Executive Summary

ENVIRONMENTAL IMPACT ASSESSMENT

New Integrated Terminal Building at Guwahati Airport, Assam

Project Proponent

Airport Authority of India

NABET Accredited Environmental Consultant

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EXECUTIVE SUMMARY

0.1 Introduction

Lokpriya Gopinath Bordoloi International Airport at Guwahati, one of the major airport in India and in North East Region is situated in the state of Assam, belongs to AAI. Operators like Air India, Jet Airways, Spice Jet, Indigo, Go Air, Vistara, Air Asia India and Pawan Hans Helicopters are presently operating with 75 flights movements per day and 528 flights in a week. The Airport is an International Airport being developed as inter-region hub and suitable for operation of B-767/A310 type of aircraft.

The existing terminal building at Guwahati Airport is capable to handle 850 pax (425 arriving + 425 departing) at a time. The existing terminal building at Guwahati has saturated. In view of the future traffic growth at Guwahati Airport, there is a requirement of construction of New Integrated Terminal Building at the available land within the airport premises.

Airports Authority of India (AAI) has planned centrally air-conditioned New Integrated Terminal Building of modular design with all modern facilities and associated facilities like multilevel car parking. The Integrated Terminal Building with area of 90000 sqm (excluding Service area as per requirement in Basement covering area of 7500 sqm) have been designed for 2900 Domestic and 200 International passengers at a time with the recommended area specifications and to match the level of service “B” as per IATA recommendations in initial years & finally to match level of service "C" in year of saturation.

The EIA studies have been carried out as per TOR approved by MoEF&CC vide letter Dated 26 October, 2016.

0.2 Project Description

0.2.1 Justification of New Integrated Terminal Building

The existing terminal building at Guwahati has saturated. In view of the future traffic growth at Guwahati Airport, there is an urgent requirement of construction of New Integrated Terminal Building at the available land within the Guwahati airport premise.

0.2.2 Key Scope of New Integrated Terminal Building

The passenger handling capacity existing terminal building has already saturated. In view of the future traffic growth at Guwahati Airport, there is urgent requirement of construction of new integrated terminal building on turn key basis. The scope of work for proposed integrated terminal building.
(i) Construction of centrally air-conditioned New Integrated Terminal Building with area of 90000 sqm) for 2900 Domestic and 200 International passengers at a time.

(ii) New Integrated Terminal Building has been designed by captures the GRIHA measures with the consideration to achieve the 4 star rating under GRIHA V-2015.

(iii) Service area Basement covering area of 7500 sqm

(iv) Departure area, Arrival area, Security Hold area and Concourse area with adequate nos. of toilets for gents, ladies and differently able persons along with drinking water facility.

(v) Media planning, Retail Area planning, etc. Solar power generation.

(vi) Departure Area with adequate number of check-in counters, immigration counters, baggage conveyor belts, queuing space, segregation railing, back-up offices for Airlines, facilitation counters, weighing machines, counters etc.

(vii) Duty Free/Retail Area Creation of Retail Islands/ Shops without affecting the passenger movement.

(viii) Food & Beverage Area

(ix) Arrival Area / Baggage Claim Area

(x) Airport Director’s office with associated office space, staff canteen, Engineering office, Toilets for staff etc to be provided in the lower ground floor.

(xi) Multilevel car park with all amenities for at least 1500 cars and surface parking for VIP cars & 10 buses, Separate car / scooter park area for AAI and airlines staff at appropriate location.

(xii) Development of four-lane vehicular road from Terminal Building / Car parking with canopy covering two lanes in front of the Terminal Building on the city side and connecting the main approach road to the city.

(xiii) Provision of water supply pumping arrangement system, Water Filtration, water cooler & R.O/U.V. Filters, Sewage Treatment Plant (STP) & Effluent Treatment Plant (ETP) as per norms and as per site conditions.

(xiv) Horticulture/landscaping, drainage system, water supply, etc.

0.2.3 Utilities and Other Features

- The total estimated electrical demand load of the new integrated terminal building is approximately 7.5 MW, which shall be supplied at 33 KV as per Assam Electricity Board and 2 no (1 Working and 1 Standby) power transformers 33/11 KV each 10 MVA capacity. Provision of 100% emergency back up by DG sets of 6 no each 2000 kVA has been kept.

- Central Airconditioning plant is proposed and total estimated air-conditioned load is 3300 TR after diversity. Microprocessor based control system (BMS) will also be installed at the Airport.

- At the new integrated terminal building Energy Conservation will be as per Energy Conservation Building Code 2007 (ECBC). 540 kW solar PV power plant will be established to generated solar power.
• Fresh water requirement will be 710 KLD for domestic, food courts, retail, offices, HVAC, etc. (Total water requirement including recycled water- 1010 KLD). Water requirement will be extracted through bore wells at the airport.

• As per water balance diagram, 810 kl/d sewage will be generated after the operation of integrated terminal building which will be treated in STP of capacity 1000 kl. Membrane bioreactor (MBR) Technology will be used for treatment of waste water at the airport.

• For storm water management at the site, rectangular sections for side drains will be provided. The drains have been kept sufficiently away from the taxiway / runway.

0.2.4 Project Cost - The estimated cost of new integrated terminal building and associated works at Guwahati Airport is estimated as Rs 1232 Cores.

0.3 DESCRIPTION OF ENVIRONMENT

Topography and Physiography: Physiographically, the site is mostly plain. Brahmaputra River is flowing at distance of 2.2 km in north direction. Deepor Beel (Lake) is located at a distance of 3 km, north-east direction. The study area has plain and rolling topography with small hills to residual hillocks.

Geology: The Guwahati is geologically an extension part of the Shillong plateau of the Pre Cambrian Age. Geologically, the city is characterized by Precambrian granite gneissic complex composed of granite gneiss, biotite schists, gneiss and quartzite.

Soil Characteristics: The soil type found in the study area is mainly sandy, silty and clay type. Soil found on river banks and in plains are rich in nutrients and are suitable for arable farming.

Water Resources: Brahmaputra River is flowing at distance of 2.2 km in north direction. Deepor Beel (Lake) is located at a distance of 3 km, north-east direction. The drainage system of the area is dominated by Brahmaputra River.

Water Quality: Water quality of study area meets desirable limit. Ground water resources in the study area were found fit for drinking purpose.

Micro Meteorology: During the study period maximum temperature was recorded as 32°C and minimum as 11°C. The relative humidity was recorded to be varying between 44 to 87%. The wind speed was recorded in the range between 0.5 to 4.2 kmph. The predominant wind direction during study period was from North East to South West (from NE towards SW).
**Ambient Air Quality:** Ambient air quality monitoring have been carried out at eight locations during post monsoon season for PM$_{2.5}$, PM$_{10}$, SO$_2$, NO$_2$, NH$_3$, O$_3$, C$_6$H$_6$, BaP, Pb, As, Ni and CO. National ambient air quality standards for industrial, residential, rural & other areas are met for all monitored parameters at all AAQM locations during the study period.

**Noise Level:** Noise measurements were carried out at 8 locations. Measured day and time Leq noise levels are within the limit stipulated noise standards.

**Natural Hazards and Disaster Risk:** The Guwahati Airport lies in seismic zone V according to zoning map of India. Structure of new terminal building has been designed in view of seismic factor and other natural hazards.

**Landuse & Land Cover in the Study Area** – As per satellite image interpretation, more than 50% of the study area is covered by vegetation & agriculture fields and followed by marshy land (11.59.9%), Settlement (9.26%), water body (9.17%) and dry river bed (9.17%), whereas the open shrub land is 4.85% in the study area.

**Terrestrial Ecology:** Vegetation in the area is common type. During the study, no tree, shrubs and grass was observed, which are endangered or threatened under IUCN (International Union for Conservation of Nature and Natural resources) guidelines.

**Aquatic Ecology** - Brahmaputra River is perennial river flowing within the 10 km radius study area. Brahmaputra river alongwith ponds, lake and other small water bodies form the aquatic ecosystem. Deepor bill (Water body) is a Ramsar site is the largest habitat of migratory birds situated about 3 km towards eastern side of the project site.

**Socio-Economic Environment of Study Area:** Total population of 112892 in the study area comprises 57730 male and 55162 female from 25379 households. Scheduled caste population and scheduled tribe population is 8.3% and 5.6%, respectively. However, the scheduled tribe population was found to be insignificant in rural area i.e.1.1%. Sex ratio of the study area is 960. The literacy rate in the study area is 87.7%.

### 4.0 Anticipated Environmental Impacts & Mitigation Measures

**Topography & Physiography:** Topography of the area is plains. For construction of new integrated terminal building, for construction of the proposed facilities at the Guwahati Airport, tentatively 100000 cum filling will be required. Approx 50000 cum earth excavated from construction of 7500 sqm size basement will be used filling at airport site.
Mitigation Measures

- Land clearing at the site will be kept to the absolute minimum practicable; and
- Construction site would be designed to minimize filling of the earths.
- Borrowing of earth will be ensured only from approved borrow area having valid environmental from District Level Environmental Impact Assessment Authority (DEIAA).

Land Use Pattern: For construction of new integrated terminal building and associated works at Guwahati Airport, total 90000 sqm land is required, which is already available within the airport. The land use pattern of the land used for construction of new integrated terminal building and associated works, will be changed permanently, however this impact will be localized.

Mitigation Measures

- Land clearing for construction site will be kept to the absolutely minimum practicable; 
- The filling and cutting of soil would be kept minimum; and
- Construction debris and waste generated during construction activities will be collected and disposed in environmental sound manner as per applicable rules depending upon type of wastes.

Water Resources and Water Quality: During the construction phase of the construction of new integrated terminal building and other associated work at Guwahati Airport, approx 300 kl/day water will be required depending upon the type of construction activities. The water requirement will be met through existing deep bore well. Total water requirement at Guwahati Airport after proposed new integrated terminal building is estimated as 1010 kld (Fresh Water 710 kld), which includes water for HVAC, CFT, green belt purposes. Waste water generated from airport will be treated in Sewage Treatment Plant (STP) and reused for HVAC, flushing, greenery development.

Mitigation Measures

- Continuous efforts will be made to reduce water consumption using less water required cisterns; 
- Water efficient urinal and toilets will be provided in new integrated terminal building.
- Efforts will be made to stop wastage and leakage of water;
- Sewage and domestic waste water will be treated in MBR based Sewage Treatment Plant
- Reused treated waste water in HVAC, flushing, greenery and landscaping
Soils: Approx 3100 kg per day solid waste will be generated during operation of the new terminal building at Guwahati airport, which is collected, segregated and managed by external agency for disposal as per Solid Waste Management Rule, 2016. Hence, the impact on the soil will be insignificant as an organized solid waste collection and disposal practices exist at the Guwahati Airport.

Mitigation Measures

- Agency will be hired for disposal of solid wastes as per the provisions of the Solid Waste Management Rule, 2016;
- Solid waste generated from the airport is transported in close containers;
- Used lubricating waste oil and oil contaminated clothes etc is collected separately in containers and is sold to authorized recyclers as per CPCB/ Pollution Control Board, Assam (ASPCB) guidelines.

Ambient Air Quality: During the operational phase of the new terminal building at Guwahati Airport, the intermittent air emissions are generated from aircraft engines during approach, landing, taxiing, take-off and initial climb, which is termed as reference Landing and Take-off Cycle (LTO cycle). For power back up, there will be 6 DG sets of 2000 KVA capacity each will be available, which will be sufficient for new terminal building and associated facilities. Vehicular emissions will also be generated from the operation of vehicular traffic at the new integrated terminal building as ground support vehicles, passengers’ pickup and dropping vehicles. Exhaust emissions comprising NO\textsubscript{2}, SO\textsubscript{2}, PM, CO, HC, etc will be generated from aircraft, DG sets and vehicular emissions.

Mitigation Measures

- Compliance of all standards prescribed by the ICAO during operation of aircrafts by preventive maintenance and monitoring;
- 30 m high chimney for DG sets will be provided as per the CPCB guidelines;
- Proper traffic management plan will be prepared to ensue that there is no traffic congestion at in front of new terminal building. It will help in reduction of vehicular emissions from the airport.
- Ground vehicles at the airport will be maintained and have a “Pollution Under Control” certificate;
- Development of greenery and landscaping at the airport for improving ambient air quality.

Noise Levels: The new integrated terminal building at Guwahati Airport will be sound proof. DG sets room will be acoustically treated to control noise levels.
**Mitigation Measures**

- The compliance of all standards prescribed by the ICAO during operation of aircrafts by preventive maintenance and monitoring,
- Proper traffic management will be prepared to ensue that there is no traffic congestion at the airport. It helps in reduction of vehicular noise emissions from the airport,
- DG sets will be provided with acoustic enclosure as per CPCB guidelines,
- Green belt, landscaping and boundary at the airport act as barrier for noise;
- Monitoring of ambient air quality/source emission will be carried out as per monitoring plan.

**Terrestrial Ecology:** Greenery and landscaping will be developed at the new integrated terminal building. For irrigation of green belt, treated waste water from STP and accumulated rainwater will be available and used. This will have positive and long term beneficial impact on terrestrial ecology of the area.

**Impacts of the Project on the Deepor Beel**

Deepore Beel Bird Sanctuary, a Ramsar Site is located at a distance of 3 km from the project site of integrated terminal building. The Deepore Beel Bird Sanctuary is not located in funnel area of runway of Guwahati Airport. Noise modelling carried for existing airport, indicate that impact of aircraft noise from aircraft operation on the Deepore Beel Bird Sanctuary is negligible.

**Action Plans/Mitigation Measures**

1. Landscaping and green belt will be developed towards Deepore Beel Bird Sanctuary.
2. Solid Waste Generated from new integrated terminal building will be collected, segregated and disposed in designated site as per Solid Waste Management Rule 2016.
3. Sewage generated from the integrated terminal building will be treated in Sewage Treatment Plant and re-used for horticulture and flushing.
4. Recommendations of Chief Wildlife Warden will be implemented.

**Socio-Economic Environment:** During construction and operation phase new integrated terminal building at Guwahati Airport will open additional direct and indirect job opportunities in the area and region. Further, it will attract more and more tourist, commercial and developmental activities in the area. Therefore, positive impacts are anticipated on socio-economic environment during new integrated terminal building at Guwahati Airport.
Employment and Economic Growth - The construction of new integrated terminal building at Guwahati Airport will result in a boost in tourism, commercial activities in the region. This will improve direct and indirect employment opportunities, revenue generation, commercial and industrial activities; therefore, resulting in positive impact on the employment and economic growth of the region.

0.5 Analysis of Alternatives

During design, construction and operation of new integrated terminal building at Guwahati Airport necessary measures will be taken for conservation of energy in line with “Energy Conservation Building Code–2017” and “National Building Code 2016”. The important energy conservation measures proposed for new terminal building are described below:

- Airport Terminal building will be designed and constructed for GRIHA Rating 4 star,
- Use of Energy Efficient building material & glass,
- Use of LED lamps instead of GLS lamps,
- Use of Solar Backed up Light Emitting Diode Lamps instead of par lamps,
- Energy efficient HVAC system,
- Solar passive techniques for terminal building,
- Use of 5 star BEE energy efficiency rating electrical equipments,
- Microprocessor-based Building Management System (BMS) will be installed for minimization of energy consumption,
- Automatic lighting on/ off control system will be provided in the airport area for optimum utilization of energy.

It is proposed that 5400 KW solar power generation plant will be established at the airport to produce clean energy. By adopting above measures more than 30% energy will be saved.

0.6 Environmental Monitoring Plan

To ensure the effective implementation of the mitigation measures and environmental management plan during construction and operation phases of the new integrated terminal building at Guwahati Airport, environmental monitoring plan have been prepared for ambient air quality, water quality, soil characteristics and noise monitoring. Suitable mitigation measures will be taken in case of monitored parameters are exceeding the stipulated limits.

0.7 Risk Assessment & Disaster Management Plan

Hazard occurrence at the new integrated terminal building at Guwahati Airport may result in on-site implications, like, fire at the storage of HSD for DG sets followed by fire,
bomb threat at terminal building, cargo terminal & aircraft and natural calamities like, earthquake, flood, etc. Other incidents, which can also result in a disaster at the Guwahati airport are agitation/forced entry by external group of people, sabotage, air raids; and aircraft crash while landing or take-off.

Disaster management plan has been prepared comprising key functions of Airport operator, other supporting organizations/agencies/services for response during emergency at the new integrated terminal building at Guwahati Airport.

0.8 Project Benefits

The direct and indirect benefits of the construction of new integrated terminal building at Guwahati Airport are as follows:

- Better infrastructure facilities passenger at new terminal building,
- Decongestion at terminal building with more space and comfort,
- More parking faculties for Aircrafts and safe taxiing,
- Increase in regional economy as it will boost tourism and commercial activities in the region.
- Generation of more revenue to the state, hence more development of the region.
- Boost in tourism and more people to travel in the state
- Employment opportunity to people.
- More business and industrial opportunities

0.9 Environmental Management Plan

The Airports Authority of India will be responsible for the implementation of mitigation measures identified in Environmental Management Plan (EMP) for construction and operation phases of the new integrated terminal building at Guwahati Airport. There will be Environmental Management Cell (EMC) at new integrated terminal building at Guwahati Airport to look after day to day basis implementation of mitigation measures for construction and operation phases.

Budget for Environmental Management and Monitoring Plan

Total budget of Rs 5.27 Crores has been kept for implementation of environmental management plan during construction and operation phases of new integrated terminal building and associated facilities. Total budget of Rs 0.11 Crore has been kept for environmental monitoring during construction and operation phases.