PRE-FEASIBILITY REPORT (PFR) FOR OBTAINING TOR FOR EXPANSION OF DEHRADUN AIRPORT

PROJECT PROPONENT:
Airport Authority of India, Dehradun

ENVIRONMENT CONSULTANT:
Greencindia Consulting Private Limited
NABET/ EIA/1619/RA 0058

Greencindia Consulting Pvt Ltd

PRE-FEASIBILITY REPORT

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EXECUTIVE SUMMARY

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Dehradun Airport is an airport serving Dehradun and Uttarakhand in India. It is situated in Jolly Grant Village, Dehradun, Uttarakhand, India. Dehradun airport is also known as Jolly Grant Airport and it serves for domestic flights. Nestled in the foothills of the Himalayas, Dehradun Airport is located about 22 km southeast of Dehradun, 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 domestic airport at Jolly Grant village, Dehradun, Uttarakhand. Existing Dehradun airport is spread over an area of 326 acres of land which acquired by AAI.

The estimated cost of the project is 303.34 crores.

The project is modernization of existing airport by developing the new terminal building, multi-level car parking & commercial facilities. Also existing terminal building will be demolished.

The Construction of a new centrally air-conditioned Terminal Building involves 30,200 sqm built-up area and allied facilities. The building is to be provided with aesthetically appealing & soothing interior decoration matching the modern structure. Space planning will be done to ensure that no dead Space/ Area are created in the building.

Construction of multilevel car park for at least 500 cars and surface parking for VIP cars &10 buses, Separate car I scooter park area for AAI and airlines staff at appropriate location. Multilevel Car Parking to be made for retailer in car parking area & it has to be developed on Built & Operate System and shall include its space planning and mode/for its operations.

The total water requirement during construction phase of the project is 13.5 KLD. During Operation Phase total water requirement is 369 KLD which includes 212 KLD water for domestic use and 157 KLD water for Flushing purpose.

The demolition of old terminal building has been proposed. Due to this demolition, approx. 1338.9 m^3 debris will be generated which will be disposed off by scientific method as per norms.

CHAPTER-2
INTRODUCTION

2. INTRODUCTION

2.1 BACKGROUND

Dehradun Airport belongs to Airport Authority of India (AAI). Dehradun airport is also known as Jolly Grant Airport and it serves for domestic flights. Nestled in the foothills of the Himalayas, Dehradun Airport is located about 22 km southeast of Dehradun, Uttarakhand, India. The airport is popularly known as Air Gateway of Garhwal as it plays an important role in the Tourism of Uttarakhand.

Dehradun Airport was constructed in year 1974. The Airport Authority of India suspended flight operations at the airport from 1st March 2007 in order to execute its airport modernization plan. The runway was extended from 3,500 feet to 7,000 feet and also broadened from 23 metres to 45 metres to enable the landing of narrow body jets like the Boeing 737 and the Airbus 320. A night landing system was installed and a new terminal building and ATC tower were also constructed. The airport resumed commercial operations on 30th March 2008 after a runway extension to accommodate larger aircraft. A new terminal building was inaugurated in February 2009.

Dehradun is the capital city of Uttarakhand, a state in the northern part of India. Located in the Garhwal region, it lies 236 kilometres north of India's capital New Delhi and is one of the "Counter Magnets" of the National Capital Region (NCR). Dehradun is in the Doon Valley on the foothills of the Himalayas nestled between the river Ganges on the east and the river Yamuna on the west. The city is famous for its picturesque landscape and slightly milder climate and provides a gateway to the surrounding region.

Dehradun is well connected with rest of the country and the climate of the city is very pleasant. One of the of the main things that makes Dehradun a place of interest is the fact that the city holds few of the most prestigious and famous educational institutes of the country. From the military academy of the country to some of the famous boarding schools, Dehradun has it all. Apart from that, natural resources and new industries make Dehradun a place of prominent growth. Dehradun is the home for many famous corporations and research institutes too.

2.2 PROJECT PROPONENT

The Government of India constituted the International Airports Authority of India (IAAI) in 1972 to manage the nation's international airports while the National Airports Authority was constituted in 1986 to look after domestic airports. The organizations were merged in April 1995 by an Act of Parliament and was named as Airports Authority of India (AAI). This new organization was to be responsible for

creating, upgrading, maintaining and managing civil aviation infrastructure both on the ground and air space in the country.

The Airports Authority of India (AAI) manages a total of 126 Airports, which include 12 International Airports, 08 Customs Airports, 81 Domestic Airports and 25 Civil Enclaves at Defence Airfields. AAI also provides Air Traffic Management Services (ATMS) over entire Indian Air Space and adjoining oceanic areas with ground installations at all Airports and 25 other locations to ensure safety of Aircraft operations.

AAI has four training establishments viz. The Civil Aviation Training College (CATC) at Allahabad, National Institute of Aviation Management and Research (NIAMAR) at Delhi and Fire Training Centers (FTC) at Delhi & Kolkata. An Aerodrome Visual Simulator (AVS) has been provided at CATC and non-radar procedural ATC simulator equipment is being supplied to CATC Allahabad and Hyderabad Airport. AAI has a dedicated Flight Inspection Unit (FIU) with a fleet of three aircraft fitted with flight inspection system to inspect Instrument Landing Systems up to Cat-III, VORs, DMEs, NDBs, VGSI (PAPI, VASI) and RADAR (ASR/MSSR).

2.3 TYPE OF PROJECT

AAI proposes to expand the existing terminal building of Dehradun Airport by demolishing the existing one. The existing airport is spread over an area of 326 acres/ 131.928 Ha. The proposed expansion is planned in the existing area itself. No additional land will be required for the expansion purpose.

The proposed project falls in Category 7(a) of the Schedule vide EIA notification 2006 amended to date involving preparation of Environment Impact Assessment study and Environment Management Plan. This project is independent and is not linked with other projects' which may attract directly or indirectly any provisions of schedule of EIA notification 2006 amended to date.

2.4 AIRPORT SECTOR PROFILE

India's transformation from an agrarian economy to an urbanized one is an inevitable consequence of GDP growth led by service sector and saturation of agricultural productivity. Air connectivity can ensure integration of such urbanizing areas with the rest of the country and national economy. Development of appropriate connectivity between robust urban agglomerations could check the influx of migrants to large metro and provide for more balance regional development.

The civil air transport network has been called the Real World Wide Web. It has been observed that the improvement in air connectivity has brought tremendous benefits to users of air transport services by:

- Reducing time spent in transit,

- Increasing the frequency of service,
- Allowing for shorter waiting times and better targeting of departure and arrival times;
- Improving the quality of service, such as reliability, punctuality and quality of the travel experience.

The four largest Indian airports (Mumbai, Delhi, Chennai, and Bangalore) each handle more than 10 million annual passengers and accounts for more than 60% of national passenger traffic. India has come through a period characterized by a major expansion of the air transportation industry and proposed to develop 67 domestic airports across country.

Air traffic in India has increased over last five years. The compound annual growth rate (CAGR) of total aircraft movement was 3.3% and of passengers 5.6% during year FY-2011 to FY-2014. Globally, Indian civil aviation is ninth market. It stands fourth in domestic passenger volume.

Improvements in connectivity will effectively contribute to the economic performance of the wider economy through enhancing its overall level of productivity. **Table 1.1** shows the quantum of passengers handled at major airports in India in last few years.

Table 2-1: Passengers Handled at Major Airports in India (in millions)

Sl. No.	Airports	City	State	2012-13	2013-14	2014-15
1.	Indira Gandhi International Airport	Delhi	Delhi	34.4	36.9	41.0
2.	Chhatrapati Shivaji International Airport	Mumbai	Maharashtra	30.2	32.2	36.6
3.	Chennai International Airport	Chennai	Tamil Nadu	12.8	12.9	14.3
4.	Kempegowda International Airport	Bangalore	Karnataka	12.0	12.8	15.4
5.	Netaji Subhash Chandra Bose International Airport	Kolkata	West Bengal	10.1	10.1	10.9
6.	GMR Hyderabad International Airport Limited	Hyderabad	Telangana	8.4	8.8	10.5

Source: Airports Authority of India

2.5 AIR CONNECTIVITY PATTERN

In India, with its geographical spread interspersed with deserts, seas, forests and hilly terrain, regional and remote area, air connectivity play a crucial role in this context. Establishing or relying on railway / road networks for connecting such parts of the country may not be time effective or even viable (technically /financially).

Also, while railway and road networks may be viable connectivity options to other parts of the country (not impacted by issues of terrain, security, etc.), air connectivity provides a key advantage in terms of time saving.

The routes connecting Tier-2 towns / cities to Tier-3 towns / Cities-1, only constitute about 7% of the air transport market in India in terms of seat deployment. While routes can be configured innumerous ways in terms of combination of frequencies, timing of the flights and aircraft sizes, a number of these routes are likely to witness traffic that can be better serviced using small aircraft such that the aircraft could be optimally utilized over the day as well as achieve viable PLF.

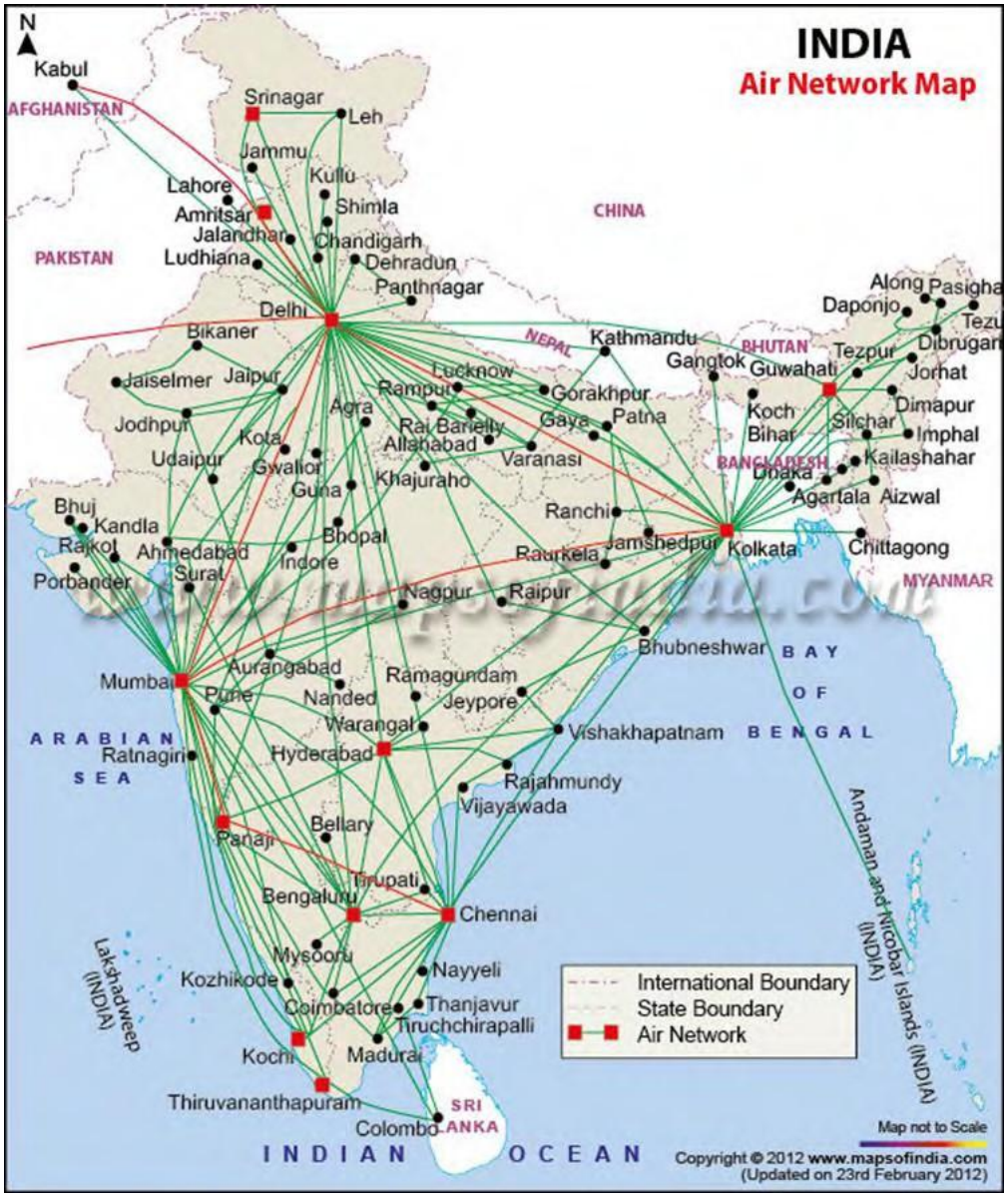

Figure 2-1 : Air Connectivity Pattern in India & Across India

2.6 NEED OF THE PROJECT

2.6.1 Traffic Analyses

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 saturated; therefore, it is proposed to build a new passenger terminal building to cater to the passengers' convenience considering future growth of Dehradun Airport. As per traffic projects done, the passenger traffic will increase to 13, 70,162 by 2021-22.

2.7 EMPLOYMENT OPPORTUNITIES

The direct employment during construction phase in proposed project will be 150-300 skilled, unskilled and professional workforce including temporary and permanent employees. These workforces shall be hired locally in order to generate the employment to the local people. During the project operation stage, for the purposes of day-today professional and maintenance works, about 109 staff is existing in the airport.

2.8 STRUCTURE OF THE REPORT

The report is divided into seven chapters excluding this chapter, the details of which are summarized below:

Chapter 2: Project Description- This chapter discusses the layout drawing and design considerations for construction of new terminal building and other facility with existing features like Runway, Apron, Apron Shoulder, Taxi Track, Runway Shoulder, boundary wall, perimeter roads and parking facilities.

Chapter 3: Site Analysis- This chapter discusses the site profile, landform, and existing land use and drainage pattern. The land details, climate and meteorological parameters are also described in various sections of the chapter.

Chapter 4: Planning Considerations- This chapter discusses the considerations of planning of various features like new terminal building and other facility with existing features like Runway, Apron, Apron Shoulder, Taxi Track, Runway Shoulder, boundary wall, perimeter roads and parking facilities.

Chapter 5: Proposed Infrastructure- This chapter discusses the Concept Plan for aviation support facilities and utilities also provides for the redevelopment & re-planning of existing airport. The Concept Plan for the proposed airport defines the ultimate scope of the proposal and the development of facilities in accordance with the requirements of traffic. Earlier discussion on Traffic Analysis and Project Sizing are used as the basis for planning of the various components.

Chapter 6: Rehabilitation and Resettlement (R&R) Plan- This chapter discusses the R&R study due to the proposed project area.

Chapter 7: Project Schedule & Cost Estimates- This Chapter describes the total investment and cost regarding the project.

Chapter 8: Final Recommendations- This chapter summarizes the Analysis of Proposal of proposed terminal building for Dehradun Airport.

CHAPTER-3
PROJECT DESCRIPTION

3. PROJECT DESCRIPTION

3.1 INTRODUCTION

Airports Authority of India, Dehradun proposes to expand the existing airport in Dehradun by construction a new terminal building after demolishing the existing terminal building. Also a multilevel car parking and allied facilities are proposed in this phase of expansion.

Existing infrastructures in the Airport include runway with all allied facilities like terminal building, Apron, Apron Shoulder, Taxi Track, Runway Shoulder, boundary wall, perimeter roads and parking facilities.

The estimated cost of the project is 303.34 crores.

3.2 LOCATION & LINKAGE

The proposed airport is located in the outskirts of Dehradun. The details of location of the airport are given in **Table 3.1**.

Table 3-1: Details of Site Location

Description	Details			
Project Site	Jolly Grant Village, Doiwala Tehsil, Dehradun, Uttarakhand			
Coordinates	**Points**	**Latitude**	**Longitude**	
	A	30°11'58.36"N	78°11'43.90"E	
	B	30°11'28.77"N	78°11'43.77"E	
	C	30°11'21.70"N	78°11'38.47"E	
	D	30°11'14.22"N	78°10'53.00"E	
	E	30°11'20.37"N	78°10'51.75"E	
	F	30°11'11.93"N	78° 09'57.72"E	
	G	30°11'21.39"N	78° 09'55.55"E	
	H	30°11'28.21"N	78°10'38.41"E	
	I	30°11'28.64"N	78°10'39.19"E	
	J	30°11'34.69"N	78°10'37.01"E	
	K	30°11'35.96"N	78°10'44.67"E	
	L	30°11'30.74"N	78°10'46.94"E	
	M	30°11'34.46"N	78°11'11.49"E	
	N	30°11'39.53"N	78°11'10.45"E	
	O	30°11'42.03"N	78°11'25.41"E	
	P	30°11'55.11"N	78°11'22.21"E	
Total Area	Existing Airport: 131.928 ha (The land for proposed expansion is within the existing area)			
Access Road	Dehradun-Rishikesh Road		Adjacent	S
District Headquarter	Dehradun		20.5 km	NW
Nearest Town	Rishikesh		13.8 km	SE
Nearest Railway Station	Doiwala Railway Station		7.0 km	NE

Description	Details		
Nearest Airport	Pantnagar Airport	178.48 km	SE

Source: (i) Primary Survey by Greencindia Consulting Private Limited (ii) Toposheet no. 53J/3, 53J/4, 53J/7 & 53J/8, Survey of India, Dehradun

3.3 SITE SELECTION & ALTERNATIVES

The airport is existing & AAI is expanding only the terminal building and a multi-level car parking is being constructed. The airport was constructed in 1974 to facilitate and operate passengers. With an increasing number of passengers, AAI decided to upgrade the airport.

Since the expansion is proposed within the existing land and no additional land will be required, no site alternatives were analyzed for the project.

Dehradun airport belongs to AAI. Dehradun airport has been developed as one of the model airports by AAI to cater for operation of wide as well as narrow bodied aircraft. The airport is served by many domestic carriers. The airport offers connectivity between Dehradun and various Indian States. The Airport presently caters for operation of A-320 and B-737 aircrafts.

As per current traffic data, the domestic passengers handled are 4, 71,542 for the year 2015-16 and 8, 82,564 for the year 2016-17. Considering the rising demand and the near saturation scenario of the existing terminal building, AAI proposes to construct a new terminal building after demolishing the existing one.

3.4 DESCRIPTION OF PROPOSED PROJECT

Construction of New Terminal Building, Multi-level Car Parking Facility and associated facilities will involve the following activities:

CIVIL WORKS:

Construction of a new centrally air-conditioned Modular Integrated Terminal Building in an area of 17,961 m^2 and will involve a built-up area of 30,200 m^2. The building will be provided with aesthetic appealing & soothing interior decoration matching the modern structure. Space planning will be done to ensure that no dead space/ area are created in the building.

The Departure area, Arrival area, Security hold area and Concourse area are to be provided with adequate nos. of toilets for gents, ladies and differently-abled persons and drinking water. Suitable number of ramps will be provided for entry and exit of differently-abled persons in departure and arrival area. Provision of battery operated buggies for senior citizens/differently-abled persons as per requirement.

The design of terminal building will include media planning, retail area planning etc. Overall planning of building will capture local architectural features and it will be part of design features of terminal. The design should include the required arrangement for its regular maintenance so as to

make it in-built part of execution. Solar power generation v.i.z solar lighting, solar roofing system etc. will be provided. Maintenance friendly roofing & building facade system including provision of regular cleaning with maintenance hoists, hooks etc. including cat walk/rope suspended platform will be provided.

Green building norms to be followed for 4-star rating of GRIHA.

MULTI-LEVEL CAR PARKING

Construction of multilevel car park will be done for at least 500 cars and surface parking for VIP cars & 10 buses, Separate car/ scooter park area for AAI and airlines staff at appropriate location will be provided.

MISCELLANEOUS FACILITIES

- Airport Director's office with associated office space, Conference hall, Retiring rooms, toilet for staff to be provided.
- Development of four-lane vehicular road from Terminal Building/ Car parking with canopy covering two lanes in front of the Terminal Building on the city side and connecting the main approach road to the city.
- Provision of VIP/ CIP lounges, provision of adequate number of chairs, furniture, furnishings etc. in the departure lounge common concourse, check-in area, security hold area and arrival lounge.
- Provision of water supply pumping arrangement system, Water Filtration, water cooler & R.O/U.V. Filters, Sewage Treatment Plant as per norms and as per site conditions.
- Sub-station, AC plant room and related service facilities. Provision should be made for the AC Plant Room vertical through AHU rooms, backup generators for essential services etc. in the lower ground floor.

ELECTRICAL WORKS & OTHER EQUIPMENTS/SERVICES

- Internal and external electrification for Terminal Building Complex, associated buildings, Car Park & roads.
- Augmentation of main power supply, Substation Equipment, DG Sets for Secondary Power supply and associated ancillary buildings.
- Provision of central air-conditioning & ventilation (HVAC) system & BMS for new terminal building.
- Provision of conveyor belts with In-line X-ray inspection System and other equipment at departure area and inclined carousels at arrival hall.
- Provision of fire detection & alarm system, provision for fire hydrants and water sprinklers

system as per standards along with fire extinguishers.

- Escalators & Elevators with matching staircase.
- Provision of Passenger Boarding Bridges (PBB) for the specified parking stands.
- Provision of automatic sliding doors at exit and entry points of terminal.

COMMUNICATION, NAVIGATION & SURVEILLANCE (CNS) PLANNING WORKS

- Public address system and car calling system.
- Surveillance Close circuit TV system (SCCTV) and provision of adequate number of close circuit TV monitors, in the Security Control Room, Terminal Manager Room, APD Office etc.
- Provision of Flight Information Display System (FIDS) with adequate number of Display Devices in departure, arrival and security hold area for passenger facilitation.
- Provision of adequate number of X-ray machines for scanning Registered Baggage (RB) /Hand Baggage (HB), including provision of required number of ETDs, DFMDs & HHMDs, as per BCAS norms.
- Provision of adequate no. of VHF FM Sets (Walkie-Talkie, Base Stations & Mobile Stations).
- Provision of Telephone Exchange/ digital EPABXI IP EPABX system for Terminal Building including telephone intercom instruments, wiring etc.

FIRE SAFETY

Currently Dehradun Airport has existing fire facility of CAT V, VCAT-VII & 03-CFT.

DEMOLITION WORK

The demolition of old terminal building is proposed. Approximately 1338.9 m^3 of debris will be generated which will be reused during the construction of the new building.

3.5 CONSTRUCTION MATERIAL

The major materials required for construction of the proposed project will be steel, aluminum, glass, cement, bricks, metal, flooring tiles/stones, wood. Sanitary and hardware items, electrical fittings, water etc. All the items to be used in me proposed project will be as per the National Building Code specification. 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. The contractors work will monitor approved and certified by the Engineering in-charge. The approximate quantities of raw material required for the expansion is tabulated in **Table 3.2**.

Table 3-2: Construction Materials

Sl. No.	Items	Quantity
1	Cement	2,08,830 bags
2	Sand	26,313 Cum
3	Aggregates	19,734 Cum
4	Bricks	7,57,009 numbers
5	Reinforcement Steel	18,872 tonnes
6	Paint	93,974 litres

3.6 RESOURCE OPTIMIZATION

The resource optimization is always pre-requisite for any development project and saving the precious. This requires a new approach to viewing, evaluating, understanding, and communicating, which ultimately requires new approaches to science, engineering, and economics. In quest towards resource optimization in proposed project the tradition practices are substituted by modern practices involving water reduction, rain water harvesting, energy conservation etc.

3.7 WATER REQUIREMENT

The total water requirement during construction phase of the project is 13.5 KLD. During Operation Phase total water requirement is 369 KLD which includes 212 KLD water for domestic use and 157 KLD water for Flushing purpose. The total water requirement for the airport during operation phase is given below in Table 3.3

Table 3-3: Water demand during Operation Phase

Sr. No.	Category	No. of Persons	Domestic (ltr/day/person)	Total Litre / day	% of STP	Flushing (lit/day/person)	Total lit/day	% of STP	Total flow to STP (ltr/day)
1.	Passengers	4110	40	1,64,400	85	30	123,300	95	2,56,875
2.	Visitors	820	7	5,740	85	8	6,560	95	11,111
3.	Drivers	820	7	5,740	85	8	6,560	95	11,111
4.	Support staff	820	20	16,400	85	25	20,500	95	33,415
5.	Kitchen	-	-	10,000	85	-	-	-	8,500
6.	Fire Water body Make-up	-	-	10,000	-	-	-	-	-
	Total			**2,12,280**			**156,920**		**3,21,012**

3.8 POWER REQUIREMENT & SUPPLY

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 is 3,718 kW. Three DG sets of 1250 capacity each will serve as back-up during power failure. The electrical supply system includes HT panel, DG set, Transformer and other LT panels. The essential electrical services shall be backed with DG sets. All the electrical HT & LT cables shall be laid as per the stipulations.

3.9 SOLID WASTE MANAGEMENT

During construction phase: Solid waste during construction phase will be collected and disposed as per established laws and procedures.

During operation phase: Twin bin waste collection system– green bins for bio-degradable wastes and blue bins for non-biodegradable wastes shall be provided. Waste collection shall be done and temporarily stored at identified locations before disposing as per established laws and procedures as per Municipality waste disposal site.

Hazardous waste shall be treated in accordance with Hazardous Waste Management Rules 2016, Batteries waste shall be handled in accordance with Batteries Management Rules, 2010 and E waste as per E-waste Guidelines, 2016.

CHAPTER-4
SITE ANALYSIS

4. SITE ANALYSIS

4.1 INTRODUCTION

Site analysis is a pre-design research activity which focuses on existing and potential conditions on and around the building site. It is an inventory of the site factors and forces, and how they coexist and interact. The purpose of the analysis is to provide thorough information about the site assets and liabilities prior to starting the design process. The typical site analysis includes the site location and size, neighborhood context, zoning, legal aspects, geology, physiographic (natural and man-made features), hydrology, soils, vegetation, wildlife, climate, culture, pedestrian and vehicular circulation, access, utilities, historic factors, density, sensory stimuli, and any other factor deemed appropriate for the particular site. This chapter discusses the site Profile, landform, and existing land use and drainage pattern. The land details, climate and Metrological parameters are also described in various sections of this chapter.

4.2 LOCATION & CONNECTIVITY

The site selected for new terminal building, multilevel car parking facility & allied facilities is proposed at existing land of Dehradun Airport which is located adjacent with Dehradun-Rishikesh road. The nearest railway station is at Doiwala, 7 km away from the proposed site.

4.3 LAND OWNERSHIP

Total 326 acres (131.928 ha) land belongs to the existing Dehradun Airport. No additional land needs to be purchased for the proposed expansion.

4.4 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

4.5 EXISTING LAND USE PATTERN

The proposed expansion is planned in the existing airport site. The surrounding features around the airport site include agricultural land, forests, built-up and water bodies. The surrounding features around the airport site are shown in table 4.1.

Table 4-1: Details of Site Location

S.No	Surrounding Feature	Distance (In km)	Direction
Forests			
1.	Rajaji National Park	9	SW
2.	Dwara RF	11	NW
3.	Malkot RF	7	NNE

4.	Paled RF	7.5	NNW
5.	Ladwakot RF	10.5	NE
6.	Thano RF	0.75	N
7.	Bhupal Pani RF	8.5	NW
8.	Tirsal RF	9	SE
9.	Barkot RF	1.5	S
10.	Kansrao RF	5.5	SW
11.	Ramgarh RF	8.8	W
12.	Lacchiwala RF	3.3	NW
13.	Saura RF	5.5	NNW
14.	Kachar RF	9.5	NNW
15.	Asaror RF	13	
Water Bodies			
1.	Song River	3	W
2.	Jhakan River	0.39	E
3.	Chandrabhaga River	7	SE
4.	Ganga River	13.7	SE
5.	Suswa Nadi	7	WSW
6.	Bidhalna River	4.5	NE
7.	Bangali Khala	6	SE
8.	Teen Pani River	10.7	SSE
9.	Gola Pani Nadi	11.2	SSE

4.6 EXISTING INFRASTRUCTURE

The said project is modernization of Dehradun Airport in terms of construction of new terminal building, multilevel car parking & commercial facilities.

4.6.1 Terminal Building:

Dehradun Airport was constructed in year 1974. The Airport Authority of India suspended flight operations at the airport from 1 March 2007 in order to execute its airport modernization plan. The airport resumed commercial operations on 30 March 2008 after a runway extension to accommodate larger aircraft. A new terminal building was inaugurated in February 2009. At present Terminal Building have capacity for 250 passenger (125 departure + 125 arrival) and holds an area of 4,200 Sq. m. with Checking Counter facilities, Immigration Counters, Departure Counters, Arrival Counters and Custom Counters.

4.6.2 Runway Orientation

The orientation of the runway for Dehradun airport is 08-26, West-East direction. The data on intensity and prevailing wind directions for Dehradun, noted from climatological tables by Meteorological Department of India for nearest observatory at Dehradun have been analyzed.

4.6.3 Runway Length

There is one runway with the following dimensions:

Table 4-2: Dimension of various parameters of Existing Airport

Name	Dimension
Length	2140 m
Width	45 m
Runway End Safety Area(RESA)	90m x 90m for both runways
Apron I	253.5m x 115m
Apron II (State Hanger)	45m x 60m

Source: Airports Authority of India, Dehradun

4.6.4 Apron

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.

4.6.5 Parking Space

In Dehradun Airport presently Terminal Building has a capacity of 187 vehicles i.e. 150 nos. cars, 7 nos. Buses and 30 nos. Scooters.

4.6.6 Firefighting facilities

CAT –V, VCAT-VII, 03-CFT level firefighting facilities are presently available at Dehradun Airport.

4.7 SOIL CLASSIFICATION

Geologically Dehradun valley is a synclinal trough within the Shiwaliks formation. The young formations in the region are the river terraces formed by Dun gravels. The limits of syncline consist of middle and upper Shiwaliks rocks followed by the northerly dipping pre-tertiary formations of lesser Himalaya in north. On all these older formations are deposited the Pleistocene and recent sediments, the Dun gravels. Outer fringe of lesser Himalaya of Garhwal is rich in its mineral deposits especially for rock phosphate and lime. Mussoorie hills and Dehradun valley have huge deposits of phosphorite. This mineralization is confined to the Krol and Tal formation and found in association with chert and black shales.

The soil of Dehradun district is deep, well drained, coarse, and moderate to highly loamy.

4.8 CLIMATIC DATA (IMD ROORKEE)

The data obtained from the Meteorological Department of India for Roorkee observatory has been utilized.

Summary of 30 years average data is presented in the **Table 4.2** below:

Table 4-3: Climatological Data as per Roorkee IMD (1971-2000)

Sl. No.	Parameters	Description of the Season				
1	Rainfall in mm	Total Annual average Rainfall is **1022.9 mm**				
			Months	**Total rainfall (in mm)**		
		Winter (Dec to Feb)	December	18.9		
			January	28.5		
			February	41.2		
			Total	**88.6**		
		Summer (Mar to May)	March	36		
			April	10.4		
			May	29.7		
			Total	**76.1**		
		Monsoon (June to Sept)	June	130.9		
			July	264.7		
			August	310.4		
			September	256.5		
			Total	**962.5**		
		Post-Monsoon (Oct to Dec)	October	129.9		
			November	17.3		
			December	5		
			Total	**152.2**		
2	Temperature (Mean Daily Temp. in ^{0}C)		**Months**	**Max**	**Min**	**Avg**
		Winter (Dec to Feb)	Dec	22.5	6.70	14.6
			Jan	20.8	6.00	13.4
			Feb	23.2	8.00	15.6
			Average	**22.2**	**6.90**	**14.53**
		Summer (Mar to May)	Mar	28.50	12.3	20.40
			Apr	35.30	17.9	26.60
			May	38.10	21.8	29.95
			Average	**33.97**	**17.3**	**25.65**
		Monsoon (June to Sept)	June	37.1	24.1	30.6
			Jul	33.6	24.8	29.2
			Aug	32.6	24.5	28.6
			Sep	32.9	22.6	27.8
			Average	**34.05**	**24**	**29.0**
		Post-Monsoon (Oct to Dec)	Oct	31.8	16.7	24.25
			Nov	27.6	10.7	19.15
			Dec	22.5	6.7	14.6

			Average	**27.3**	**11.3**	**19.3**
3	Relative Humidity in per cent	Winter (Dec to Feb)	**Month**	**08.30 hrs**	**17:30 hrs**	
			Dec	83	54.0	
			Jan	84	53.0	
			Feb	80	47.0	
			Average	**82.33**	**51.3**	
		Summer (Mar to May)	Mar	68	39.0	
			Apr	50	30.0	
			May	47	32.0	
			Average	**55**	**33.7**	
		Monsoon (June to Sept)	Jun	63	48	
			July	80	67	
			Aug	85	73	
			Sep	82	64	
			Average	**77.5**	**63**	
		Post-Monsoon (Oct to Dec)	Oct	74.0	52.0	
			Nov	78.0	51.0	
			December	83.0	54.0	
			Average	**78.3**	**52.3**	
4	Wind-speed	Winter (Dec to Feb)	**Month**	**Speed (kmph)**		
			Dec	2.8		
			Jan	3.2		
			Feb	4.1		
			Average	**3.4**		
		Summer (Mar to May)	Mar	5.10		
			Apr	5.60		
			May	6.50		
			Average	**5.73**		
		Monso17on (June to Sept)	Jun	5.5		
			July	5.1		
			Aug	4.1		
			Sep	3.6		
			Average	**4.6**		
		Post-Monsoon (Oct to Dec)	Oct	2.70		
			Nov	2.20		
			Dec	2.80		
			Average	**2.57**		

Source: Climatological Table 1971 – 2000, Indian Meteorological Department, Govt. of India, New Delhi

The wind rose for the entire year is given below:

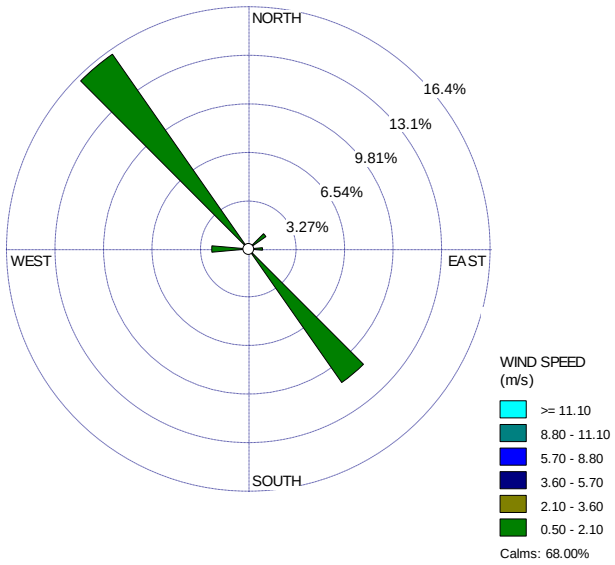

Figure 4.1 : Annual Wind Pattern

The climate of the district is normally good and healthy. January, February and March months are usually pleasant with cold winds. May is hottest months of the year while December & January are the coldest months.

4.9 SOCIAL INFRASTRUCTURE

Social Infrastructure available

The all types of social infrastructure and facilities that are available near the Dehradun Airport.

- Hospital with ambulance;
- Bank & Bank ATM;
- Post office;
- Bus station;
- Fire station;
- Secondary school;
- Police station;
- Community halls;
- Primary health care centers.

CHAPTER-5
PLANNING BRIEF

5. PLANNING BRIEF

5.1 PLANNING CONCEPT

The Concept Plan for the proposed expansion defines the scope of the proposal and the development of facilities in accordance with the requirements of traffic. Earlier discussion on Traffic Analysis and Project Sizing are used as the basis for planning of the various components.

It is the overall objective of this effort to produce a balanced airside and landside complex to serve forecast aviation demands. The primary goal of the Master Plan is to define a development concept which allows for the airport to be marketed, developed, and safely operated for the betterment of the region and its users. With this in mind, the following development objectives have been defined for this planning effort:

- Maintain an attractive, efficient, and safe aviation facility in accordance with government, state, and local regulations.
- Develop facilities to efficiently serve general aviation users and encourage increased use of the airport, including business and corporate activity.
- Provide sufficient airside and landside capacity, efficiency, and safety through additional facility improvements which will meet the long term planning horizon level of demand for the airport and region.
- Identify any future land acquisition needs.
- Ensure that any recommended future development is environmentally compatible.
- Enhance local economic development through maximizing the use of available property.

5.2 POPULATION PROJECTION

The traffic projection of Dehradun Airport is given in **Table 5.1**:

Table 5-1: Traffic Projection of Dehradun Airport

Year	A/C movements/year (in Nos.)	Passengers/year
2016-17 (Base Year)	9485	882564
Growth Rate	**6.00%**	**8.00%**
2017-18	10054	953169
2018-19	10657	1029423
Growth Rate	**8.00%**	**10.00%**
2019-20	11510	1132365

Year	A/C movements/year (in Nos.)	Passengers/year
2020-21	12431	1245601
2021-22	13425	1370162
2022-23	14499	1507178
2023-24	15659	1657895
2024-25	16912	1823685
2025-26	18265	2006054
2026-27	19726	2206659
2027-28	21304	2427325
Growth Rate	**10.00%**	**12.00%**
2028-29	23434	2718604
2029-30	25778	3044836
2030-31	28356	3410217
2031-32	31191	3819443
2032-33	34310	4277776
2033-34	37741	4791109
2034-35	41516	5366042
2035-36	45667	6009967
2036-37	50234	6731163
2037-38	55257	7538902

Source: Airports Authority of India

5.3 LAND-USE PLANNING

The land-use planning of the airport is given in **Table 5.2**.

Table 5-2: Land-use Planning

Airport Area	326 acres	132 ha
Proposed Terminal Building	4.44 acres	1.8 ha
Proposed Multi-level Car parking	1.13 acres	0.46 ha
Built-up area of proposed Terminal Building	30200 m^2	
Built-up area of proposed Multi-level Car parking	18320 m^2	

5.4 ASSESSMENT OF INFRASTRUCTURE DEMAND

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. As per traffic projections done, the passenger traffic will increase to 13, 70,162 by 2021-22.

The existing building capacity is near saturated; therefore, it is proposed to build a new passenger terminal building to cater to the passengers' convenience considering future growth of Dehradun Airport.

5.5 AMENITIES/FACILITIES

The amenities and facilities inside the airport includes parking facilities, small retail outlets etc.

CHAPTER-6
PROPOSED INFRASTRUCTURE

6. PROPOSED INFRASTRUCTURE

6.1 INDUSTRIAL AREA

This proposal is for expansion of existing airport and is planned within the existing area of 326 acres. The expansion involves Construction of a new centrally air-conditioned Modular Integrated Terminal Building in an area of 17,961 m^2 and will involve a built-up area of 30,200 m^2.

The Departure area, Arrival area, Security hold area and Concourse area are to be provided with adequate nos. of toilets for gents, ladies and differently-abled persons and drinking water. Suitable number of ramps will be provided for entry and exit of differently-abled persons in departure and arrival area. Provision of battery operated buggies for senior citizens/differently-abled persons as per requirement.

Construction of multilevel car park will be done for at least 500 cars and surface parking for VIP cars & 10 buses, Separate car/ scooter park area for AAI and airlines staff at appropriate location will be provided.

The demolition of old terminal building is proposed. Approximately 1338.9 m^3 of debris will be generated which will be reused during the construction of the new building.

6.2 RESIDENTIAL AREA

No residential area is proposed in the expansion phase.

6.3 GREENBELT

It has been decided that an area covering 40% of the site will be developed into greenbelt.

6.4 SOCIAL INFRASTRUCTURE

Need for social infrastructures will be identified and included as part of CSR programme.

6.5 CONNECTIVITY

The site project site is located adjacent with Dehradun-Rishikesh road. The nearest railway station is at Doiwala, 7 km away from the proposed site.

6.6 DRINKING WATER MANAGEMENT

The total water requirement for domestic purpose is 212 KLD. The water will be sourced from ground water.

6.7 SEWERAGE SYSTEM

The wastewater from the airport will be treated in a duly designed sewage treatment plant. The STP will be designed considering the maximum generation of wastewater.

6.8 SOLID WASTE MANAGEMENT

Twin bin waste collection system– green bins for bio-degradable wastes and blue bins for non-biodegradable wastes shall be provided. Solid waste generated from the proposed airport mainly comprises of food waste and garbage waste. Further, small quantities of sludge from STP, medical waste and other waste will be generated. Collection and handling of domestic solid waste would be done in line with the provisions of the Indian standards.

Hazardous and e-waste waste shall be disposed by authorized vendor of MoEF&CC.

6.9 POWER REQUIREMENT, SUPPLY & SOURCE

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 is 3,718 kW. Three DG sets of 1250 capacity each will serve as back-up during power failure. The electrical supply system includes HT panel, DG set, Transformer and other LT panels. The essential electrical services shall be backed with DG sets. All the electrical HT & LT cables shall be laid as per the stipulations

CHAPTER-7
REHABILITATION & RESETTLEMENT (R&R PLAN)

7. PROJECT SCHEDULE & COST ESTIMATES

7.1 INTRODUCTION

The proposed completion schedule for the project is 18 months. The estimated cost of the project is 303.34 crores. The budgetary cost estimates for the project have been prepared as per following details:

A brief breakup of the capital expenditure (excluding any land cost) is mentioned below:

Table 7-1: Cost Estimation for the Proposed Development

S. No.	Description	Amount (In Crores)
1	Civil Work	172.37
2	Mechanical, Electrical & Plumbing Work	51.66
3	Specialized Equipment's	48.59
4	External Infrastructures	30.72
	Grand Total	**303.34 Crores**

Source: Airports Authority of India

CHAPTER-8
PROJECT SCHEDULE & COST ESTIMATES

8. REHABILITATION & RESETTLEMENT PLAN

The proposed new terminal building will be constructed within already available land in existing Dehradun Airport with land area of 326 acres (131.928 ha) belonging to Airports Authority of India, Dehradun. No rehabilitation is proposed because the land is already available with Dehradun Airport.

CHAPTER-9
ANALYSIS OF PROPOSAL

9. FINAL RECOMMENDATIONS

Dehradun Airport is an operational airport and need to be upgraded State Govt. and AAI wants to modernization/ expansion and upgrade of Dehradun Airport to cater the need of the visitors coming to Dehradun & surrounding areas. The land for the project will be provided by State Govt. at free of cost and without encumbrances.

As per current traffic data, the domestic passengers handled are **471,542** for year 2015-16 and **882,564** for year 2016-17. The above building capacity are saturated, therefore it is proposed to build a new terminal building to cater to the passenger's convenience in future growth of Dehradun airport.

Airports Authority of India committed to inclusive growth and sustainable development in not only the communities it operates in, but also in contributing towards nation building. The focus of the activities are mainly on three major dimensions of human development which include expansion of sustainable livelihood opportunities, improving the status of health and education and broadening the range of choices by creating rural infrastructure. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future, together.

The easy and speedy access of the location also attracts the investment from high profile players of the market. The probability of the investment by the builders and hoteliers is also likely due to the proposed development of the airport. Hence, the project would act as a boon for development of the region and direct and indirect benefits will be drawn from the projects. Following evaluation of the benefits are listed below:

- Employment potential -skilled; semi-skilled and unskilled labor both during construction and operational phases of the project with specific attention to employment potential of local population as well as necessity for imparting any specialized skills to them to be eligible for such employment in the project on a long term basis i.e., during operational and maintenance stages of the project.
- Other tangible benefits like improved standards of living, health, education etc.
- Improvements in the physical infrastructure by way of addition of project infrastructure, ancillary industries that may come up on account of the project.

The general evaluation of the site indicates that the following:

As already this is an operational airport therefore an adequate access exists to sources of bulk services including water, power and telecommunications.

In summary, the conditions appear to be feasible for modernization/expansion and up gradation of Dehradun Airport for handling increasing traffic.