OLS SURVEY REPORT

PROPOSED AIRPORT AT SHIVAMOGGA, KARNATAKA

AUGUST 2019

KARNATAKA STATE INDUSTRIAL AND INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

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Survey Consultant

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1. INTEGRITY AND ACCURACY STATEMENT

"This is to certify that the aeronautical/obstacle survey data provided vide survey of the Proposed AIRPORT located at MADHUBHAVI Village, SHIVAMOGGA District, KARNATAKA. Dated: May 2019 complies with the Aeronautical Data Quality Requirements as defined in ICAO Annex 15 and in DGCA CAR 9, Series-1 Part-1."

All work on this project was overseen by certified surveyors, who have performed works as per the AAI Aeronautical Survey Manual standards. The survey team utilized a variety of software validation tools and quality control techniques to ensure the data was processed, reduced, and collated into an accurate final dataset.

The survey team has documented and recorded all manual computations throughout the project. Survey notes and computations were completed while onsite, during data collection, and reviewed prior to leaving the site to ensure consistency and accuracy. Manual computations were checked to verify accuracy of calculations. All discrepancies identified during data processing and analysis was corrected and source of error identified and eliminated.

The survey team has performed all necessary survey and mapping operations adhering to the industry standard methodologies to ensure AAI is receiving a sound and accurate product of the highest quality that exceeds the accuracy requirements for all features collected during this project. Survey data and aeronautical charts prepared for the concerned Airport is the property of KSIIDC/GEOID Consultancy Private Ltd and cannot be used without their permission either fully or part thereof for any other assignment/purpose.

In case of any part require any clarification regarding this exercise they can get in contact with the Field Surveyor Mr. Sundara Moorthy on the following details.

GCPL

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2. INTRODUCTION:

2.1 Background & Purpose:

M/s. Karnataka State Industrial and Infrastructure Development Corporation Limited has engaged GEOID Consultancy Private Ltd for carrying out OLS survey for New AIRPORTs at different places of KARNATAKA. In order to promote safe, regular, secure and efficient use and development of Services, Therefore they desires to update the existing /New reference system in view of the major developments taking place in the country, with reference to WGS-84 as well as in terms of implementing the Global Navigational Satellite System (GNSS), for its services

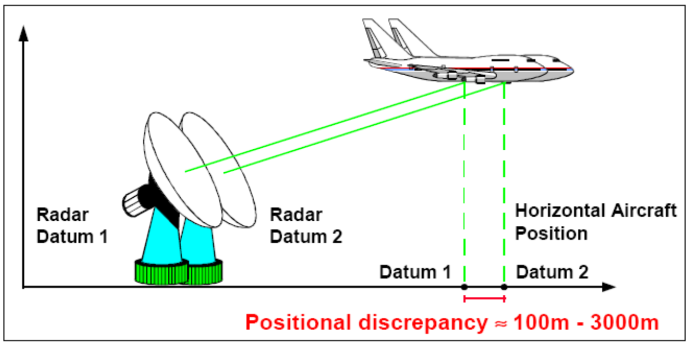
The KSIIDC, has asked Consultant, M/s GEOID Consultancy Private Ltd. to carry out Object Limitation Survey along with Topographic Survey of each existing & proposed site in terms of WGS-84 system, Precisely World Geodetic System 1984 (WGS 84) coordinates and to present work in a standard in conformation to the International Civil Aviation Organization (ICAO) Guidelines and World Geodetic System 1984 Manual (Doc. 9674, AN/946 of ICAO) Requirements.

In view of making the Civil Aviation absolutely free from life threatening hazards, error free operation of Aircrafts the ICAO adopts, as a standard, the geodetic reference system WGS 84 and develops appropriate ICAO material, particularly in respect of Annexes 4 and 15, in order to ensure a rapid and comprehensive implementation of the WGS 84 geodetic reference system for all the member who operate under the ICAO umbrella.

GEOID Consultancy Private Ltd was asked by KSIIDC to submit an offer to carry out Obstacle Survey (OLS Survey) for the Proposed AIRPORT at SHIVAMOGGA, located at SHIVAMOGGA district, KARNATAKA.

2.2 Choice of Reference System

To overcome the problems arising from different geodetic reference datums in Air navigation, it becomes very difficult to ascertain the horizontal position for the aircraft.



There are many geodetic reference datum's in use throughout the world providing references for the charting of particular areas. Each datum has been produced by fitting a particular mathematical Earth model (ellipsoid) to the true shape of the Earth (geoid) in such a way as to minimize the differences between the ellipsoid and the geoid over the area of interest. Most ellipsoids in current use were derived in the last century and were normally referenced to a local observatory. These different datums and ellipsoids produce different latitude and longitude grids and hence, a different set of geographical coordinates. Different countries developed their own geodetic datums which usually differed from those of adjacent countries. As distance requirements increased beyond national boundaries, new requirements arose from datums on at least continental scale. Thus - the main source of systematic errors is the non-use of a common geodetic reference datum for quoting the radar positions and its solution is to derive the radar positions in a common system.

Coordinates derived by the Global Navigation Satellite System (GNSS) airborne system from signals received from satellites will be Earth-centered because the GNSS satellites operate with an Earth-centered reference model, WGS 84. GNSS coordinates will not compare with coordinates based on local geodetic datums except in areas where coordinates have been readjusted to an Earth-centered datum. This means that the difference between the coordinates of a point referenced to a local geodetic datum and the coordinates of that same point referenced to the Earth-centered WGS 84 datum has to be taken into account.

Therefore, KSIIDC, which is mandated by the ICAO, has asked Consultant, M/s GEOID Consultancy Private Ltd. for undertaking survey by using WGS-84 with the help of Differential Global Positioning System (DGPS), Thereafter OLS Survey has been completed in phases and the Draft report has been prepared and was submitted to KSIIDC on Sep 26_th 2019.For the same observations have been communicated through E-MAIL Dated Sep 26 __th 2019. After incorporating the observations, the Draft Final report is being submitted which comprises a comprehensive report towards the required in terms of WGS 84 survey only, as the work is in its final stage of completion and the report under submission is part of the original consultancy work, may be read in conjugation to Consultant's all previous stage reports of the project.

2.3 NATIONAL REFERENCES FOR THE PROJECT

The National reference Datum of is **Everest Spheroid as Reference Surface** system. Therefore, in general In India, **Everest Spheroid as Reference** system for reference station was to be adopted as the initial station of reference for the exercise. However, due to the requirement of AIRPORT/Aviation System at (SHIVAMOGGA) a few reference stations established by S.O.I in the vicinity of AIRPORT viz, GTS (Triangulation Stations) were picked up.

2.4 DGCA CARs & ICAO Regulations:

Aerodrome Standards Air Traffic Services Series 'B', Part III issued on 28th Aug 2006 and further modified by Issued-II dated 19th Dec 2016 and ICAO Annex-14 Vol-II Fourth Edition July 2013 have been followed in full all through in this report for regulatory guidance.

3. GENERAL

3.1 Objective:

To conduct OLS Survey at Proposed Infrastructure & Establishing control stations in the World Geodetic System 1984 (WGS-84) in accordance with ICAO Manuals & Procedures at Proposed SHIVAMOGGA AIRPORT site.

3.2 TYPE OF SURVEY

This was a high accuracy survey based on Static and Real time Kinematic differential GPS in the WGS-84 system in accordance with ICAO Manuals & Procedures to meet the accuracy prescribed at Table 5-1 of the manual and placed below for better appreciation.

5-2 *World Geodetic System — 1984 (WGS-84) Manual*

Table 5-1. Minimum survey accuracy and integrity requirements for navigation elements

Note.— Accuracies are those relative to the established aerodrome/heliport survey control network except where marked by an asterisk (*) when they relate to absolute coordinates with respect to the datum.

Latitude and longitude	*Accuracy data type*	*Integrity classification*
En-route NAVAIDS and fixes, holding, STAR/SID points	100 m surveyed/calculated	1×10^{-5} essential
Aerodrome/heliport reference point	30 m surveyed/calculated	1×10^{-3} routine
NAVAIDS located at the aerodrome/heliport	3 m surveyed	1×10^{-5} essential
Obstacles in the circling area and at the aerodrome/heliport	3 m surveyed	1×10^{-5} essential
Significant obstacles in the approach and take-off area	3 m surveyed	1×10^{-5} essential
Final approach fixes/points and other essential fixes/points comprising instrument approach procedure	3 m surveyed/calculated	1×10^{-5} essential
Runway (landing) threshold	1 m surveyed	1×10^{-8} critical
Runway end (flight path alignment point)	1 m surveyed	1×10^{-8} critical
Runway centre line points	1 m surveyed	1×10^{-8} critical
Taxiway centre line points	0.5 m surveyed	1×10^{-5} essential
Ground taxiway centreline points, air taxiways and transit routes points	0.5 m surveyed/calculated	1×10^{-5} essential
Aircraft standpoints/INS checkpoints	0.5 m surveyed	1×10^{-3} routine
Geometric centre of TLOF or FATO thresholds at heliports	1 m surveyed	1×10^{-8} critical
WGS-84 geoid undulation at aerodrome/heliport elevation position	0.5 m or 1 ft surveyed	1×10^{-5} essential
WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, non-precision approaches	0.5 m or 1 ft surveyed	1×10^{-5} essential
WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, precision approaches	0.25 m or 1 ft surveyed	1×10^{-8} critical
Aerodrome/heliport survey control network (datum transfer)	1 m * surveyed	1×10^{-8} critical

3.3 AUTHORITY:

The KSIIDC being represented by __Mr. Krishnamoorthy & Mr. Shamanth_________ Consultants M/s. KSIIDC, and was responsible for the entire survey work, Co-ordination from the Airport authorities, supervision and implementation of Quality Measure System as well as production of final product after compilation of the data drawings & report in the desired format.

3.4 SURVEYED BY

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Email:support@geoid.co.in

3.5 DURATION OF SURVEY

22th April to 28th April 2019

3.6 SURVEY TEAM MEMBERS

a. Mr Sundara Moorthy, Sr Surveyor
b. Mr. Prabakaran, Surveyor
c. Mr Elango, Surveyor
d. Mr Ravi kumar, Surveyor

3.7 Site Location:

The AIRPORT site is located near SOGANE Village, SHIVAMOGGA District, KARNATAKA.

The AIRPORT is planned for Day VFR operations as public AIRPORT for commercial operations for KSIIDC.

Location Coordinates (WGS-84)	**13°51'14.587"N 075°36'40.183"E**
Location Coordinates (UTM)	**43P 566042 1531669 UTM**
Elevation	**620.89 m (2037 ft) AMSL**
City	**SHIVAMOGGA**
District	**SHIVAMOGGA**
State	**KARNATAKA**
Country	**India**
Population (Census 2011)	**322,650**

3.8 History of SHIVAMOGGA

Shimoga, officially known as Shivamogga is a city and the district headquarters of Shimoga in the central part of the state of Karnataka, India. The city lies on the banks of the Tunga River. Being the gateway for the hilly region of the Western Ghats, the city is popularly nicknamed as "Gateway of Malnad".

Industries like Pearlite Industries, Malnad Alloys, Shanthala Sperocast, Vijay Technnocrats, Perfect Alloys, Smiths & Founders (India)Limited are some foundries manufacture quality castings, supply to major Original Manufacturers in India and also exporting their products to many countries and several other Industries are located in Shimoga. Shimoga IT Park is an information technology hub built just outside Shimoga near the future Shimoga Airport.

Shimoga has its own Railway Station named as Shimoga Nagar Railway Station which is connected to the major cities of Karnataka and other states like Mangalore, Hampi, Bangalore, Pune and Mumbai. You can also reach the place via bus. There are frequent buses from Bangalore to Shimoga. You can also hire a taxi to reach Shimoga and you can continue with the same taxi to explore the city.

Nearest Airport:

Nearest Airport from Proposed SHIVAMOGGA AIRPORT is the Mangalore International Airport located at a 132 Kms or 71 NM (Aerial Distance) from Propose Airport Site located towards North West on a bearing of 218°.

Nearest Railway Station:

SHIVAMOGGA Railway Station, SHIVAMOGGA, KARNATAKA, Situated 8 km away from SHIVAMOGGA AIRPORT and North West Near SH 69.

Location Map of SHIVAMOGGA AIRPORT

PROPOSED SHIVAMOGGA AIRPORT

4. EQUIPMENTS USED AND METHODOLOGY

4.1 Equipment used with defined accuracy.

- DGPS: - NAVCOM – SF3040 Dual frequency GNSS System,
- Total station: Pentax Total Station R-1501N with 1" accuracy.

PENTAX W 2801 N

4.2 METHODOLOGY & QUALITY CONTROL

- ***Differential Global Positioning System:*** Our team had used Dual Frequency Differential Global Positioning System (DGPS) equipment, which is a set of two Receivers and is based on measurements of signals emitted by Navstar Satellites. DGPS is treated as one of most precise and quickest methods to establish Geographical Coordinates (Lat, Long & Elevations) on Survey Bench Marks, without needing long traverses. The team utilized the Post processed ephemeris with Static GPS survey techniques during this process. In addition, GPS was also used wherever possible for remote & enroute locations not directly linked with the site.
- ***Terrestrial Surveying:*** For ground based survey (Terrestrial Survey), the Survey team extensively used "Electronic Total Station, (Which is a combination of Digital Theodolite & Electronic Distance Measuring equipment, and has got the accuracy within centimeters) for measurement of horizontal and Vertical distances & true bearings.

Methods used to check the survey.

- In order to meet the ICAO Standards & Recommended practices contained in ICAO Annex 14 & Annex 15 as well as DGCA Civil Air Requirements Section-4, Aerodrome Standards & Air Traffic Services, Series 'B', Part I, 31st July, 2006 (Subject: Aerodrome Design And Operations), the Survey team had followed the following technique;
- For survey work, high precision survey equipment were used, with least count of total station and other survey equipment were one second (Horizontally / vertically) or better. The DGPS used was a dual frequency geodetic GPS receiver.
- Deployment of Qualified & Experienced Team Members of Survey Team.
- Appropriate Grid system and a proper Base line were established before the start of survey work.
- Geographical coordinates for the project were measured in WGS-84 Coordinate System. All the elevation other dimensions were in Meters.
- We store the source data in the form of "Master database", holding all the basic Coordinates of the aerodrome & ground aids located within and outside the operational area, navigation coordinate data and coordinates of obstacles with additional supporting information name of objects, name of owner, detailed survey and geodetic information. This data is entered into the system either directly recorded through the Survey instruments like Total Station or DGPS, or through Manual Entry where observations have been made through analogue or visual observations.
- The transfer of each & every record and data from written or printed form onto electronic media is carried out after cross checking and comparing the input & outputs records & re-checking.
- We undertake the following actions for ensuring a fault-free recording and accuracy of data;
- Observations on significant Control Stations were made two times.
- A survey rod with locking pins was used for the rover Pole.
- The initialization was a valid checked initialization.

- While carrying out this survey, both horizontal & Vertical angle measurement and target heights are taken to obtain x, y & z coordinates of terrain points; and then the traverse is closed & adjusted.
- The Following Quality Control Measures were adopted;

Carrying out Validation checks for recorded data:

- We carry out the following Validation checks to ensure that the data have been correctly entered, maintained or transferred and to filter out gross errors. These checks include:-
- Range limit – We set range limits for various data fields so that any value, exceeding the range is rechecked or discarded. For example in terms of Geographical coordinates we set the limits of Latitude between 0°N to 90°N, Longitude between 0°E to 180°E, Minutes & Seconds from 0-60. (We further filter it while working for Indian Airports so that it does go out of Indian Boundary).
- Related record / field – We ensure that appropriate data are held in related fields or records. e.g. every survey point is supported by an identifier, description, latitude, longitude, and height data
- Data item relationship - Survey quality checks are made by comparison with independent derivation. Thus distances & bearings between two points are also worked out by using navigational software. (It may be mentioned that many of these navigational software to calculate distances, bearings & coordinates were solely developed independently by me, and it is understood that the same software are still in use in AAI). Similarly, while transform existing data from the local datum to the WGS 84 reference system, direct observations as well as SOFTWARE are used.
- Manual data entry methods are made using software to check operator entries for correct field format, range limitations, expected geographical location.
- Show evidence that the required accuracy for the particular data type has been achieved.
- Verification of survey data is ensured by manually (Physically) comparing soft and hard copies of data collected during field observation (Source data) and during transfer of data at each & every step to achieve 100% comparison to the source data.
- Verification of data is also done by comparing the results with the published & available sources like Survey of India Topo Sheets and other methodology.

4.3 SURVEY & OBSERVATIONS

AIRPORT DATA

- Determination and reporting of AIRPORT related aeronautical data is in accordance with the accuracy and integrity requirements set forth in the WGS-84 Manual while taking into account the established quality system procedures. Accuracy requirements for aeronautical data are based upon a 95 per cent confidence level and in that respect, three types of positional data has been identified & surveyed (e.g. runway threshold & Navigation Aids). Geographical coordinates indicating latitude and longitude has been determined and is being placed in this report. So as to enable the aeronautical information services authority in terms of the World Geodetic System — 1984 (WGS-84) geodetic reference datum, identifying those geographical coordinates too, which have been transformed into WGS-84 coordinates.

INSTRUMENT TESTING AND CALIBRATION

- At present there is no consensus on GNSS calibration. This is because it is complex field and there are differing, valid points of view concerning what exactly needs to be calibrated and how to go about doing it. Examples of different approaches are: anechoic chambers, baselines, field testing facilities and robots.
- One common sense rule in the ISO 9001:2000 standard (chapter 7.6) concerns the control of monitoring and measuring devices. Specifically, it requires that whenever necessary to ensure valid results, measuring equipment shall be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification is to be recorded.
- “Instrument testing (ISO 17123) should not be confused with an instrument calibration. Calibration links the instrument directly to international standards. Calibration is the act of checking or adjusting by comparison with a standard or reference the accuracy of a measuring instrument. A standard or reference is an instrument or method that will measure more accurately and precisely the desired quantity than the measuring instrument itself”.

- The results of the test are influenced by several factors, such as satellite configuration visible at the points, ionospheric and tropospheric conditions, multipath environment around the points, and precision of the equipment, quality of the software running in the rover equipment or in the system generating the data transmitted from the base point.

4.4 PRACTICE ADOPTED:

- Nevertheless, there are several commonly accepted generic guidelines that can be regarded as best practice to achieve optimal measurement results. These guidelines **(ISO 17123 PART 8: GNSS Field Measurement Systems)** in Real Time Kinematic **(RTK)**, typically aim to minimize the errors associated with GNSS measurements.
- Listed below are several well known and common GNSS errors that degrade the accuracy of derived coordinates in surveying applications, have been adhered to maintain the desired accuracy with respect to **WGS-84 Manual**, during the field observations:

Multi-path and Electrical Interference,

- Obstructions,
- Ionospheric and Tropospheric influences,
- Incorrect Integer Ambiguity,
- Dilution of Precision (DOP) and Satellite Availability (SA),
- Inappropriately long Baseline Length,
- Lack of network redundancy,
- Use of poor quality or degraded benchmark and/or datum references,
- Malfunctioning equipment,
- Control over blunders and human errors due to ignorance and bad survey practice.

- Keeping the above facts in mind the following steps were adopted to calibrate the Instrument:

SPECIFICATIONS FOR GPS-BASED SURVEYING

Component Criterion

Equipment:

1. GPS receiver, antenna, firmware and software => must satisfy standard by passing calibration test.
2. **Base Receiver Configuration**
   - PDOP mask => 6
   - Elevation mask => 10 degrees
   - SNR mask => 6
   - logging interval => 5 secs
   - Minimum no of satellites => 4 (3D solution)
   - Time interval of individual base files => 1 hour
3. Rover Receiver Configuration
   - PDOP mask => 4 or 6 (depending on vegetation)
   - Elevation mask => 15 degrees
   - SNR mask => 6
   - Logging interval => 5 secs.
   - Minimum no of satellites => 4 (3D solution)
   - Minimum no of positions per occupation => 12

Calibration Test:

1. Calibration Network => At least ten calibration points must be used for calibration
2. Field Procedure => All ten points must be occupied in 3 consecutive circuits in the morning and in 3 additional circuits in the afternoon.
3. Verification of Precision => Positions for all occupations must be computed with respect to two base stations (excluding closest base station.
4. => Difference in positions processed from two (min.) baselines must be <1 meter
5. => Difference in positions from two or more occupations must be <1.4 meters
6. Test for Systematic Error (bias) => Mean position of each calibration point from two baselines and six occupations must be <1 meter different from known positions

Field Survey:

1. Pre- and Post-Survey Checks => At least two control points must be occupied
2. Multiple Occupation Test => At least I hour must be allowed between occupations
3. => Every point must be occupied at least twice

Office Computations:

1. 1. Differential Correction => At least two base stations must be used
2. 2. Reference Coordinates => Entered to 0.001" if Latitude and Longitude or to 0.01m if Easting and Northing.

=> Referenced to WGS84

=> Height above ellipsoid

3. 3. Reference Elevation => Entered to 0.1m

Tolerances:

1. Pre-Survey Control Check Processed position (mean) must be <1 meter from known position
2. Post-Survey Control Check Processed position (mean) must be <1 meter from known position
3. Multiple Baseline Test Difference in positions processed from two (min.) baselines must be <1 meter
4. Multiple Occupation Test Difference in positions from two or more occupations must be <1.4 meters.

5. SUMMARY OF SURVEYED OBJECTS

TOTAL OBJECTS SURVEYED FROM 22.08.2019 TO 27.08.2019			
TYPE OF OBJECT	COUNT	TOTAL NO. OF OBJECTS	TOTAL NO. OF OBSTACLES
BUILDINGS	102	100	2
CHIMNEY	14	11	3
CELLPHONE MAST	22	22	0
ELECTRIC POLE	123	123	0
FLOOD LIGHT	8	8	0
HILL	17	17	0
MOBILE ROAD TRAFFIC	20	20	0
OHWT	17	17	0
CONCRETE WATER TANK	2	2	0
OTHER OBJECTS	10	10	0
H.T.TOWER	66	64	2
TREES	145	132	13
TOTAL COUNT	546	526	20

6. DETAILS OF PROPOSED RUNWAY

TRUE BEARING 073°29’/253°29’

ORIENTATION RWY 07/25

RUNWAY LENGTH 1200 m x 45 m

RUNWAY STRIP 1320 m x 150 m

RWY 07
Latitude : 13° 51' 11.975" N Northing : 1531587.806
Longitude: 075° 36' 19.803" E Easting : 565430.854
Elevation: 612.54 m

Rwy 25
Latitude: 13° 51' 22.989" N Northing : 1531929.126
Longitude: 75° 36' 58.157" E Easting : 566581.289
Elevation: 624.161 m

7. OBSTACLE DETAILS

- A list showing obstacles in and around Proposed AIRPORT at SHIVAMOGGA are placed below. The detailed list of surveyed objects is enclosed as Annexure "J"

Table-A

SLNO	UID	LATITUDE	LONGITUDE	DESCRIPTION	TOP ELEVATION IN m.	INFRIGEMENT IN m.	SURFACE
1	5008	13° 51' 15.929" N	075° 36' 39.709" E	Hut	620.68	1.67	WITHIN RWY STRIP
2	5030	13° 52' 25.064" N	075° 38' 59.748" E	Building, Pole Top - 680.60 m, Grill Top - 679.09 m, Building Top - 673.28 m.	680.60	5.54	WITHIN C.S.
3	5104	13° 52' 06.465" N	075° 38' 39.523" E	Chimney Top	684.15	14.99	WITHIN I.H.S.
4	5109	13° 52' 23.064" N	075° 38' 59.306" E	Chimney Top	693.50	20.44	WITHIN C.S.
5	5110	13° 52' 23.059" N	075° 38' 59.475" E	Chimney Top	694.23	20.94	WITHIN C.S.
6	5341	13° 52' 09.700" N	075° 38' 54.120" E	H.T.Tower	670.93	1.77	WITHIN I.H.S.
7	5342	13° 52' 04.379" N	075° 39' 00.663" E	H.T.Tower	678.65	9.49	WITHIN I.H.S.
8	5410	13° 51' 14.424" N	075° 36' 39.734" E	Tree	633.18	11.10	WITHIN T.S.
9	5411	13° 51' 11.381" N	075° 36' 38.848" E	Tree	644.40	11.28	WITHIN T.S.
10	5423	13° 51' 18.641" N	075° 36' 52.999" E	Tree	624.87	0.61	WITHIN T.S.
11	5426	13° 51' 19.834" N	075° 37' 01.300" E	Tree	636.17	5.68	WITHIN T.S.
12	5427	13° 51' 25.859" N	075° 36' 58.120" E	Tree	632.99	7.42	WITHIN T.S.
13	5428	13° 51' 19.319" N	075° 36' 53.946" E	Tree	624.31	1.18	WITHIN RWY STRIP
14	5434	13° 51' 25.845" N	075° 36' 55.753" E	Group Of Trees	629.79	1.57	WITHIN T.S.
15	5435	13° 51' 24.547" N	075° 36' 54.223" E	Group Of Trees	629.01	4.74	WITHIN T.S.
16	5454	13° 51' 11.343" N	075° 36' 07.081" E	Group Of Trees	624.66	1.72	WITHIN APP. FUNNEL
17	5455	13° 51' 10.118" N	075° 36' 10.262" E	Group Of Trees	627.43	7.19	WITHIN APP. FUNNEL
18	5456	13° 51' 10.253" N	075° 36' 11.603" E	Group Of Trees	627.80	8.89	WITHIN APP. FUNNEL
19	5457	13° 51' 06.763" N	075° 36' 13.845" E	Tree	635.48	15.92	WITHIN T.S.
20	5467	13° 51' 17.839" N	075° 36' 23.495" E	Tree	625.76	0.21	WITHIN T.S.

8. CONCLUSION AND RECOMMENDATION

Development of Runway 07/25 of dimensions 1200 x 45m is feasible for operations of small aircraft under Day VFR Conditions.

However necessary action on obstacles as per table-A of this report may be undertaken by concerned authorities.

9. LIST OF CHARTS PREPARED

a. **Airport Map – Annexure ‘A’ (Attached Separately)**
b. **30 NM CHART – Annexure ‘B’ (Attached Separately)**
c. **Approach Chart 07 – Annexure ‘C’ (Attached Separately)**
d. **Approach Chart 25 – Annexure ‘D’ (Attached Separately)**
e. **Vertical Significance Chart – Annexure ‘E’ (Attached Separately)**
f. **Type A Chart RWY 07 – Annexure ‘F’ (Attached Separately)**
g. **Type A Chart RWY 25 – Annexure ‘G’ (Attached Separately)**
h. **Type B Chart – Annexure ‘H’ (Attached Separately)**
i. **Zoning Map – Annexure ‘I’ (Attached Separately)**
j. **List of Surveyed Objects - Annexure ‘J’ (Attached Separately)**
k. **Obstacle Book – Annexure ‘K’ (Attached Separately)**