the project.





## 2. NOISE & VIBRATION AND AIR QUALITY IMPACTS

- 2.1. Construction noise of the project shall be considered generally in accordance with the National Environmental (Noise Control) Regulations No 01 of 1996 in line with the provisions of the NEA.
- 2.2. Operation noise of the LRT project shall be considered generally in accordance with the CEA's Guideline for Assessment Criteria for LRT projects (Attachment 1) and noise level at the operational stage shall be complied with the limit set out in the said guideline.
- 2.3. Noise level monitoring programme for construction shall be carried out in accordance with requirement of the condition 2.1 above, and noise level monitoring programme for operational stage shall be carried out in accordance with requirement of the condition 2.2 above and necessary mitigation actions to be employed when and where necessary.
- 2.4. Multistory human settings located close proximity, receiver's affect and receiver's sensitivity on noise shall be considered and addressed.
- 2.5. All effort should be taken to address construction stage noise impacts based on the source control technique and regular equipment inspection and maintenance programme shall be undertaken. In the event of source control technique is not applicable; site control, time and/ or activity management system and/ or selecting of appropriate combination of machinery and equipment shall be incorporated with construction activities.
- 2.6. Predicted construction noise levels indicated at the EIA report dated April 2018 should be validated and verified at field and to take action to rectify any issues giving especial attention to locations where type two fence barriers suggested for abatement of impact of construction noise.
- 2.7. Noise generated from wheel squeal when operation of the light rail system to be monitored and management mechanism for addressing wheel squeal noise to be employed where necessary. Night time noise management should be done by adopting appropriate light rail operation management system and/ or adopting suitable noise control devices and/or their combinations.



- 2.8. Construction stage vibration levels shall be monitored and assessed generally in accordance with the Proposed Air-blast Over Pressure and Ground Vibration Standards published by the CEA. In the event of results are given in decibels, such result to be converted into part particle velocity (PPV) mode, and converted values should be indicated.
- 2.9. Prior to commence construction, distance and structure sensitivity based risk category map shall be formulated considering human and public settings outside to the project boundary and proper monitoring programme to be employed based on the said map.
- 2.10. In prior to commence constructions a physical structure condition survey including existence of cracks shall be done and crack survey shall be performed in regular manner. In case of it will be determined developing of cracks in any building/ structure frequency of the survey shall be modified and immediate actions to be taken to address the issue identified.
- 2.11. Bored pilling should be employed for pilling activities required for deport area and in the event of bored pilling is not applicable; impact based pilling schedule to be prepared so as to cause minimum vibration effect and pilling should be done in accordance with the schedule. A copy of such pilling schedule to be submitted to the CEA.
- 2.12. Predicted vibration levels for construction stage indicated at the EIA report dated April 2018 should be validated and verified at field and to take action to rectify any issues giving especial attention to locations where depots to be constructed, archeological sites and hospital comprising operation theaters.
- 2.13. All effort should be taken to address construction stage vibration impacts based on the source control techniques and regular equipment inspection and maintenance programme will be undertaken. In the event of source control technique is not applicable; site control, time and activity management system and/ or selecting of the best combination of machinery and equipment shall be incorporated with construction activities giving especial attention to piling and compaction activities.





- 2.14. Monitoring vibration effect for human (human annoyance of vibration) should be done when and where necessary and remedial actions to be taken considering the limits indicated in the table 4.1.5 of the EIA report dated April 2018.
- 2.15. The MM&WD shall assign a public relation officer/s, and design and implement a communication and public grievances handling protocol for the public to provide information, to voice concerns and to make complaints.
- 2.16. In prior to commence the construction activities, the MM&WD shall develop an Environmental Management Plan including the exact way of monitoring of construction and operational noise and vibration, and envisaged issues management system.
- 2.17. Proper record keeping system shall be adopted and a summary of the same with a periodic report shall be provided to the CEA in regular manner and made available for inspection by affected parties and the authorized officials.
- 2.18. Project proponent shall incorporate with bid and contract documents a proper mechanism ensuring the assessment and mitigation of potential noise and vibration impacts arise in construction stage of the project.
- 2.19. No construction activities to be performed in densely populated areas during 09.00 p.m. to 06.00 a.m. and any alteration to the said restriction to be done in consultation of relevant authorities, and special events of adjacent social environment should strictly be considered during construction.

### **3. TRAFFIC IMPACTS**

- 3.1. A comprehensive traffic impact assessment should be carried out during the detailed design stage to assess the different scenarios of stage wise construction, traffic diversion option for each construction phase and its impacts on network traffic flow as proposed in the EIA report dated April 2018. A Traffic Management Plan should be drawn up for each stage of construction based on the findings of the above assessment. This study should be conducted with the participation of other relevant agencies such as relevant Local Authorities, RDA, UDA and Traffic Police.
- 3.2. Accessibility to private lands shall not be disturbed due to project activities/ structures.



- 3.3. The structures (pillers) of the elevated rail should be constructed in such a way with minimum or no disturbance to the pedestrian area where the elevated rail occupies part of the pedestrian area. The walkability and safety of pedestrian should be ensured during the constructional stage. The pedestrian space should be kept thought out the section and the width of pedestrian walkways shall comply with the standards of the RDA.
- 3.4. Additional lands should be acquired from both sides wherever required to ensure the uninterrupted traffic movements.
- 3.5. Adequate precautions should be taken to minimize the congestion raised during the operational stage as a result of reduction of the lane widths permanently due to the columns on the roads.
- 3.6. The MM&WD should closely coordinate with the RDA in determining how to integrate the LRT structure and future road developments including additional land acquisitions.
- 3.7. Stations should be designed to provide parking area for dropping off and picking up of passenger vehicles.

#### **4. HYDROLOGY, DRAINAGE AND IRRIGATION ASPECTS**

- 4.1. Prior approval should be obtained from the Sri Lanka Land Reclamation & Development Corporation (SLLRDC) for any kind of construction activities which involve land filling such as pilot road or other temporary filling, blocking of natural waterways and reduction in retention in flood prone areas and low land areas.
- 4.2. Temporary pipe culverts or bridges/ causeways should be provided for pilot road at stream crossings and other necessary locations depending on drainage and irrigation requirements. Prior approval should be sought from SLLRDC for those temporary crossings.
- 4.3. Precautionary measures should be taken where necessary to prevent lateral displacement of soil used in filling. In the event if storm water contaminated with mud is discharged to storm water drainage system, silt traps should be incorporated and maintained prior to discharge.
- 4.4. Lead in and Lead away drains should be improved as necessary in order for the hydraulic structures to effectively function in storm water conveyance.





- 4.5. Soil used for the pilot road or any other temporary land filling should be removed at the end of construction period and all canals should be cleared removing silt due to construction. The approval should be obtained from the SLLRDC for the disposal sites, prior to commencement of removing soil of the pilot road.
- 4.6. During the construction stage, the pilot road should be breached if required to avoid flood risk in the area.
- 4.7. Natural drainage paths should not be disturbed due to construction activities. Necessary measures should be taken to connect natural drainage paths either to build up drains or natural stream network to ensure smooth flow pattern.
- 4.8. If the project activities involve in reclamation of paddy lands prior approval should be obtained from the Department of Agrarian Development.
- 4.9. Necessary steps must be taken to prevent pollution of irrigation canals by chemicals and oil spills.
- 4.10. The MM&WD should study the impacts on irrigation/ flood control infrastructure affected due to the construction of the pilot road at depot area and necessary mitigatory measure should be implemented in consultation with the Irrigation Department and Provincial Irrigation Department of Western Province.
- 4.11. Necessary actions should be taken to avoid water constriction across the Diyawannawa Oya in consultation with the SLLRDC during the constructional stage.
- 4.12. The entire cross section of Diyawannawa Oya which crosses by the LRT trace should not be blocked substantially for construction works. Blocking of Lake cross section should be done part by part.
- 4.13. Blocking of the Lake section should be carried out according to the instruction of SLLRDC and on the site specific construction arrangement.
- 4.14. A 3 m wide canal should be provided the right around of the depot area to reduce flood impacts in depot area. The temporary filling and construction in the depot area should be done in parts. The temporary filling should be removed once the construction of a part of the depot is over.



- 4.15. The existing drainage canal in the area should be improved, de-silted and connected to the main canal to facilitate the drainage movement.
- 4.16. Drainage management at the depot area should be carried out in such a way not to cause impacts on cultivable paddy lands of the area.

## **5. WASTE WATER TREATMENT AND DISPOSAL**

- 5.1. The detailed design of the wastewater treatment system at the depot site should be submitted to the CEA for review and acceptance.
- 5.2. The treated effluent should conform to the general standards for discharge of effluents in to inland surface waters prior to disposal.
- 5.3. The treated waste water from the depot area shall be disposed to the Proposed Sri Jayawardenapura Kotte Common Sewage Treatment System as proposed in the EIA report dated April 2018. A separate pipeline should be installed with the approval of the CEA to connect the wastewater pipeline from depot to the Common Sewage Treatment Plant which is located in Battaramulla.
- 5.4. Since the above proposed sewage system is not in place at present, an interim solution for the disposal of treated wastewater should be proposed and submitted to the CEA, approval obtained.
- 5.5. Approval of the National Water Supply & Drainage Board (NWSDB) should be obtained if the treated wastewater is to be discharged to Madiwela Canal during the interim period since the Madiwela Canal outlet is located upstream of Ambatale water intake point.
- 5.6. The treated wastewater should be reused in administrative building and maintenance yard as much as possible.
- 5.7. Necessary steps should be taken to prevent the pollution of surface water at the depot area by installing oil and grease traps in the drainage system. Leakage/ spillages of fuel oil and lubricant oil in the depot area should be prevented by adopting good housekeeping practices.
- 5.8. Site specific management plan should be implemented to prevent pollutants including silt runoff entering into surface water drainage paths.





- 5.9. Septic tank combined with soil absorption system or up flow an aerobic filter should be established for treatment of domestic waste water generated at all stations in line with the requirement stipulated in SLS 745 part II; 2009, since soakage pits are not feasible where groundwater table is high.
- 5.10. The MM&WD should establish the baseline status of the surface water quality (Total Suspended Solids (TSS), oil and grease, Biochemical Oxygen Demand (BOD<sub>5</sub>), chemical oxygen demand (COD), Dissolved Oxygen (DO), pH, conductivity, turbidity, e-Coli etc.) in and around the depot area prior to commencing construction activities.
- 5.11. Construction equipment and vehicles should be serviced and maintained regularly and such service areas should be sheltered, paved with concrete and provided with oil traps.
- 5.12. An Environmental Protection License (EPL) should be obtained for the depot under the Gazette Notification No.1533/16 dated 27.01.2008.

## **6. SOLID WASTE DISPOSAL**

- 6.1. All generated hazardous waste should be disposed of in an acceptable manner via an approved agency as proposed EIA report dated April 2018.
- 6.2. A Scheduled Waste Management License should be obtained for generate, storage and disposal of hazardous waste under the Gazette Notification No. 1533/18 dated 01.02.2008.
- 6.3. All domestic solid waste generated from stations and depot area should be disposed via relevant Local Authority.
- 6.4. Construction wastes, unsuitable material and debris generated during construction activities should be disposed of only into approved sites. Such material should be removed frequently without storing them in and around the construction site for a long period.
- 6.5. Appropriate waste collection measures with systematic segregation method should be implemented at all stations and in depot area in consultation with relevant Local Authorities.
- 6.6. Any excavated/ dredged material or excess top soil or other unsuitable material shall not be disposed of at road sides, marshy lands, paddy fields, any other wetland or at a site where it is likely to enter into a water body or which would make nuisance to the neighbouring community. Such material shall be stockpiled at suitable locations and disposed of at a suitable disposal site in a nuisance free manner.



- 6.7. Suitable disposal sites shall be identified and approval obtained from the CEA prior to disposal.

## **7. SOCIOLOGICAL & CULTURAL ASPECTS**

- 7.1. The MM&WD shall conduct a comprehensive socio economic survey covering the impact area of the project for identifying affected parties, buildings, houses, other structures to be removed and lands/ other properties to be acquired due to implementation of the project in order to serve as baseline data prior to commencing any construction work of the project.
- 7.2. A detailed resettlement plan and compensation package should be prepared inclusive of relocation sites. MM&WD should consider provisioning of alternative lands for affected persons who request for alternative lands. The resettlement plan and the compensation package so prepared should be submitted to the Ministry of Lands.
- 7.3. Livelihood of affected persons shall also be taken into account in determining the compensation packages.
- 7.4. If compensation is to be done in terms of monetary terms, it should be done before the affected persons moving into the alternative land.
- 7.5. MM&WD should initiate a consultative dialogue with the persons to be affected by the project with immediate effect. They should be kept informed well in advance regarding the project components and also the compensation packages as well as the proposed date of commencement of project activities.
- 7.6. An income restoration plan for affected parties should be considered as a means of offsetting any adverse impacts on livelihood.
- 7.7. All existing access roads that are to be affected by the project should be restored and maintained regularly.
- 7.8. MM&WD should open a dialogue with the Sri Lanka Railway, Ceylon Electricity Board, Sri Lanka Telecom, National Water Supply & Drainage Board and Colombo Municipal Council with respect to shifting of utilities such as power line, water transmission lines etc. MM&WD should work in close coordination with the line agencies in this matter.





- 7.9. Prior notice should be given to public about the disruption of the utility supplies, if any during construction. Temporary water supply, electricity should be provided to affected people.
- 7.10. Every precautionary measure should be taken by the MM&WD to prevent accidents occurring due to activities of the project or negligence of the employees or contractors of the project.
- 7.11. Safety and health of the neighbouring communities shall be ensured by adopting effective measures during construction and operation.
- 7.12. The MM&WD shall obtain approval of the Department of Archeology before commencement of any construction activity.

## **8. BIOLOGICAL & ECOLOGICAL AND LANDSCAPING ASPECTS**

- 8.1. Elevated railroad should be constructed with minimum or no disruption to scenic beauty and the expected ceremonial character of the Sri Jayawardanapura Highway.
- 8.2. The rail road in this section (from Ayurveda Junction to Diyatha Uyana) shall be designed in consultation with the National Physical Planning Department and the UDA.
- 8.3. Sensitive locations in other areas should also be thoroughly studied in consultation with the concerned agencies and suitable measures should be applied to safeguard exiting sensitive views.
- 8.4. The MM&WD should co-ordinate closely with the planning agencies such as the UDA, relevant Local Authorities, Divisional Secretaries, and other Government Departments to resolve any conflicts with existing and future development plans along the trace and to develop detailed land use plans for all stations to mitigate land use conflicts and adverse environmental impacts due to unplanned development of the area.
- 8.5. Minimum number of trees should be cut for construction of the rail road.
- 8.6. Compensatory tree planting program should be implemented at deport area as a green buffer zone.



- 8.7. Qualified professionals shall be engaged during design and construction stage in order to give due consideration to safety and aesthetic aspects especially near stations. The MM&WD shall make sure that the structures should blend with the natural environment to enhance the aesthetic quality. Micro level detailing, structures, colours, lighting, planning and train designs should be determined to reduce negative landscape impacts.
- 8.8. Appropriate action should be taken to minimize the shading effect on wetland areas due to elevated structures at depot area as much as possible.
9. **EXTRACTION, HANDLING, TRANSPORTATION AND STORAGE OF CONSTRUCTION MATERIAL**
  - 9.1. Potential locations for extraction of required quantities of construction material including sand, gravel and rock aggregates in a sustainable manner shall be studied and identified. A copy of the study report shall be submitted to the CEA prior to commencing any construction works.
  - 9.2. Necessary approvals for extraction of construction material from the identified sites shall be obtained from the CEA and the GS&MB prior to extraction. All blasting/ quarrying activities shall be carried out under valid licences issued by the GS&MB and CEA.
  - 9.3. If construction material is envisaged to be bought from a third party, it should be obtained from quarry/ borrow/ extraction sites approved by the GS&MB and CEA.
  - 9.4. The routes for transport; including unusually heavy loads shall be subjected to agreement with the appropriate traffic authorities. The movement of heavy loads on public roads shall be done at non-peak traffic periods.
  - 9.5. Any roads damaged due to project construction activities or due to transportation of materials shall be rehabilitated in consultation with the relevant authorities.
  - 9.6. Transport, loading and unloading of materials shall be carried out in such a way as not to cause nuisance to the people.
  - 9.7. Measures such as covering the materials in the transporting vehicles with appropriate sheet to avoid any spill of such materials, dust blowing from open-topped Lorries etc., limiting the speed of vehicles, frequent sprinkling of water on exposed earth surfaces and unpaved access roads, covering the construction materials stockpiles, spoil and any land clearing debris etc shall be taken.





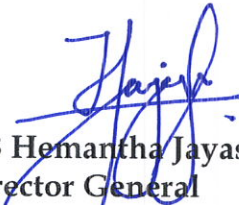
- 9.8. Metal crushers, asphalt mixing plants and concrete premix plants should be located at carefully selected sites and necessary clearances shall be obtained from CEA and/or the relevant Local Authorities for locating them prior to installation.

## 10. MONITORING PROGRAMME

- 10.1. The MM&WD shall forward to the CEA an Environmental Management Plan incorporating the mitigatory measures proposed precisely and a monitoring plan/ programme to monitor the implementation of mitigatory measures prior to implementation of any construction works. The EMP should contain the work schedule of implementation of mitigation measures, responsible agencies for implementation the mitigation measures and parameters to be monitored with intervals/ frequencies together with the locations.
- 10.2. The MM&WD shall implement a Monitoring programme on water quality as soon as this approval is granted, so as to establish the baseline condition. The MM&WD shall establish a continuous monitoring of water quality [Total Suspended Solids (TSS), oil and grease, Biochemical Oxygen Demand (BOD<sub>5</sub>), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), pH, conductivity, turbidity, e-Coli.] of the water bodies within/adjacent the project area in order to monitor the impacts of the project.
- 10.3. The MM&WD shall submit the above baseline data to the CEA for future reference.
- 10.4. The MM&WD shall submit monitoring reports on regular basis to the CEA in order to facilitate verification of compliance with stipulated standards, norms and conditions and implementation of required mitigation measures.
- 10.5. A monitoring committee comprising of relevant stakeholder agencies will be appointed by the CEA to oversee the implementation of the EMP and any environmental impacts of the project.
- 10.6. All costs incurred by the monitoring committee appointed by the CEA to oversee implementation of mitigatory measures and the monitoring plan, shall be borne by the MM&WD.



The MM&WD shall comply with any additional conditions that may be communicated from time to time by the CEA during the execution of the project.

  
**P B Hemantha Jayasinghe**  
**Director General**

Cc:

1. Secretary, Ministry of Mahaweli Development & Environment
2. Secretary, Ministry of Transport & Civil Aviation
3. Secretary, Ministry of Lands
4. Municipal Commissioner, Colombo
5. Municipal Commissioner, Sri J'pura-Kotte
6. Municipal Commissioner, Kaduwela
7. General Manager, Sri Lanka Railways
8. General Manager, Sri Lanka Land Reclamation & Development Corporation
9. General Manager, National Water Supply & Drainage Board
10. General Manager, Ceylon Electricity Board
11. General Manager, Sri Lanka Telecom
12. Director General, Road Development Authority
13. Director General, Urban Development Authority
14. Director General, National Physical Planning Department
15. Director General, Department of Wildlife Conservation
16. Director General, Department of Archaeology
17. Commissioner General, Department of Agrarian Development
18. Divisional Secretary, Colombo
19. Divisional Secretary, Thimbirigasyaya
20. Divisional Secretary, Sri J'pura-Kotte
21. Divisional Secretary, Kaduwela
22. Director (Environment), Irrigation Department
23. Provincial Director of Irrigation, Western Provincial Council
24. Director, EPC/ CEA
25. Director, Laboratory Services Unit/ CEA
26. Director, Western Provincial Office/ CEA

*emaanu \f\e\mydoc\peiris\light rail approval letter final*



## Guidelines for Rail Noise Assessment Criteria for Light Rail Projects

### 1. Scope

This document presents guidance and recommendation for rail noise assessment criteria for light rail projects.

#### 1.1 Definition of Light Rail Projects

“Light Rail Transit (LRT) refers to an urban rail transit system operates with lower passenger capacity on a localized shorter network compared to heavy rails. It uses Light Rail Vehicles (LRVs) operating in multiple units powered by electricity mostly on a shared Right of Way (ROW) with other road vehicles on an elevated structure.”

### 2. The purposes of this guideline are :

- 2.1 For planning purposes, typically by projects proponents, local authorities, and consultants.
- 2.2 For institutions who are involved in noise measurements, monitoring, modeling and prediction in light rail projects.
- 2.3 To be used in noise impact assessments, pre and post EIA compliance verification.
- 2.4 In quantifying a noise disturbance on a quantitative manner.
- 2.5 To offer an introductory treatise in light rail noise control.

### 3. Validity of the rail noise assessment criteria

- 3.1 This guideline only applies to light rail projects which were evaluated after year 2017 for environmental compliance.
- 3.2 Noise assessment criteria which are given in this guideline can be applied only for existing noise sensitive receivers at the time of announcement of the new light rail project.
- 3.3 This guideline could not be applied to new noise sensitive development, which has gained development consent after announcement of new light rail project.
- 3.4 It is the developers' responsibility to ensure the new development is designed with appropriate consideration of noise impacts due to existing light rail operation.

### 4. Noise Limits

Noise assessment limits are based on either of following depending on circumstances.

- 4.1 An absolute limit is given in this guideline is based on the average level of noise which should not be exceeded in a specified time period.
- 4.2 A relative limit is based on the permitted increase in noise level with respect to the background noise level.

**Noise Assessment criteria for light rail projects**

**Table 1. Airborne light rail noise assessment criteria for residential land use**

Assessment criteria dB (A) - External	
Day 7.00 am – 10.00 pm	Night (10.00 pm – 7.00 am)
60 L <sub>Aeq</sub> (15h) and 80 L <sub>AFmax</sub>	50 L <sub>Aeq</sub> (9h) and 80 L <sub>AFmax</sub>

**Table 2. Airborne light rail noise assessment criteria for commercial land use**

Assessment criteria dB (A) - External	
Day 7.00 am – 10.00 pm	Night (10.00 pm – 7.00 am)
65 L <sub>Aeq</sub> (15h) and 85 L <sub>AFmax</sub>	55L <sub>Aeq</sub> (9h) and 85 L <sub>AFmax</sub>

**Table 3. Airborne rail noise assessment criteria for light rail developments for sensitive land users other than residential , commercial users.**

Other sensitive land users	Assessment criteria dB (A) (when in use)	
	Internal level	External Level
Schools, educational institutions, and child care centers	45 L <sub>Aeq</sub> (1h)	65 L <sub>Aeq</sub> (1h)
Places of worship	45 L <sub>Aeq</sub> (1h)	60 L <sub>Aeq</sub> (1h)
Hospital wards	40L <sub>Aeq</sub> (1h)	-
Hospital other areas	-	65L <sub>Aeq</sub> (1h)
Open space – passive use (eg. Parkland, forest reserves)	-	65L <sub>Aeq</sub> (15h)
Open spaces – Active user (eg. Sports ground, golf course, walking track)	-	65L <sub>Aeq</sub> (15h)

Note : In case of background noise is higher or marginal to relevant noise assessment level, +3dB (A) is allowed subject to following conditions:

- a) External Level : Should not be higher than 70<sub>L<sub>eq</sub></sub>(1-hour)
- b) Internal Level : Should not be higher than 55<sub>L<sub>eq</sub></sub>(1-hour)



## Technical Note to Table 1, Table 2 and Table 3

1. Specified noise assessment levels refer to noise at the receiver location.
2. Noise assessment levels refer to noise from rail transport only. It should not include ambient noise from other sources.
3. The noise levels are external levels except where otherwise stated.
4.  $L_{Aeq(T)}$  (Where T is the relevant time period ) refers to the equivalent continuous noise event and is measured using the 'fast' response setting on a sound –level meter. The purpose of the  $L_{Amax}$  assessment level is to capture the potential noise impact associated with individual pass- by events.
5. Noise from safety warning devices such as horns and bells should not exceed the  $L_{Amax}$  assessment level.

### 5. Background noise level correction

- 5.1 Background correction should be done in the case of background noise level is between 3dB (A) and 10dB (A) below the measured noise level of a single passing event.
- 5.2 Background noise level should be measured by using  $L_{A90}$  descriptor before and after single passing event.
- 5.3 Decibel subtraction can be used to calculate the actual noise level of a single passing event.
- 5.4 Corrected single passing event noise level should be used to calculate the time average noise level ( $L_{Aeq(T)}$ ).

2018/07/24

## 6. Locations where noise assessment criteria apply.

The nominated locations for assessment against the criteria are described in Table 4.

**Table 4 : Assessment locations for existing land use.**

Assessment Type	Assessment Location
External noise levels at residencies	The noise level should be assessed at 2.5 meters from the façade/room and at a height of 1.5 meters from the floor. (Note 1)
Noise levels at multi-level residential buildings	The external point of reference for measurement is the floor of the building that is most exposed to light rail vehicle noise. This point should be selected at the height of selected floor and 3 meters from the building (Note 2)
Internal noise levels	Noise level at the centre of the habitable room that is most exposed to the light rail vehicle noise with openable windows being opened sufficiently to provide adequate ventilation.
External noise levels for other noise sensitive land users.	External points should be selected considering area where the typical activities of the land used is being taken in place. (Note 3).
Open space : Passive or active use	The noise level is to be assessed at the time (s) and location (s) regularly attended by people using the space. In this regard, “regular attendance at a location means at least once a week”.

### Note 1 :

The position has been adopted to provide a relatively accessible measurement location, and will protect the acoustic amenity of both the internal space in the dwelling and external space near the respective façade/room. In case such location is not accessible point inside the building could be selected for the assessment with windows open condition. However external level should be considered for assessment criteria.

### Note 2 :

In case this point is not accessible for noise measurement; point inside the same floor can be selected with the condition of openable windows being opened sufficiently to provide adequate ventilation. In such a situation assessment is based 5 dB (A) less than the relevant external level.

### Note 3 :

This does not mean that noise levels over the entire property will also meet the assessment criteria.



## 7. Measurement Equipment

- 7.1 The measurement shall be made with a precision sound level meter which comply with the requirements of the IEC publications, IEC 60942 and IEC 6172-1 or thereafter for the type of meters in class 1.
- 7.2 The "A" weighting network and 'fast' time weighting response shall be used for sound pressure level measurements for equivalent  $L_{eq}$  and statistical centile readings.
- 7.3 Measurement for statistical centile levels ( $L_{90}$ ) and maximum level ( $L_{max}$ ) shall be made using a sound level meter which is installed with statistical analysis functions, or alternatively computed from continuously monitored instantaneous sound pressure levels using data acquisitions system for the stipulated time period.
- 7.4 The calibration of sound level meter shall be checked and adjusted according to the manufacture's instructions using standard sound source. (Sound level meter calibrator or pistophone) at the beginning and end of each series of measurement.
- 7.5 A wind shield approved by the microphone manufacture shall be used. Measurements cannot normally be made if the wind speed exceeds 5 m/s. For continuous remote monitoring the wind speed shall be monitored concurrently with sound levels.

## 8. Calibration of equipment

- 8.1 Sound level meters and sound level calibrators which is used for noise measurement should have valid calibration certificate with international traceability.
- 8.2 Usually valid period for calibration report for sound level meter is 4 years and sound level meter calibrator is 2 years.

## 9. Requirement of Accreditation

The organization/Institute who measures/monitors the light rail noise levels should have valid ISO 17025 accreditation status for measurement of environmental noise and background noise.

## 10. Software Packages

Internationally accepted software package should be used in prediction of noise levels. A number of software packages which implement various suits of calculation methods are available including;

Sound PLAN	- Braunstein +Berndt
Cadna A	- Datakustik
Type 7810/Pradiator	- B & K
Traffic noise model	- US federation Highway administration.

The above software packages can accurately implement calculation methods as specified by their developers. This is not an exhaustive list and there are other software as well.

It is important to note that, any software which is used must be validated with respective in-field measurement in order to noise prediction reflect the actual situation as closely as possible and any difference between the model output and measurement value are known.

4  
2018/07/24

## 11. Applying the noise assessment criteria for new light rail project

Steps should be taken in the following order to apply noise assessment criteria for actual noise mitigation.

### 11.1 During planning stage of the project.

**Step 1 :** Identify the study area, comprising noise sensitive assessment locations within 200 meters from the centre line of the outermost light rail track on each side of the proposed light rail track.

**Step 2 :** Predicted noise levels (with estimated vehicle count for 5 years) at the identified noise sensitive receivers should be calculated using internationally accepted noise prediction software. (Noise prediction should be done using a validated software within Sri Lanka).

**Step 3 :** For each assessment location in the study area where exceedance are identified in step 2, identify feasible and reasonable mitigation measures in following order of priority.

- i. In-corridor noise barriers
- ii. Localized noise barriers or at-property treatment.

**Step 4 :** Calculate the predicted noise level in step 2 again with the proposed mitigation and make sure the predicted noise levels are within the assessment criteria.

**Note :**

In some locations In-corridor noise barriers are not effective or not economical. In such situation localized noise barriers or at property treatment could be considered. Localized noise barriers or at property treatment should be designed in consultation with the land user(s) and consent for design should be taken.

### 11.2 During operation of the project.

**Step 5 :** Actual noise measurements should be carried out after one year time from the date of operation of the light rail track. Additional noise receivers (if any) should be identified using this actual noise measurement.

**Step 6 :** Suitable mitigation method should be applied for the receivers who were identified in step 5.

**Step 7 :** Repeat step 5 and step 6 in three years and five years time interval after the date of operation of the light rail track.

**Note :** Only existing land users before the announcement of the light rail track will be considered for step 1 to step 7.