

## EXECUTIVE SUMMARY

### ENVIRONMENTAL IMPACT ASSESSMENT OF MDB CORRIDOR 3

1. Chennai, the capital city of the state of Tamil Nadu, is part of the Chennai Metropolitan Area (CMA) that is home to over 8 million people and plays a vital role in the economy of South India.<sup>1</sup> Like other metropolitan areas in the country, CMA is currently facing the challenges of accelerated urbanization growth that have considerably strained the area's transportation system. The increase in economic activities has boosted the regional economy and job creation, which in turn necessitates improvement in ease of travel and connectivity.
2. Chennai Metro Rail Limited (CMRL), a joint venture of the Government of India (GoI) and the Government of Tamil Nadu (GoTN) with equal equity ownership, is responsible for implementing, operating, and maintaining the city's metro system. CMRL developed the Comprehensive Mobility Plan for CMA in 2015 and identified three corridors (corridors 3, 4, and 5) for the second phase of the Chennai Metro Rail to alleviate CMA's transportation capacity constraints.
3. GoI requested the Multilateral Development Banks<sup>2</sup> (MDBs) to assist in the construction of SIPCOT depot and line and 10.1 km of line 3 after Sholinganallur station upto entry to SIPCOT stabling including 9 stations. This line is southernmost section of Chennai metro corridor 3 and will be referred to as MDB line 3 in this report. Sholinganallur station forms part of balance Corridor 3 from Madhavaram to Sholinganallur which is being implemented by JICA. This alignment has been finalized after examining alternatives. The total capital cost of MDB Corridor 3, excluding SIPCOT depot, is estimated to cost USD 290 million at 2018 prices. The project will be implemented from July 2021 to September 2025 in synchronisation with MDB Corridor 5. CMRL will take full responsibility of the implementation of MDB Corridor 3.
4. As per provisions of the EIA Notification 2006 and its subsequent amendments by the Ministry of Environment, Forests and Climate Change (MoEF&CC), Metro Rail Projects are exempted from requirements of prior environmental clearance.
5. This Environmental Impact Assessment (EIA) comprising baseline data on existing conditions of physical, ambient and ecological environment, together with the identified and anticipated environmental impacts and proposed mitigation measures, has been prepared in accordance with GoI's legislative framework and MDBs' environmental safeguard policies<sup>3</sup>. This MDB Corridor 3 will be financed by ADB.
6. Balance Corridor 3 from Madhavaram to Sholinganallur via Adyar which is being financed by JICA constitutes one of the Associated Facilities to MDB Corridor 3: the other Associated Facilities which are required for passenger trips forecast on MDB Corridor 3 to materialize are a) MDB Corridor 5 b) Phase 1 under operation, c) Phase 1A under construction d) MRTS and suburban railway.
7. Overall, Corridor 3 is expected to generate environmental and socio-economic benefits in terms of decreasing air pollution from traffic congestion and serving the growing travel

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<sup>1</sup> Indian National Census, The Census Organization of India, 2011.

<sup>2</sup> Asian Development Bank (ADB), Asian Infrastructure Investment Bank (AIIB) and New Development Bank (NDB).

<sup>3</sup> ADB's Safeguard Policy Statement (SPS) 2009, AIIB's Environmental and Social Framework (ESF), and NDB's Environmental and Social Framework (ESF).

demand. Category A was assigned to MDB Corridor 3 due to the significant impacts anticipated during construction.

8. MDB Corridor 3 consists of 9 elevated stations from Sholinganallur Lake to SIPCOT 2. Standard Gauge (1435mm) will be adopted with a minimum track center distance of 4000 mm, 16-ton maximum axle load capacity and a design speed of 80 kmph. The viaduct is 2-level so as to accommodate space for a future elevated road at lower level and metro at the higher level. Implementing Agency for elevated road will be different from CMRL, timeline for construction of elevated road is not decided. Elevated metro is generally located on the road median 140 m long and 24 m wide. To reduce physical and visual impact of the elevated station, stations have been made transparent with minimum walls on the sides. Signaling system will be adopted for MDB Corridor 3 in line with balance length of Corridor 3. Rolling stock is of light weight stainless steel/aluminum body for energy efficiency. Universal accessibility has been reflected in the design following international best practices. Green building features like rainwater harvesting, solar energy panels at elevated stations' roofs, will be considered in station design.

9. The terrain along MDB Corridor 3 alignment is mostly flat. The soil along the alignment is rock overlaid by sandy soil. Corridor 3 alignment is located neither within an existing nor any proposed ecological sensitive zone known for providing habitat and movement corridor for any kind of wildlife. 164 trees are likely to be felled along the corridor.

10. Despite the seemingly abundant sources of water, Chennai suffers continuously from water stress since the entire basin is dependent on rainfall. Groundwater quality parameters are well within the prescribed permissible limits as per the Bureau of Indian Standards except for chlorides and coliforms. The water quality at Sholinganallur Lake meet the criteria for propagation of wildlife and fisheries.

11. Results of the air monitoring at 3 locations showed that all parameters were within the permissible level of National Ambient Air Quality Standards (NAAQS). However Particulate Matter exceeded WHO guideline.

12. The noise level monitored at 1 of the 6 receptors along the alignment was above the national and international permissible daytime limits. From initial noise modeling it is expected that noise barriers can mitigate construction noise. During operation a 3 meter high noise barrier would reduce operational noise to acceptable levels at impacted sensitive receptors. The noise modeling report also suggests noise barriers to be put in place near curves in the alignment and at station locations.

13. Peak VdB vibration level at 3 out of 4 monitored locations is found to exceed acceptable human annoyance impact criteria for ground borne vibration prescribed by the Federal Transit Administration (FTA) USA. However the observed levels at all 4 locations are well below the construction vibration damage criteria as per Caltrans and the Directorate General of Mines Safety (DGMS).

14. Initial vibration modeling shows that for the elevated section of corridor 3, masonry building structures within a maximum distance of 29 m will be affected if 80 kmph design speed is considered. A full baseline will be collected prior to contractor's mobilization to elaborate the current baseline.

15. Based on analysis of project and environmental settings, a detailed assessment of potential impacts due project location and design, construction and operation has been carried out. For each of these adverse impacts, mitigation measures have been proposed. The key positive environmental impacts include reduced use of private vehicle leading to reduction in pollutants and a modest reduction in greenhouse gas emissions; road safety

improvements and increased accessibility and mobility,. The main negative impacts of MDB Corridor 3 include fugitive and point source dust emission, surface noise from excavation, construction and demolition, disposal of large quantities of construction wastes, and occupation and community health and safety, which are mainly temporary and localized.

16. The main mitigation measures proposed are as follows: (i) to plant twelve saplings for each tree to be cut as against ten saplings ordered for infrastructure projects by the Honorable Madras High Court, with estimated compensatory afforestation cost in place accordingly; (ii) noise reduction measures (i.e. noise barriers at sensitive receptor locations); and (iii) reuse of excavated material where feasible and disposal of construction waste in a regulated manner; and (iv) design features, equipment and procedures for increased public and occupational health and safety. MDB Corridor 3 will take into consideration the climate change effects of an anticipated continuous increase in ambient temperature, intensity of cyclones and storm surge, heavy precipitation events, and sea level rise in the future. Climate change considerations to be integrated into MDB Corridor 3 design include: (i) using solar panels on station buildings and roofs to reduce the extensive use of grid-generated electricity supplied to the station for its operation and maintenance; and (ii) through better station roof design of stations, providing for rainwater harvesting by channeling rainwater through gutters and pipes to either harvesting pits in the ground or to recharge groundwater.

17. Various alternatives such as modes of transport, alignment, proposed design etc. have been considered and analyzed for its likely impacts on various environmental parameters. Additionally, an evaluation of potential environmental impacts in terms of 'with' and 'without' project situation has been considered for the justification of MDB Corridor 3.

18. Meaningful public consultations were carried out with communities on the alignment during EIA preparation and will continue before start of implementation of MDB Corridor 3 and throughout its implementation. Public consultations highlighted opinions of participants on benefits of Metro in terms of reducing congestion on roads. Individual consultation of PAPs will also be carried out during implementation. Information disclosure will follow the procedure for MDBs' Category A projects.

19. Grievance Redress Mechanism (GRM) has been proposed for Corridor 4 that comprises the procedures to address grievances i) first at the Project Implementation Unit (PIU) level, ii) second at Grievance Redress Committee for Environment (GRC-E), to ensure grievances from PAPs and workers are addressed to facilitate timely project implementation. A GRC-E will be formed which will have representatives from Contractor, General Consultant (GC), CMRL, assisting NGO and PAPs and representatives. Unsatisfied PAPs will have the option to escalate the grievances from PIU level to GRC at any point of time and the GRC will not bar them from approaching a Court of Law.

20. An Environmental Management Plan (EMP) with institutional arrangements, budgetary provisions, schedule for EMP implementation and its monitoring has been prepared, including appropriate mitigation measures, provisions related to occupational health and safety, labour camp and construction site management, and traffic and public utility management etc. to address all impacts during Project pre-construction, construction and operation phases. The EMP has been developed in conjunction with general safety, health and environment provisions (which are included in the standard bidding document) and it forms part of the contract document of the contractors. Semi-annually monitoring reports will be prepared by GC and submitted to MDBs through CMRL. A third-party monitor will also monitor work independently and submit reports to CMRL and MDBs. The preliminary estimated cost of the EMP including implementation and monitoring is USD 1.496 million (INR 109.5 million). This cost estimate is exclusive of land acquisition and resettlement & rehabilitation cost.

21. Benefits far outweigh negative impacts. Overall, the major social and environmental impacts associated with MDB Corridor 3 are limited to the construction period and can be mitigated to an acceptable level by implementation of recommended measures and by best engineering and environmental practices. In addition, stringent monitoring requirements and actions have been included in the Environmental Monitoring Plan (EMoP) on noise and vibration levels that will be generated during construction. CMRL will ensure that the EMP and EMoP are included in Bill of Quantity and forms part of bid document and civil works contract. The same will be revised if necessary, during project implementation or if there is any change in the project design and with approval of MDBs.

22. This EIA report is structured as following: (i) Introduction of background, methodology of preparation of the report; (ii) Policy and legal framework within which environmental safeguards will be recommended and implemented; (iii) Project description with enumeration of salient features of MDB Corridor 3 which have bearing upon its environmental impacts; (iv) Environmental baseline of MDB Corridor 3 in terms of physical, ambient, and ecological baseline (socioeconomic baseline will be presented in Social Impact Assessment Report); (v) Identification of negative and positive impacts arising from pre-construction, construction and operation and respective measures to mitigate negative impacts and where feasible enhance generate positive impacts; (vi) Analysis of alternatives including its need and alternatives of technology and alignment; (vii) Consultations with stakeholders and plan for disclosure of project information; (viii) Mechanism for stakeholders to communicate grievances and suggestions and for their Redressal; (ix) EMP and institutional arrangement for implementation of environmental impact mitigation measures; and (x) Conclusion.