

OLS SURVEY REPORT

PROPOSED GREENFIELD INTERNATIONAL AIRPORT AT JEWAR (U.P)



MAY 2018

CONTENT

1. Executive Summary	4
2. Introduction	5
3. List of survey equipment deployed	9
4. DGPS controls point/ DGPS &TS observation	10
5. Runway end co-ordinates and Aerodrome Reference	10
6. Obstacles Details	11
7. Topographic Survey	12
8. List of nearby airports and Radius Navigation Aids	13

TABLES

Table 1. Boundary Co-ordinates	5
Table 2. Geographic location of facilities	10

FIGURES

Figure A. Jewar airport site& Geographical spread	6
Figure B. Location of facilities	11

ANNEXURE

Annexure 1. Jewar Airport Location	
Annexure 2. Location of Runways and ARP	
Annexure 3. Physical Features of Airport Area	
Annexure 4. Objects in Approach of Runway 10L and 10R	
Annexure 5. Objects in Approach of Runway 28L and 28R	
Annexure 6 . Objects of vertical significance (AutoCAD)	
Annexure 7. Details of objects around the airport.	
Annexure 8. Contour Map of the site (AutoCAD)	
Annexure 9 . Spots Elevation	

Jewar International Airport

1. EXECUTIVE SUMMARY

The airspace around any aerodrome is to be maintained free from obstacles so as to permit the intended aeroplane operations at the aerodromes to be conducted safely and to prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes. To this purpose, ICAO has laid norms for establishing a series of obstacle limitation surfaces that define the limits to which objects may project into the airspace around an airport. Those norms and standards are normally used to determine obstructions to air navigation that may affect the safe and efficient use of navigable airspace and the operation of planned or existing air navigation and communication facilities.

In planning for development of any airport it is of utmost importance that the surrounding terrain and structures are examined to assess the obstruction, if any, existing in the navigable airspace. It is therefore essential that for a Greenfield airport like Jewar, a detailed survey is undertaken to determine such existing manmade or natural objects in and around the proposed airport site, which protrude the defined limiting surfaces. A survey of Jewar site was undertaken earlier by M/s RITES Ltd. But, due changes in aerodrome reference point location as well as the runway locations it was considered essential to undertake a review of the earlier report.

In accordance with the norms and standards of ICAO as contained in chapter 4 of Annexure 14 Vol-1, and Ministry of Civil Aviation GSR 751(E) dated 30th September'2015, the surveyed data of structures has been evaluated in respect of the planned runways/ aerodrome reference point locations.

The study reveals that there are three structures which are protruding above the established obstacle limitation surfaces, details of which have been provided in the report.

A topographic survey of the site was also undertaken. The contour map of the airport site terrain is also included in the report.

Jewar International Airport

2. INTRODUCTION

The proposed site for establishing the Jewar international Airport (JIA) is located near Greater Noida, in Gautam Buddha Nagar, a district of Uttar Pradesh. The site is accessible through Yamuna Expressway connecting Noida to Agra, the world famous city of tourist attraction. Nearest commercial airport to the site is IGI International Airport located at an aerial distance of 63 Kilometres North West of the site.

The Airport is planned to cater to domestic as well as International flight operations with Aerodrome Reference Code 4F, Precision Approach CAT III runways as per norms and recommendations contained in Annexure-14 of ICAO and CAR's of DGCA India.

The proposed airport site is approximately 6.1 km long in east-west direction and 2.2 km in north south direction. A parallel set of runways laid east-west, is proposed in Stage-1 of the development.

A map showing location and geographical stretch of land, over Survey of India Open Series Map No. H43X12, is placed at Figure A. The Map in .pdf and .jpg is also provided at Annex 1 to the report. The geographical Coordinates of the airport boundary are as shown in the table 1, placed below.

List of Boundary Co-Ordinates				
Sr.No.	Latitude	Longitude	Northing	Easting
1	28°11'06.79"	77°34'49.73"	3120416.03	753331.98
2	28°11'06.71"	77°34'30.01"	3120402.12	752794.06
3	28°10'31.55"	77°34'37.41"	753018.95	3119323.87
4	28°10'23.92"	77°34'39.03"	753068.14	3119089.89
5	28°10'05.60"	77°34'42.84"	753184.08	3118528.04
6	28°09'53.23"	77°35'36.01"	754642.96	3118178.11
7	28°09'59.59"	77°35'37.92"	754690.88	3118375.05
8	28°09'22.69"	77°38'16.11"	759031.89	3117331.99
9	28°09'52.22"	77°38'27.69"	759328.1	3118248.09
10	28°09'58.23"	77°38'05.33"	758713.96	3118419.86
11	28°10'13.37"	77°38'10.21"	758836.98	3118888.91
12	28°10'09.86"	77°38'20.39"	759117.09	3118786.88
13	28°10'30.76"	77°38'29.81"	759360.1	3119435.99
14	28°10'35.16"	77°38'17.31"	759016.11	3119564.04

Jewar International Airport

15	28°10'41.02"	77°37'54.76"	758396.95	3119731.1
16	28°10'56.90"	77°36'53.53"	756715.89	3120183.89
17	28°11'07.61"	77°35'54.49"	755098.12	3120479.01

Table:1 Boundary coordinates

The magnetic variation using WMM (World Magnetic Model) is reported as 1.09°E and change by 0.03° E.

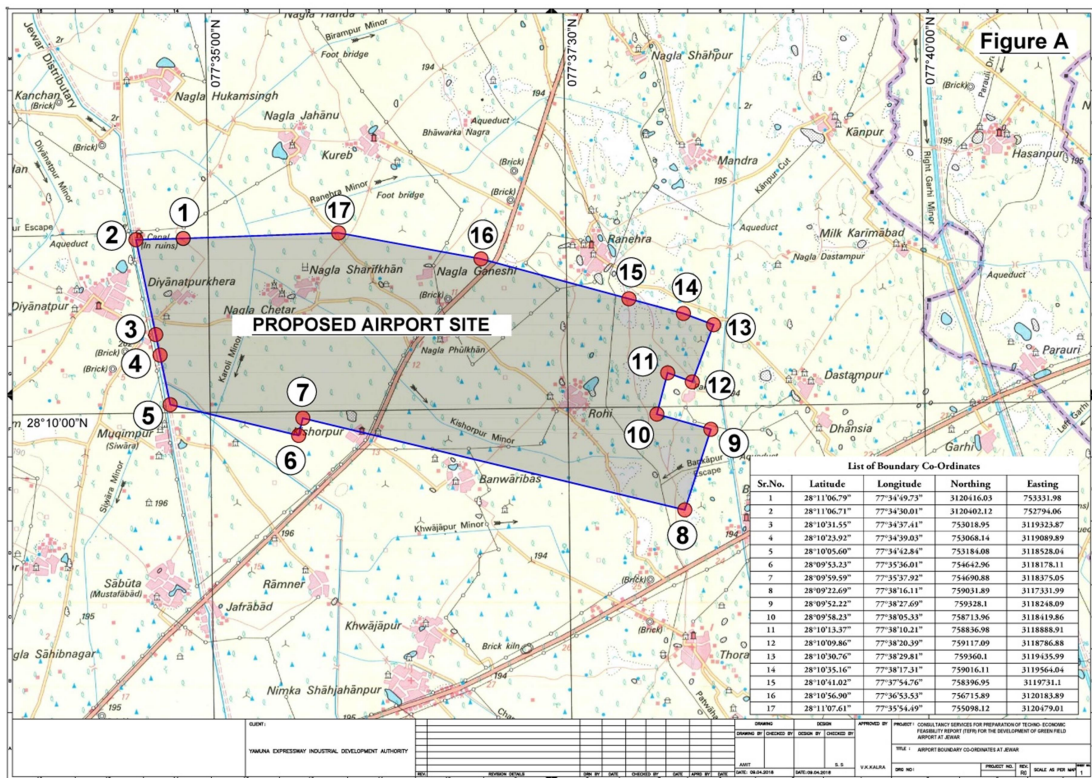


Figure A: Jewar Airport Site and Geographic spread

OLS Survey was conducted to identify the significant objects in and around the airport area and area within 20 Kms of radius centred on Aerodrome Reference Point, by using modern and latest survey equipment. All the objects of vertical significance have been considered and evaluated as per Annexure-14, Vol. -1 of ICAO and the relevant GSR 751(E) dated 30th September 2015.

Initial survey was conducted by the RITES Ltd. a Government of India Enterprise. The scope of obstruction survey included:

Jewar International Airport

- i. Identification of all manmade as well as natural structures / features (roads, buildings, electric/ telephone lines, towers/ chimneys, hills etc.) of height more than 30 m (with reference to the identified site's runway R.L.) falling in the inner horizontal surface within a radius of 4000m from the centre of the proposed airstrip and establishing their location and elevation on a plan.
- ii. Identification of all manmade as well as natural structures /features (roads, buildings, electric/telephone lines, towers /chimneys, hills etc.) falling in the approach areas, on both side of the proposed site, above 3 m height beyond boundary (or at level above height of runway basic strip end) up to 15000m with 15% divergence from 300 m wide strip and 2% and 2,5% slope, as defined in Table 4.1 of Annexure 14 Vol.-1 including such other features and establishing their location and elevation on a plan.
- iii. Identification of the all features on both sides of the runway basic strip, especially structures intersecting Transitional Surface rising with a slope of 14.3% and achieving a height of 45 at a distance of 315 m from edge of basic strip.

Further, it was specified that in Approach Surface Area

- i. Approach surface areas in both the direction of the runway be surveyed. The survey included identification of all man-made as well as natural structures/ features (Road, building, high ground, electric/ telephone lines, tower/ chimney, hills etc.) falling in the approach area on both sides of the proposed runway and establishing their location and elevation (Top & base) on a plan. The objects were shown along with their location and elevation (Top and Base) in the following manner.
 - a. **Distance 0 -500 m** - All objects.
 - b. **Distance 500-1000 m**- All objects with more than 10m height from ground level and all objects having top elevation more than runway elevation.

- c. **Distance 1000-3000 m-** All objects with more than 20 m height from ground level and all objects having top elevation more than runway elevation. Four or five prominent / highest trees in the group of trees in radius of 150 m may be shown (Instead of showing all trees). In case of building /houses four or five Prominent / highest building / houses in the radius of 150 m may be shown (instead of showing all buildings).
- d. **Distance 3000-6600 m-** All objects with more than 60 m height from ground level and all objects having top elevation more than 45mt of runway elevation to be shown. Four or five prominent / highest trees in the group of trees in radius of 150 m may be shown (Instead of showing all trees). In case of building / houses, four or five prominent / highest building / houses in the radius of 150 m may be shown (Instead of showing all building)
- e. **Distance 6600-15000 m-** All objects with more than 150 m height from ground level and all objects having top elevation more than 150mt of runway elevation to be shown. Four or five prominent / highest trees in the group of trees in radius of 150 m may be shown (Instead of showing all trees). In case of building/ houses, four or five prominent / highest building / houses in the radius of 150 m may be shown (Instead of showing all buildings).
- f. **Hill Features** - Hill features shown by marking peak of the hill and a few prominent contours.

The task entailed in the **Inner Horizontal Surface** comprised of: Identification of all man-made as well as natural structure/features (Roads, building, electric/ telephone lines, tower/chimneys, hill etc.) of height more than 45mt from ground level and all objects having top elevation more than 30mt above aerodrome elevation falling in the inner horizontal surface and establishing their location and elevation (Top and base) on a plan. Four or five prominent / highest trees in the group of trees in radius of 150mt may be shown (Instead of showing all trees). In case of building/houses, four or five prominent /highest building / houses

in the radius from the highest structure of 150 m may be shown (Instead of showing all building).

The survey undertaken in **Outer Horizontal Surface** and **Conical Surface Area** included:

Identification of all man-made as well as natural structure/features (Roads, building, electric/ telephone lines, tower/chimneys, hill etc.) of height more than 75mt from ground level and all objects having top elevation more than 75mt above aerodrome elevation falling in the Outer horizontal surface area and establishing their location and elevation (Top and base) on a plan. Four or five prominent / highest trees in the group of trees in radius of 150 m may be shown (Instead of showing all trees), In case of building/houses, four or five prominent /highest building / houses in the radius from the highest structure of 150 m may be shown (Instead of showing all building). Similarly, all areas beyond OHS up to 20 Kms should also be surveyed and all objects having top elevation more than aerodrome elevation +75m AMSL falling in the Outer Horizontal Surface and establishing their location and elevation (Top and base) on a plan.

Due change in location of aerodrome reference point, runway locations and alignment, the site was revisited and another survey undertaken to update and evaluate the data afresh, to understand and identify the obstruction existing in 20 Km of area around the proposed airport site.

3. List of Survey Equipment Deployed

The team used the following Survey Equipment for the OLS Survey;

1. Total station: Sokkia Model CX-101 Reflector less with 1" accuracy.
2. Differential Global Positioning System (DGPS): - Sokkia Model GSX2 Dual frequency GNSS System, Base Receiver & Rover.
3. Auto Level: GeoMax Model ZAL-124, (2mm Accuracy)
4. Handheld GPS-Garmin Oregon 650 and Magellan Triton-500 (GPS)

5. Laser Distance Meter (Trupulse 360R)

The survey was undertaken by deploying skilled and highly experienced surveyors.

4. DGPS Control Points / DGPS & TS Observation

The Dual frequency DGPS-Sokkia Model GSX2 equipment was used for Survey observations & measurement. The fixing of DGPS control points was started by setting up a base point named GPS1. Two Rover units were set up at various other locations.

The DGPS observation was carried out for the duration of one hour at each point. The DGPS data was downloaded in the site computer and was processed through GNSS solutions software. The WGS84 UTM co-ordinates were derived from GNSS solutions software, Data Processing Software for carrying out further works.

Subsequently, Traverse secondary control points were established by using Total Station, Sokkia Model CX-101 Reflector less with 1" accuracy.

5. Runway End Coordinates and Aerodrome Reference Points:

The table2 placed below shows the Runway End Coordinates and Aerodrome Reference Points adopted for establishing the various obstruction limitation surfaces and evaluation of existing structures to identify the structures protruding above the limitation surfaces and the extent of penetration. The Figure B placed below shows their actual location and also the surfaces.

Geographic Location of Runways and ARP				
	Runway	Latitude	Longitude	Elevation
1	Runway 10R	28° 10' 10.41"	077° 35' 16.26"	199M
2	Runway 10L	28° 11' 00.46"	077° 35' 32.74"	199M

Jewar International Airport

3	Runway 28L	28°09'43.00"	077° 37'45.15"	195M
4	Runway 28R	28°10' 34.69"	077° 37'52.67"	195M
5	ARP	28°10' 32.20"	077°36' 22.47"	199M

Table 2: Geographic Location of facilities

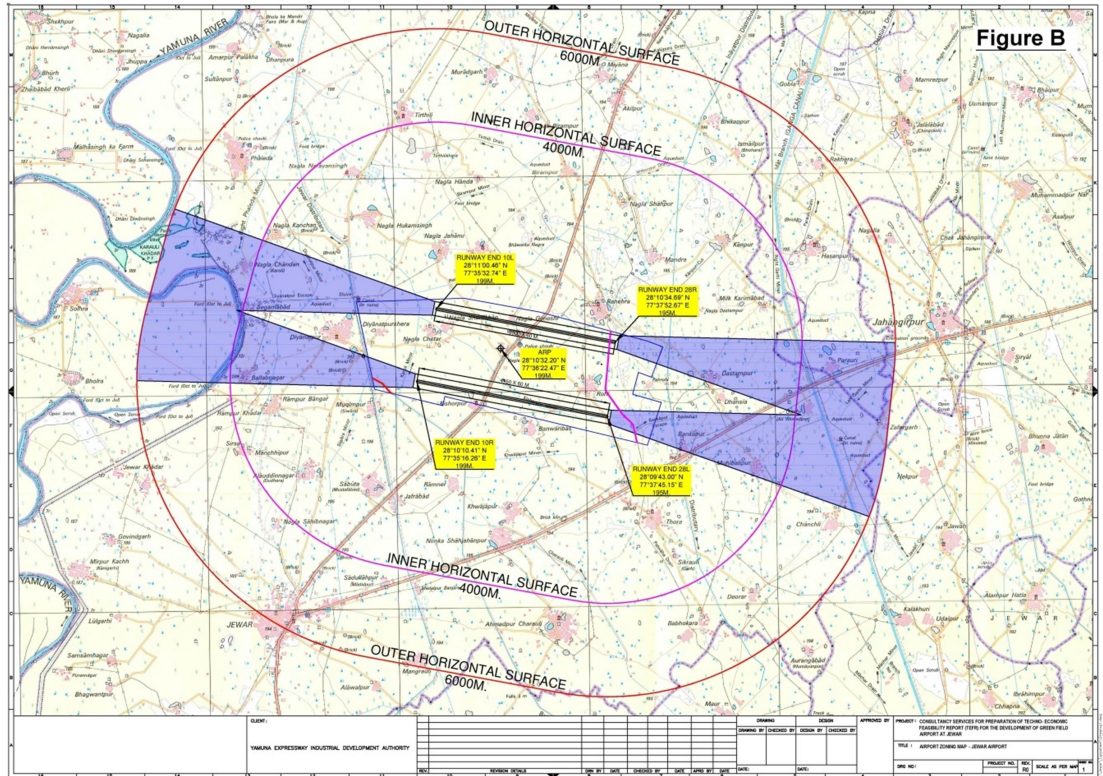


Figure B: Location of facilities

A larger view of the Map (Figure B) is placed at Annexure 2.

6. Obstacles Details.

The Jewar Airport is located on a flat area. The distances and bearing of all the objects lying within various limitation surfaces are detailed in the annexed plans.

A drawing showing physical features of the site is placed at Annexure 3.

Details of objects in the approach funnel of runway 10L and 10R are shown at Annexure 4.

Details of objects in the approach funnel of runway 28L and 28R are shown at Annexure 5.

AutoCad file of the map showing all the objects of vertical significance within 15000mt of the ARP is placed at Annexure 6 to the report.

A detailed list in the form of excel sheet is also enclosed at Annexure 7.

It is noted that no temples/ mosques or any other religious structure are existing on the planned runways or in the runway strip area.

It is also noted that the mobile traffic over the Yamuna expressway is also not penetrating the approach and take-off surface of Runway 10L and 10R.

Following two obstacles have been noticed penetrating the approach and take-off surface of Runway 10R.

1. A water tank marked as object 781 is protruding the approach surface of runway by 4.7mt.
2. A Brick Kiln Chimney, marked as object number 788 in the approach surface is protruding by 1.9mt.

In the mid of approach funnels of runway 28L and 28R a mobile tower is located protruding the surface by 7.3mt.

It is recommended to remove these objects.

7. Topographic Survey

Topographic survey of the airport area was simultaneously undertaken. A total station was deployed and spot levels were taken at 5mt intervals. Based on the auto logged x, y, and z data a contour map is evolved. The contours map with contours at 1m interval is drawn and placed at Annex 8 (Contour Map in AutoCAD) for detailed and exhaustive information.

A list of x, y, z of various spots within the airport area is also attached at Annexure 9.

Jewar International Airport

8. List of Nearby Airports and Radio Navigation Aids

AERODROME/FACILITY	GEOGRAPHIC LOCATION	Bearing	NM	Kms
Sikandarabad (VOR)	28°27'00.00"N 77°41'00.00"E	15	18.1	33.6
Nuh (NDB)	28°06'00.00"N 77°00'12.00"E	264	31.6	58.4
Delhi (Safdarjung Airport)	28°35'04.20"N 77°12'24.40"E	321	32.8	60.8
Danipur Airstrip (Aligarh)	27°51'38.50"N 78°08'47.87"E	121	34.2	63.3
Hindan Airfield	28°42'26.91"N 77°21'32.00"E	339	35.3	65.3
Delhi IGI Airport	28°34'07.42"N 77°06'43.69"E	314	35.5	65.8
Sakras VOR/DME	27°50'54.40"N 77°00'29.60"E	239	36.3	67.1
Aligarh VOR/DME	27°49'45.50"N 78°10'42.00"E	123	36.6	67.8
Sakras (VOR)	27°50'52.00"N 76°58'58.00"E	240	37.4	69.3
Meerut Airport	28°54'18.52"N 77°40'38.12"E	5	45.0	83.4
Chillarki VOR/DME	28°20'51.20"N 76°39'20.20"E	283	51.0	94.4
Sampla VOR/DME	28°49'11.10"N 76°49'09.60"E	314	57.0	105.7
Agra (U.P.)	27°10'00.00"N 77°58'00.00"E	162	62.6	116.0
Alwar (Rajasthan)	27°30'00.00"N 76°30'00.00"E	236	70.3	130.2
Bhilwara (Rajasthan)	28°04'37.56"N 76°12'18.00"E	266	73.8	136.6
Narnaul (Haryana)	28°05'00.00"N 76°12'00.00"E	267	74.0	137.1
Dadri (NDB)	28°36'00.00"N 76°16'00.00"E	291	75.0	138.9
Moradabad Aerodrome	28°49'00.77"N 78°55'43.76"E	61	80.6	149.4
Bhiwani (Haryana)	28°50'15.65"N 76°10'39.33"E	299	85.2	157.8
Dholpur (Rajasthan)	26°43'00.00"N 77°56'00.00"E	168	88.3	163.6
Karnal (Haryana)	29°42'50.75"N 77°02'15.00"E	343	97.9	181.3
Etawah(UP)	26°56'00.00"N 79°04'00.00"E	133	107.3	198.8