Environment and Social Due Diligence Report

January 2014

IND: Accelerating Infrastructure Investment Facility in India –GMR Hyderabad International Airport Limited

Prepared by

India Infrastructure Finance Company Limited for the Asian Development Bank

IIFCL

Due diligence Report on Environment and Social Safeguards

Sub Project: Development, design, construction, operation and maintenance of Greenfield international airport at Shamshabad, near Hyderabad in Andhra Pradesh

Sub-Project Developer: GMR Hyderabad International Airport Limited

India Infrastructure Finance Company Limited

IIFCL

January 2014

Sub Project: Development, design, construction, operation and maintenance of Greenfield international airport at Shamshabad, near Hyderabad in Andhra Pradesh

Due Diligence Report on Environment and Social Safeguards

Prepared by:	Ms. Ruchi Malik, Environment Specialist, IIFCL Ms. Rumita Chowdhury, Social Safeguard Specialist, IIFCL	Ruchi Malik Rumita
Reviewed and Approved by:	Mr. Sanjeev Ghai, Chief General Manager, IIFCL	

CONTENTS

LIST OF TABLES:

APPENDICES:

Appendix I: Copies of the EIA/EMP reports prepared in the year 2003 and 2007	**Appendix II: Copies of Environment Clearance and other important permissions**
Appendix III: Minutes of Public Hearing Proceedings	**Appendix IV: EMP budget spent during the year 2011-12 and budget provision for the year 2013-14**
Appendix V: Concession agreement Clauses related with Health, safety and Environmental Management	**Appendix VI: Environmental Compliance Manual prepared and implemented by Concessionaire during operation**
Appendix-VII : Environment Compliance Manual for Operation Phase	**Appendix VIII: Presentation delivered by project developer on HSE aspects during Site Visit**
Appendix IX: Environmental Quality Monitoring reports	**Appendix X : Safety Management System at RGIA**
Appendix XI: - Airport Area wise Site safety instructions and copy of safety policy	**Appendix XII: Emergency Preparedness and Response Plan-Mock Drill Photos**
Appendix XIII: Incident Frequency Sheet for Safety performance	**Appendix XIV: Project Organogram for HSE Teams**
Appendix XV: Impact Assessment Report on CSR Activities	**Appendix XVI: Grievance Redressal Status the year 2012-2013**
Appendix XVII: Statement of Recruitment Report	**Appendix XVIII: Airport Colony Baseline Survey Report**
Appendix XIX: Presentation by the Concessionaire on CSR Activities during the site visit	

PHOTOPLATE:

PHOTOPLATE I- SITE VISIT PHOTOGRAPHS- ENVIRONMNETAL SAFEGUARDS

PHOTOPLATE II- SITE VISIT PHOTOGRAPHS- SOCIAL SAFEUGUARDS

PROJECT BACKGROUND:

1. SUB-PROJECT TITLE:

1. The Project includes Development, design, construction, operation and maintenance of greenfield international airport at Shamshabad, near Hyderabad in Andhra Pradesh.

2. SUB-PROJECT BACKGROUND:

2. The twin cities of Hyderabad and Secunderabad was linked with other airports in India and abroad through the then existing Begumpet Airport serving both the Domestic and International Airlines. Though the then existing Begumpet airport was planned mainly for the domestic sector, it had been subsequently upgraded to serve the international sector. The Begumpet airport is located in the city center. It, therefore, suffered from a strategic weakness, virtually insurmountable of facing grave infrastructural constraints to further expansion arising from severe unavailability of unencumbered land, as the existing airport was completely surrounded by residential and commercial inhabitation leaving almost no room for any further expansion. Inadequate availability of land was a severe constraint in the exploitation of development potential. Further, the expansion of the existing airport would have added to the increased airport related traffic, which would have further escalated the already existing traffic jam problem at the peak hours and air pollution to vehicular emissions.

3. As per the preliminary forecast, the traffic was likely to be 2.27 Million Passengers Per Annum (MPPA) by the year 2006-07. In addition to this, there existed substantial potential for cargo traffic at the Airport, mainly due to its strategic location. It was expected that by 2006 the cargo traffic would reach 26,000 Metric Tonnes Per Annum (MTPA) mainly catering to drugs & Pharma, Agricultural Produce and Hardware.

4. Hence, to accommodate large size aircrafts and provide the state-of-the-art facilities for operation of an international airport meeting international standards, the Andhra Pradesh Government proposed development of the international airport at the outskirts of the congested twin cities of Hyderabad and Secunderabad in the Rangareddy district. It was planned that airport once operational will replace the existing Begumpet airport at Hyderabad, which handled both Domestic and International Aircraft operations.

5. The Ministry of Civil Aviation ('MoCA') signed the Concession Agreement ('CA') with a consortium led by GMR Infrastructure Limited ('GIL') in December 2004 to build, operate and maintain an airport at Hyderabad.GMR Hyderabad International Airport Limited ('GHIAL', 'Company', 'Borrower') is the SPV for the design, finance, construction, operation, maintenance and management of a new international airport at Shamshabad, Hyderabad on Build, Own, Operate and Transfer ('BOOT') basis. The concession period is for 30 years, extendable by another 30 years at the option of GHIAL.

6. The international airport is being developed in four phases, based on traffic trigger principle. Currently, Phase-1 of the airport project (involving Original, Expansion and Additional Works Projects) has been completed and further expansion would be based on the traffic trigger principle. The overall Airport Project can be divided into "**Original Project**", "**Expansion Project**" and the "**Additional Works Project**".

(i) Original Project- Initially the airport, which was constructed on a greenfield site (5,450 acres of land, leasehold rights provided by GoAP) at Shamshabad about 22km south of the present airport at Begumpet (Hyderabad), was designed to handle a capacity of 7 million passengers and 1 lakh tonnes of cargo annually (Original Project). The Original Project achieved financial closure in August 2005 with the scheduled commercial operations date ('SCOD') as March, 2008.

(ii) Expansion Project- However, considering the growth potential with the availability of low cost air travel, the company conceived an Expansion Project which included:

- Expansion of the terminal capacity to 12 million passengers annually,
- Development of 13,500 kilo litres of fuel farm capacity to cater to the fueling requirements of the airlines and,
- Construction of 308 keys 4 star hotel property on a 5-acre land catering to the business travel segment under "Novotel" brand ('Accor Group')

Notwithstanding the Expansion Project, the scheduled COD of the airport remained unchanged and the airport was inaugurated on 23rd March, 2008.

(iii) Additional Works Project- Subsequent to the commencement of the airport operations, GHIAL conceived an Additional Works Project which included provisions of retail shops, food court, retail kiosks, business lounges, cargo agents building, CFM Building, enhancement new office building, Kirby shed, Public Transport Centre(PTC) building etc. and enhanced security requirements as per guidelines from various regulatory bodies.

7. The salient features of the project and the project cost have been detailed in below **table 1**.

Table 1: Project Salient Features

Particulars	Project Road
Original Project	Development, design, construction, operation and maintenance of the initial phase as described in Concession Agreement dated 20th December, 2004 entered between GHIAL and the Government of India ("the Concession Agreement") with annual capacity to handle 7mn passengers annually.
Expansion Project	Expansion of the terminal capacity to 12 million passengers annually, Development of 13,500 kilo litres of fuel farm capacity to cater to the fueling requirements of the airlines and Construction of 305 keys 5 star hotel property.
Additional Works Project	The works involve improvements and other works for increasing passenger comfort, enhancing efficiency of operations & airport services, better interiors, higher level of safety and security for passengers and increased commercial activity.

Project Cost/ Means of Finance	Original Project cost: Rs. 1760.00 crores financed with debt of Rs. 960.00 crores and equity of Rs. 800.00 crores Expansion Project cost: Rs. 718.00 crores financed entirely through debt Additional Works Project cost: Rs. 442.00 crores financed entirely through debt.

Source: Project Information Memorandum -2012

3. AIRPORT FACILITIES:

8. The highlights of the facilities provided at the airport is given below:

- With one of India's longest runways (4260 meters), the airport has an initial capacity of 12MPPA, 100,000MT of cargo handling capacity per annum and 90,000 Air Traffic Movements per annum in the initial phase.
- The airport provides facilities and infrastructure, in accordance with ICAO standards and practices to handle large aircraft and international traffic.
- Its integrated domestic and international terminals are equipped with 12 contact boarding bridges, 30 remote stands, Common User Terminal Equipment (CUTE), self check-in kiosks (Common User Self Service- CUSS) and 46 immigration counters.
- It also incorporates modern IT systems including Flight Information Display Screens, Baggage Handling System (BHS), and Airport Operational Database (AODB) Technology for the first time in India.
- The airport has the Airport Operations Control Centre which acts as the nerve centre for all coordination within the airport.
- The modular integrated Cargo facility is spread over 14,330sq.mtr, with a capacity to handle 100,000MT annually.
- On the east of the airport is a 250 acre Aerospace SEZ that houses, the GMR Aviation Academy as a Global Training Hub for the Asia Pacific region. The Academy has started offering varied courses.
- The airport houses a 13,500 KL fuel farm facility that operates on "Open Access" fuel policy where any Oil Marketing Company (OMC) under a contract with an airline can supply fuel using this facility.
- Other salient features at the airport include an integrated terminal that offers an international experience with a local flavor, airport village with shopping arcade, 305-room 5 star business hotel under the "Novotel brand"(operated by the Accor group) located just three kilometers away from airport, conference facilities for the business traveler and integrated modern IT systems.

4. CONCESSIONAIRE:

9. The Ministry of Civil Aviation ('MoCA') signed the Concession Agreement ('CA') with a consortium led by GMR Infrastructure Limited ('GIL') in December 2004 to build, operate and

maintain an airport at Hyderabad. GMR Hyderabad International Airport Limited ('GHIAL', 'Company', 'Borrower') is the SPV for the design, finance, construction, operation, maintenance and management of a new international airport at Shamshabad, Hyderabad on Build, Own, Operate and Transfer ('BOOT') basis.

5. IIFCL FUNDING:

10. The total project cost of the project is Rs. 2920 crore, which is financed with debt of Rs. 2120.00 crore and equity of Rs. 800.00 crore. GMR Hyderabad International Airport Limited has signed the Takeout Agreement on 16th January 2012 for First Tranche, 23rd October 2012 for Second Tranche and on 29th July 2013 for Third Tranche with India Infrastructure Finance Company Ltd. (IIFCL).

11. The project has been financed by IIFCL under Takeout Finance Scheme and IIFCL has committed for Rs. 306.10 croreunder three tranches of Rs. 96.05 crore, Rs. 93.05 crore and Rs. 117.00 crore. The details of the sanctioned amount and their disbursement status is given in below **table 2**:

Table 2: Details of IIFCL financing

Sl. No.	Tranches	Sanctioned Amount (in Rs.)	Disbursed Amount (in Rs.)
1.	First Tranche	96.05	94.55*
2.	Second Tranche	93.05	79.80
3.	Third Tranche	117.00	0.00
Total		**306.10**	**174.35**

** Out of the total sectioned amount only Rs. 94.55 crore was required by the concessionaire for settlement*

DUE DILIGENCE ON ENVIRONMENTAL SAFEGUARDS

6. ENVIRONMENT SAFEGUARD COMPLIANCE REVIEW:

12. Government of Andhra Pradesh decided to develop a new International Airport due to various constraints faced in the existing Begumpet Airport(Operational Airport before RGIA) to cater to the growing needs of air traffic and once operational the proposed airport(currently RGIA) will replace the existing Begumpet airport at Hyderabad. The project was approved by Ministry of Civil Aviation, Government of India vide their letter No. 4527/CSP/Coon/2000 dated 29.5.2000.The alternative sites and siting guidelines were considered while selecting the site for the project.

13. Rajiv Gandhi International Airport (RGIA) is a Greenfield airport built under the PPP Mode and GMR Hyderabad International Airport Ltd. (GHIAL) is the operator of RGIA.
GHIAL is a joint venture company promoted by the GMR Group (63%) in partnership with Govt. of India (13%), Govt. of Andhra Pradesh (13%) and Malaysia Airports Holdings Berhad (11%). This Airport got commissioned in March 2008 with Airport capacity of 12 million passengers and 3 lakh tons of cargo handling per annum.The total area of the project is 5494 acres.

14. The Ministry of Environment and Forests (MoEF) has earlier accorded Environmental clearance to this project vide letter no. J-16011/4/2003, dated 6.3.2003 for 5 MPPA. Later, the Ministry approved the expansion of the airport to 7 MPPA vide letter No. J-16011/4/2003, dated 10.4.2006. For the current expansion of 12 MPPA, the project proponent sought clearance for the expansion of the project to accommodate 12 million passengers per annum vide letter no. 10-14/2006-IA-III, dated 10th April, 2007.On behalf of Joint venture company of Hyderabad International Airport Limited (HIAL), M/s Vimta Labs Limited has prepared the Environmental Assessment and Environment Management Plan. Copies of the EIA/EMP reports prepared in the year 2003 and 2007 are given in **Appendix-I**.

15. The Environmental safeguard due-diligence study was carried out for the project on the basis of site visit observations and understanding project scope based on information and documents provided by Concessionaire. The following documents were referred in order to prepare Environmental Safeguards Due-Diligence Report:

- Project Information Memorandum (PIM);
- EIA/EMP Report for project, Prepared in year 2003 for Establishment of Airport ;
- EIA/EMP Report, Prepared in year 2007 for Airport Expansion ;
- Environment Safeguards related Clearances/Permits obtained for the project;
- Minutes of Public Hearing Proceedings;
- Six Monthly Compliance reports submitted to MoEF;
- Environmental Statement Form submitted to SPCB;
- Emergency Compliance Manual for Operation Phase;
- Environmental Quality Monitoring Reports;
- Concession Agreement clauses related with HSE measures;
- Airport Safety Management related documents;
- EMP Compliance and Safety Management related Monitoring Documents during Operation Phase.

7. VISIT TO SUB-PROJECT LOCATION:

16. As part of the preparation of the ESDDR, the sub-project was visited jointly by the Environmental and Social safeguard specialists of IIFCL and ADB Review Mission Team on 3rd of June, 2013 for field verification of Environmental safeguards as reported in the EIA/EMP reports and consultation with the O&M Team of concessionaire was also done regarding safeguards implementation. The project is currently in operation phase. The site visit photographs are given in **Photo Plate-I.** The concessionaire, M/s. GMR Hyderabad International Airport Ltd. (GHIAL) has developed this project on Build, Own and Operate (BOO) framework and is a public-private joint venture between GMR Group, Malaysia Airports Holdings Berhad and both the State Government of Andhra Pradesh and Airports Authority of India (AAI).

17. The HIAL project site is located near Shamshabad in Rangareddy district of Andhra Pradesh State. The HIAL project site is accessible by National Highway (NH) 7 (Hyderabad-Bangalore National Highway) till the Umdanagar railway station (on south central railway BG line connecting Hyderabad to Bangalore) after which the site can be reached after passing through Umdanagar / Shamshabad villages. The site is also accessible through the Srisailam State Highway connecting Hyderabad to Srisailam. NH - 7 is located on the west of the site and Srisailam State Highway on the east of the site. It is also connected by the present inner ring road in the Hyderabad district. Some of the major benefits associated with Airport project operations are given below:

- Capability to provide for the increased air traffic demand in the area;
- Facilitate UMRA and HAJJ pilgrims from the State and the surrounding areas to travel directly to Mecca and Madina;
- Gulf employed natives of the state and surrounding areas to directly reach their home and depart from home for work;
- The uncertainty stress of connecting flight reservation, delays, exploitation, costs, inconvenience and above all the time wasted in transiting through metro airports;
- Providing for additional revenue generation in terms of foreign exchange earned from operations at the proposed international airport;
- Providing for additional employment arenas in view of associated development in the area due to the proposed project;
- Trigger growth in the state and of the region due to increased air traffic (both passenger and cargo) demand in the area and the resultant associated development;
- Development of linkage Industries and Infrastructure thus creating a Development Cycle, providing for additional revenue generation;
- Providing for additional employment opportunities in view of associated development in the area due to the proposed project and improvement in quality of life of the local population;

8. ENVIRONMENTAL SENSITIVITY AND DUE DILIGENCE:

18. The environmental sensitivity of the Rajiv Gandhi International Airport, Hyderabad has been assessed by reviewing the Environmental Assessment and Management Plan, prepared as part of the project preparation, Compliance Monitoring related documents during O&M phase, supplemented by field visit and consultation with the concessionaire. The environmental sensitivity assessment is given below:

- The present landuse at the project site falls under Industrial Category. The expansion of the airport has been carried out within airport boundary and no additional land has been acquired for this purpose;
- There is no sanctuary or National Park or wildlife migrant route situated within 10 km radius of the project site. The nearest ecologically sensitive sites w.r.t. project site are ,Nehru Zoological Park which is a tourist place is at a distance of about 12 km in north direction, Kasu Brahmananda Reddy National Park-20 km N,Deer Park at Vanasthalipuram-21 km NE and Chilkur Reserved Forest - 15 km NW from the center of the site;
- There is no loss of bio-diversity as there are no known rare, threatened or endangered fauna species within the project study area;
- No notified forestland is involved in the Airport Site. As per EIA reports (2003,2007), the nearest reserved forest area having scrubby vegetation is at a distance of 2.5 km from the boundary of the site in south direction near Harshagudem village.
- There are no archeological monuments and sites within 10 km radius of this project. As given in both EIA reports, the important nearest places from project site center are Falaknuma Palace (11 km, NE), Golconda Fort (16 km, N), Qutubshahi Thombs (15 km, N), Charminar (14 km, NE), Mahakali Temple (22 km, NE), Salarjung Museum (15 km, NE).
- No Rehabilitation and resettlement issues are involved in the expansion project. As entire land acquisition was done in the initial phase by estimating the future expansion requirements. As per EIA report(2003),Total number of PAPs were about 422. The displaced families belonged to 8 villages, namely Anantharedddy Guda, Gollapalli Kalan, Gollapalli Khurd, Galvaguda, Mamidipalli, Maqta Bahdur Ali, Manneguda and Shamshabad. The PAPs were compensated as per the norms of the Land Acquisition Act, 1894 and the Comprehansive package has been given by the Andhra Pradesh State Government to PAPs.
- Rehabilitation and Resettlement Plan was fully implemented by the Government of Andhra Pradesh (GOAP). GMR Varalakshmi Foundation and “Airport Colony” were established for the people. During Due-diligence site visit of 3rd June,2013, R&R Colony for PAPs provided by Airport project was also visited by safeguards team of IIFCL as well as ADB;
- As per the State Pollution Control Board norms, the policy of zero discharge is being implemented at airport. All sewage water being generated at the airport premises is treated in the Sewage Treatment Plant and the treated water is used for flushing and green belt within the airport premises. Sludge generated from STP is being used as manure in landscape development;
- During airport operation phase, the solid waste is collected and disposed to the Andhra Pradesh Pollution Control Board (APPCB) approved vendor for power generation purpose i.e. Selco International, Hyderabad;

- As per Environment Clearance letter received in 2007 for expansion project, condition of taking up landscaping in 600 acres of land has been complied with. Landscaping of approximately 674 acres has been completed in the present phase.
- As given in Six monthly compliance report of EC letter, its stated that during construction phase, the quarry material was obtained from Balapur quarry, Indu quarry and IGM quarry which are approved quarries.
- An integrated online continuous environmental monitoring station has been commissioned at a suitable site within airport premises. In addition to this, a third party environmental quality monitoring is being done at 9 locations in and around the airport;
- As per Environmental Statement form submitted with State Pollution control board for the financial year ending on 31st March 2012, Baseline environmental monitoring for air, water and noise environment indicates good quality of environment at project site as the levels for different environmental parameters are within the prescribed limits of National environmental standards;
- Elaborate environmental management and monitoring programme has been suggested for this airport project along with Risk assessment & Disaster Management Plan for which compliance confirmation has been communicated to MoEF in six monthly compliance reports that all the recommendations made in Environmental Management Plan and Disaster Management Plan are being strictly implemented during Operational Phase ;
- Necessary Fire-fighting facilities including provision for fire hydrant system has been provided within Airport premises. Architectural design of the terminal building is designed in such a way that it allows natural light to enter into the building so that electricity consumption can be minimized in maximum order;
- No groundwater is extracted in airport project and rainwater harvesting system is implemented as per the plan;
- The concessionaire has undertaken the implementation of safety management system by adopting safety policy for the project and has developed systematic procedures in form of safety manuals for different areas within airport during operation stage of the project. Regular safety audits and mock drills are conducted for effective implementation of best safety practices ;
- Public consultations have been conducted during the environmental studies to disseminate the project information and to record the views/aspirations of the local people near project site ;
- EMP Budget for 5.18 crores to be spent during 2013-14 financial year has been proposed for Environmental Management and Monitoring plan implementation during operation phase; and,

- Periodical environmental management and monitoring during the project implementation is being carried out by the concessionaire.

9. CATEGORIZATION OF SUB-PROJECT:

19. The sub-project can be classified into Category "B" based on ADB's EA requirements as per their Safeguard Policy Statement (2009) as the project may involve investment of ADB funds through a financial intermediary. For Category FI, if the sub-project results in adverse environmental impacts then Financial Intermediary must ensure that sub-project meets the requirements of appropriate National, local authorities and ADB's safeguard policies and suitable environmental management plan has been applied.

10. STATUS OF REGULATORY CLEARANCES:

20. The applicable statutory clearances from competent authorities were obtained during construction and operation phases of project. The detailed status of permits approval as obtained by Concessionaire/EPC Contractor is given in **Table-3** below:

Table 3: Status of Regulatory Clearances Obtained

Sl. No.	Clearances Required	Statutory Authority	Current Status of Clearance
1.	Environmental Clearance	Ministry of Environment and Forests, New Delhi	MoEF has granted Environmental Clearance for Expansion of Hyderabad International Airport at Shamshabad on 10th April, 2007, Letter no. 10-14/2006-IA-III.
2.	Consent for Operation and Hazardous Waste Authorisation	Andhra Pradesh Pollution Control Board, Hyderabad	Renewal Consent for Operation Vide Consent order no. APPCB/HYD/HYD/214/CFO/HO/2012.3475 , dated 23rd January,2012 has been received from Andhra Pradesh Pollution Control Board by M/s. GMR Hyderabad International Airport for discharge of water under section 25 of the water (prevention and control of pollution) Act, 1974, and for air emissions under section 21 of Air (Prevention & Control of Pollution) Act, 1981. This consent authorizes the applicant to operate the industrial plant to discharge the effluents from the outlets and the quantity of emissions per hour from the chimneys. Under the same renewal consent for operation, Hazardous Waste Authorisation is also granted to operate the facility for collection, reception, storage, transport and disposal of hazardous wastes as given in consent order quantity-wise. Valid Till: 31st January, 2016

3.	License to import and store Petroleum in installation	Chief Controller of Explosives, Petroleum and Explosives Safety Organisation (PESO), Hyderabad (Govt. of India, Ministry of Commerce & Industry)	CCoE permission for storage of 90 KL Petroleum Class B (Diesel) is granted to M/s. GMR Hyderabad International Airport, Hyderabad, Andhra Pradesh vide Lic. No. P/HQ/AP/15/3535(P193751), Dated: February 14, 2008 CCoE permission for Fuel Farm has also been renewed/obtained by Concessionaire vide License No. P/HQ/AP/15/3514 (P185511), Dated 23rd February, 2012. Valid Till: 31st December, 2013
4.	Labour License	Office of Joint Commissioner of Labour, Rangareddy Zone, Hyderabad	The establishment has been registered under the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the Contract Labour (Regulation and Abolition) Central Rules, 1971 and labour license has been obtained for the project under the said act from Govt. of Andhra Pradesh, Office of the registering officer vide Certificate No. JCL-RRZ/65/2005 (PE), dated 11th March, 2005.
5.	Public Liability Insurance Policy	Requirement of Public Liability Insurance Act, 1991 (amended in 1992)	Public Liability (Industrial Risks) Insurance Policy has been taken by Reliance Industries Ltd.& GMR Hyderabad International Airport for public liability (Industrial Risk) for Hyderabad Refuelling facility by RIL at GMR Hyderabad International Airport , dated 21st May, 2013. Policy Period: 22-05-2013 to 21-05-2014
6.	NOC for Height Clearance of ATC Tower	Airport Authority of India, New Delhi	No Objection Certificate for construction of ATC Tower by Hyderabad International Airport was obtained from AAI vide NOC No. AAI/20012/780/2004-ARI(NOC), Dated 5th September,2005
7.	NOC from Ministry of Defence	Govt. of India, Ministry of Defence	No Objection Certificate for establishment of Hyderabad International Airport at Shamshabad (Hyderabad) was obtained from Defence Ministry vide NOC No. 3(40)/02/D(Air II), Dated 2nd November, 2004
8.	Aerodrome License-Public Use	Govt. of India, Office of the Director General of Civil Aviation, New Delhi	Director General of Civil Aviation granted Aerodrome license to GMR Hyderabad International Airport Ltd for landing & departure of aircrafts vide License No. AL/Public/021 dated: 4th March, 2008 under Aircraft Act, 1934, Aircraft Rules,1937

21. Copies of Environment Clearance and other important permissions as mentioned above are given in **Appendix-II.**

11. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE:

22. Public participation and community consultation has been taken up as an integral part of social and environmental assessment process of the project. Formal Public Hearing as part of Environment Clearance Process was conducted at the Office of Mandal Revenue Office, Shamshabad, Rangareddy District on 28th December, 2002.Minutes of public hearing held in connection with the establishment of M/S. Hyderabad International Airport are attached as **Appendix-III**.

12. ALTERNATIVE ANALYSIS:

23. As per EIA report, various alternative sites were considered before finalizing the final location of Shamshabad area where currently Hyderabad International Airport is established. The earlier civil airport at Begumpet was located on the Northern side of Hyderabad –Secunderabad Metropolitan area. Besides, there were two other major Defence Air fields (Hakimpet & Dundigal) operated by Indian Air Force. Both of them were located on the Northern side of earlier airport at Begumpet. Thus, the air space zone of influence surrounding the earlier airport was severely congested and therefore, did not possibly permit the location of any new airport on the northern side of Hyderabad –Secunderabad Metropolitan area. Thus, the only strategic option that was left, was to select an appropriate site on the Southern side of the Metropolitan area. Accordingly Govt. of Andhra Pradesh(GoAP) identified preliminarily the following five potential sites located on the Southern side of the Hyderabad and further, GoAP also constituted a Site Selection Committee, which carried out survey of these five sites and gave recommendations for most suitable site. Following are the five alternative sites which were considered for site selection:
    - Site No. 1: Bongulur Village, Ibrahimpatnam Mandal, Ranga Reddy District;
    - Site No. 2: Mamidipalli Village, Shamshabad Mandal, Ranga Reddy District;
    - Site No. 3: Pedda Shapur Village, Shamshabad Mandal, Ranga Reddy District;
    - Site No. 4: Narkhuda Village, Shamshabad Mandal, Ranga Reddy District;
    - Site No. 5: Nadargul Airstrip, Saroornagar Mandal, Ranga Reddy District;

24. Site-5 was not considered, as it does not have adequate area, Similarly, Site No. 4 was also not considered because of its close proximity to the Himayat Sagar Reservoir. It was noted that Site No. 3 has four habitations within the site with approximate population of 2000 people. Hence, it was decided that only Site No.1 and No. 2 should be examined and Site No. 3 should not be considered.

25. The site features of Site 1&2 were further assessed techno-economically and environmentally by the team and it was concluded that though the features of both the site were almost alike but Site No. 2 had an edge over Site No. 1 because of its proximity to the demand center and convenient approaches by road. Also the proposed site was close to Railway station, which would offer greater convenience to the passengers and staff. Further, Site-1 was not acceptable as it involved acquiring non-government land displacing large number of human habitation. The site selection committee accordingly

recommended the site located near village Mamidipalli, Shamshabad Mandal, Ranga Reddy District (Site No. 2). The GoAP accepted the recommendations and approved the site recommended. Site no. 2 was selected considering the following site selection criteria:

- Less involvement of PAPs compared to the land involved and less homestead population displacement issues;
- Significant distance from Himayat Sagar Reservoir;
- Availability of land sufficient to develop all the four phases of the project;
- Water and power availability; and
- Less distance to Hyderabad/Secunderabad city and good accessibility due to National Highway no. 7 and sub-urban railway line near to the proposed project site; and

26. Based upon abovementioned criteria, Government of Andhra Pradesh allocated the project site and before project development at site, the land use of site was mixed type comprising mostly fallow and barren land followed by small patches of agricultural land. More elaborate details of alternative analysis for site selection are given in EIA/EMP report prepared for this project in year 2003 which is attached as Appendix-I.

13. IMPLEMENTATION OF EMP DURING OPERATION PHASE:

27. As part of the project, detailed EMP measures have been undertaken during Operation phase including a year-wise budget for implementing the same. The EMP budget spent during the year 2011-12 and budget provision for the year 2013-14 is attached as **Appendix-IV** which exclusively includes the following measures:
    - Environmental Quality Monitoring;
    - Institutional arrangement for Environmental Management;
    - Green Belt Development and Horticulture;
    - Water Treatment;
    - Waste Water Management;
    - Solid and Hazardous Waste Management;
    - Rain Water Harvesting;
    - Green House Gas Management;
    - Management of Safety Measures including Fire-fighting system;

13.1. CONCESSION AGREEMENT-HSE RELATED CLAUSES :

28. The Master Plan for Hyderabad International Airport is prepared in line with current ICAO Standards and Recommendations / IATA guidelines which also covers Environmental regulations and compliance. Project developer has provided main clauses of Concession agreement related with Health, safety and Environmental Management which are attached as **Appendix-V**. As mentioned in Schedule 2 of this agreement, Master Plan has been developed using the forecast prepared by HIAL which is foreseen to follow the traffic demand. The ultimate development presented in the Master Plan caters for 40 million passengers per annum.

29. Requirement for obtaining various clearances from different authorities is given under Schedule-1. Under Schedule-2 , provisions for rescue and fire-fighting facilities, Sewage disposal, water supply, sewage disposal and storm water drainage system has been given. Under Schedule 3 for Airport activities, Noise insulation and sound proofing has been mentioned for Airside/landside/terminal facilities and requirement of Wastewater /refuse treatment and disposal has been given under infrastructure utilities. Provisions for Fire Protection system, water supply and sewage network has been provided under Schedule-4 of this agreement.

13.2. ENVIRONMENT MANAGEMENT PLAN (EMP) IMPLEMENTATION:

30. The environmental management plan as appeared in Chapter-5 of EIA report (Year 2007) is given in Appendix-I, which describes the proposed mitigation measures that have been adopted during the operation stage of the project. Environmental Compliance Manual prepared and implemented by Concessionaire during operation phase is attached as **Appendix-VI**. This manual describes various procedures related with Environmental Management of Airport project which covers legal requirements for compliance and evaluation, Environmental parameters monitoring, Solid and hazardous waste management, sewage Treatment plant operation monitoring, Management Information System, Roles/responsibilities of Environmental Cell, Green House Gas Management, Legal register, Environmental aspects evaluation register, Hazard identification and risk assessment register and list of SOPs etc.

13.2.1. Concessionaire's EMP Compliance Status:

31. As part of project review and site visit, effort has been made to track the present status of implementation of the EMP. Compliance status of Environmental Management Plan by Concessionaire during operation phase is attached as **Appendix-VII**. Concessionaire is continuously submitting compliance status & monitoring reports to various authorities like Ministry of Environment & Forest, New Delhi and State Pollution Control Board. Copies of latest six monthly compliance reports (For the period of April 2012 to September 2012 and October 2012 to March 2013)as per the conditions of Environmental Clearance letter and Environmental Statement for the year 2011-12 submitted by concessionaire during Operation phase have also been attached under Appendix-VII. Most of the activities are in compliance with the agreed EMP and compliance is being done continuously. The presentation delivered by project developer on HSE aspects implemented in the project is attached as **Appendix-VIII** which was showed to us during our site visit for this project. Based upon information shared by developer , major Health, safety and Environment management related measures taken by project developer during operation phase are given below:

Environmental Legal Compliance: Environment legal register is maintained which describes applicable legal requirements, mode of compliance and responsibility. GHIAL has adopted Environment and Safety policy and has also established EHS Management cell which comprises of separate teams for safety, occupational health, Environmental

compliance, energy and water management, solid/hazardous/e-waste management and landscaping teams.

Greenbelt Cover: Greenbelt has been developed with various plants in an area of 273 hectares and 971 hectares of natural greenery is undisturbed. This Green cover helps in removal of 124 tonnes of CO_2/annum from the environment. RGIA received the best landscape award from the State Govt. in the years 2010,2011 and 2012.

Green Building: Airport terminal building structure is architecturally designed as environmentally responsible and resource-efficient throughout the building's life-cycle .Building is designed to allow natural light to enter into the building so that electricity utilization can be minimized and natural ambience of passenger movement area can be improved. RGIA's Passenger Terminal Building is certified for "Leadership in Energy & Environmental Design" (LEED) 'Silver Rating" by the US Green Building Council (US GBC).

Energy Conservation: GHIAL has taken various measures towards energy conservation which includes introduction of energy efficient LED lighting, implementation of building automation system, replacement of cooling tower blades of aluminum to Fiber Reinforced Plastic (FRP) material, installation of power saver units for car park high mast and offices air conditioning optimization to ambient temperature & weather conditions. GHIAL has been certified for ISO 50001, which is an international standard for energy management system and also received National Energy Conservation award in 2011.

GHG Management: GHIAL has conducted Greenhouse gas (GHG) emission inventory since 2009 which has been verified and validated by third party in line with ISO 14064:2006. In the year 2012, GHIAL reduced 3403 tons of CO_2 as compared to year 2011. Airport Council International has accredited RGIA under the Airport Carbon Accreditation Programme - level 2 (for reduction of greenhouse gas emissions).
RGIA became the 6th accredited airport in Asia- Pacific region and 3rd airport at reduction level 2 in the Region.

Air & Noise Pollution Control: Necessary mitigative steps such as high raised chimneys and acoustic enclosures for DG sets, Use of Battery driven ground supporting equipment, installation of Fixed Electrical Ground Power (FEGP) units at aircraft parking stands for reduced usage of Auxiliary Power Units (APU), PUC for vehicles, restriction in the use of reversal thrust, compound wall for noise control etc. are provided.

Water Management: Fresh water source is HMWS & SB supply which is used for domestic purposes like drinking, catering , hand wash etc. Water saving methods are adopted like use of rainwater instead of HMWS source water for flushing and washings, use of R.O. reject water for flushing and work is under progress for reuse of WTP backwash water. Wastewater is being treated in Sewage Treatment Plant (STP) at site and reused for flushing and plantation. Sludge from STP is being used as manure.

Rainwater harvesting system has been implemented at site and rainwater net recharge is estimated at 1.729 million cubic meter per annum.

Solid Waste Management: Solid waste is generated from Passenger Terminal Building (PTB), offices, cargo handling, canteen etc. which consists of food waste, plastic waste, paper waste etc. Food waste is used for making compost and paper and plastic waste are being handed over to recyclers. The average waste generation is 2297 kg per day. Bio-medical waste is disposed off to M/s. GJ Multiclave (India) Pvt. Ltd. (APPCB authorized agency) and E-waste disposal is done to authorized recycling facility. Used batteries are procured on buy back basis and used oil & waste grease is handed over to authorized agencies. Compost generation from food waste is about 400 tonnes/annum and compost & STP sludge is used in place of chemical fertilizers for green belt.

Integrated Management System: RGIA is certified for Integrated Management System comprising ISO 9001:2008 for Quality Management System, ISO 14001:2004 for Environmental Management System and OHSAS 18001: 2007 for Occupational Health & Safety Management System.

13.2.2. Environmental Quality Monitoring

32. A comprehensive environment monitoring system is in place to assess the present environment scenario and to take the preventive measures. This monitoring is essential to judge the effectiveness of mitigation measures planned during construction and operation phase. The environmental monitoring is the responsibility of the Concessionaire. An integrated online continuous environmental monitoring station has been commissioned by M/s. GHIAL which monitors continuously ambient air quality (PM10 & PM 2.5, sulphur dioxide and nitrogen dioxide parameters), Ambient Noise levels and Weather monitoring including Wind speed, wind direction, vertical wind speed, barometric pressure, air temperature, solar radiation, relative humidity and rainfall. In addition to this, a third party environmental quality monitoring is also being done at 9 locations in and around the airport

33. The Environmental Monitoring has been outsourced to an Environmental Laboratory namely M/s.Universal Enviro Associates (UEA), Hyderabad which is recognized by MoEF, Govt. of India. The results of Environmental Monitoring are enclosed as **Appendix-IX**. This monitoring report is an overview of the findings of the field investigations carried out for the month of March 2013. The field monitoring data was collected during 05-03-2013 to 07-03-2013 & 21-03-2013 to 24-03-2013 at Rajiv Gandhi international Airport, Shamshabad and 10 km surrounding the area. The environmental monitoring analysis is carried out for ambient air as well as stack, water, soil, wastewater and noise in and around the airport site. As per the report attached, levels of environmental quality parameters are within the permissible limits at all the locations in and around the airport.

14. IMPLEMENTATION OF SAFETY MANAGEMENT SYSTEM DURING OPERATION PHASE:

34. Safety Management system at RGIA has been developed by keeping in view the requirements of Directorate General of Civil Aviation(DGCA) and International Civil Aviation Organization (ICAO).Safety Management System has various key elements like Safety Policy, Management Commitment and Leadership, Risk and Change Management, Safety Assurance, Safety Promotion, Documentation, and implementation of the Safety Management System. GHIAL's Safety Management System has been attached as **Appendix-X**.

35. Under Safety management system, clear roles and responsibilities at all levels have been defined and appointments of building safety wardens, safety officers and first aiders have been done. Safety committees have been structured systematically and Apex committee has also been formed. Airport premises are well equipped with fire-fighting facilities including fire-fighting station& rescue team which is in compliance with National Building Code & National Fire Protection Association requirements. GHIAL has imparted first aid training to all security, ARFF personnel and 15% of other staff members. As informed by project team, safety audits and inspections of workplace environments and centers of activity are conducted on a regular basis. Safety awareness related programmes are regularly conducted and airport users , contractors and service providers are encouraged to participate and contribute towards safety programmes.

36. GHIAL has made consistent efforts to put in place a Safety Management System and build a safety culture in the organization through following measures;

- Implementation of ICAO Doc 9859 SMS requirements;
- OHSAS 18001 implementation;
- British Safety Council's 5-star Health & Safety Management System implementation;
- Business Excellence Initiative

37. RGIA is the only airport in the world to achieve the Five Star Rating for its Health & Safety Management System. Copy of mail received from British Safety Council regarding certification confirmation and copy of certificate is also attached under **Appendix-X**. As informed by project developer, lots of improvements were made to Safety Management system as part of BSC's five star Health and Safety Management System Audit.

38. GMR has developed a comprehensive site safety policy and has also developed safety instructions separately for airside, passenger terminal and lanside. Area-wise Site safety instructions and copy of safety policy have been attached under **Appendix-XI.**

14.1. EMERGENCY PREPAREDNESS AND RESPONSE PLAN:

39. GHIAL has an Airport Emergency Plan (AEP) which is one of the key components of Business Continuity process of the organization, developed with an objective of handling airport emergencies in a systematic and orderly manner approved by Director General of Civil Aviation (DGCA). One of the conditions of the Environment Clearance necessitates the need for due-diligence by the airport operator on the risks that were earlier identified in the Environmental Impact Assessment report as given under the chapter for risk assessment and Disaster Management Plan. An extensive Aerodrome Emergency plan is in place which is approved by DGCA vide AV20025/9/2007-AL, dated 12.05.08. This emergency plan specifies the role and responsibilities and actions to be taken in the

event of various emergency situations. Brief document on Emergency Preparedness & Risk Assessment and Disaster Management Plan is attached as **Appendix-XII**.

40. GHIAL has prepared and published a comprehensive Aerodrome Emergency plan and a security manual which are approved by DGCA and BCS, respectively. These manuals are provided to various stakeholders involved in functioning of EIA. GHIAL has a well-established Airport Rescue and Fire Fighting Service (ARFF) which is manned by trained and experienced personnel and equipped with most modern fire appliances and equipment. The airport employees are also given training in Fire safety and Building Evacuation. Periodic emergency exercises are conducted in order to ensure the adequacy and effectiveness of the Airport Emergency Plan and actions by participating agencies/ organizations. Photographs for emergency Mock Drills exercise are also attached under **Appendix-XII**. In order to manage and control the emergency operations, coordination centers are defined in the Airport Emergency Plan and made available at RGIA. The Incident Management Center is managed by higher management officials from various agencies including Govt. Authorities and this group continuously monitors, give overall directive for control and management of crisis, continuity of operations and recovery.

14.2. INCIDENT MANAGEMENT SYSTEM:

41. GMR has developed Online Hazard Management system with a submission option of Confidential Hazard Reporting Form in which anyone can report anonymously regarding hazards which have caused any incident/accident or likely to cause. All accidents/incidents/near misses are investigated & reported in electronic format and all safety occurrences are reported via an established call tree mechanism up to CEO level. All safety occurrences are categorized into five categories and corrective and preventive actions are tracked. Safety performance sheet showing incidents frequency between April 2012 to March 2013 period has been attached as **Appendix-XIII**.

15. OVERALL INSTITUTIONAL FRAMEWORK FOR ENVIRONMENT AND SAFETY MANAGEMENT PLAN :

42. GHIAL has Environmental Management cell headed by Chief Operating officer supported by One Environment Manager and one Environment Asst. Manager having sufficient educational and professional qualification and experience to discharge responsibilities related to environmental management including statutory compliance, pollution prevention, environmental monitoring etc. The head of the cell directly reports to the top management of the International Airport. Environment Management cell structure is attached under **Appendix-XIV**. EHS Management Cell comprises of various teams which are related to safety, occupational health, environmental compliances, energy & water management, solid/hazardous & e-waste management and landscaping teams. Safety department structure is also headed by COO of airport having position of one Assistant General Manager & Junior Manager for Airside and one Safety Manager & Junior Manager for lanside operations. There are various committees which have been constituted for handling various safety & security issues associated with various types of

airport operations along with one apex committee comprising of top management of airport. These committees handle safety related issues of various operations like transport, aerodrome, Airport Emergency Planning, Bomb Threat assessment, runway safety, Apron safety, Landside, Food, Terminal Space Management etc. Project organograms for structure of committees, safety department and EHS Management cell are also included under **Appendix-XIV**.

16. SITE VISIT OBSERVATIONS:

43. A site visit was undertaken by IIFCL's Environmental and Social Safeguard specialists along with ADB's Review Mission on 3rd June, 2013 to review the implementation of the project's environmental safeguards. During the site visit, following staff was mainly consulted regarding environmental safeguards related measures implemented at airport site:

    1. Mr. G.U.G. Sastry, Chief Operating Officer, RGIA
    2. Mr. Veera Rao B, Manager-Environment
    3. Mr. Sourabh Jain, General Manager and Head-Strategic Planning Group
    4. Dr. Avinash Kumar, Senior Programme Leader
    5. Ms. Shewata Saini, Manager- Finance and Account
    6. Airport Control Center, Safety and Rescue Team Officials

44. During site visit, presentations were delivered by GMR team regarding implementation of environmental Management, Occupational Health and Safety Management and CSR activities associated with Airport Operations, Copies of these presentations are already attached in Environmental and Social safeguards section of this ESDDR. Based on the discussions with abovementioned officials site observations are given below:

    - Green belt has been developed within Airport premises for which maintenance is regularly carried out by project developer. Beautiful landscaping has also been developed in Project site at suitable places.
    - Architectural design of the terminal building is designed in such a way that it allows natural light to enter into the building so that electricity consumption can be minimized in maximum order;
    - For treatment of sewage/domestic wastewater generated from the airport premises, sewage treatment plant having tertiary treatment facility has been set up inside the airport area. All sewage water being generated at the airport premises is treated in the Sewage Treatment Plant and the treated water is used for flushing and green belt within the airport premises. Sludge generated from STP is being used as manure in landscape development;
    - An integrated online continuous environmental monitoring station has been commissioned at a suitable site within airport premises which continuously monitors noise, air and weather monitoring data.

- Fire-fighting station has been established inside Airport which is well equipped with State of the Art Emergency equipment and Rescue Team.
- Throughout the airport premises, proper fire extinguishers and fire-fighting facilities has been provided including provision for fire hydrant system.
- For communication during the situation of emergency, public call points and public address systems have been provided at various locations inside the Airport Premises along with Emergency Exits & Emergency Numbers at suitable places.
- Rainwater harvesting system is well implemented inside the Airport site and Rainwater Harvesting Pond was also seen within Airport premises;
- DG Sets used in the airport premises are provided with proper stack height and acoustic enclosure.
- Airport staff is provided with proper safety gears and safety related signage are displayed at various locations inside airport area.
- Very robust safety & security system has been implemented inside Airport premises. Entire Airport site is under CCTV Surveillance which is monitored by Central Control Centre and adequate security staff.
- Waste Segregation Bins has been provided at suitable places and various kinds of waste generated inside airport premises is managed through outsourced agencies authorized by APPCB.
- To benefit the local area, various community development related activities are regularly done by project developer for which GMR Varalakshmi Foundation has been established. During Site Visit, various CSR initiatives associated with Airport project operation were visited like Vocational Training Centre under local youth livelihood development programme, School Facility at Shamshabad under Chinmaya Mission, Mobile Medicare Unit, R.O. Water facility for Villagers, R&R Colony established for PAPs, Tailoring Centre and Nutrition Centre for local ladies group, marketing of hand-made products by Women self-help groups of local area etc. More details of various CSR initiatives are included in Social Safeguards Section of this ESDDR under the heading of Community Development Activities.

45. The site visit photographs regarding the environmental safeguard measures implemented during operation phase are given in **Photo Plate-I**.

17. CONCLUSIONS AND RECOMMENDATION:

46. Based upon the available documents and site visit, it is concluded that the concessionaire has undertaken adequate environmental safeguard measures. The conclusions for the sub-project are given below:

- The sub-project has been prepared by GHIAL as per its own funding requirement and not in anticipation to ADB operation.

- The expansion of this Airport project has no major significant environmental impacts.
- The Concessionaire has confirmed that all applicable environmental clearances as well as permits and approvals for project implementation have been obtained.
- Concessionaire has confirmed that continued compliance is being carried out with the terms & conditions stipulated in obtained statutory environmental clearances/consents.
- Safety Management system at RGIA has been developed and implemented by keeping in view the requirements of Directorate General of Civil Aviation (DGCA) and International Civil Aviation Organization (ICAO).
- As informed by project team, RGIA is the only airport in the world to achieve the Five Star Rating for its Health & Safety Management System by British Safety Council.
- The sub project may also have a positive GHG emission reduction due to its Green cover and Green Building initiatives.
- The institutional arrangement available for the implementation of Environment Management Plan (EMP)and Safety Management System (SMS) appears to be adequate as there is a sufficient number of staff available for implementing and monitoring the EMP& SMS implementation.
- During site visit and discussion with the project developer, the implementation of EMP and environmental monitoring system were found adequate.
- Periodical Environmental/Safety management and monitoring during the project operation phase is being carried out by the concessionaire.

47. Based on the site visit and due diligence findings, it can be deduced that the sub-project has no significant environmental safeguard issues. The Sub-project, therefore, does not appear to involve any kind of reputational risk to ADB funding on environmental safeguards and recommended for funding.

DUE DILIGENCE ON SOCIAL SAFEGUARDS

18. DUE DILIGENCE OF SOCIAL IMPACTS:

48. The Social safeguard due diligence study of GMR Hyderabad International Private Limited has been done by reviewing the documents made available by the Concessionaire. The documents reviewed for the due diligence study are as below:

- EIA Report (December 2003): The first EIA report was prepared in December 2003, which provides the details regarding social impact of the project due to land acquisition, its Resettlement & Rehabilitation implications.
- EIA Report (January 2007): The second EIA report was prepared for the Expansion of New Hyderabad International Airport at Shamshabad.
- Minutes of Public Hearing
- Environment Clearance letters received from MoEF
- Project Appraisal Memorandum
- Impact Assessment Report prepared by the Concessionaire
- Baseline survey report for the Airport Colony

19. VISIT TO PROJECT LOCATION:

49. As part of the preparation of the Environment and Social Due Diligence Report (ESDDR), the project was visited by the Environmental and Social safeguard specialists of IIFCL along with ADB's Fact Finding Mission Team on 3rd June 2013 for field verification of Environment &Social safeguards related aspects of project site and consultation with the O&M Team of concessionaire was also done regarding their scope of safeguards practices & implementation. The project is currently in operation phase. The site visit photographs are given in **Photo Plate-II.**

20. ALTERNATIVE ANALYSIS:

50. Efforts have been made during the design stage to minimize the social impact by doing alternative analysis in site selection. These alternatives have been adopted keeping in mind the prime objective of reducing the environmental impacts and reducing the displacement of the people and disruption of livelihoods. As mentioned in the EIA Report (December 2003), Government of Andhra Pradesh (GoAP) identified primarily five potential sites and constituted a Site Selection Committee, which carried out survey of these sites. The brief details of the alternative sites considered before finalizing the project site is given in below **table 4** (please refer to **Chapter 1 of Appendix I** for details):

Table 4: Salient features of the Alternative sites and recommendations by Site Selection committee

Sl. No.	Name of site	Salient Features of the site	Suggestion/ Recommendation by the Site Selection Committee

1.	Bongulur Village, IbrahimpatnamMandal, Ranga Reddy District	• 144.33 Acres of forest land to be affected • Impact on Orchards and some poultry farms • Only one high-tension line passing through the identified site having four high tension electric towers • About one Kilometer of road connecting Nadargul and Adibatla requires diversion.	This site could not be recommended due to its huge impact on forest land and its requirement of acquiring additional non-governmental land which would have displaced large number of human habitations.
2.	Mamidipalli Village, ShamsabadMandal, Ranga Reddy District	• About 422 families to be displaced • Only one high-tension line with a capacity of 33 KV crossing the proposed site	This site was selected due to its close proximity to demand center, railway stations and its convenient approaches by road.
3.	PeddaShapur Village, ShamsabadMandal, Ranga Reddy District	• Four habitations with a population of 2,118 (as per 1991 Census) to be completely affected • 4 temples and 1 mosque to be affected • Only one high-tension line with a capacity of 33 KV crossing the proposed site • Impact on two tanks with an area of 30.0 acres and 7.0 acres	This site could not be selected due to the severe impact on the four habitations
4.	Narkhuda Village, ShamsabadMandal, Ranga Reddy District	• Closeness of the project site to HimayatSagar reservoir which supplies drinking water to Hyderabad and Secunderabad	This site could not be selected due to its proximity to HimayatSagar reservoir.
5.	Nadargul Airstrip, SaroornagarMandal, Ranga Reddy District	• Low level land sloping towards the west • Some high tension transmission lines are passing through the proposed sites	This site could not be selected as it didnot had adequate area

Source: EIA Report (December 2003)

51. The Site Selection Committee recommended the site near village Mamidipalli, Shamsabad Mandal, Ranga Reddy District. The GoAP accepted the recommendations and approved the

site selected. The project site had been selected considering the following site selection criteria:

- Availability of land sufficient to develop all four phases of the project
- Water and power availability
- Less distance to Hyderabad/ Secundrabad city and good accessibility due to NH-7 and sub-urban railway line passing near the selected project site
- Less involvement of Project Affected persons (PAPs) compared to land involved and less displacement of homestead population.

21. PUBLIC CONSULTATION:

52. Public hearing was conducted at Shamsabad location and all the environmental and social issues were discussed during the meetings. Local people were made aware regarding the environmental and social impacts of the project. The major social issue discussed during the meeting was related to the compensation of the land and providing employment opportunities to the affected people by the concessionaire. The minutes of meeting of the public hearing is attached as **Appendix III**.

22. LAND ACQUISITION IN THE SUB-PROJECT:

53. The international airport is located near Shamsabad, at the outskirts of the twin cities of Hyderabad and Secunderabad. As informed by the concessionaire, the total land acquisition for the project is 5494 acres. No forestland was involved in the project site. The land use of the projects site was mostly fallow and dry land followed by small areas of agricultural lands and settlements. The land acquisition was completed during the implementation of the 'Original Project' stage of the airport project under Phase-1A. The expansion of the airport was carried out after the completion of 'Original Project' stage and no additional land was acquired during expansion of New Hyderabad International Airport. As informed by the concessionaire, the sub-project does not have any litigation cases related to land acquisition.

54. The land acquisition was done by Government of Andhra Pradesh (GoAP) and then transferred to GHIAL. The Land Lease Agreement ("LLA") was entered into between GoAP as Lessor and GHIAL as lessee on September 30, 2003. The agreement provided for contiguous, unobstructed, unencumbered and freehold land to lessee on a continuous and uninterrupted basis with a right of lease and subleases or creates a mortgage or charge over the leased portion of the land. The lease is initially for a period of 30 years and is co-terminus with the Concession Agreement (CA). Lease rentals is payable on an annual basis from the 8th year of COD@ 2% of the base land cost of Rs 155.00 crores, which would be escalated @ 5% per annum (from the 8th year of COD).

23. RESETTLEMENT IMPACT IN THE SUB-PROJECT:

55. As per the EIA report (2003), the State Government of Andhra Pradesh acquired the land for the project and about 422 families were displaced due to this land acquisition. The displaced

families belonged for 8 villages, namely Anantharedyguda, GollapalliKalan, GollapalliKhurd, Galvaguda, Mamidipalli, MaqthaBahadur Ali, Manneguda and Shamsabad. The State Government of Andhra Pradesh formulated a comprehensive rehabilitation package for 422 families who were displaced due to the project. No Rehabilitation and Resettlement (R&R) issues were involved in the expansion of the project as there was no additional land acquisition.

24. COMPENSATION AND R&R ASSISTANCE:

56. The land acquisition has been done by Government of Andhra Pradesh as per the prevailing R&R guidelines in the state of Andhra Pradesh. It was informed by the concessionaire during the site visit that the State Government acquired and rehabilitated the villages as per agreement and 2-3 villages inside the airport land were rehabilitated very close to airport to a place which is now called 'Airport Colony'. Good physical infrastructure like cement roads, drainage, water, electricity, etc. were provided to the colony. The Rehabilitation package included 250 sqyds of land for house, compensation of land acquired (ranging from Rs. 3 to 5 lakhs per acre). As mentioned in the EIA report (2003), apart from the compensation for land, a separate R&R package was also given to the Project Affected Persons (PAPs) by the state government which included economic assistance, vocational training grant, compensation to houses etc. The details of Rehabilitation package is given under section 1.9 in Chapter 1 in **Appendix I**.

57. GHIAL played a facilitator during the initial phase, while GMR Varalakshmi Foundation (GMRVF), which is the CSR wing of GMR, moved in after the initial resettlement was over for long-term rehabilitation and relief. The long term rehabilitation by GHIAL has been done by the CSR wing of Group Company.

25. MONITORING AND EVALUATION:

58. In order to assess the effectiveness of the various activities carried out by GHIAL in and around Hyderabad Airport, GMRVF engaged New Concept Information Systems Pvt. Ltd. to undertake a study (attached as **Appendix XV**). The impact assessment study on the CSR activities was done on three areas of work - Education, Health, Empowerment and Livelihood. The report highlights the process adopted for implementing project activities, presents an analysis of the intervention outcomes and also the various actions to be taken to make the social safeguards initiatives more effective.

26. GREIVANCE REDRESSAL:

59. As informed by the concessionaire, GMR Varalakshmi Foundation deals with the grievances received from the local people. The grievances received are addressed by the concessionaire after proper consultation with the community. The concessionaire maintains a Grievance Redressal recording system where all requests, complaints, grievances from community are recorded along with the action taken. Regular feedbacks are also taken from village during the village meetings, SHG meetings, youth group meetings to modify and

improve the interventions. The grievances received during the year 2012-13 and their addressal status, as provided by the concessionaire, is attached as **Appendix XVI**.

27. EMPLOYMENT GENERATION AND INCOME RESTORATION:

60. As informed by the concessionaire, local labour was employed during the various construction and operation activities. As per the Environment Clearance Compliance status report for October 2012-March 2013, the number of workers accommodated in various works is approximately 615. It has also been informed by the concessionaire that more than 800 people from affected villages were placed in airport at different entry-level jobs including vocational trainees. A sample Recruitment report, as provided by the concessionaire, is attached as **Appendix XVII**.

61. The concessionaire has also made various efforts for organizing training programmes for income restoration of the local and affected people. The GMR Varalakshmi Foundation (GMRVF), as part of its corporate social responsibility, has set up seven Centres for Empowerment and Livelihoods (CEL), providing well-orchestrated training programmes, equipping rural and urban youth in skills which is geared to make them self-sufficient. In addition to this, efforts have also been taken by the concessionaire to introduce livelihood generating programs especially for women folks. These programmes include SHG strengthening, providing skill trainings, support for establishing enterprises and providing market linkages.

28. COMMUNITY DEVELOPMENT ACTIVITIES:

62. GMR Varalakshmi Foundation (GMRVF), the Corporate Social Responsibility (CSR) arm of the GMR Group, has been undertaking CSR activities since 1991. GMRVF, Hyderabad site, the CSR wing of Group Company - GMR Hyderabad International Airport Limited (GHIAL), works with under-served sections of communities in the vicinity of Rajiv Gandhi International Airport, Hyderabad since 2005.GMRVF works in the areas of Education, Health, hygiene and sanitation, Empowerment and livelihoods and Community development. The concessionaire has conducted a baseline study of the Shamshabad Rehabilitation Colony before taking up any community development activities to understand the needs of the area. Main needs identified were primary education, health services and livelihood generation. The Baseline survey report is attached as **Appendix XVIII**. Based on the baseline survey report of the airport colony and the requirement raised by the local people, a long-term plan was prepared which included provision for providing education, health and livelihoods facilities for a sustained period of time to reach measurable impacts. The major initiatives taken by the concessionaire are given below:

- The concessionaire has built a fully-equipped school at Shamshabad for imparting quality English medium education which is run by Chinmaya Mission. 20% of the seats are for poor and meritorious students who get sponsored through Foundation under “Gifted children scheme”.

- Based on the requirement of the rehabilitation colony, the concessionaire facilitated a government primary school, medical mobile unit and vocational training facilities to the affected people.
- The RO Water Plant at Airport rehabilitation colony for safe drinking water running in a sustainable manner was also provided by the concessionaire.
- A long-term plan was prepared which included provision for providing education, health and livelihoods facilities for a sustained period of time to reach measurable impacts.
- MoU has also been signed with ICDS department for adopting govt. angaanwadis (7) in target villages. The concessionaire is running 2 balabadis to cover the gap.
- The after-school tuitions at five places for students of 9th and 10th are also provided by the concessionaire. More than 400 children are benefitting every year.
- Mobile Medical Unit (MMU)is operational since April 2005 with basic mandate to cater to elderly people.

63. The details of the CSR activities as carried out by the concessionaire were presented during the site visit. The copy of the presentation providing the details of these activities is attached as **Appendix XIX**.

29. SITE VISIT OBSERVATION:

64. A site visit was undertaken by the Environmental and Social safeguard specialists of IIFCL along with ADB's Fact Finding Mission Team on 3rd June, 2013 for field verification of Social safeguards related aspects of project site. During the site visit, the project O&M team, which included Mr. G.U.G. Sastry, Chief Operating Officer, RGIA, Mr. Veera Rao B, Manager-Environment, Mr. Sourabh Jain, General Manager and Head-Strategic Planning Group, Dr. Avinash Kumar, Senior Programme Leader, Ms. Shewata Saini, Manager-Finance and Account and Airport Control Center, Safety and Rescue Team Officials, were consulted regarding environmental and social safeguards related measures implemented at airport site. A presentation was also made by the concessionaire regarding the various environmental and social safeguards measures adopted by them at the project site. The observations during the site visit are given as below:

- The concessionaire has set up a Vocational Training Centre – GMR Varalakshmi Centre for Empowerment and Livelihoods in airport campus. Various vocational courses are offered in this center which has well-equipped classrooms and the courses offered are designed as per the industry requirements of the academic partners of the training centre like Voltas, Schneider, Volvo, Hero Moto Corp, VLCC, Jain Irrigation, etc. The dormitory facility is also made available to the trainees who are coming from the nearby villages or towns.
- Good physical infrastructure like cement roads, drainage, water, electricity, etc. were provided to the colony.
- The concessionaire has built a fully-equipped school at Shamshabad for imparting quality English medium education which is run by Chinmaya Mission. As informed by the

concessionaire, 20% seats for poor and meritorious students sponsored through Foundation (gifted children scheme).

- A RO water plant has been provided by the concessionaire near the Resettlement colony for safe drinking water. An amount of Rs.2/- is charged per 20 liters of drinking water and the collected money is used for maintaining the RO Plant.
- The concessionaire has provided Mobile medical facility to the nearby villages which is more focused into providing medical facilities to the elderly people.
- GMRVF has been training women in basic stitching, tailoring, embroidery or other such handicrafts. Ladies Tailoring Classes has also been started at Airport Colony, which were operational during the site visit. It was informed by the women working there that they get bulk orders for conference and seminars.
- The concessionaire has also set up a Supplementary Nutrition Centre for 'Pregnant and Lactating Women' where they provide Nutritious food for pregnant women.

65. The site visit photographs are given in **Photoplate-II**.

30. CONCLUSION AND RECOMMENDATIONS:

66. Based upon the available documents, observations and discussion during the site visit, it is concluded that the concessionaire has undertaken adequate social safeguard measures during the operation of the project. The conclusions for the sub-project is given below:

    - The sub-project has been prepared by the Government of Andhra Pradesh along with the Government of India as per the national and state government requirement and not in anticipation to ADB operation.

    - The land acquisition for the project has been done by Government of Andhra Pradesh as per the applicable policies and the compensation has been paid to the affected families before handing over the land to the concessionaire. The displaced families have been resettled by the state government and have also been provided with applicable resettlement and rehabilitation packages.

    - Adequate measures have been adopted for the minimization of social impacts during the planning stage of the sub-project. Alternative analysis has been carried out by the Site Selection Committee as appointed by the State Government before finalizing the project site.

    - Employment opportunities have been provided to the local people both during the construction and operation stage.

    - Concessionaire has undertaken various community development activities to benefit the local people through GMRVF.

67. The Sub-project, therefore does not appear to involve reputational risk to Asian Development Bank funding on social safeguards and is thus recommended for funding.

CHAPTER - 5
ENVIRONMENT MANAGEMENT PLAN

5.0 ENVIRONMENTAL MANAGEMENT PLAN

5.1 Introduction

The infrastructure development in the study area needs to be inter-twined with judicious utilization of natural resources within the limits of permissible assimilative capacity of the region. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged in the environment without affecting the designated use and is governed by dilution, dispersion and removal due to natural physico-chemical and biological processes.

The Environment Management Plan (EMP) is required to ensure sustainable development in the area of the proposed airport site at Shamsabad. Hence, it needs to be an all encompassive plan for which the airport authorities, Government, Regulating agencies like Andhra Pradesh Pollution Control Board (APPCB) working in the region and more importantly the affected population of the study area need to extend their co-operation and contribution. The identification and quantification of impacts based on scientific and mathematical modeling has been presented in Chapter-4.0.

It has been evaluated that the study area has not been affected adversely with present industrialization and urbanization. The proposed project is likely to provide new economical fillip, not only for the study area but also for the region as a whole. Mitigation measures at the source level and an overall Management Plan for the study area are elicited so as to improve the supportive capacity of the study area and also to preserve the assimilative capacity of the receiving bodies.

The affected environmental attributes in the region include air quality, water quality, soil, land use, ecology and public health.

The Management Action Plan aims at controlling pollution at the source level to the possible extent with the best available technology followed by treatment measures before they are discharged to the environment.

In addition to the specific control measures, the proposed airport establishment will explore the techno-economic feasibility of adopting reuse and recycling technologies to reduce generation of waste to extent possible as well as controlling pollution at source.

It is to be delineated here that the proposed airport will be operated with the international standards following the ICAO, FAA and DGCA guidelines, which also includes the measures to control the environmental pollution. However, it may have some positive or negative impacts on the surrounding environment. The negative impacts are within the limits and can be easily ameliorated to a significant extent through adoption of appropriate mitigative measures.

5.2 Summary of Anticipated Environmental Impacts and Mitigation

The summary of anticipated adverse environmental impacts and mitigation measures are given in the **Table-5.1.**

TABLE-5.1
ANTICIPATED ADVERSE ENVIRONMENTAL IMPACTS AND MITIGATION

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
Constructional Impact				
Water Quality	Increase in suspended solids due to soil run-off during heavy precipitation	Loose soil at construction site	A non-scouring, non-silting storm water drain will be laid from the proposed airport and a rainwater harvesting structure is proposed at a strategic location to arrest the run-off water of the proposed airport site.	Reduced surface water pollution due to erosion. Recharge of ground water is possible in the region.
Air Quality	Increase in dust and NOx concentration	Leveling activity and Heavy vehicular movement	Sprinkling of water in the construction area and unpaved roads. Proper maintenance of vehicles will be done.	The impact will be low, as the main approach road and internal roads will be tarred.
Noise	Increase in noise level	Construction equipment	Equipment will be kept in good condition to keep the noise level within 90 dB(A).	Workers will be provided necessary protective equipment *e.g.* ear plug, earmuffs.
Terrestrial Ecology	Clearing of Vegetation	Soil enabling activities	Landscaping and extensive plantation will be done.	Plantation will be done in consultation with the local forest department and horticulture experts.
Socio-economics	Land and homestead oustees	Land Acquisition	Framing and implementation of R&R plan in consultation with the Government of Andhra Pradesh	Rehabilitation and resettlement package has been prepared for all the project affected persons and the compensation has been paid to all the PAPs.
Operational Impact				
Water Quality	Deterioration of surface water quality	Effluent Discharge from proposed airport.	Adequate treatment facilities will be provided so that the treated effluents conform to the regulatory standards.	The proposed airport effluents after treatment will be reused within the airport premises for greenbelt development and thus there will be zero discharge out side the airport premises.
Air Quality	Increase in CO and NOx levels in ambient air.	Aircraft engines, vehicles and DG Stack emissions.	Adequate stack height as per CPCB guidelines will be provided for the DG sets. Aircrafts will be operated and maintained as per ICAO guidelines to keep the emissions within the standards. Roads in the proposed airport area will be paved to reduce dust emission. Afforestation	The air quality in and around airport premises will conform to the stipulated standards.

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
			programs will be undertaken around the proposed airport area.	
Solid waste	Land/soil contamination	Sludge from effluent/sewage treatment units, food waste and other garbage from restaurant and the terminal building.	The sludge will be used as manure for plantation. Waste oil from the maintenance areas will be sold for off-site recycling. Food waste will be composted and used as manure for greenbelt development. Garbage will be segregated for recyclable material and the inorganic material will be incinerated.	The solid waste generated from the STP and restaurant will be composted and compost will be used as manure for greenbelt plantation. The oil & grease waste generated from ETP, STP, tank farm etc will be will be sold to authorized third parties for off-site recycling.
Terrestrial Ecology	Impact on plant species	Emissions from aircrafts and DG stack.	Measures as described under air quality.	Ambient air quality will be within limits hence no active injury to the vegetation is expected. Plantation will be done around the proposed airport.
Aquatic Ecology	Impact on aquatic life of the water bodies.	Treated waste water from proposed airport	The wastewater will be provided with adequate treatment. The treated effluent will be re-used within the airport premises and there will be zero-discharge from the proposed airport.	As all the effluents will be treated and re-used within the proposed airport, there will not be any impact on the surrounding aquatic bodies.
Noise	Increase in noise levels in and around the proposed airport area.	Aircraft take-off and landing, traffic and auxiliary equipment operations such as compressors and DG.	Appropriate international guidelines as stipulated by ICAO, FAA will be followed during take-off and landing. Proper Scheduling of aircrafts will be done. Auxiliary Equipments will be designed to conform to noise levels prescribed by regulatory agencies. DG area will be provided with acoustic enclosures.	Employees working in high noise areas would be provided with earplugs/ earmuffs as protective device. Provision of green belt and plantation would further help in attenuating noise. Also rescheduling of aircrafts.
Demography and Socio-Economics	Strain on existing amenities like housing, water sources and sanitation, medical and infrastructure facilities.	Influx of people of proposed airport employees as well as contractor's employees/ labourers.	Additional facilities like township will be developed by the project proponents.	Overall socio-economic status of the area is expected to improve.

5.3 Environmental Management during Construction

The impacts during the construction phase of the proposed airport on the environment would be basically of transient nature and are expected to reduce gradually on completion of the construction activities.

5.3.1 Site Preparation

Since the project site terrain is almost flat, some minimal leveling may be required. Vegetation on topsoil is removed prior to commencement of bulk earthwork. Construction water is proposed to be drawn either from the small ponds at the projects site or from boreholes dug in the site area. During dry weather conditions, dust may be generated by activities like excavation and transportation through un-metalled roads. The dust will be suppressed using water sprinkling and may continue after completion of construction. The prospective contractors shall make provision for water sprinkling at the construction site.

As soon as construction is over the surplus earth will be utilized to fill up low-lying areas, the rubbish will be cleared and all un-built surfaces reinstated. Appropriate vegetation will be planted and all such areas will be landscaped. Fuel oil will be stored in proper and designated areas.

To prevent unauthorized felling of trees surrounding the site by construction workers for their fuel needs, efforts will be made by the contractor to provide fuel to the construction workers.

The borrow pits as well as scars left as a result of removal of earth for during construction shall be suitably rehabilitated. For the disposal of excavated material and the road rubble including the bituminous material, if any, suitable sites should be identified so that it does not affect the landscaping and material is not disposed off down slope, to prevent soil erosion. The natural drainage should not be disturbed for the proposed construction.

The development around the airport should be regulated through a statutory body e.g. Hyderabad Airport Development Authority (HADA) and should be ensured that slaughter houses are not located in the vicinity of the airport.

5.3.2 Water Resources and Quality

Following mitigation measures will be adopted to avoid impact on water resources:

- Construction equipment requiring minimum water for cooling and operation for optimum effectiveness will be chosen;
- Steam curing of concrete will be carried out, wherever possible;
- High-pressure hose will be used for cleaning and dust suppression purposes;
- Rate of extraction of water from the local borewells, if required should always be kept below the safe yield level; and
- Water harvesting wherever it is possible.

During construction period in rainy season, the water quality is likely to be affected due to the construction work and loosening of topsoil. This is likely to increase the suspended solids in the run-off during heavy precipitation. In order to reduce the impact on water quality, temporary sedimentation tanks will be constructed for the settlement of the suspended matter. However, it is envisaged that the monsoon period will be avoided for cutting and filling of earthwork. Additionally, following measures will be taken to avoid the surface water pollution:

- Soil binding and fast growing vegetation and grass would be grown around the construction site before commencement of construction activity to reduce soil erosion;
- Appropriate slope stabilization measures such as providing check dams/dykes will be taken to reduce the soil erosion potential; and
- Appropriate sanitation facilities to be provided for the construction workers to reduce impact on surface water quality.

There is no likely hood of ground water contamination as no waste will be discharged to ground water bodies during construction. The construction hazardous wastes, as far as possible, will be recycled, reused or recovered. Wherever construction wastes needs to be disposed off on land on-site or off-site, the same will be disposed off in a designated landfill site with provision of impermeable layers to prevent migration of toxic leachate to ground water.

5.3.3 Air Quality

During construction period, there is likely hood of generation of dust and NOx emissions. This can be attributed to leveling activity and vehicular movement. The transport vehicles using petrol or diesel will be properly maintained to minimize smoke in the exhaust. Since, there is likelihood of fugitive dust from the construction activity water sprinkling will be done. In addition to this following measures will be taken during the construction phase to reduce the impact on the air quality:

- Any vehicle not meeting the vehicular pollution standards will not be allowed within the construction site and for the construction activity;
- All vehicles and construction equipment with internal combustion engines in use will be maintained for effective combustion to reduce carbon particles, CO and HC emission;
- As far as possible unleaded petrol will be used for petrol driven vehicles in use;
- Water will be sprayed by high-pressure water hoses during dust generating construction activities *e.g.* excavation, crushing/demolishing, concrete mixing, material handling *etc.* to suppress dust; and
- Use of asbestos will be avoided as far as possible. If asbestos is used, all asbestos wastes to be collected separately and disposed off in a landfill with appropriate soil cover above the waste layer.

5.3.4 Noise Levels

The noise impact on the surrounding population during the construction phase will be within the acceptable limits. High noise generating equipment, if used, will not be operated during the night to eliminate any possible discomfort to the nearby residents. Community noise levels are not likely to be affected because of the vegetation and likely attenuation due to the physical barriers. The following recommendations will be implemented:

- Provision for insulating caps and aids at the exit of noise source on the machinery;
- Construction equipment generating minimum noise and vibration will be chosen;
- Vehicles and construction equipment with internal combustion engines without proper silencer will not be allowed to operate at the construction site;
- The use of damping materials such as thin rubber/lead sheet for wrapping the work places like compressors, generator sheets;
- Shock absorbing techniques will be adopted to reduce impact;
- Inlet and outlet mufflers will be provided which are easy to design;
- Ear muffs will be provided to the workers and it will be enforced to be used by the workers; and
- Greenbelt will be developed along the periphery of the proposed airport and all along the internal roads and in the northern side of the airport site. Along the runway side, mandatory grass will be developed.

5.3.5 Ecological Aspects

During construction period, there could be clearing vegetation in order to prepare the site for construction. However, this will be mitigated by proper landscaping and extensive plantation along with the construction of the proposed airport. Similarly, there will not be any impact on the aquatic ecology as there are no major aquatic bodies surrounding proposed airport site. Operation of high noise producing equipment will be avoided during night-time to avoid impact on fauna including human beings in the neighbourhood.

5.3.6 Socio-Economic Aspects

Land acquisition process for both private and government land is being done as per the Land Acquisition Act. The land and homestead oustees are suitably compensated as per the Government norms. Detailed R&R plan has been prepared and has been implemented in consultation with the State Government.

Local people will be employed as workers for construction work to the maximum extent possible. Proper facility for domestic water supply, sanitation, domestic fuel and other essential community services will be made available to the construction workers.

5.3.7 Solid/Hazardous Waste Disposal

The hazardous materials used during the construction may include petrol, diesel, welding gas and paints. These materials will be stored and handled according to the guidelines specified under Hazardous Wastes Storage, Handling and Transportation Rules of EPA, 2000. Some of the precautions of storage and handling of hazardous materials and waste includes the following:

- Dyked enclosures will be provided which will be able to contain complete contents of the largest tank;
- Diesel and other fuels will be stored in separate dyke enclosures;
- Wherever possible, hazardous raw materials to be substituted by non-hazardous materials, e.g. cleaning solvents can be replaced with film-free biodegradable cleaners, usage of non-chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paints for oil-based ones;
- On-site recycling of all waste solvents/thinners and oils and off-site recycling of paint thinner solvent wastes and waste oil;
- Separate storage of waste paints and thinners, contaminated rags and brushes to facilitate recycling and reuse. Rags could be laundered for reuse;
- Installation of on-site recycling equipment to be considered by large painting subcontractors;
- Vehicle maintenance area to be designed to prevent contamination of ground water by accidental spillage of oil; and
- Maintaining appropriate inventory control.

5.3.8 Site Security

Adequate security arrangement will be made to ensure that the local inhabitants and the stray cattle are not exposed to the potential hazards of construction activities.

5.3.9 Migrant Laborers

Safe and secure camping area will be provided for the migrant laborers during the construction period. Adequate arrangements will be made for water supply, sanitation and cooking fuels.

The construction site will be provided with sufficient and suitable toilet facilities for workers to allow proper standards of hygiene. These facilities would be connected to a septic tank and maintained to ensure minimum environmental impact.

5.3.10 Facilities to be Provided by the Labour Contractor

The contractor will be asked to provide following facilities to construction work force:

First Aid: At work place, first aid facilities will be maintained at a readily accessible place where necessary appliances including sterilized cotton wool etc. shall be available. Ambulance facilities will be kept readily available at workplace to take injured person to the nearest hospital;

Potable Water: Sufficient supply of cold water fit for drinking will be provided at suitable places;

Sanitary Facility: Within the precinct of very work place, latrines and urinals will be provided at accessible place. These will be cleaned at least twice during working hours and kept in a good sanitary condition. The contractor will conform to sanitary requirement of local medical and health authorities at all times;

Canteen: A canteen on a moderate scale will be provided for the benefit of workers;

Security: Project Authorities will provide necessary security to work force in co-ordination with State authorities; and

Facilities for Women: Facilities as per Factory Rules of the State government will be provided to the women working force. Separate toilets for women will be provided and marked in a vernacular language with conspicuous letters.

5.3.11 Management measures for Access Road through Airport connecting NH-7 and Srisailam State Highway

During the construction of the access road through airport connecting NH-7 and Srisailam State Highway, the following Management measures should be implemented:

- The clearance for the Right of Way for the road should be kept bare minimum and avoid cutting trees out of the ROW;
- The dust emissions during laying of the road should be contained by regular sprinkling of water;
- The construction equipment should be regularly serviced such that their emissions are within the designed limits;
- The workers should be provided with ear plugs and mufflers to withstand the high construction noise levels;
- The run-off from the road side should be routed through sedimentation basins to avoid silting in the downstream nallahs; and
- Avenue plantation along the roadside should be taken up right from the beginning of the construction of the road.

5.4 Management During Operational Stage

The EMP in the design stage endeavors to mitigate the problems related to health, safety and environment. The proposed airport will be designed taking into account all applicable standards/norms both for regulatory and safety purpose.

The design basis will lay special emphasis on measures to minimize effluent generation and emission control at source. The specific control measures related to gaseous

emissions, liquid effluent discharges, noise generation, solid waste disposal *etc.* are described below:

5.4.1 Air Quality Management

5.4.1.1 Reduction at Source Level

Major pollutants envisaged from the proposed airport will be from aircraft exhaust, vehicular traffic to and fro from the airport and from DG sets of Captive Power Plant. The major pollutants will be Oxides of Nitrogen and Carbon monoxide besides the particulates and sulphur di-oxide. The baseline ambient air quality levels in the project area are within the permissible limits as specified by regulating agency. The following methods of abatement will be employed for the air pollution control at the source level.

- Aircrafts will be operated in accordance with ICAO/USEPA standards to ensure aircraft emissions are within specified standards;
- Allowing aircrafts with certified engines to land and take-off, as far as possible;
- Shut down as many engines as possible during idling and taxing;
- Single engine taxing and reduced taxing would be effective in reducing emissions of HC and CO from aircrafts;
- Encouraging to use larger aircrafts and increasing occupancy rate on aircrafts will reduce the number of landings and takeoffs;
- Providing electricity and conditioned air for aircraft at terminal gates;
- Converting ground support equipment to use alternative fuels;
- The Double Annular Combustor (DAC) burns the fuel at lower temperature in two stages to radically reduce NOx levels;
- Height of the stack for DG sets will be kept as per CPCB guidelines;
- Measures for vehicles and equipment with internal combustion engines will be taken in the operational phase also;
- Providing adequate buffer zones where pollution concentrations is highest to reduce the impact of emissions;
- Appropriate design of access roads to avoid traffic jams to reduce air pollution; and
- Providing suitable green belt to reduce the impact of air pollution.

In addition to the above, any additional control measures suggested by SPCB/CPCB/MoEF will be implemented.

5.4.1.2 Stack Gas Monitoring

The emissions from the stacks of DG sets will be monitored for exit concentration of Oxides of Nitrogen and Particulate Matter. Sampling ports will be provided in the stacks according to CPCB guidelines.

5.4.1.3 Ambient Air Quality Monitoring

The concentration of SPM, SO_2, NOx, HC and CO in the ambient air outside the project boundaries and in the adjoining villages will be monitored as per the direction of the State Pollution Control Board and MoEF. About four locations will be selected in consultation with SPCB and monitored at regular intervals as suggested by SPCB. The data will be statistically analyzed and compared against the pre-project baseline data.

5.4.1.4 Meteorological Observations

As per the operational requirement of airport, the meteorological parameters like dry bulb temperature, wet bulb temperature, wind speed, wind direction, cloud cover, rain fall, atmospheric pressure, evaporation rate and solar radiation will be monitored and recorded daily at the airport.

5.4.2 Traffic Management

The airport will be connected to NH-7 and State Highway (Hyderabad-Srisailam road) from western and eastern side respectively. The airport connectivity to these roads will establish connectivity of these roads. The traffic will be allowed to cross over from NH-7 to State Highway through this network of road.

The airport will be provided with railway link from Umdanagar railway station. The railway will enter the airport premises from western side of the airport and will run parallel to the road connecting NH-7. The following mitigatory measures should be adopted;

1. There should be minimum tree falling. The trees within the Right of Way (ROW) only should be cut;

2. The trees should be planted along the road on either side;

3. Fly Over Bridge (OFB) should be provided at western side of the road connecting NH-7 to cross over the rail track to avoid traffic congestion; and

4. Sharp curves should be avoided to the maximum extent.

5.4.3 Water and Wastewater Management

5.4.3.1 Water Conservation

The total water requirement for the proposed airport will be met from the HMWSSB water supply network. In order to conserve the water resources, the treated effluents will be re-used in the airport premises for greenbelt development and make-up water for cooling system.

The following measures will be taken to minimize the water usage in the operational phase:

- Use of low flow fixtures and appliances for reduced water consumption such as low flush water closets and cisterns;
- Water saving shower head flow controls, spray taps and faucet aerators and photo-sensitive taps;
- Sewage generated will be treated in the sewage treatment plant and reused for green belt development to reduce the fresh water requirement;
- The effluent generated from the maintenance areas will be treated in a full fledged ETP and will be re-used for green belt or as AC-make up water;
- The storm water from paved areas will be treated for the removal of oil & grease and sediments and routed to the water harvesting structures to recharge the ground water table;
- The storm water from the pervious area will also be routed to the rainwater harvesting structures;
- The storm water treatment facility will be located at an appropriate site keeping in view the slope contours and collection point at the most convenient point;
- The storm water in rainy season will stored to maximum extent and utilized in fire fighting facility and balance will be routed to Rain Water Harvesting structure after treatment;
- Dry cleaning methods would be practiced in workshop and maintenance for area cleaning. High-pressure hoses will be used for area cleaning, only where required; and
- All the effluent treatment units and STP will be located outside the Supreme Court defined limit of 10-km radius from the FTL of Himayat Sagar lake.

5.4.3.2 Monitoring of Water Consumption

Continuous efforts will be made to reduce the water consumption and thereby to reduce the wastewater generation. Automatic flow meters will be installed for the entire major water inlet and the flow rates will be continuously monitored. Periodic water audits will be conducted to explore the possibilities for minimization of water consumption.

5.4.3.3 Wastewater Treatment and Disposal

Oily wastewater generated from maintenance activities such as from the aircraft hangars, maintenance workshops, etc., from DG set area will be treated in a separate wastewater treatment plant suitable for handling waste water containing oil & grease, heavy metals and solvents (Refer Chapter 2.0 Section 2.6.2). Sewage will be treated in the separate sewage treatment plant. The treated wastewater will be reused for green belt development after ensuring it conforms to standards for disposal on land. The treated wastewater will be utilized in the routine operations to conserve the fresh water resources.

Some of the guidelines proposed for reducing wastewater generation are:

- Dry cleaning the workshop and maintenance area;
- Minimize quantity of effluents through re-use to the maximum extent feasible;
- The treatment facilities (ETP and STP) will be provided outside the Supreme Court defined 10-km radius from the FTL of Himayatsagar lake;
- The treatment schemes proposed will be provided before the commissioning of the airport;
- Settling tanks, blow down tanks and neutralization pits will be cleaned regularly in order to avoid clogging. Sludge will be removed regularly and sufficient time will be given for proper settling of solids; and
- Strom water treatment facility which mainly comprises of oil & grease removal and sedimentation tank to remove the suspended matter;
- Strom water collection points will be conveniently located keeping in view of the slope counters;
- The treatment units will be operated regularly.

5.4.3.5 Monitoring of Waste Treatment

All the treated effluents will be monitored regularly for the flow rate and quality to identify any deviations in performance of effluent and sewage treatment plants. Appropriate measures will be taken if the treated effluent quality does not conform to the limits specified by the regulatory authorities.

5.4.4 Noise Level Management

The noise levels (Lmax) due to the proposed airport will be around 65 dB(A) near the boundaries and above 80 dB(A) at the southern boundary of the airport where runway is located. The specifications for procuring major noise generating machines/equipment will include built in design requirements to have minimum noise levels meeting Occupational Safety & Health Association (OSHA) requirement. Appropriate noise barriers/shields, silencers etc. will be provided, wherever feasible.

Some of the practices proposed for noise attenuation are as follows:

- Aircrafts with certified engines shall be allowed to land and take-off to the extent possible to reduce the noise impacts on the surroundings;
- Rollar takeoffs will reduce the noise levels;
- Dual nozzle in the aircraft will reduce the noise levels;
- Proper scheduling of the aircrafts so as to minimize the noise levels;
- Switching of as many engines possible during idling and taxing;

- Proper maintenance of ground servicing equipments;
- Flight scheduling and Airport zoning should be done to reduce noise levels;
- Use of damping materials such as thin rubber/lead sheet for wrapping the work places like compressor room, DG room etc.;
- Measures regarding vehicles mentioned during construction phase will be taken in operational phase also;
- Personnel working in noisy areas will be provided with ear plugs/mufflers to reduce the noise impacts;
- Assuming that the DG set will be a water cooled one, it will be ensured that at 1 m distance from the DG set, sound power level will be less than 121 dB(A). In addition, the DG set will be provided with acoustic enclosure for effective noise reduction of 25 dB(A). Also, the DG set will be provided with exhaust muffler capable of effective noise reduction of 25 dB(A);
- The sources of intermittent noise generating equipment such as compressors will be provided with appropriate acoustic barriers so that the noise level within 100 m of these facilities when in operation will be less than 70 dBA; and
- Noise attenuating green belt shall be developed for effective reduction in noise wherever feasible taking local meteorology into consideration.

5.4.5 Solid Waste Management

Solid waste generated from the proposed project would comprise sludge generated from STP, sludge from ETP, separated oil from oily wastewater treatment units, garbage/food waste from the restaurants and airport operations and paper and packaging waste generated in cargo section during the operational phase as well as solid waste generated due to spill containment in any untoward event.

These will be disposed off as described below:

- The sewage sludge will be used as manure for green belt;
- The sludge generated from the ETP will be disposed off in a safe manner such as landfill;
- The waste oil from STP, ETP and storm water treatment units will be sold to third parties for off-site recycling;
- Garbage will be separated for recovery of recyclable material. Food waste shall be composted and compost will be used as manure for green belt development;
- The composting and disposal of manure is proposed in a manner that the menace cause by bird hits is avoided;
- The solid waste generated in cargo section will be sold to third parties for off-site recycling;
- Oil soaked absorbents/containment booms would be recycled to the extent possible and incinerated for final disposal; and

- All the above treatment units will be located outside the Supreme Court specified limit of 10-km radius from the FTL of Himayat Sagar.

5.4.6 Green Belt Development

The extensive greenbelt and grass development around the airport area covering about 2000 acres will be provided. The species of wide varieties will be planted which will help in suppression of dust, attenuate noise levels and provide aesthetic background.

The location of the plantations in the greenbelt has been selected considering the meteorological aspects like wind direction, temperature. At the site, it was observed that the wind predominantly flows from east to west and vice versa. The greenbelt can not be provided in this direction since the area is close to runway. However, grass will be grown in unpaved areas along the runway. The trees will be planted in north, northwest, north-east sides, along the airport boundary and along all roads including the main access road connecting the NH-7 and Srisailam State Highway. Moreover the most of the habitations are in the northern side of the airport site and the runway is located in the southern side of the airport side. The greenbelt in this direction will act as a barrier between habitation and airport. The avenue trees will be planted along the periphery of the site and along the internal roads. The trees will also be planted along the railway siding and road connecting NH-7 and State Highway. Further, green belt will be taken up in order to prevent noise during the take-off and landing as per the regulations of Bureau of Civil Aviation. The recommended density of plantation will be about 1500-2000 plants per hectare in the northern side of the airport site. The Greenbelt area at the airport is depicted in **Figure-5.1.**

5.4.6.1 Objectives of Green belt

Implementation of afforestation program is of paramount importance for any major infrastructure development. It will also check soil erosion, make the eco-system more complex and functionally more stable, make the climate more conductive and restore water balance. The main objective of the green belt is to provide a barrier between the airport and the surrounding areas. The green belt helps to capture the fugitive emissions and to attenuate the noise generated in the airport apart from improving the aesthetics of the airport site.

5.4.6.2 Criteria for Selection of Species

The following basic considerations will be given for selecting different plant species of greenbelt and plantation.

A] Greenbelt

⇒ Tall growing, evergreen trees, native to the area and in closer spacing;

⇒ Adaptability to hazardous gases;

⇒ Acceptability of treated effluent preferably fully or at least partially;

⇒ Easy and quick early growth and establishment;

⇒ Uniform spreading crown habit. Medium canopy not disturbing traffic by wide horizontal branches;

⇒ Three tier plant heights system (to act as wind barriers);

⇒ Development of straight bole upto 12 to 15 feet;

⇒ Evergreen habit, if possible, or at any rate short deciduous period;

⇒ Tolerance to high sodium contents of soil, aerosol generated due to hydrocarbons;

⇒ Timber trees having long gestation period;

⇒ Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces;

⇒ Ability to withstand conditions like inundation, salinity and draught;

⇒ Soil improving plants (Nitrogen fixers, rapidly decomposable leaf litter);

⇒ Attractive appearance with good flowering and fruit bearing;

⇒ Sustainable green cover with minimal maintenance;

⇒ Ability of fixing atmospheric Nitrogen; and

⇒ Improving waste lands.

B] Plantation

Housing colony

⇒ Small to medium size trees with attractive flowering;

⇒ Trees with curved boles for hanging pots and orchids; and

⇒ Avoid tall growing ornamental trees as they occupy lot of space and do not allow smaller plant to grow.

Parks

⇒ Ornamental trees with spreading branches, shade giving with colourful flowers for people to relax.

⇒ Suitable patches of lawns, rocketry with cactus plants

Avenue trees

⇒ Trees with conical canopy with attractive flowering;

⇒ Trees with branching at 10 feet and above;

⇒ Trees with medium spreading branches to avoid obstruction to the traffic; and

⇒ Avoid fruit trees because of which children obstruct traffic and general movement of public.

Certain exotic species like eucalyptus will also be tried along with local or indigenous species in plantation schemes because diversity in species confers stability to the ecosystem.

5.4.6.3 Layout of the green belt

A] Different tiers of Greenbelt

For the purpose of pollution attenuation the green belt should be developed in three tiers as stated below:-

1. Shrubs species having good levels of air pollution tolerance limits which is referred to as **Tolerance zone;**

2. Trees having fast growth potential with conical canopy called as **Dispersion Zone;** and

3. Trees having hairy leaves with thick and round canopy called as **Absorption Zone**.

The three tiers of trees can be of varying width. The first tier is usually 15 to 20% M, second of 30 to 40% M and the third with 50 to 60% M width of the area available for greenbelt.

B] Different Types of Tree Canopies Suitable for Different Tiers of Greenbelt

1. **Rotund type :** The shape of the crown is more or less rounded, branches and leaves are closely arranged e.g. Ficus tree. *Suitable for 2nd and 3rd tier.*

2. **Flat topped canopy :** The branches of the crown uniformly give a flat topped crown and the spread of the crown is wide to cover a wide area *e.g.* Cassia sps. *Suitable for 2nd and 3rd tier.*

3. **Cylindrical type :** The branches and leaves form a close network and give the longitudinal spread *e.g.* Sism *In between the trees in the 3rd tier.*

4. **Chimney type:** The branches give the appearance of long chimney e.g. Eucalyptus sp. *Outer rows of 3rd tier.*

5. **Conical type :** The growth of main stem and horizontal branches appear in the form of a cone. e.g. Casurina. *Peripheral rows of the 3rd tier.*

6. **Broken or interrupted :** The branching pattern and canopy formation is not uniform. e.g. Palm varieties. *In between the shrub species at regular intervals in the first tier.*

7. **Drooping canopy :** The branches and leaves droop downwards e.g. Ashok. *In between the shrubs in the 1st tier.*

5.4.6.4 Additional Information About Plantation

To undertake plantation for different purposes, following steps will be involved:

- Raising seedlings in nursery;
- Preparation of pits and preparing them for transfer of seedlings; and
- After-care.

A] *Raising Seedlings in Nursery*

Seedlings will be raised in nurseries of the nearest forest departments at Hyderabad or agricultural university at Rajendranagar, which is near to the proposed airport. Adequate number of surplus seedlings will be made available considering a 10% mortality in seedlings. Healthy seedlings will be made ready for transfer to permanent location before rainy season.

B] Preparation of pits and preparing them for transfer of seedlings

* Standard pit size would be 1 m x 1 m x 1 m;
* The distance between pits would vary depending on their location;
* The pits will be filled using good soil from nearby agricultural fields (3 parts) and Farm yard manure (1 part);
* Rhizobium commercial preparation (1 kg/1000 kg);
* BHC powder, if the soil inhabits white ants (Amount variable); and
* The pits will be watered prior to plantation of seedlings.

5.4.6.5 Soil Studies

a] Parameters for soil study in connection with Greenbelt:

The detailed soil survey and soil analysis has to be conducted before the commencement of green belt development. The following guidelines have to be followed for carrying out soil studies:

- All soil sampling for soil profile studies has to be conducted footwise upto a depth of six feet;
- During soil sampling the depth of the water table is to be noted; and
- Occurrence of any hard-pan in the soil profile is to be noted.

B] Tests to be conducted to determine the Physical and Chemical conditions of soil are as follows:

Physical Parameters

- Hydraulic conductivity;
- Specific gravity;
- Bulk density; and
- Infiltration rate.

Chemical Parameters

- pH value;
- Electric conductivity;
- Individual salt content like Carbonate, Chloride, Sulphate;
- Organic carbon;
- Available $P_2 0_5$;
- Available $K_2 0$; and
- Any other parameter relevant to emissions of the concerned industry.

Plant species suitable for different types of soils are given in **Table-5.2.**

TABLE-5.2
PLANT SPECIES SUITABLE FOR DIFFERENT TYPES OF SOILS

Sr. No.	Soil Type	Name	Botanical Name
1.	Marshy areas	Male Bamboo	*Dendreocalamus strictus*
		Bhendi	*Thespesia populnea*
		Karanj	*Derris indica*
		Gliricidia	*Gliricidia sepium*
3.	Acidic soils	Chinch	*Tamrindus indica*
		Karanj	*Derris indica*
		Gliricidia	*Gliricidia sepium*
4.	Alkaline soils	Nilgiri	*Eucalyptus species*
		Kashid	*Cassia siamea*
		Neem	*Azadirachta indica*
		Maharukh	*Alianthus excisa*
		Arjun	*Terminalia arjuna*
		Subabul	*Leucaena lucocephala*
5.	Saline soils	Arjun	*Terminalia arjuna*
		Neem	*Azadirachta indica*
		Babul	*Acacia nilotica*
6.	Dry soils	Neem	*Azadirachta indica*
		Karanj	*Derris indica*
		Nilgiri	*Eucalyptus hybrid*
		Subabul	*Leucaena leucophala*

5.4.6.6 Suitability of Treated Effluent for Irrigation

The treated effluent quality suitable for irrigation is given below in **Table-5.3.**

TABLE-5.3
TREATED EFFLUENT QUALITY SUITABLE FOR IRRIGATION

Sr. No.	Constituent	Good	Fair	Harmful
1.	Suspended solids (mg/l)	1000	1000-5000	5000
2.	Carbonates (mg/l)	80	80-100	100
3.	Bicarbonates (mg/l)	120	120-150	150
4.	SAR (Sodium Absorption Ratio)	4	4-8	8
5.	RSC (Residual Sodium Carbonate) (mg/l)	1.25	1.25 - 2.5	2.5
6.	PH	6.5-7.5	7.5-8.5	8.5
7.	Electrical Conductivity (mmhos/cm at 25°C)	1.5	1.5-7.5	7.5

5.4.6.7 Recommended Species for Plantation

Based on climate and soil characteristics of the study area, some species are recommended for plantation. In addition, the species recommended by ICAO, Bureau of Civil aviation should also be taken into consideration and planted. The climate of the region is dry type extreme where there is considerable heat and soil temperature is very high in summer. Hence, in order to have a ground cover, some fast growing species, which do not require frequent watering, have been recommended for mass plantation. The species are as presented below:

- *Albizzia lebbek*
- *Peltophorum ferrusinum*
- *Lannea grandis*
- *Mitragyna parviflora*
- *Pongamia glabra*

The above mentioned species not only resist water stress but also covers the ground quickly and also have a wider soil adaptability.

List of Plants suitable for Air Pollution Attenuation (arranged in the decreasing order of their Air Pollution - Tolerance) are given below:

Evergreen Trees

- *Ficus glomerata* (Guler)
- *Terminalia tomentosa* (Asan)
- *Acacia auriculiformis* (Babul)
- *Polyalthia longifolia* (Ashoka)
- *Ficus bengalensis* (Banyan)
- *Thespesia populnea* (Bhendi)
- *Erythrina indica* (Pongra)
- *Eucalyptus citriodora* (Nilgiri)
- *Mangifera indica* (Mango)
- *Anona squamosa* (Sitaphal)

Deciduous (leaves shredding) Trees

- *Ficus religiosa* (Pipal)
- *Albizzia lebbck* (Siris)
- *Phyllanthus distichus*
- *Zizphus jujuba* (Ber)
- *Azadirachta indica* (Neem)
- *Spindus muckorossi* (Soapnut)
- *Tamrindus indica* (Tamrind)
- *Psidium guyava* (Guava)
- *Anthocephalous cadamba* (Cadamba)
- *Moringa olifera* (Moringa)

Shrubs

- *Bogunvilla spectabillis* (Bogunvilla)
- *Calatropis gigantia*
- *Riccinus communis* (Castor)
- *Duranta plumieri*
- *Prosopis juliflora* (Villayati babul)
- *Ipomea species* (Sadabahar)

Herbs

- *Vinca rosea* (Vinca)
- *Croton tiglium* (Croton)
- *Clerodendron infortunatum*
- *Aloes*

The plants mentioned below are capable of capturing and retaining higher rates of particulate contaminants and dust particles:

- *Ficus religiosa* (Peepal)
- *Ficus benghalemsis* (Banyan)
- *Tectona grandis* (Teak)
- *Terminalia arjuna* (Arjuna)
- *Polyalthia longifolia* (Ahoka)
- *Mangifera indica*(Mango)
- *Bahunia purpuria* (Kachnar)
- *Thespesia populnea* (Tulip)
- *Saraca indica,*
- *Butea frondosa* (Palas)
- *Cassia fistula* (Amaltas).

5.5 Environmental Management System

5.5.1 Introduction

The earlier sections identified measures for environmental protection especially for providing the necessary pollution control to comply with the standards stipulating the limits for emitting pollutants in air, water or on land so that the assimilative capacity is not exceeded.

Standards are stipulated by various regulatory agencies to limit the emission of pollutants in air and water. Similarly, a mandatory practice is recommended for preparing an Environment Statement each year in order to reduce the quantities of wastes. This in itself is not sufficient since this does not provide an assurance that its environmental performance not only meets, but also will continue to meet legislative and policy requirements.

Hence, Environmental Management Systems (EMS) is suggested for ensuring that the activities and services of the region conform to the carrying capacity (supportive and assimilative capacity). This is based on Bureau of Indian Standard Specification IS:13967 (1993): Environmental Management Systems - Specification (equivalent to British Standard BS 7750). Since this is more in line with the quality systems, it is recommended that the proposed airport authorities develop one as outlined in the following sub-sections.

The EMS - its set-up, role and responsibilities - is given subsequently.

5.5.2 Formation of an Environmental Management System

The environmental management system to be formed by the airport authorities will enable it to maximize its beneficial effects and minimize its adverse effects - with emphasis on prevention. It will:

- Identify and evaluate the environmental effects arising from the proposed activities, and services to determine those of significance;
- Identify and evaluate the environmental effects arising from incidents, accidents and potential emergency situations;
- Identify the relevant legislative and regulatory requirements;
- Enable priorities to be identified and pertinent environmental objectives and targets to be set;
- Facilitate planning, control, monitoring, auditing and review activities to ensure that the policy is complied with; and
- Allow periodic evaluation to suit changing circumstances so that it remains relevant.

5.5.3 Implementation of an Environmental Management System

5.5.3.1 Commitment

It is essential that the top management of the airport is committed to development of its activities in an environmentally sound manner and supports all efforts in achieving this objective.

Experience has shown that efficient management of all the activities pertaining to airport operations leads to reduce/prevent wastes and efficient use of resources, which ultimately result not only in environmentally sound practices but also better business returns.

5.5.3.2 Preparatory Environmental Review

The airport authorities with no formal environmental management system will first establish its current position with regards to environment through a preparatory environmental review. This will cover four areas:

- Legislative and regulatory requirements;
- Evaluation and registration of significant parameters and their environmental impacts;
- Review of existing environmental management practices and procedures; and
- Assessment of feedback from investigation of previous environmental incidents and non-compliance with legislation, regulations or existing policies and procedures.

The resulting report will address:

- The nature and extent of problems and deficiencies;
- The priorities to be accorded to rectify them; and
- An improvement program designed to ensure that the personnel and material resources required are identified and made available.

5.5.3.3 Environmental Policy

The airport management will actively initiate, develop and support the environmental policy, which is relevant to its activities and services and their environmental effects.

Broadly, this will cover the following:

- Be consistent with the occupational health and safety policy and other operational policies (such as quality policy);
- Indicate which of the activities are covered by the environmental management system;

- Be communicated and implemented at all levels of the airport operation; and
- Be available publicly.

The policy for Environmental Management is to create sound and eco-friendly environment for sustainable development in and around the proposed airport.

5.5.3.4 Organization and Personnel

To facilitate the implementation of the EMS, one of the most important aspects relate to the organization and personnel. The related issues are:

- Define and document the responsibility, authority and inter-relations of key personnel involved in the implementation of the environmental policy, objectives and environmental management system;
- Identify the in-house verification requirements and procedures including resources and personnel;
- Appoint a Management Representative (MR);
- Communicate to employees at all levels the importance of compliance with the environmental policy, their role and responsibilities in achieving compliance, the potential consequences of departures from the specified procedures and identify and provide appropriate training; and
- Establish and maintain procedures to ensure that contractors are made aware of the environmental management system requirements and provisions.

5.5.3.5 Environmental Effects

The airport authorities will establish and maintain procedures for:

- Receiving, documenting and responding to internal as well as external communications concerning environmental aspects and management;
- Identifying, examining and evaluating the environmental effects of its activities under normal and abnormal/emergency situations (including risk assessment) and compiling significant effects in a register; and
- Recording all legislative, regulatory and other policy requirements and codes in a register.

5.5.3.6 Environmental Objectives and Targets

The objectives will be set with a view to realizing gradual and steady improvements in environmental performance through application of best available and economically viable practices.

The areas targeted for improvement will be those where improvements are most necessary to reduce risks (to environment and airport) and liabilities. These will be identified through cost-benefit analysis wherever practicable.

5.5.3.7 Environmental Management Program

The establishment of an environmental management program is the key to compliance with the proposed airport's environmental policy and achievement of the environmental objectives and targets.

It will designate the responsibility for achieving the targets at each level and the means thereof. It will deal with the actions required for the consequences of the past activities as well as address the life cycle of development of new practices so as to effectively control adverse impacts.

5.5.3.8 Environmental Management Manual and Documentation

The documentation is intended to provide an adequate description of the environmental management system. The manual is expected to provide a reference to the implementation and maintenance of the system.

5.5.3.9 Operational Control

The management responsibilities will be defined to ensure that the control, verification, measurement and testing of environmental parameters within the airport are adequately co-ordinated and effectively performed.

The control, verification, measurement and testing will be made through documented procedures and work instructions defining the manner of conducting activities, the absence of which can lead to violation of the environment policy.

In the event of non-compliance, procedures for investigation of the causative mechanism will be established and the factors reported for corrective actions.

5.5.3.10 Environmental Management Records

The airport will establish and maintain a system of records to demonstrate compliance with the environmental management systems and the extent of achievement of the environmental objectives and targets. In addition, the other records (legislative, audit and review reports), management records will address the following:

- Details of failure in compliance and corrective action;
- Details of incidents and corrective action;
- Details of complaints and follow-up action;
- Appropriate contractor and supplier information;
- Inspection and maintenance reports;
- Monitoring data;
- Environmental training records; and
- House keeping.

5.5.3.11 Environmental Management Audits

The management audits are to determine whether the activities are conforming to the environmental management systems and effective in implementing the environmental policy. They may be internal or external, but carried out impartially and effectively by a person properly trained for it. Broad knowledge of the environmental process and expertise in relevant disciplines is also required. Appropriate audit programs and protocols will be established.

5.5.3.12 Environmental Statement

As a mandatory requirement under the Environment Protection Rules (1986) as amended through the Notification issued by the Ministry of Environment and Forests in April 1993, an Environmental Statement will be prepared annually. This will include the consumption of total resources (e.g. water), quantity and concentration of pollutants (air and water) discharged, quantity of hazardous and solid waste generation, pollution abatement measures, conservation of natural resources and cost of production vis-à-vis the investment on pollution abatement. The intention of this statement is:

- To identify the areas where resources can be used more efficiently through a comparison with the figures of a similar project (thereby reducing the consumption of resources);
- To determine the areas where waste generation can be minimized at source and through end of pipe treatment (thereby reducing the wastes generated and discharged); and
- To initiate a self-correcting/improvement system through an internal analysis to achieve cost reduction through more efficient practices.

5.5.3.13 Environmental Management Reviews

The senior management will periodically review the Environmental Management System (EMS) to ensure its suitability and effectiveness. The need for possible changes in the environmental policy and objectives for continuous improvement will be ascertained and revisions made accordingly.

EMS based on the above objectives will be formulated and implemented at the industry level. Every department will be headed by Sr. Manager / Manager level officer belonging to disciplines like Civil, Mechanical, Electrical, Instrumentation, Information technology etc. The Environment Department will be headed by Manager (Environment) and adequate staff will be provided for establishing environmental controls within the airport premises.

5.6. Implementation Schedule of Mitigation Measures

The mitigation measures suggested above will be implemented so as to reduce the impact on environment due to the operations of the proposed airport. In order to facilitate easy implementation, mitigation measures are phased as per the priority implementation. The priority of the implementation schedule is given in **Table-5.4.**

TABLE-5.4
IMPLEMENTATION SCHEDULE

Sr. No.	Recommendations	Time Requirement	Implementation schedule	
			Immediate	Progressive
1.	Air pollution control measures	Before commissioning of airport	*	-
2.	Water pollution control measures	Before commissioning airport	*	-
3.	Noise control measures	Along with the commissioning of airport	*	-
4.	Ecological preservation and upgradation	Stage wise implementation	-	*

Note: [•] indicates implementation of recommendations.

5.7 Environmental Management Cell

An environmental management cell will be formed headed by an Environment Manager supported by adequate number of personnel having sufficient educational and professional qualification and experience to discharge responsibilities related to environmental management including statutory compliance, pollution prevention, environmental monitoring, preventive maintenance of pollution control equipment and green belt development & maintenance. The head of the cell will directly report to the top management of the proposed international airport.

This cell will be the nodal agency to co-ordinate and provide necessary services on environmental issues during construction and operation of the project. This department will interact with State Pollution Control Board (SPCB), MoEF, Central Pollution Control Board (CPCB) and other environment regulatory agencies.

Environmental Management cell will implement and review the compliance of the stipulated conditions specified in Environmental Clearance and Consent for Establishment. Environmental cell will submit six monthly compliance report regarding status of implementation of each stipulated conditions to MoEF. The cell will be responsible to obtain Consent for Operation under water Act and Air Act from SPCB.

The organizational structure for environmental management of the proposed airport is given in **Figure-5.2.**

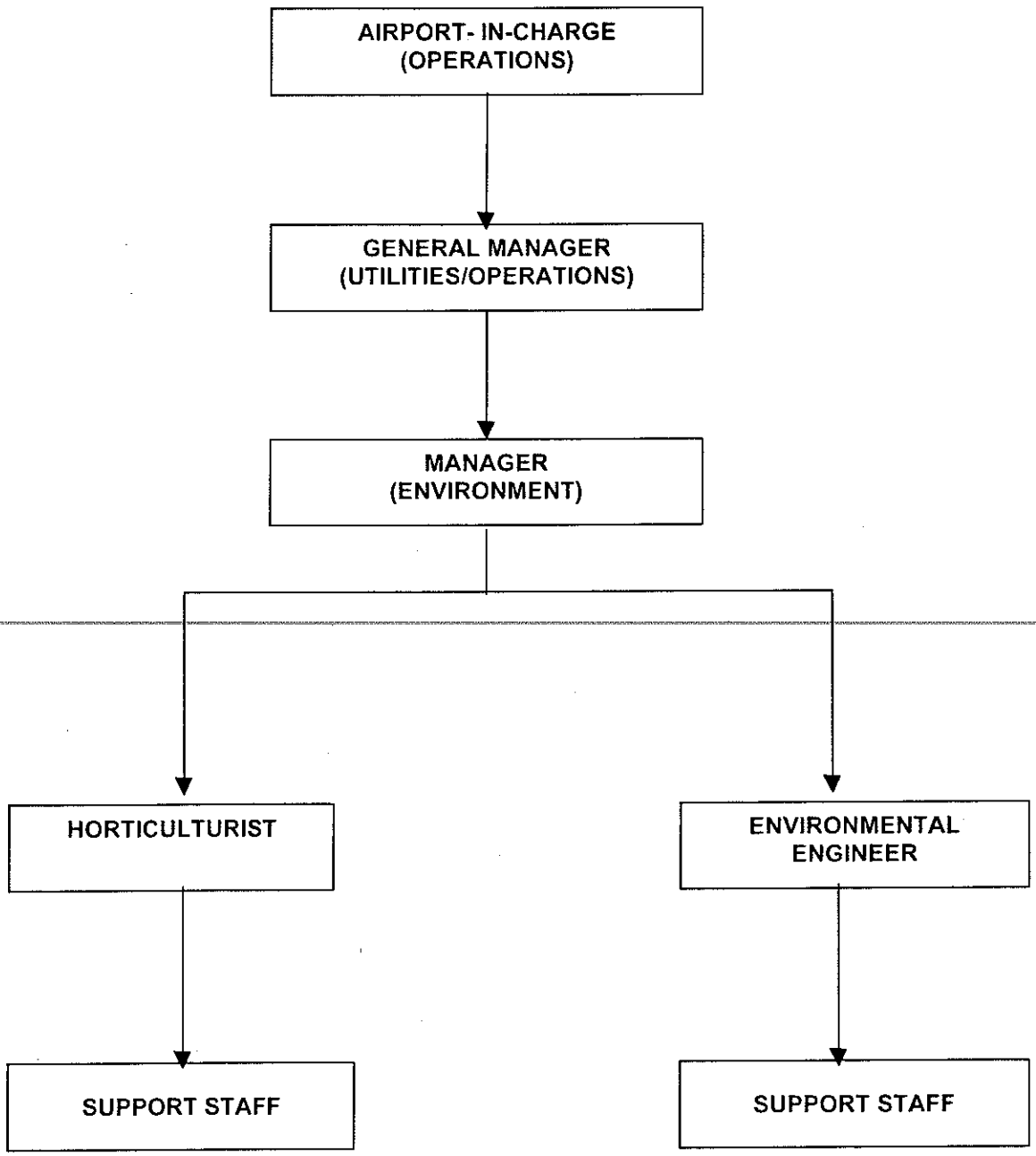

FIGURE-5.2
ENVIRONMENT MANAGEMENT CELL OF THE PROPOSED AIRPORT

5.8 Post Project Environmental Monitoring

An impact assessment study comprises two main phases:

- Assessment of the present situation with regard to environmental problems; and
- Prediction of the impact of future development.

Usually, as in the case of the present study, an impact assessment study is carried out over a short period of time and the data cannot bring out all variations induced by natural or by human activities. Therefore, regular monitoring program of the environmental parameters is essential to take into account the changes in the environment. The objectives of monitoring is:

- To verify the results of the impact assessment study in particular with regard to new development;
- To follow the trend of parameters which have been identified as critical;
- To check or assess the efficiency of the pollution control measures;
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new installations;
- To check assumption made with regard to the development and to detect deviations in order to initiate necessary measures; and
- To establish a database for future Impact Assessment Studies for new projects.

The attributes, which merit regular monitoring, are specified underneath:

1] Air quality both at source and ambient atmosphere,
2] Water and wastewater quality;
3] Noise levels;
4] Ecological preservation and afforestation; and
5] Socio-economic aspects.

The Post Project Monitoring (PPM) to be carried out at the airport level is discussed below:

5.8.1 Monitoring and Reporting Procedure

Regular monitoring of important and crucial environmental parameters is of immense importance to assess the status of environment during airport operation. With the knowledge of baseline conditions, the monitoring program can serve as an indicator for any deterioration in environmental conditions due to operation of the proposed airport and suitable mitigatory steps could be taken in time to safeguard the environment. Monitoring is as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring. The following routine monitoring program would therefore be implemented.

A comprehensive monitoring program is suggested in **Table-5.5**. The environmental attributes will be monitored as given below:

- **Air Pollution and Meteorological Aspects**

Both ambient air quality and stack emissions for DG will be monitored. The ambient air will be monitored twice in a week [in line with the guidelines of Central Pollution Control Board] at four locations. All other conditions with reference to air pollution as stipulated in the consent conditions of SPCB and MoEF will also be monitored.

As per the functional requirements of the airport the continuous online monitoring of the meteorological parameters such as wind speed and direction, temperature, humidity, visibility, solar radiation, atmospheric pressure, cloud cover and rainfall will be done.

- **Water and Wastewater Quality**

There will be no discharge of untreated wastewater from the airport premises and treated wastewater will be used within the airport premises. Further, a suitable storm water drain and a check dam will be constructed to arrest the flow of silt loads emanating from the airport site during monsoon season. The treated storm water from the paved areas will be routed to the rainwater harvesting structure indoor to increase the ground water table. Further, the ground waters down stream of the proposed airport will also be monitored. It is also proposed to monitor the physical, chemical parameters and heavy metals in the surrounding wells and lakes as per **Table-5.4**.

- **Noise Levels**

Noise levels in the work zone environment such as terminal building, hanger area, DG Room, Compressor room, Administrative building and aircraft noise during take-off and landing etc. will be monitored. It is proposed to install online integrated noise meters within airport premises at the strategic locations to monitor the noise levels continuously. This monitor will be connected to the central monitoring station where all the data will be stored and processed.

The environmental monitoring cell will co-ordinate all monitoring programs at the airport and data thus generated will be regularly furnished to the State Regulatory Agencies.

TABLE-5.5
MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

Sr No.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
I	**Air Pollution & Meteorology**				
	A	**Stack Monitoring**			
		DG Stack	Once in a month	30 min	NOx, SPM, Temperature, flow etc
	B	**Ambient Air Quality Monitoring**			
		1. Near Terminal building/hanger area 2. Near Runway 3. Mamidipalli Village 4. Shamsabad (near to airport premises) or locations specified by APPCB	Twice in a week	24 hrs continuously	SPM, RPM, SO_2, NO_x and CO
	C	**Meteorology**			
		Meteorological data to be monitored at the proposed airport for the functional requirements.	Hourly/Daily	Continuous on line Monitoring	Wind speed and direction, temperature, relative humidity, atmospheric pressure, rainfall and solar radiation, visibility etc.
II	**Water and Wastewater Quality**				
	A	**Treated Waste Water**			
		Sanitary/airport premises treated wastewater	Once in a season	24 hr composite	As per EPA rules, 1996 or as specified by APPCB.
	B	**Ambient Water quality**			
		1. Mamidipalli (Tube well) 2. Shamsabad (Tube well) 3. Airport Premises (Tube Well) 4. Himayat Sagar lake	Once in a season except for heavy metal which will be monitored annually once.	Grab	Parameters specified under IS:10500, 1993
III	**Industrial Noise Levels**				
	1	Near Terminal Building/Taxiway	Continuous on line Monitoring	Hourly	Leq, SEL, Lmax etc
	2	Runway Eastern side	Continuous on line Monitoring	Hourly	Leq, SEL, Lmax etc
	3	Runway Western side	Continuous on line Monitoring	Hourly	Leq, SEL, Lmax etc
	4	DG Room	Once in 6 months	8 hr continuous with 1 hr interval	Leq
	5	Compressor	Once in 6 months	8 hr continuous with 1 hr interval	Leq
IV	**Ambient Noise Levels**				
	1. 2. 3.	At the Airport Boundary in four directions Shamsabad Mamidipalli	Once in 3 months	24 hr continuous with one hr interval	Leq

5.8.2 Monitoring Equipments and Consumables

Following equipment and consumable items will be required to implement the monitoring program as given in **Table-5.6.** Alternatively, the monitoring work can be carried out through reputed outside agencies for unbiased results.

TABLE-5.6
PROPOSED EQUIPMENT FOR ENVIRONMENTAL MANAGEMENT

Name of equipment	Numbers	Purpose
High volume samplers with RPM cyclones	4	AAQ monitoring
Stack monitoring	1	Particulates, SO_2, NOx and CO monitoring
Automatic weather monitor set	1	Meteorological data collection at airport
Sound level meter	1	Measurement of ambient noise level
Integrated noise level meter with central data logging system	3	Measurement of Airport noise
Spectro-photo meter	1	Chemical analysis
Micro-balance	2	Chemical analysis
BOD Incubator	1	For BOD estimation
COD reflux set up	1	For COD estimation
Refrigerator	2	For preserving samples
Oven	1	For heating
Thermometer	1	For temperature
PH meter	1	For pH analysis
Distilled water plant	1	For distilled water
DO analyzer	1	For DO analysis
Pipette box	1	For analysis
Titration set up	1	For analysis
Relevant Chemicals	Lumpsum	For analysis

5.8.3 Cost Provision for Environmental Management

It is proposed to invest about Rs 10.81 Crores on pollution control and treatment, which include Rs. 6.81 Crores allocated for green belt development and landscaping and about 4 Crores on sewage/effluent treatment. Besides this, there will be expenditure on the online monitors for metrological parameters, noise level meters and other instruments required for environmental monitoring.