Delhi Mumbai Industrial Corridor Development Corporation Ltd. (DMICDC)

Development of Greenfield International Airport at Bhiwadi in Alwar District, Rajasthan

ANALYSIS OF ALTERNATIVE SITES

CONTENTS

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1. INTRODUCTION

Delhi Mumbai Industrial Corridor Development Corporation Ltd (DMICDC) desires to setup a new Greenfield Airport at Kotkasim near Bhiwadi in Alwar District, Rajasthan.

DMICDC identified three potential locations for the establishment of Airport on the basis of:

- Location and spatial analysis
- Operational analysis and
- Technical economic assessment of factors and financial viability

The three potential locations are as follows:

1. West of the NH 8, approximately 40 km North-West of Jaipur (near Kaladhera)
2. In between Neemrana and Bhiwadi (near Kotkasim)
3. West of the NH 8 (near Trivenidham)

The location near Trivenidham was initially selected for its promising setting close to the NH-8. The two other locations were selected from a conducted torpographic scan of the wider area along the NH8 in between New Delhi and Jaipur following the scope for the Rajasthan sub-region of DMIC. Only the location near Kaladhera and the location near Kotkasim are technically feasible.

Both these locations looked promising and offer comparable technical and spatial possibilities for development of an Airport. Furthermore, from site investigations it can be concluded that no discriminating environmental constraints like high risks of bird collision hazards exist in the proximity of both the sites and Noise hindrance to densely populated areas will be limited for both locations. However from a primarily socio-economic and financial investigation the site near Kotkasim is the preferred location as it is relatively close proximity to Delhi, offering more socio-economic and financial benefits than the Site near Kaladhera.

Accordingly, two sites were examined by Airports Authority of India (AAI) near Kotkasim for the Proposed Development of Greenfield Airport at Bhiwadi in Alwar District, Rajasthan. The details of these sites are given below:

2. SITE I (OLD SITE)

The site is rectangular in shape with two fingers on the outer edges on both eastern and western sides and encompasses an area of approximately 6km X 4km. The area worked out is 1752 ha (4330 acre). Toposheet and satellite image showing the Site I for the proposed Airport is shown in **Figure 1 and 2**. PFR prepared by AAI is enclosed at **Annexure 1**.

Physical Aspects: The proposed site is mainly of agricultural land. The land use of the proposed site includes agriculture and settlement. The selection of this site will change agriculture land for non-agriculture purposes. No major water body exists within the project area; however seasonal streams and ponds are identified during the reconnaissance. Sahibi River is passing at a distance of 1.6 km from the site, which is a seasonal river. 3 to 4 rows of HTL are cutting across the proposed airport site, which need to be shifted from the project site.

Pollutions Aspects: The proposed site is mainly open land with some settlements. The people generally use fossil fuel for cooking food and noise pollution is only during some special occasions. Hence, Air and noise pollution are very minimal in the project area at present.

Air quality influencing area for aircraft emission is considered to be 1000 ft below and typically around 3 km from departure or for arrivals[1]. Noise impacts due to mobile source of emission such as aircraft is considered up to 3 km from project site. Mithiawas village (232 HH with 1195 population) and scattered settlements falls within the 3 km funnel area from the runway end in eastern direction and some scattered settlements within the 3 km funnel area from the runway end in western direction. Noise Impact on these settlements will be moderate during the operation phase of the project. These impacts would be lessened with implementation of best management practices at airport.

Ecological Aspects: Although project involve mainly agricultural land, trees of common species are likely to be affected. Impacts on the environment due to biomass loss will be compensated by afforestation. No national park and wildlife sanctuary exists within project boundary and in 10 km radius of project area. Hence no appreciable impacts are anticipated.

Social Aspects: The proposed airport project requires approximately 1752 ha. The proposed project needs to displace 6 villages namely Majri, Meerpur, Bhamoowas, Bhonkar, Berawas Kalan, and Madhoopur. Total number of Households from these villages is 1357 with a population of 7290. Partially affected villages due to the project are 9 villages. Agriculture is the most predominant occupation of the area. Large number of agricultural families will lose their livelihoods. Displacement will not only affect their livelihood but also affect social infrastructures and social relationship.

Historical Resources: No historical and archaeological sites are located within project boundary.

Obstacles to Flying: A tall building exists on the northern side of the Site I, which will form obstruction in the approach for northern runway. In addition to this, close existence of Kajariya Factory near to the Airport project site may form the obstacle to the project operations.

3. SITE II (PROPOSED SITE)

The proposed site is rectangular in shape with two fingers on the outer edges on western direction and encompasses an area of 6.2km X 3.5km. The area worked out is approximately 2074 ha (5126 acre). Toposheet and satellite image showing the Site II for the proposed Airport is shown in **Figure 3 and 4**. PFR prepared by AAI is enclosed at **Annexure 2**.

Physical Aspects: The proposed site is mainly of agricultural land. The land uses of the proposed site include agriculture, settlement and barren land. The selection of this site will change agriculture land for non-agriculture purposes. No major water body exists within the project area; however seasonal streams and ponds are identified during the reconnaissance. Sahibi River is passing at a distance of 3.8 km from the site, which is a seasonal river. A row of HTL is cutting across the proposed airport site, which need to be shifted from the project site.

[1] EIA Guidance Manual for Airports, Ministry of Environment and Forest, Government of India

Pollutions Aspects: The proposed site is mainly open land with some settlements. The people generally use fossil fuel for cooking food and noise pollution is only during some special occasions. Hence, Air and noise pollution are very minimal in the project area at present.

Air quality influencing area for aircraft emission is considered to be 1000 ft below and typically around 3 km from departure or for arrivals. Noise impacts due to mobile source of emission such as aircraft is considered up to 3 km from project site. No village falls within the funnel area from the runway end up to 3 km except some scattered settlements. Managing the balance between the needs of the airport and the impacts of aircraft noise on the surrounding communities is a key element in the planning for growth of any Airport. However, it is anticipated that these impacts would be relatively minor due to the low population in the immediate vicinity of the airport. These impacts would be lessened with implementation of best management practices at airport.

Ecological Aspects: Although project involve mainly agricultural land, trees of common species are likely to be affected. Impacts on the environment due to biomass loss will be compensated by afforestation. No national park and wildlife sanctuary exists within project boundary and in 10 km radius of project area. Hence no appreciable impacts are anticipated.

Social Aspects: The proposed airport project requires approximately 2074 ha. The proposed project needs to displace 6 villages namely Bhojawas, Salahera, Berawas Khurd, Doomhera, Roneeja and Daulatpuri. Total number of Households from these villages is 539 with a population of 3198. Partially affected villages due to the project are 6 villages. Agriculture is the most predominant occupation of the area. Large number of agricultural families will lose their livelihoods. Displacement will not only affect their livelihood but also affect social infrastructures and social relationship.

The project proponent will make every effort to minimize the need of direct resettlement and land or asset acquisition and compensation in the project lands. If they are resettled and rehabilitated properly at new location and compensated as per the LARR 2013, the affected families will not only to restore and improve the standard of living but also bring qualitative change in their life.

Historical Resources: No historical and archaeological sites are located within project boundary.

Obstacles to Flying: No obstacles are observed in the funnel area of the runway.

4. CONCLUSION

Comparative statement of these two sites is given in Table 1 below. By considering the various aspects like R&R of affected villages, aviation aspects and noise impact in the funnel area of the two sites, Site II has the better potential for the Development of Green Field International Airport at Bhiwadi in Alwar District, Rajasthan.

TABLE 1: COMPARISON OF ALTERNATIVE SITES

S. No	Parameter	SITE I (Old Site)	SITE II (Proposed Site)
1.	Location		
	Latitude	28° 3' 24.10" N	28° 0' 23.50" N
	Longitude	76° 47' 8.65" E	76° 47' 2.88" E
	Elevation in m	267	269
2.	Area	1752 ha (4330 acre)	2074 Ha (5126 acre)
3.	Forest Area	Nil	Nil
4.	Aerial Distance from IGI	34 NM on a bearing of 206 deg from IGI	43 NM on a bearing of 206 deg from IGI
5.	Predominant wind direction	W-NW and S-SE	W-NW and S-SE
6.	Land use	Agriculture	Agriculture
7.	Surrounding Area of proposed Airport	Villages with Agricultural Land	Villages with Agricultural Land
8.	Major Obstacles	A tall building exists on the North Eastern side which will form obstruction in the approach for the Northern runway. Kajariya Factory near to the Airport project site may form the obstacle to the project operations	No major obstacles in the funnel area.
9.	Fully Affected Villages	6 Villages - Majri, Meerpur, Bhamoowas, Bhonkar, Berawas Kalan, and Madhoopur	6 Villages - Daulatpuri, Salahera, Berawas Khurd, Doomhera, Roneeja, and Bhojawas
	Affected House Holds	1357	539
	Affected Population	7290	3198
10.	Partially Affected Villages	9 Villages - Sherpur, Chawandi, Matawas, Jagmal Heri, Gelpur, Mithiyawas, Nasopur, Kutubpur, Kayampura Jokhawas	6 Villages - Ladpur, Gangapuri, Daika, Jalalpur, Binoliya and Isroda
11.	Impact on Water Bodies	Small streams and ponds are identified, which are seasonal	Small streams and ponds are identified, which are seasonal
12.	Historical and Archaeological sites	Nil	Nil
13.	National Parks and Wildlife Sanctuaries within 10 km radius	Nil	Nil
14.	Critically Polluted Area	Yes, The proposed project falling within 10 km distance from the Kushkhera Industrial Area of Bhiwadi Industrial Cluster.	Yes, The proposed project falling within 10 km distance from the Kushkhera Industrial Area of Bhiwadi Industrial Cluster.
15.	Noise Sensitive Villages in the funnel (Villages in the Funnel area up to a distance of 3 km from runway end)	Mithiawas village (232 HH with 1195 population) and scattered settlements falls within the 3 km funnel area from the runway end in eastern direction. Some scattered settlements within the 3 km funnel area from the runway end in western direction.	No village exists except some scattered settlements up to a distance of 3 km from Runway end within funnel area in both the directions
16.	HTL	3 to 4 rows of HTL cutting across the site	A row of HTL cutting across the site

FIGURE 1: SITE I (OLD SITE) ON TOPOSHEET

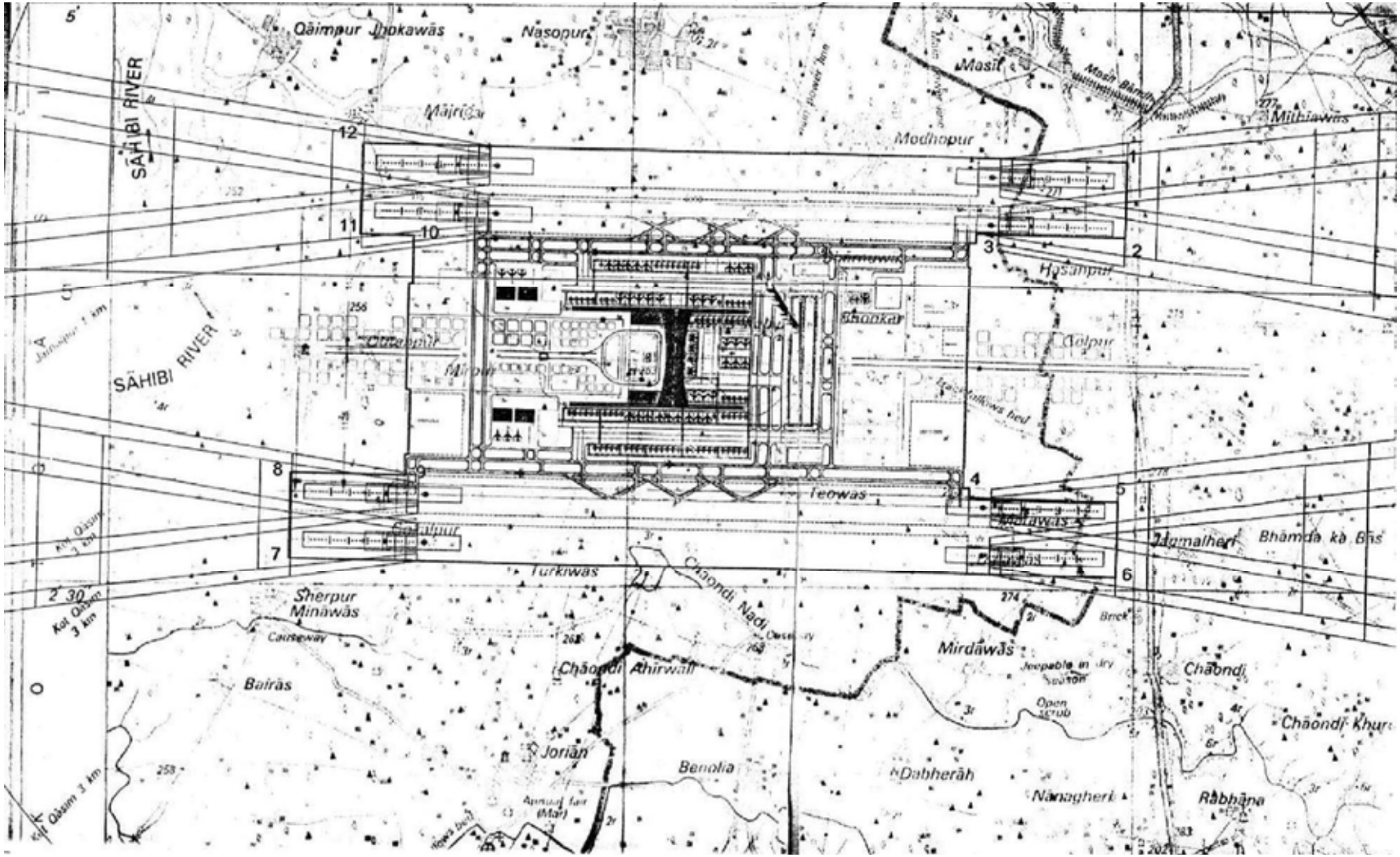


FIGURE 2: SATELLITE IMAGE OF SITE I (OLD SITE)

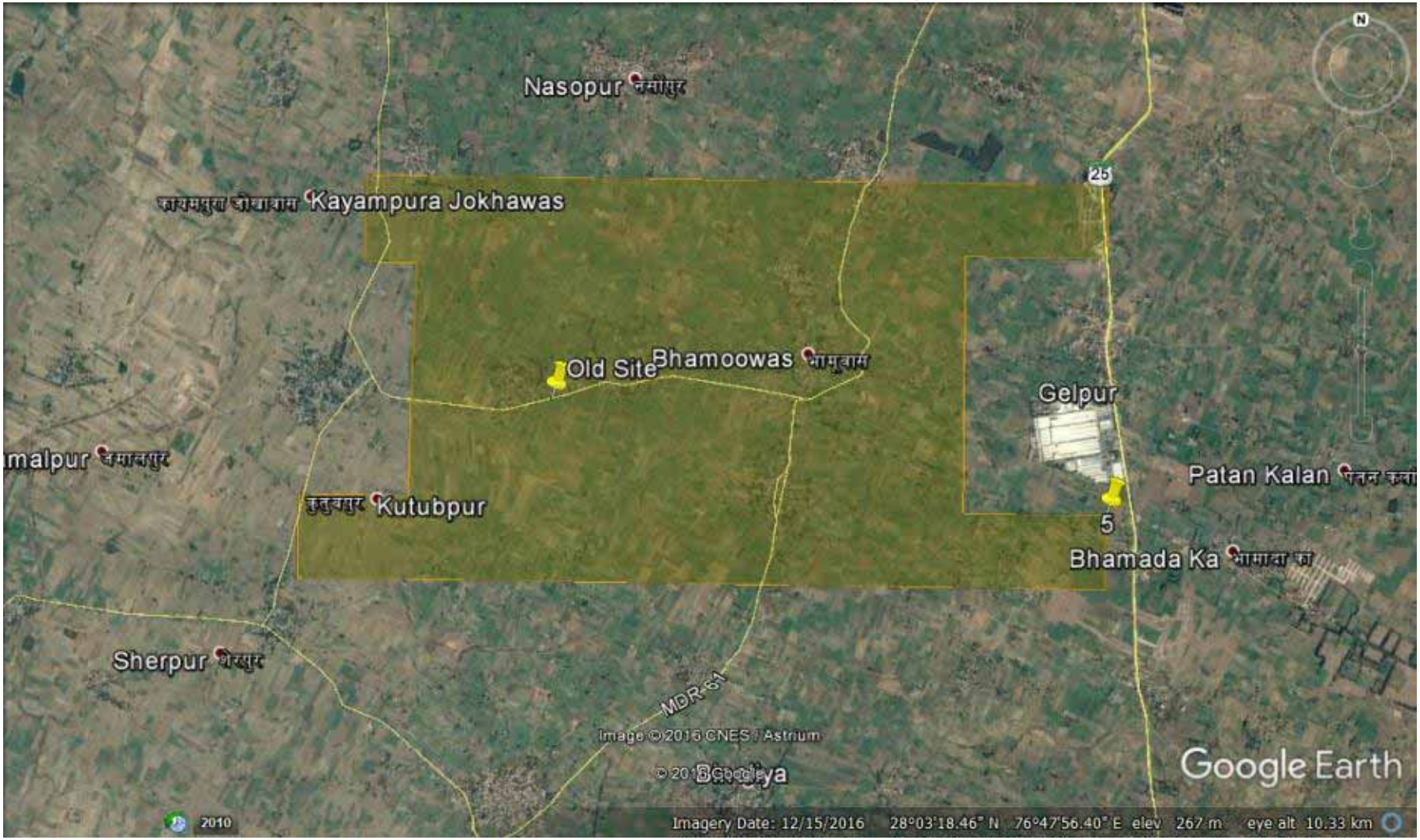


FIGURE 3: SITE II (PROPOSED SITE) ON TOPOSHEET

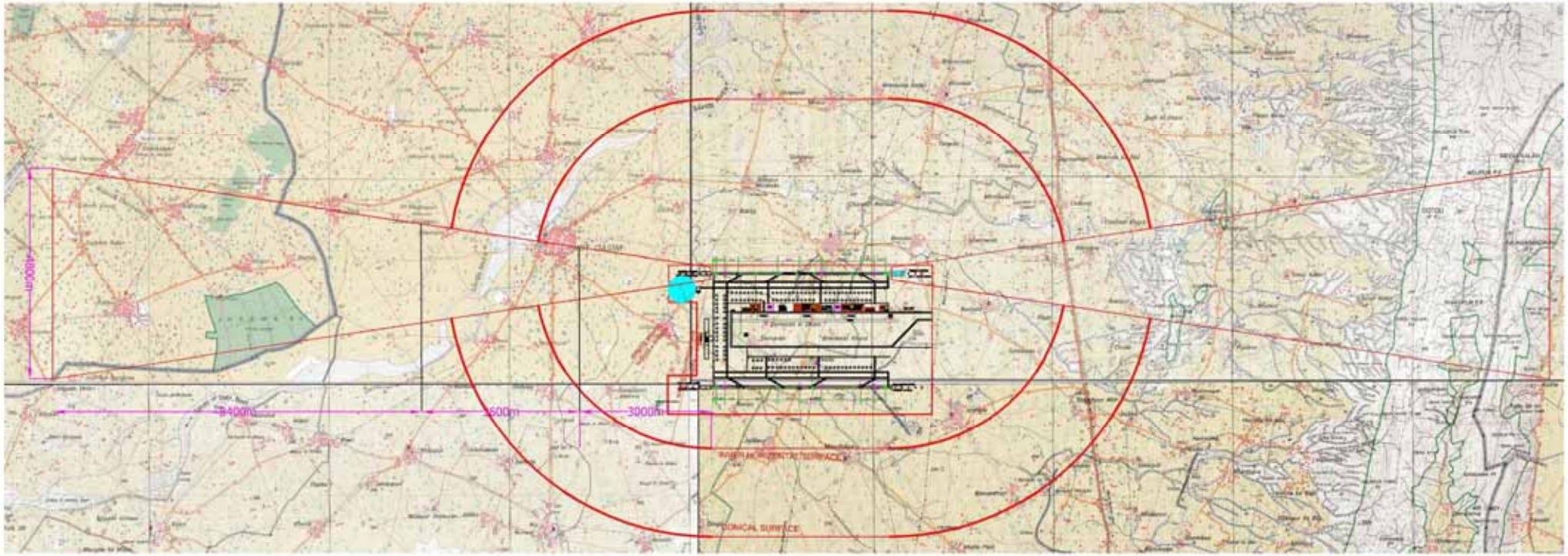


FIGURE 4: SATELLITE IMAGE OF SITE II (PROPOSED SITE)

ANNEXURE 1

PFR PREPARED BY AAI FOR SITE I (OLD SITE)

Pre-Feasibility study of Greenfield Airport at Kotkasim near Bhiwadi in Alwar District, Rajasthan

1) INTRODUCTION:

Delhi Mumbai Industrial Corridor Development Corporation Ltd. (DMICDC) desires to setup a new Greenfield Airport at Kotkasim near Bhiwadi in Alwar district, Rajasthan.

The proposed site was visited on 08.03.2013 by the following A.A.I. officials:

1. Sh. D.P.Singh, Executive Director (C & C/CPMS)
2. Sh. G.Shiv Kumar, Dy.General Manager (FPD)
3 Sh. Rajiv Handa, Asst.General Manager (C&C)
4. Sh. Vijay Yadav, Senior Manager (Arch.)

The team of following officials from the client's side accompanied the AAI team during the inspection of site:

1. Sh. Nitin Kumar, Manager IL&FS
2. Sh. Nikhil Deshpande, DHV-India
3. Sh. Sanjeev Dhavan, DHV-India

ANNEXURE 1 contd. ..

2) OBSERVATIONS:

2.1) The site is at an aerial distance of approx 34 NM on a bearing of 206 deg from IGI airport, Delhi, 036 deg/89.7 NM from Jaipur Airport and 310 deg/82 NM from Agra Airport.

2.2) The site is rectangular in shape with two fingers on the outer edges on both eastern and western sides and encompasses an area of approx 6 km by 4 km. The area worked out is 4330 acres aprox. The master plan enclosed as **Annexure-1** has been provided by the client. This can be reviewed at latter stage.

2.3) The airport co-ordinates given by the client **(Annexure-2)**.However the co-ordinates are not correct with respect to Long. & Lat., wherein N marked as E & E marked as N and needs to be interchanged. A map showing the location of the proposed site superimposed on Google map with corrected co-ordinates, is attached as **Annexure-3**.

2.4) The site is full of agricultural fields with some trees, villages and 3 to 4 rows of high tension electric lines cutting across the site.

ANNEXURE 1 contd. ..

2.5) The eastern side of the site is flanked by Aravalli hills with a maximum height of 403 m. The hills/open scrub-lands begin approx from 4 km in the east and from 2.5 km on the north eastern and south eastern sides of the site. The other sides are relatively free of high terrain.

2.6) There is a tall building under construction (already 14 story high) on the north eastern side **(Annexure-4)**, which will form obstruction in the approach for the northern runway also another housing complex is planned adjacent to this building and within the airport boundary. The client has to initiate immediate appropriate action in this regard.

2.7) In view of the obstructions mentioned above an OLS survey may be undertaken by the client before taking final decision.

2.8) The wind rose diagram was made available for Gurgaon airport, 50 kms from the site for a period from 1977 – 1991 with two observations.(0830 and 1730 hrs). It shows pre-dominant wind direction of W-NW and S-SE **(Annexure-5)**.

4. From IAL point of view, it is preferable to have a runway orientation similar to the runway orientation at Delhi (10/28; 11/29; 09/27). Another airport in this region ,Jaipur has a runway orientation of 09/27. The site can support two parallel runways (one runway in the northern side and other runway in the

ANNEXURE 1 contd. ..

southern side) with the runway beginning being placed at 900-1000m from the finger edge.

2.9) The 30 NM airspace will partly lie in Delhi 30 NM airspace. It does not lie in any military airspace. The NAV Aids closer to the site are Chilerki VOR and Sakras VOR. The ATS routes closer to the site are W20S and A474 /R462 /W13S /W65S and Q2 (Annexure-6).The airspace constraints have to be worked out with Delhi

3) CONCLUSION:

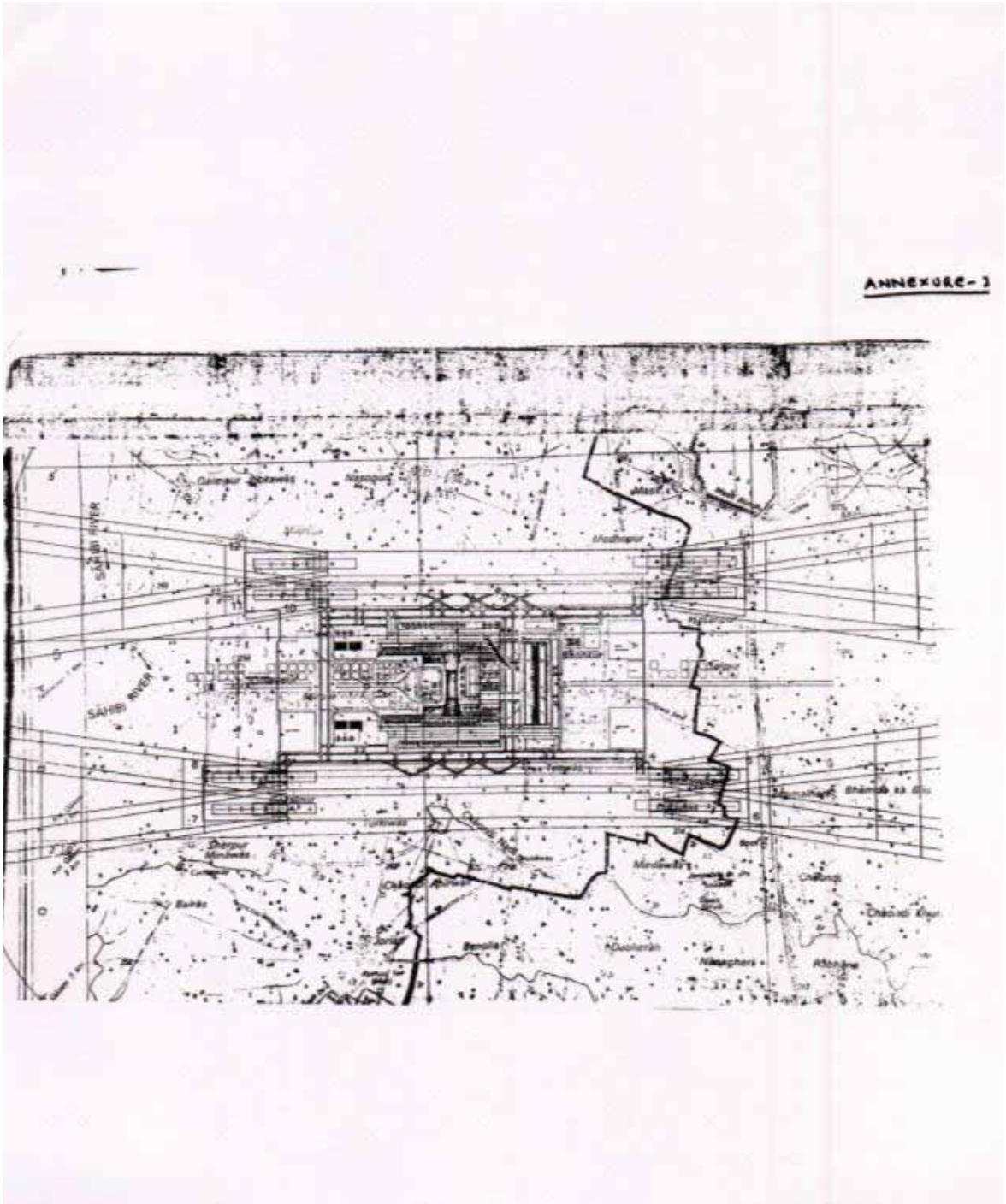
The runway orientation and bearing can be finalised depending upon the results of the OLS survey (terrain and man made obstacle survey) coupled with the wind data.The OLS survey has to be carried out to assess the effects of the under construction building, Kajaria factory, terrain and other man made obstacles. This will decide the feasibility of runways and if feasible, threshold placement and subsequently the feasibility of Instrument Approach procedures.

Vijay Yadav	Rajiv Handa	G Shiv Kumar
Senior Mgr.(Arch)	Asstt.Gen.Mgr.(C&C)	Dy.Gen.Mgr(FPD)

D.P.Singh

Executive Director (C&C/CPMS)

ANNEXURE 1 contd. ..



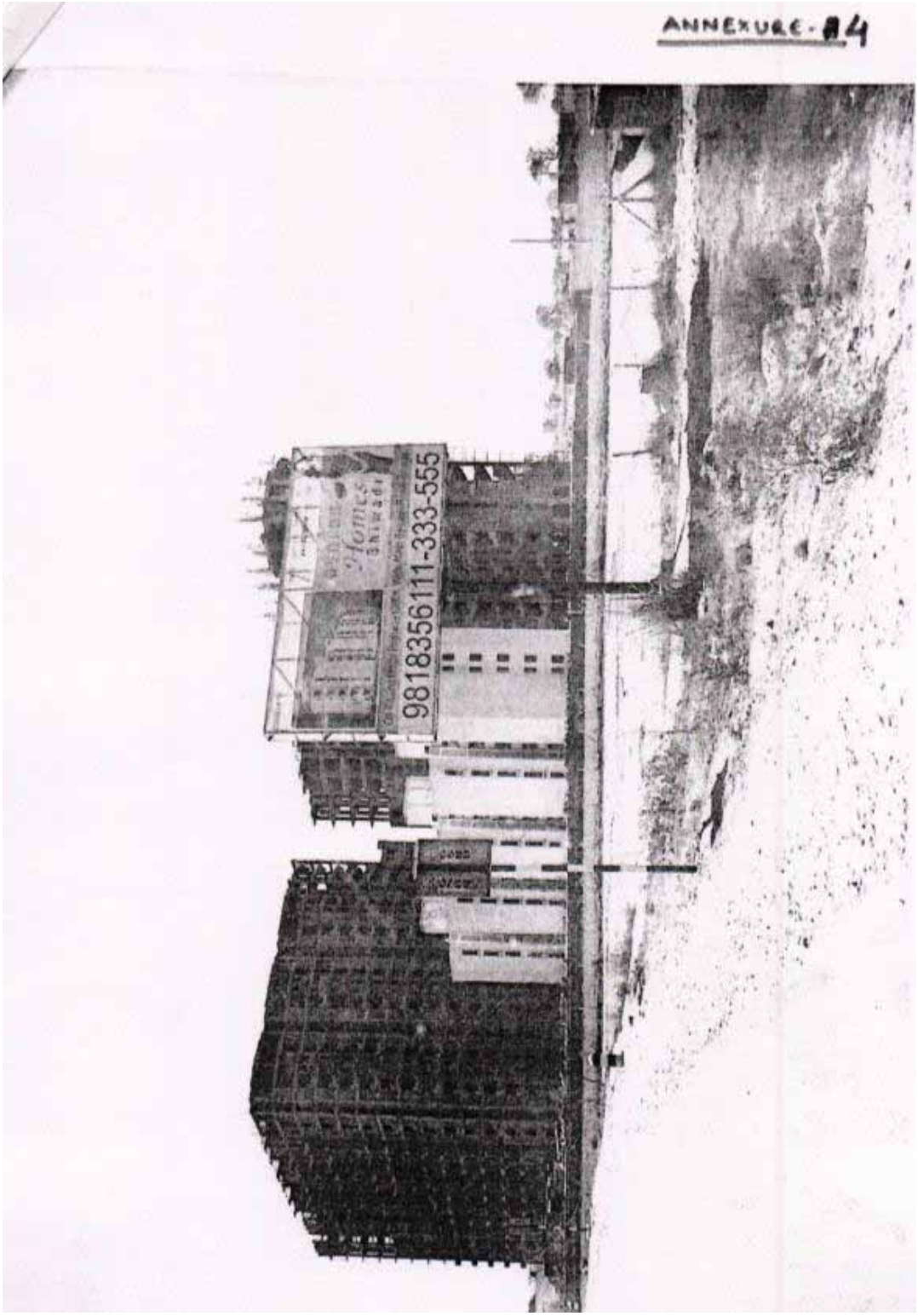
ANNEXURE 1 contd. ..

ANNEXURE-2

S N		1	Airport Cordinates DD		DMS
	1 X	680068.7228 Longi	76.83246146 Logi		76° 49' 56.9" N
	Y	3106589.348 Lati	28.07250334 Lati		28° 04' 21.0" E
	2 X	680068.7228	76.83236882		76° 49' 56.5" N
	Y	3105984.348	28.06704469		28° 04' 01.4" E
	3 X	678896.2228	76.82044246		76° 49' 13.59" N
	Y	3105984.348	28.06720341		28° 04' 01.93" E
	4 X	678896.2228	76.82012318		76° 49' 12.44" N
	Y	3103884.348	28.04825585		28°02' 53.72" E
	5 X	680068.7228	76.83204753		76° 49' 55.37" N
	Y	3103884.921	28.04810242		28° 02' 53.17" E
	6 X	680068.7228	76.83195492		76° 49' 55.04" N
	Y	3103279.348	28.04263858		28° 02' 33.50" E
	7 X	673436.2228	76.76450487		76° 45' 52.28" N
	Y	3103279.348	28.04352187		28° 02' 36.68" E
	8 X	673436.2228	76.76460504		76° 45' 52.58" N
	Y	3103959.348	28.04965747		28° 02' 58.76" E
	9 X	674336.2228	76.77375824		76° 46' 25.53" N
	Y	3103958.281	28.04952989		28° 02' 58.31" E
	10 X	674360.2226	76.77428553		76° 46' 27.43" N
	Y	3105869.348	28.06677006		28° 04' 0.37" E
	11 X	673936.2228	76.7699726		76° 46' 11.90" N
	Y	3105869.348	28.06682575		28° 04' 0.57" E
	12 X	673936.2228	76.7700791		76° 46' 12.28"
	Y	3106589.348	28.07332223		28° 04' 23.96"

ANNEXURE 1 contd. ..

ANNEXURE 1 contd. ..



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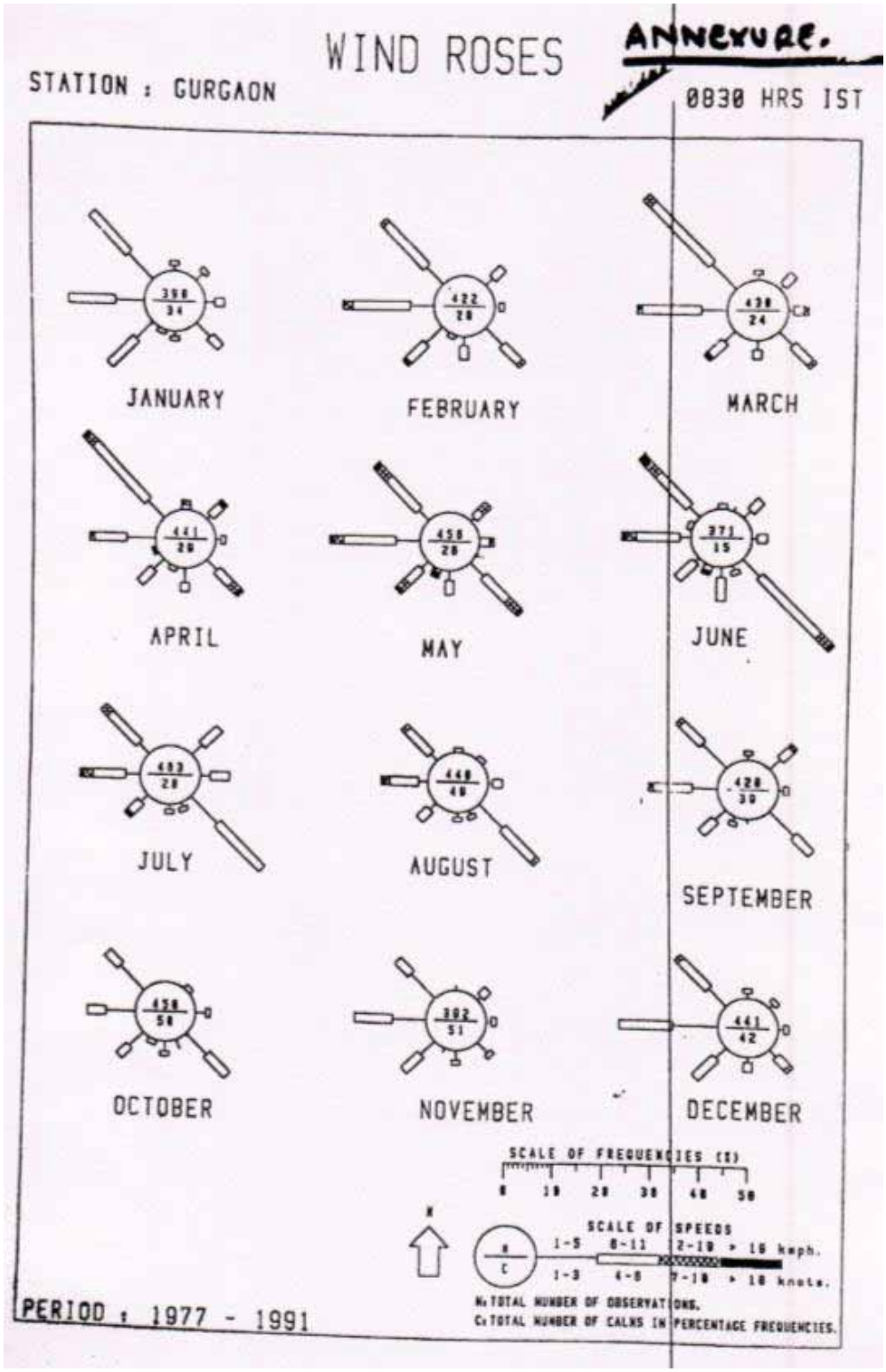

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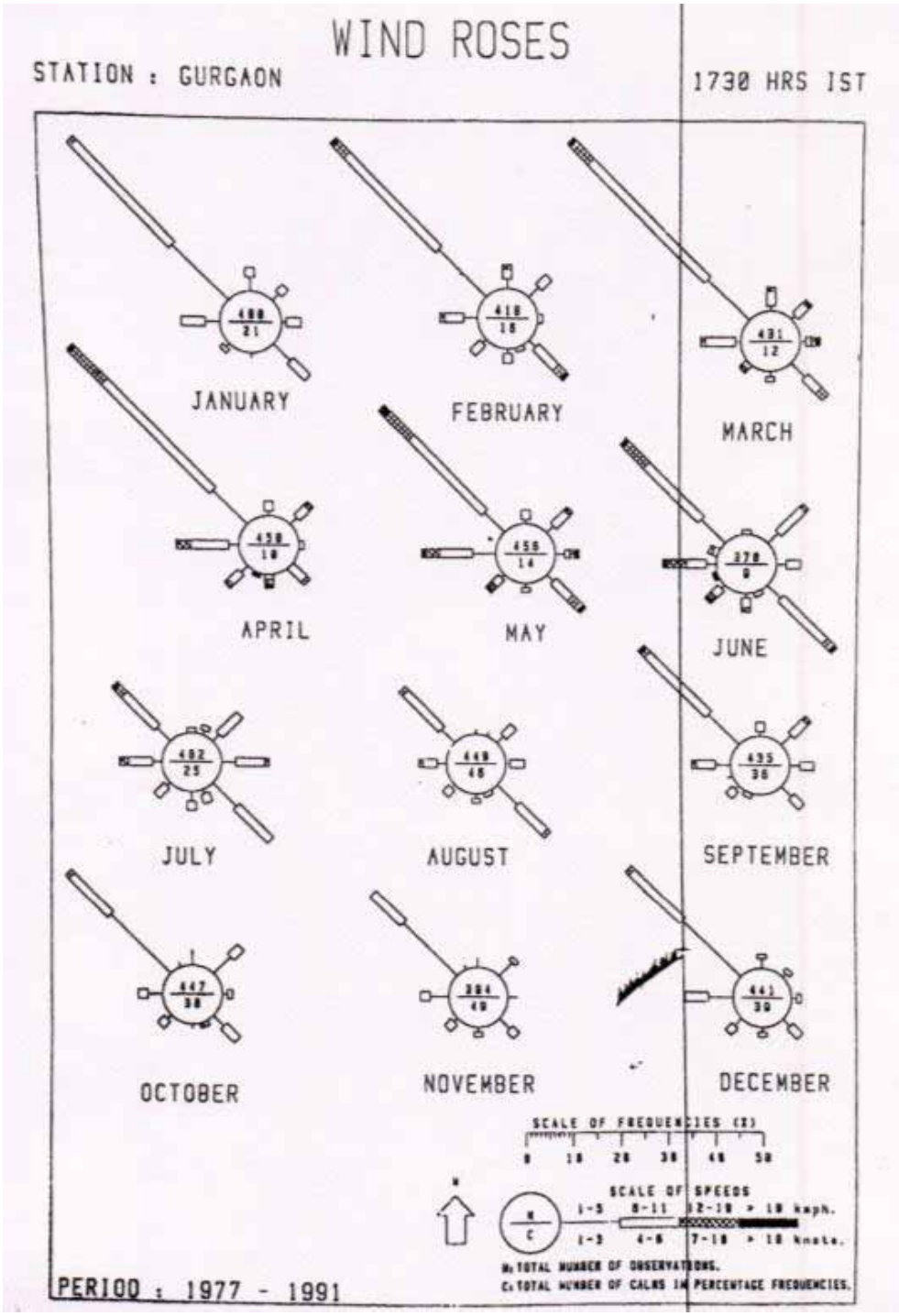

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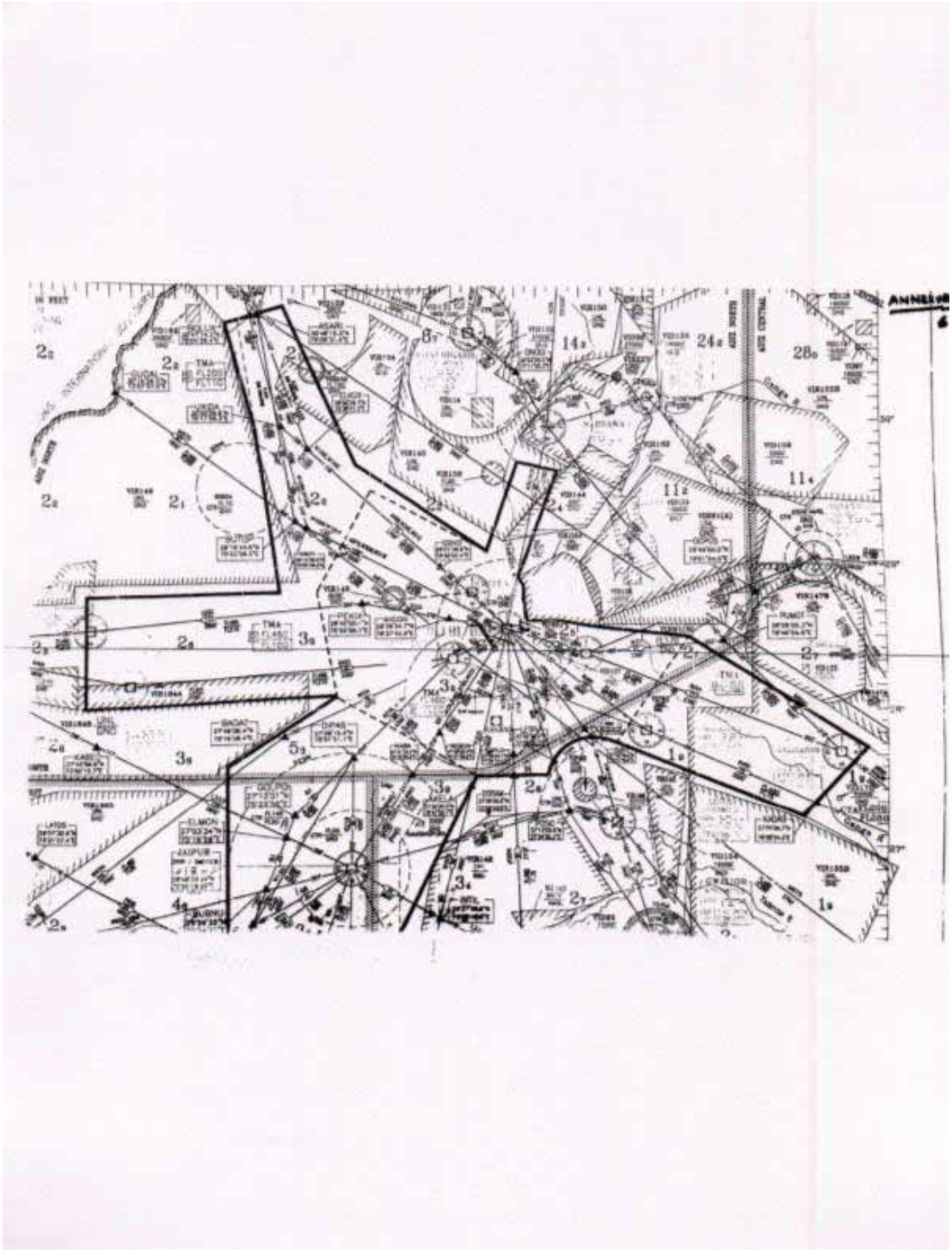


ANNEXURE 2

PFR PREPARED BY AAI FOR PROPOSED AIRPORT SITE

Pre-feasibility study of proposed Greenfield Airport at Bhiwadi in Alwar District, Rajasthan

1. INTRODUCTION:

1.1 Delhi Mumbai Industrial Corridor Development Corporation Ltd. (DMICDC) desires to setup a new Greenfield Airport at Bhiwadi in Alwar district, Rajasthan.

1.2 The proposed site was visited on 19.06.2013, as the previous proposed site visited on 08.03.2013 was not suitable in view of the existing high rise building (14 storey) under construction and other structures in the vicinity falling in the approach funnel and huge rehabilitation of villagers falling in the site. In view of this, the following A.A.I. officials visited the alternate site:

1. Sh. D.P.Singh, Executive Director (C & C/CPMS)
2. Sh. L.D. Mohanty, Dy.General Manager (FPD)
3 Sh. Rajiv Handa, Asst.General Manager (C&C)
4. Sh. Vijay Yadav, Senior Manager (Arch.)

1.3 The team from client side consisting of DMICDC executives, Sr. Officials (Town Planner from UIT), CREDAI members and experts from IAC&S as Aviation Consultants, were also present. Some of the Sr. executive's names are given as under:

1. Sh. Praveen Jain, Chief Town Planner, NCR, Govt. of Rajasthan
2. Sh. Ravindra Kr. Sharma, SDM, Kotkasim
3. Sh. Pushpendra Singh, Dy. Secretary, Bhiwadi
4. Sh. R.K. Tuleva, Sr. Town Planner (NCR)
5. Sh. Anshul Gupta, DMICDC
6. Sh. Arpan Gupta, DMICDC
7. Sh. Brijlal Meena, Tehsildar Tijora

2. OBSERVATION ABOUT SITE LOCATION

2.1 In view of Para 1.2 above, two alternative sites were proposed by DMICDC for inspection and its suitability for airport development. In both the sites big 5-6 villages such as Ladpur, Bachala, Ishroda and Jorian consisting of 1500-2500 houses were located and it was felt by AAI team that the re-location of such a large number of houses will be a difficult task and therefore should be excluded from the land to be acquire for the airport development to minimise the dislocation of human settlement. In view of this, AAI team, after undertaking the physical visit of the entire area, decided to suggest a third site in between the two sites where the re-location of household was minimum. The site proposed by AAI team contains 6 small villages (Refer Para-2.3 below) having 100 to 125 houses each and this site was acceptable to the representatives of all the organisations present during the site visit (Refer Annex-I)

2.2 The approximate coordinates of the corners (Refer Annex-I) of the land as observed on Google earth are as follows:

ANNEXURE 2 contd. ..

A-1	28°01'24.78"N,	76°44'34.41"E
A-2	28°01'24.72"N,	76°48'21.39"E
A-3	27°59'31.11"N,	76°48'20.41"E
A-4	27°59'31.07"N,	76°44'33.55"E
A-5	28°00'00.34"N,	76°44'33.54"E
A-6	28°00'00.23"N,	76°44'58.21"E
A-7	28°00'55.46"N,	76°44'57.58"E
A-8	28°00'55.54"N,	76°44'34.39"E

2.3 The following villages are falling within the above mentioned proposed airport land as shown in Annexure-I. The name and the approximate coordinates of the centre point of the villages to be relocated are as follows:

i)	Daulatpuri	28°01'11.36"N,	76°46'42.50"E
ii)	Salahera	28°00'41.37"N,	76°47'51.88"E
iii)	Beharwas Khurd	28°00'26.78"N,	76°46'56.65"E
iv)	Domerah	28°00'26.59"N,	76°45'48.98"E
v)	Ronijo	27°59'34.96"N,	76°45'34.71"E
vi)	Bhojawas	28°00'08.33"N,	76°46'31.72"E

2.4 The site is rectangular in shape with two fingers on the outer edges on both eastern and western sides and encompasses an area of approx. 6.2 km by 3.5 km. The area worked out is 5126 acres approx. The draft master plan enclosed as **Annexure-I** has been prepared by AAI. This can be reviewed at latter stage.

2.5 The site is full of agricultural fields with some trees, 6 villages and a row of high tension electric lines cutting across the site. Besides above, some LT lines were also observed.

3. OBSERVATIONS RELATING TO AIRSPACE

3.1 The site is at an aerial distance of approx 43 NM on a bearing of 206 deg from IGI airport, Delhi, 036 deg/102 NM from Jaipur Airport and 310 deg/94 NM from Agra Airport.

3.2 The site is rectangular with two fingers on the outer edges on western sides and encompasses an area of approx. 6 km by 3.5 km & located towards southwest direction of the previous proposed site (Refer Annex-I).

3.3 The site is full of agricultural fields with some trees.

3.4 The eastern & south western side of the site is flanked by Aravalli hills with a maximum height of 500m. However, OLS survey has to be carried out to assess feasibility and declared distances of the runways.

3.5 The wind rose diagram was made available for Gurgaon airport, 50 kms from the site for a period from 1990 – 1999 with two observations.(0830 and 1730 hrs). It shows

ANNEXURE 2 contd. ..

pre-dominant wind direction of W-NW and S-SE.(Refer Annex -II) This allows a runway orientation of W-E direction as per the site layout and the wind direction. It is preferable to have a runway orientation similar to the runway orientation at Delhi. (10/28; 11/29; 09/27). Another airport in this region (Jaipur) has a runway orientation of 09/27. However the runway orientation and bearing can be finalised depending upon the results of the OLS survey (terrain and manmade obstacle survey) coupled with the wind data.

3.6 Instrument approach procedures are feasible subject to the obstacle limitation surfaces/VSS being clear or obstructions if any can be removed.

3.7 The 30 NM airspace will partly lie in Delhi 30 NM airspace. It does not lie in any military airspace. The NAV Aids closer to the site are Chilerki VOR and Sakras VOR. The ATS routes closer to the site are W20S and A474 /R462 /W13S /W65S and Q2. (Refer Annex.-III). The airspace constraints have to be worked out with Delhi.

3.8 The draft configuration of operational area and city side layout depending upon the land requirements and the availability is enclosed as Annex-I.

4. CONCLUSION:

4.1 To avoid large scale human resettlement, an alternative site in between the two sites proposed by DMICDC was suggested by AAI team and this site was acceptable to the representatives of all the organisations present during the site visit.

4.2 The site proposed by AAI team also contains six villages having 100-125 houses each and this site involve minimum of relocation of households among all the options available.

4.3 A HT line and few LT lines are crossing the site, which will require relocation.

4.4 The OLS survey has to be carried out in view of the Aravalli ranges towards eastern and sought-western directions in-order to assess feasibility of runways and if feasible, threshold placement and subsequently the feasibility of Instrument Approach procedure.

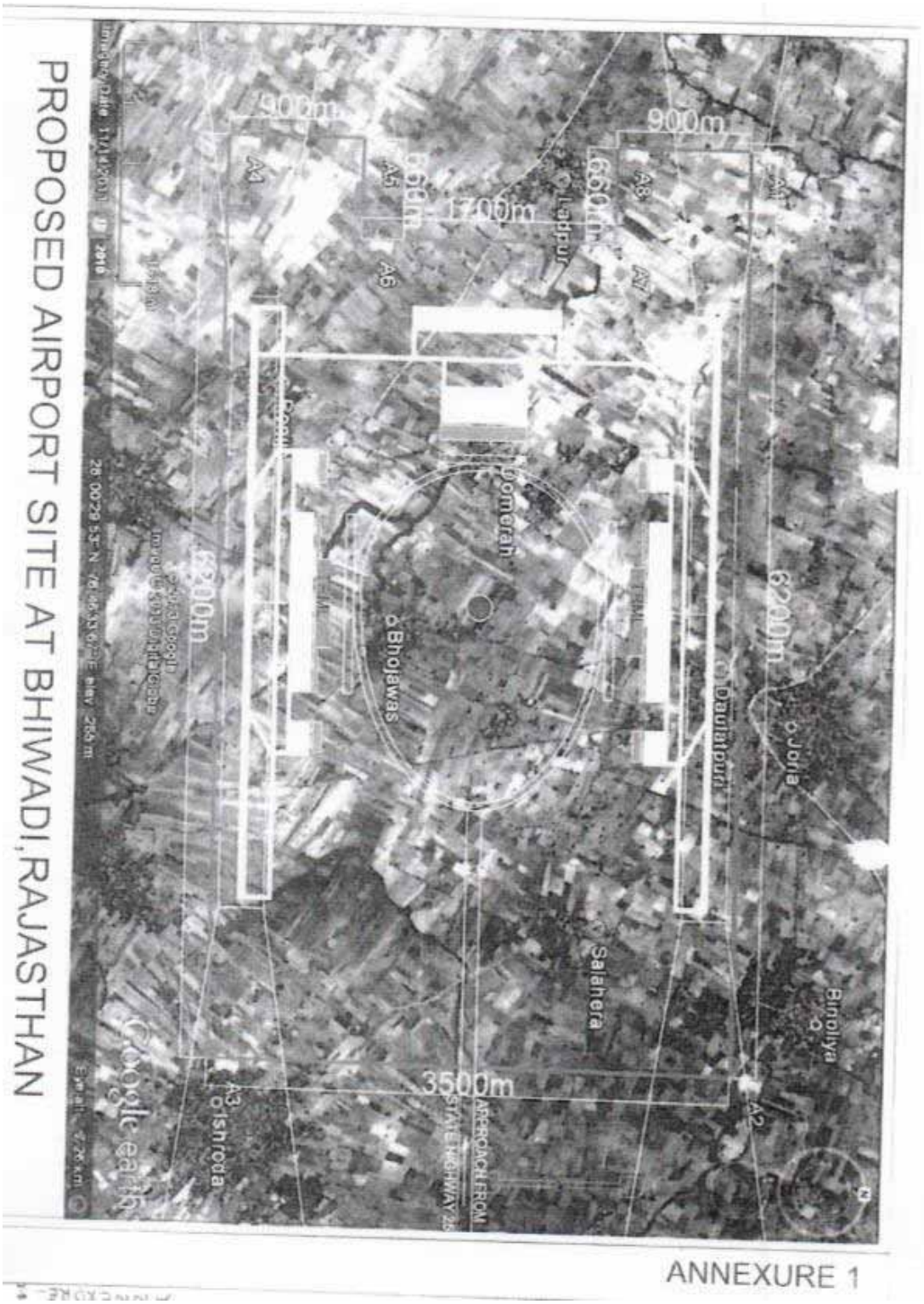
(Vijay Yadav)
Senior Mgr.(Arch)

(Rajiv Handa)
Asstt.Gen.Mgr.(C&C)

(L.D. Mohanty)
Dy.Gen.Mgr. (FPD)

(D.P.Singh)
ED (C&C-CP&MS)

ANNEXURE 2 contd. ..



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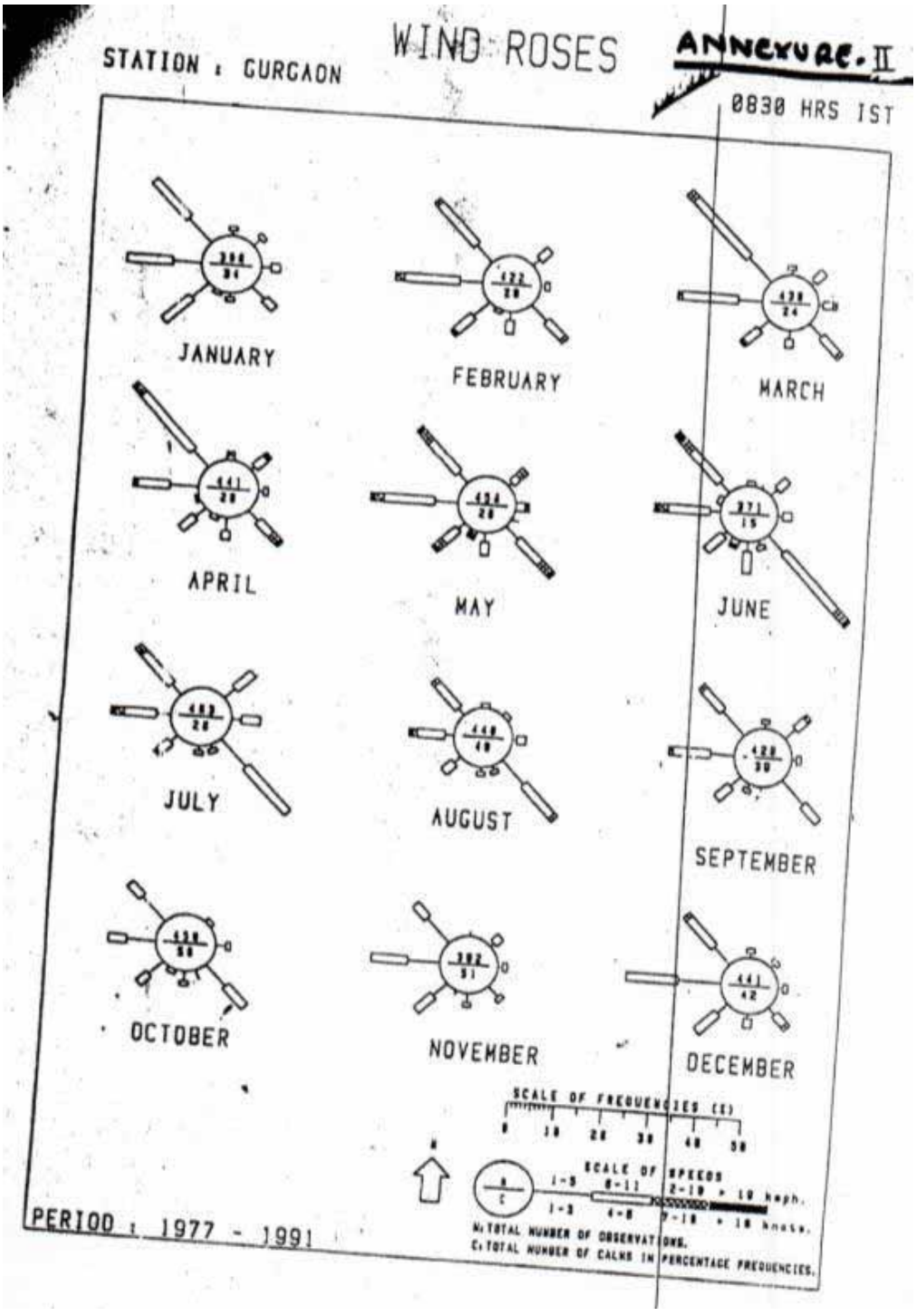
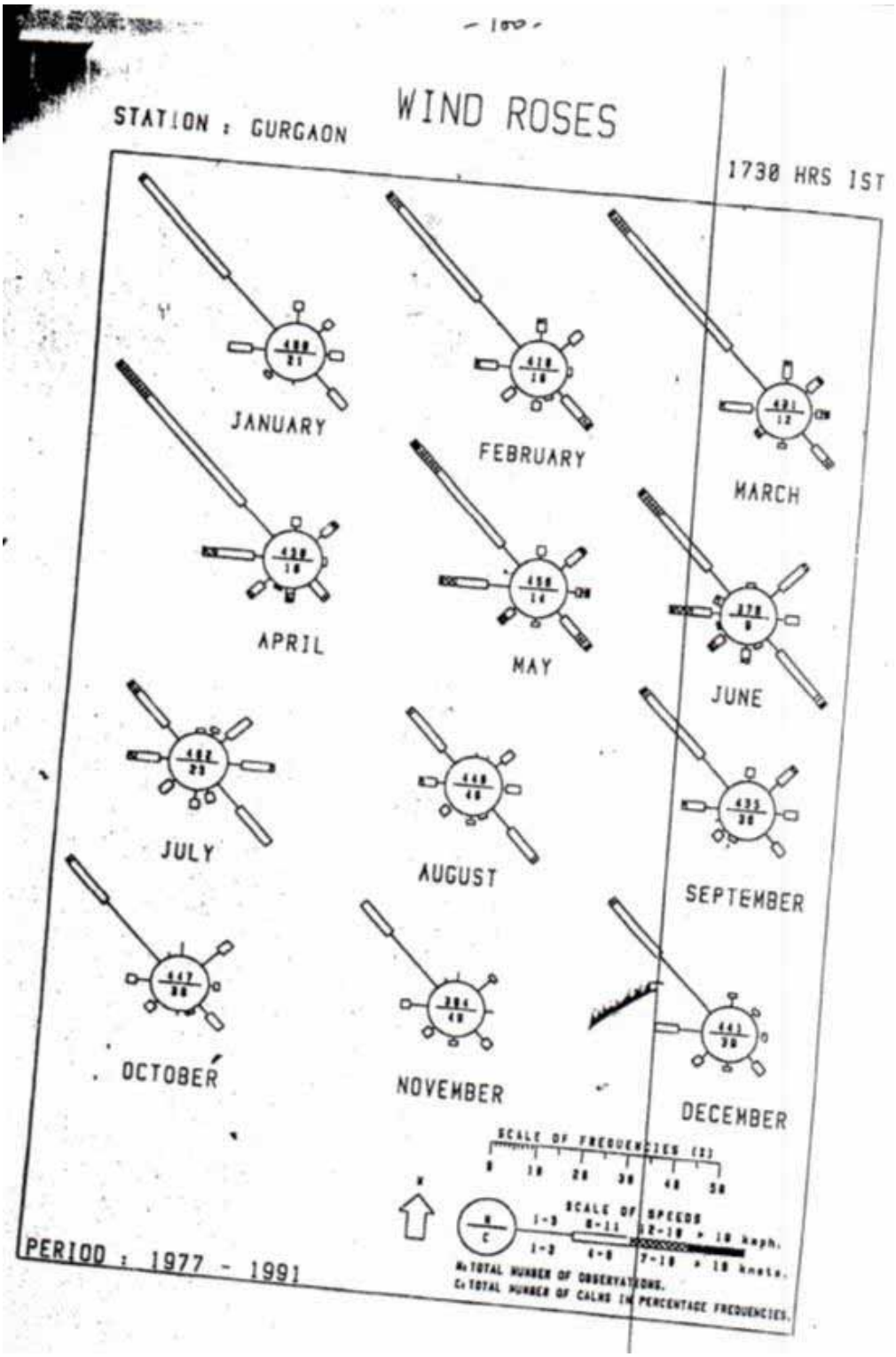


ANNEXURE 2 contd. ..



ANNEXURE 2 contd. ..