0. EXECUTIVE SUMMARY

0.1 PROJECT BACKGROUND

Dehradun Airport is owned by the Airport Authority of India (AAI), also known as Jolly Grant Airport and it serves for domestic flights only presently. Nestled in the foothills of the Himalayas, Dehradun Airport is located about 20.5 km southeast of Dehradun, in the state of Uttarakhand, India. The airport is popularly known as Air Gateway of Garhwal as it plays an important role in the Tourism of Uttarakhand.

The proposed project is a modernization/expansion project of Dehradun Domestic Airport at Jolly Grant village, Dehradun, Uttarakhand, involving construction of a new terminal building, apron extension and development of commercial facilities. The existing terminal building will be demolished. Existing Dehradun airport is spread over an area of 132.09 Ha. (326.42 Acres) of land which was acquired by AAI and the estimated cost of the project is **INR 344.75 crores**.

During the 24th Meeting (Agenda No. 24.3.15) of the Expert Appraisal Committee of Ministry of Environment of Forest & Climate Change (MoEF&CC) for Expert Appraisal Committee (Infra-2) for Projects related to All Ship Breaking Yard including Ship Breaking Unit, Airport, Common Hazardous Waste Treatment, Storage and Disposal Facilities, Ports and Harbours, Aerial Ropeways, CETPs, Common Municipal Solid Waste Management Facility, Building/Construction Projects, Townships and Area Development Projects held on 30th October 2017, the project was considered and TOR was finalised vide letter no. F.No.10-60/2017-IA-III, dated 5th December 2017 for EIA & EMP. The present EIA report has been prepared as per the ToR issued by MoEF&CC. The compliance of TOR is given in **Annex 1.1** of the EIA Report.

0.2 PROJECT DESCRIPTION

0.2.1 PROJECT JUSTIFICATION

As per current traffic data the domestic passengers handled are 4,71,542 for year 2015-16 and 8,82,564 for year 2016-17. The existing building capacity is near saturation, therefore there is a need to build a new passenger terminal building to cater to the passengers' convenience considering future growth of Dehradun Airport. As per traffic projections done, the passenger traffic will increase to 13,70,162 by 2021-22.

0.2.2 LAND AND LOCATION

The airport lies 20.5 km in the north-west direction from the District Headquarter, Dehradun and is approximately 13.8 km in the South east direction from the nearest town, Rishikesh. The approach to the airport is through a two-lane Dehradun-Rishikesh Road, which also connects to the NH-7. The site has Jakhan Rao River, 0.4 km in the East direction and Sang River, 3 km in the West direction. The location of the site is shown in **Figure 1.1**. The coordinates of the site is shown in **Table 1.1** and the geographical coordinates of the site superimposed on topo-sheet is shown in **Figure 1.2**.

Table 0-1: Salient features of the site

Features/ Aspect	Description
Land-use	• Forest Land: As per Survey of India Toposheet no. 53J/3, 53J/4, 53J/7 & 53J/8 land of Thano RF is partially falling under the existing airport site land is under AAI ownership. • The project does not involve any resettlement. • The project site falls within the jurisdiction of Jolly Grant Village, Doiwala Tehsil, Dehradun District.
Topography	• The site topography is undulating and the ground levels vary from 531 m to 576 m amsl. The general slope of the site is from NE to SW.
Nearest water Bodies	• The site has Jakhan Rao River, 0.4 km in the East direction from the eastern boundary of the site and Sang River, 2.8 km in the West South West direction.

Features/ Aspect	Description
Soil Type	• The soil of Dehradun district is deep, well drained, coarse, and moderate to highly loamy.
Plantations	• NA
Connectivity	• Road connectivity: Dehradun-Rishikesh Road is Adjacent to the Airport • District HQ – Dehradun (20.5km, NW) • Nearest Town – Rishikesh (13.8, SE) • Nearest Railway Station – Doiwala Railway Station (7 km, NE) • Nearest Airport - Chandigarh Airport, (143.91 Km, NW)

Source: GCPL analysis

0.2.3 PROJECT DETAILS

An area of 132.09 Ha. (326.42 Acres) has been earmarked for the Dehradun Airport. The Dehradun airport (**Aerodrome Reference Code 4C**) is proposed to be developed by AAI. The project is to be developed at the tentative cost estimate of **INR 344.75 crores**. The expansion activities will be carried out on the already acquired land by AAI of the existing Airport. The project site involves forest land (As per Survey of India Toposheet no. 53J/3, 53J/4, 53J/7 & 53J/8 land of Thano Reserve Forest is partially falling under the existing airport site land is under AAI ownership) but no resettlement and rehabilitation.

The present airport is designed for handling A-322 type aircrafts or equivalent, and has one runway. The orientation of the runway is 08-26, West-East direction, with a length of 2140 m. and the width of 45m. There are two types of Apron existing at Dehradun airport. Apron I having dimension of 253.5m x 115m, and Apron II (State Hanger) having dimension of 45m x 60m. At present the Terminal Building has a capacity for 250 passengers/hour (125 departure + 125 arrival) (1,22,000 passengers/annum) and with plot area of 3,516 m^2, and built-up area of 4200 m^2, with Checking Counter facilities, Immigration Counters, Departure Counters, Arrival Counters and Custom Counters. The parking area at the airport is provided for 186 PCU i.e. 150 cars, 7 buses and 30 scooters, with an area of 6,680 m^2. A green area of nearly 5.5 ha. is present in the Airport.

The proposed construction activities would be for the new Terminal building with a plot area of 18,373 m^2, and built-up area of 37,700 m^2, designed to handle an annual traffic of 1300 passengers per hour (1.5 million passengers per annum). The Apron I of the airport will also be extended. Apart from this, ancillary facilities like the Sewage Treatment Plant will have increase area from 50 m^2 to 60 m^2.

0.3 PROJECT REQUIREMENTS

0.3.1 LAND

Dehradun Airport had an area of 11.4 ha. in the year 1990, and in 2003 an additional 70 ha. of land from Thano Reserve Forest, and 50.7 ha. from Jolly Grant Village was acquired by the state government, with a total of **132.09 Ha. (326.42 Acres)**. The project area falls within the jurisdiction of Jolly Grant Village, Doiwala Tehsil, Dehradun District, and Thano Reserve Forest, the details of which are elaborated in the table below 132.09 Ha. (326.42 Acres).

Table 0-2: Khasra details of Project Land

S. No	Name of Village/Forest	Survey Nos. covered	Extent in Ha.	Distance, direction
1.	Earlier Land		11.40	0 km
2.	Jolly Grant Village	4294	50.69	0 km, E
i.	Jolly Grant		30.83	0 km
ii.	Athurwala		19.86	0 km
3.	Thano Reserve Forest	-	70.00	0 km, East and South
Total			**132.09**	

Source: AAI (2018)

0.3.2 WATER SOURCE & DEMAND

The project will utilize water supply from the ground water. The daily consumption of water during operation phase will be about 137.8 KLD of which 54.9 KLD will be fresh water and 82.9 KLD will be recycled water. The construction water requirement is 37.4 KLD for domestic use which could be met through private water tankers. For civil works 22.5 KLD of water will be used which will be met through private water tankers.

0.3.3 POWER SUPPLY & BACKUP

Total electrical load of existing airport is 11 KV HT connection from Uttarakhand Power Corporation Limited (UPCL), 1000 kVA contract demand and 3x500 kVA DG sets are provided for backup during power failure.

The required electrical load for proposed project: 33 kV HT supply coming from Uttarakhand Power Corporation Ltd. will be stepped down to 433/415 V through Oil Type Transformer. The LT supply will be then fed to various connected loads inside & outside the Terminal building. Anticipated power demand based on the architectural layouts and the equipment and systems proposed to be installed works out to be 3548.16 KW. There will be 3 nos. of 2000 KVA and one no of 500 KVA radiator cooled DG sets for backup.

0.3.4 SEWERAGE TREATMENT PLANT (STP)

The daily sewerage generation for operation of the airport is estimated to be around 145.1 KLD. A sewerage treatment plant of MBBR technology, and 175 MLD capacity, shall be located in the airport. An area of 60 m^2 has been earmarked in the master plan in place of the existing STP capacity of 50 KLD. The recycled water shall be utilized for flushing / landscaping etc. The main source of sewage generation will be the discharges from toilets (water closet), urinals, sinks, pantry, kitchen and other similar utilities. During the construction phase, 37.4 KLD of waste water will be generated, which will be discharged through soak pits and septic tanks.

0.3.5 SOLID WASTE GENERATION AND DISPOSAL

Construction Stage: 50 kg / day (@ 0.1 kg / person /day for 400 labours + 100 employees) of solid waste will be collected and disposed as per established laws and procedures. Apart from this the construction material waste generated would be in the tune of (@40-60 kg of Construction & Demolition waste per sq m of construction)[1], 2,911 Metric-tons. Efforts would be put to reuse the waste in the foundation and other road laying activities.

Operation phase: Commercial waste of 1.3 MT will be generated from airport which will be collected using twin bin waste collection system; green bins for bio-degradable wastes and blue bins for non-biodegradable wastes. Waste collection shall be temporarily stored at identified locations before disposing as per established laws and procedures of the nearby Municipality waste disposal site. The total solid waste generation will be 1.9 MT per day, but the horticulture and street sweeping waste will be converted to manure for the landscaping area, and only the Municipal waste will be transported to the nearby municipality landfill site after segregation. Organic Waste Converters will be provided for biodegradable waste. Inert and recyclable waste will be sent to nearest MSW facility.

Hazardous waste shall be disposed in accordance with Hazardous Waste Management Rules 2008, battery wastes shall be handled in accordance with Batteries Management Rules, 2010 and e-waste as per E-waste Guidelines, 2008. Bio-medical wastes shall be collected and disposed in accordance with Bio-medical Waste (Management and Handling) Rules, 1998.

0.3.6 CONSTRUCTION MATERIAL

The construction material used in proposed project will be sourced from local approved vendors through the contractor and the specification will be as per the conditions laid in contract agreement by the AAI. The contractors work will be monitored, approved and certified by the Engineering-In-Charge of AAI. The quantity of construction material required is presented in **Table 0-3.**

[1] *Source: www.cseindia.org/userfiles/Construction-and%20-demolition-waste.pdf*

Table 0-3: Construction Material Requirement

- Cement – 2, 08, 830 bags
- Sand- 26, 313 Cum
- Aggregates – 19, 734 Cum
- Bricks – 7, 57, 009 numbers
- Reinforcement Steel – 18, 872 tonnes
- Paint – 93, 974 litres

Source: AAI

0.3.7 RAINWATER HARVESTING

Proposed storm water system consists of pipe drain, catch basins and seepage pits at regular intervals for rain water harvesting and ground water recharging. Peak hourly rainfall has been considered as 35 mm/hr. A total of 17 pits of cylindrical shape with dimension of 3m dia and 7.15 m depth are proposed in the site.

0.3.8 MANPOWER REQUIREMENT

Approximately **400 daily labors** will be employed during the construction period. Proper sanitary facilities will be provided to construction laborers through community level toilets and treatment will be done using septic tank. Wash areas will be constructed and good hygienic conditions will be maintained. During the operation phase it is estimated that **100 staff** would be employed in the airport.

0.3.9 ROADWAY SYSTEM

0.3.9.1 Primary Access Road

The airport has its access road via the two lane Dehradun-Rishikesh Road, which is adjacent to the project site.

0.4 BASELINE ENVIRONMENTAL STATUS

0.4.1 TOPOGRAPHY

The elevation of the airport site varies from 531 m to 576 m amsl. The general slope of the site is from NE to SW. The soil type found at the site is mainly coarse loamy soils.

0.4.2 SEISMOLOGY

The project site falls under seismic zone IV which is a high risk zone.

0.4.3 SOIL

- The soil is neutral to slightly alkaline, with pH ranging from 6.7 to 7.7 in the study area. The texture of the soil is dominantly sandy clay loam and clay loam in nature.
- The moisture content of the soil samples is found to be low and ranges from 3.4% to 6.8%. This is due to low water holding capacity of the soil.
- Organic carbon, a major nutrient for soil fertility, was ranged high (average sufficient to more than sufficient) in the study area.
- The NPK content was found very average for Nitrogen and Phosphorus, and with Potassium showing very low values, which is an indicator of low fertility of soil in the area.

0.4.4 AIR

The Air Quality has been conducted for 9 sites in and around the project site. The results of monitored data indicate that the ambient air quality of the region is in conformity with respect to rural/residential norms of National Ambient Air Quality standards of CPCB.

0.4.5 NOISE

The Noise Quality has been conducted for 8 sites in and around the project site. The L_{eq} was recorded in the range of 43 dB(A) at Doiwala village (N4), to 55.4 dB(A) near End of runway - W side (N2), during daytime and 34.7 dB(A) at End of runway - W side (N2), to 42.8 dB(A) near Rainapur (N8), during night time..

0.4.6 SURFACE AND GROUND WATER

The **surface water** samples were collected from Song River near Bhagtana village and Hariyawala Khurd, near Dehradun, surrounding the project site area. Surface water qualities represent the aquatic life of an area.

- The analysis results indicate that the pH value of the samples are in the range 7.6 to 7.8. All values meet criteria A.
- DO was found to be in the range of 5.8 to 5.9 mg/l. It is observed that it is well within the permissible limits of B for both samples.
- The BOD levels in the water samples meets criteria B as both samples are high at 1.4 and 1.1mg/l.
- Total Coliforms was found to be 390 and 400 MPN/100ml in both water bodies. These values meet criteria B. In rivers, due to flowing water, it is <500 MPN/100ml and meets criteria B. Another reason for the slight higher values of coliform in water bodies can be attributed to bathing of human and cattle in these water bodies.
- Thus the water quality for both surface water samples is of **B category**, which is suitable for organized outdoor bathing.

The **ground water quality** does not indicate any industrial contamination and meets the standards of IS 10050:2012 and therefore can be used for drinking purposes.

- The villages in the project area have limited number of hand pumps and bore-wells, and the residents of these villages make use of this water for drinking and other domestic uses. Therefore 2 bore well samples have been considered for sampling.
- The analysis results indicate that the pH of the samples ranges in between 7.3 to 7.6 which are well within the specified standard of 6.5 to 8.5.
- Total hardness was observed to be ranging from 188.1 to 232.9 mg/l. The maximum hardness (232.9 mg/l) was recorded at GW2 (Jolly Grant Village) and the minimum (188.1 mg/l) was recorded at GW1 (Doiwala). The hardness was found to be within the permissible limit of 600 mg/l as per IS 10500:2012.
- Chlorides were found to be in the range of 23.0 mg/l at GW1 (Doiwala village) to 28 mg/l at GW1 (Jolly Grant village) which is well within the specified standard of 250 mg/l, as per IS 10500:2012.
- Sulphate was found to be in the range of 98.0 mg/l to 124.0 mg/l. The minimum value observed at GW1 (Doiwala village) whereas the maximum value was observed at GW2 (Jolly Grant village), which is well within the specified standard of 200 mg/l, as per IS 10500:2012.

The depth to water ranges between 5 and 10 m in the southernmost part of the Uttarakhand district. The area close to the hills is represented by water table >15 m bgl. About 3.00 m. average water level fluctuation between pre and post monsoon period is noticed in the district.

0.4.7 ENVIRONMENTAL SENSITIVITY

There are 15 Reserve Forests in the Study Area, the project site has 70 ha. of Thano Reserve Forest area, and is 8km from Rajaji National Park. The site has Jakhan Rao River, 0.4 km in the East direction and Sang River, 3 km in the West direction.There are also a total of 9 rivers flowing through the study area, however, and the project site has few secondary channels, which will be diverted along the boundary of the project site.

0.4.8 FAUNA

The faunal groups were recorded mostly on the basis of secondary information like discussion with forest officials and local villagers. No schedule I fauna has been reported in the study area probably due to absence of any dense forest.

0.5 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

The environmental impacts were identified and the potential impacts on different environmental components due to the construction and operation of the proposed project were predicted. The airport project would create impacts on the environment in two distinct phases:

- During the construction phase which may be regarded as temporary or short – term
- The other during the operation stage which would have long – term effects

The potential impacts on physical, ecological and socio-economic components of the local environment due to the proposed activities and sub-activities were predicted.

Prediction of impacts is the most important component in the Environmental Impact Assessment studies. Several qualitative and quantitative techniques and methodologies were used to conduct analysis of the potential impacts likely to accrue as a result of the proposed development activities on physical, ecological and socio-economic environments. Such predictions are superimposed over the baseline (pre-project) status of the environmental quality to derive at the ultimate (post-project) scenario of environmental conditions. The prediction of impacts helps to minimize the adverse impacts and maximize the beneficial impacts on environmental quality during pre and post project execution.

The negative impacts of the project will be mitigated/prevented/controlled with suitable mitigation measures. Due to the proposed project, water environment, air environment, noise, land environment, ecological environment and socio-economic factors are identified as the significant environmental components likely to be affected.

0.6 ANALYSIS OF ALTERNATIVES

0.6.1 GREEN BUILDING AT DEHRADUN AIRPORT

Following measures will be adopted to develop the terminal building as green building or sustainable building:

- By adopting passive design strategies like building profile and orientation, natural lighting and passive solar design lesser electricity will be consumed as compared to conventional buildings.
- On-site energy generation through renewable energy utilization to cater to its energy needs. For instance, solar thermal systems can help generate hot-water and replace the conventional electrical geyser in buildings. Solar PV panels can help generate electricity which can reduce the buildings dependence on grid power.
- By providing ultra low-flow fixtures, dual plumbing systems, water conserving toilets, shower heads and faucet aerators will reduce not only the demand for water use but also reduce demand on septic systems or sewage treatment plants too.
- To cater to the internal and external (landscape) water demands, waste-water recycling systems and rain-water harvesting systems will be adopted
- By employing waste management strategies like segregation of organic & recycled waste will generate lesser waste so will minimize the burden on landfills.
- To maximize the use of daylight, a high-performance glazing system will be adopted which allows more light and less heat than a typical window, without negatively impacting the building cooling load in the summer. This is typically achieved through spectrally-selective films. These glazing's are typically configured as a double pane insulated glazing unit, with two 0.25 in. (6 mm) thick panes of glass that are separated by a 0.50 in. (12 mm) air gap
- Paints may also have major negative impact on indoor air quality of the building , that's why paints and wood preservatives which have low VOC (volatile organic compound) and lead free will be used.

- Energy Star labeled equipments that offer significant cost and energy savings without compromising performance will be provided.
- Walls and roofs with eco friendly insulation will be planned for the building as insulation acts as a barrier to heat loss and heat gain, particularly in roofs and ceilings, walls and floors. Insulation is the most practical and cost effective way to make a house more energy efficient, keeping it cooler in summer and warmer in winter. In addition, insulation may reduce condensation This can provide health benefits by reducing mould and damp.

0.6.2 ALTERNATIVE FOR CONSERVATION OF WATER

At the proposed airport, water will be conserved by utilizing treated waste water for flushing of toilets and for development of greenery and landscaping.

0.7 ENVIRONMENT MONITORING PLAN

The purpose of the monitoring programme is to ensure that the intended environmental measures are achieved. To ensure proper implementation of the Environment Management Plan (EMP), it is essential that an effective monitoring programme is designed and carried out during construction and operation. The broad objectives of the environment monitoring programme are:

- To monitor impacts on the surrounding environment and the effectiveness of mitigation measures during the construction and operation.
- To ensure that the environmental control systems are operating satisfactorily.
- To suggest ongoing improvements in management plan, if required, for subsequent effective monitoring.

0.7.1 REPORTING SCHEDULE DURING CONSTRUCTION STAGE

Reporting of the data in prescribed format is to be submitted to respective state pollution control Board (SPCB) half yearly.

0.7.2 STATUTORY COMPLIANCE DURING OPERATION STAGE

The AAI will submit different statutory returns/compliance reports for proposed Dehradun Airport as per the following schedule:

- Submission of half yearly compliance report in respect of the stipulated prior environmental clearance's terms and conditions in hard and soft copies to the Regional Office of Ministry of Environment, Forests and Climate Change (MoEF&CC) on 1st June and 1st December of each calendar year
- Submission of environmental statement for the financial year ending 31st March to the concerned regulatory authority on or before 30th September every year.
    - Submission of Water Cess returns in Form 1 as per Rule 4 (1) of The Water (Prevention & Control of Pollution) Cess Rules 1978 on or before the 5th of every calendar month.

0.7.3 ENVIRONMENT MANAGEMENT COST

All costs involved in Environmental Mitigating measures and Management to be put on the account proposed project is summarized in **Table 0-4.**

Table 0-4: Cost of Environment Management Plan

Component	Stage	No. of Locations	Total No. of samples	Frequency	Cost per Sample (In Rs.)	Total cost (Rs)
Air	Construction	4	192	Twice a week for 6 months	5,000	9,60,000
	Operation	2 stacks	2	Once in 6 months	2,000	4,000
		5	240	Twice a week for 6 months	5,000	12,00,000
Water	Construction	2 surface water	4	Twice in 6 months	6,000	24,000
		2 ground water	4	Twice in 6 months	5,500	22,000
	Operation	2 surface water	4	Twice in 6 months	6,000	24,000
		2 ground water	4	Twice in 6 months	5,500	22,000
Noise	Construction	3	72	Once in a week for 6 months	2,000	1,44,000
	Operation	5	120	Once in a week for 6 months	2,000	2,40,000
Soil	Construction	3	6	Twice in 6 months	6,000	36,000
	Operation	2	4	Twice in 6 months	6,000	24,000
Plantation & landscaping	Construction	Survival rate of tree sapling			Lump sum	2,00,000
	Operation				Lump sum	2,00,000
Total Cost						**31,00,000**

0.8 ADDITIONAL STUDIES

Additional studies have been carried out, providing details of the Green Building (GRIHA).

The **CSR budget** is 2% of average net profit during three immediately preceding financial year, which amounts to **~INR 75 lakhs/year** for the project.

0.9 PROJECT BENEFITS

The existing building capacity is near saturation, therefore there is a need to build a new passenger terminal building to cater to the passengers' convenience considering future growth of Dehradun Airport. As per traffic projections done, the passenger traffic will increase to 13,70,162 by 2021-22. The project would also enhance the local economic conditions in terms of employment generation and increase in local businesses, and bring about improvement of the physical and social infrastructure in the surrounding areas.

0.10 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) consists of description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA. As such, the

chapter deals with the set of mitigation, management, monitoring and institutional measures to be taken during the implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels. The present environmental management plan addresses in brief the components of environment, which are likely to be affected by the different operations in a project area.