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Gevgelija Aerodrome Location Selection

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Abstract: The Republic of Macedonia has two airports, the "Alexandar the Great" in Skopje and "St. Paul the Apostle" in Ohrid. For better aerodrome coverage in the southern part of the state, an aerodrome in the vicinity of Gevgelija city is necessary. In the first phase this aerodrome will be intended for sport, pilot school, sightseeing and medical urgency flights. The paper is presenting location selection process. Location must satisfy possibilities of extension runway and aerodrome.

Key words: Gevgelija aerodrome selection process, aerodrome location criteria's, aerodrome sustainable development.

1. Introduction

The City of Gevgelija has no aerodrome for general aviation. The main purpose of aerodrome is pilot school. The process of electing and testing several possible locations is based on standards and criteria which leads to election of the best aerodrome location. Using the acquired knowledge for a multidisciplinary analysis and theoretical testing, the most suitable location has been selected.

The process of determining the potential locations complies with given conditions and long term aerodrome development in accordance with the Strategy and the Physical Planning Program of the Republic of Macedonia and Municipality of Gevgelija Regional Planning.

The selection of possible locations is based on meteorological, topographic and navigation parameters, taking into consideration the geological, traffic urban and ecological conditions. The selection of the most potential location would have the most favourable conditions for development, given the determining parameters. In order to avoid the obstacles regarding the surrounding of the city, urban and regional space plans would be taken into account.

The Gevgelija aerodrome would be classified up to 800 m length of runway of the finally selected location as non-instrumental, which allows runway extension up to 1,200m length.

2. Gevgelija Aerodrome Location Selection

Having in mind the factors which influence the possible aerodrome location, the location selection will be primary elaborated considering the topographical, meteorological and navigational condition, and also urban space planning, civil engineering and geology, traffic and other conditions.

2.1 Topography

Three potential locations are taken into consideration with regard to settlements, construction condition and free state land for the Gevgelija aerodrome, designated in Fig. 1 as Lokacija 1, Lokacija 2 and Lokacija 3; further in paper as L1, L2 and L3.

Into consideration for location selection will be taken the state border, the surroundings settlement as well as the Gevgelija area amenities.

Gevgelija is located in the southeast part of Macedonia 3 km away from the Bogorodica checkpoint on the Macedonian-Greek border, with the Vardar river on the right side in a valley surrounded by the Kozuf and Pajak mountains. Gevgelija is an intermediate stop on the Skopje-Thessaloniki road, 70 km from Thessaloniki

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Fig. 1 Possible Gevgelija location for aerodrome position.

and 165km from Skopje. Due to the Aegean Sea proximity, Gevgelija has a Mediterranean climate and Mediterranean characteristics. City coordinates are 41°8′22.2’’N and 22°30′10’’E.

The Municipality of Gevgelija has total area of 483,43 km². Gevgelija is located in Valandovo valley, with Vardar hill on the east side, extending towards the Kozufmountain. The location is giving Gevgelija a very important economic, administrative and cultural significance. All three locations are flat areas which allows prepare surface with minimal excavation or infill.

2.2 Meteorology

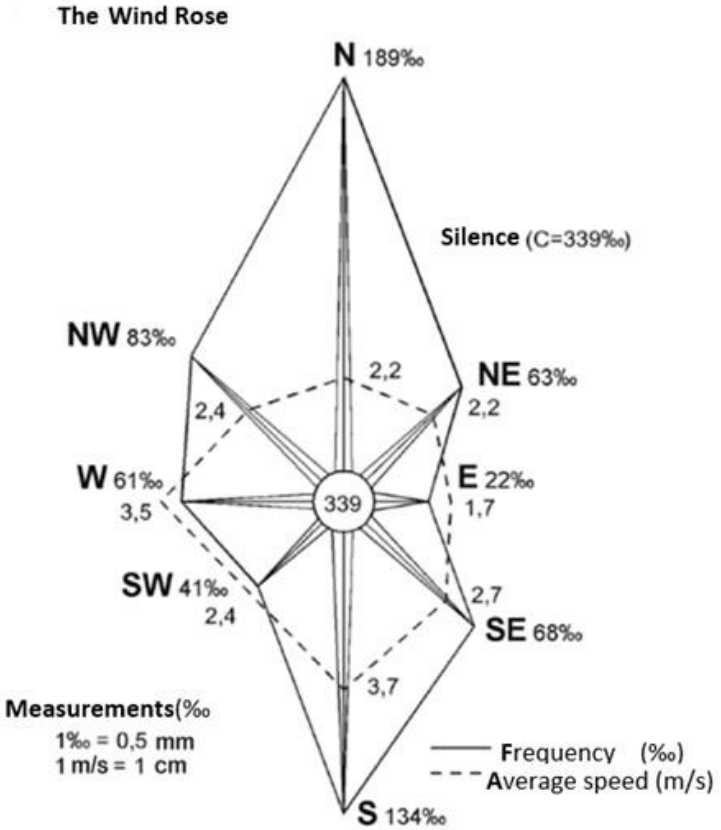
According to the wind rose northern and southern winds dominates. Other winds occur less often and with less intensity. Winds have a generally lower intensity during the summer, while during the winter, the end of autumn and early spring they are of a much greater intensity. The occurrence of storms is very rare. The maximum wind speed from the north is 15.5 m/s, from the south 18.9 m/s. Calm is approximately 33.9%, wind from north 18.9% and from south 13.4%.

2.3 Navigation

According to the navigational conditions there is no significant obstacles at the locations. The safety of air navigation in the vicinity of the aerodrome depend on obstacle limitations. Location of surrounding settlements are distanced enough and they are not under the approach and surface. If it should be any obstacles limitation it would be marked and lighted if it would be necessary according to the Annex 14, Volume 1, Chapter 6, 6.2. or 6.3.

The aerodrome boundaries include airspace height up to 4,000ft AMSL (Above Mean Sea Level) defined by the approach and departure routes to the direction of runway. All the activities which would exceed 1,500 m MSL (Mean Sea Level) flight must require competent air traffic control approval. The relative height of the school circle must be 300 m or 250 m according to the eligible amount. The Gevgelija aerodrome traffic pattern for gliders could take place on the east and west side. Aerodrome departure and following arrival procedure border points must be outside the airport zone at 850 m MSL.

Compulsory reporting points before entering the airport traffic and maintaining contact to the already established frequency are obligatory for the pilots. To perform the navigation within the airport zone would be realized by using visual navigation. The announcement



Direction	N	NE	E	SE	S	SW	W	NW	C
Frequency (‰)	189	63	22	68	134	41	61	83	339
Aver.Speed (m/s)	2,2	2,2	1,7	2,7	3,7	2,4	3,5	2,4	/
Max.Speed (m/s)	15,5	15,5	15,5	18,9	18,9	15,5	22,6	18,9	/

Fig. 2 The wind rose for Gevgelija.

of the flight approval would be carried out by the Skopje control. The pilots would be required to prepare for starting and finishing the flight operation themselves.

3. Location Selection

The selection is according to the international air traffic and common reference system. Geographical coordinates will be expressed in World Geodetic System-84 as Positional Geodetic System. For height reference the MSL system of sea level will be used.

According to the topographical, metrological and navigational conditions, and taking into consideration urban-spatial conditions, civil engineering-geological and traffic conditions location L3 is determined as most suitable.

The selected aerodrome will be intended for ultralight aircraft flights, general aviation's, helicopters, jumping, parachuting and other flight activities. Selected aerodrome location is about 100 ha area and positioned 11 km from the city of Gevgelija and 3 km from the village Prdejci, parallel to the highway and railway on the eastern side. At a distance from 2 km north is the Vardar river and on the west L3 side is the Kozuf mountain. The most suitable meteorological, topographical and navigational conditions when taken into consideration imply the most favourable location. The aerodrome location ensures safe operations conduct.

Design and aerodrome operation determined by the Annex 14 to the Convention on International Civil Aviation, volume 1, defines the planned runway threshold, centrelines and reference points coordinates.

Fig. 3 Gevgelija aerodrome location movement area.

According to the wind rose runway is situated in direction 350°-170° ensuring that aerodrome will be opened more than 95% of time because of the winds. The conditions for aerodrome reference code A1 and commercial further development fits the selected L3. The most favourable location selection satisfies for extensions and ancillary facilities.

4. Runway Physical Characteristics

Selected location for Gevgelija aerodrome has no obstacles. This aerodrome location selection is justified by the current political and social situation and air transport development.

Location is suitable for aerodrome from the topographical conditions characteristics, meteorological situation, proximity of surrounding aerodromes, facilities and other resources. All elements in the planning process need to be complied with the specifications of ICAO. Selected reference aerodrome field length is 600 m and runway land corrected length is 840 m. The runway strip with parallel taxiway and its strip would have a rectangular shape of approximately 250×900 m. Location, the MS elevation is 78 m.

According to the reference temperature (30°C) longitudinal slope (2%) and elevation (78 metres) correction of the runway length is approximately 840 m.

5. Elements of Obstacle Limitation Surfaces

Corresponding to the aerodrome reference code A1 the reference length of runway is 600 m, and the width is 18m. Compulsory runway correction length is made due to temperature, altitude and slope is 840 m. Width could be extended to 23 m in the second phase of the runway extension, according to the established ICAO regulations. Runway is designed for visual meteorological conditions.

The region as well as the city needs an aerodrome for small aircraft during the whole year. Grassed runway would be operational about 10 months. This situation implies the mostly pilot school aviation needs, while the commercial service could be provided in the future development. The potential location fulfils the conditions for an A1 aerodrome.

The location meets the requirements of the necessary conditions for further development.

In order to achieve the conditions for an aerodrome usage throughout the year, the recommendation is to expand and construct the movement area of constructive pavement. The runway and apron are connected with one longitudinal taxiway and to entry exit taxiways. For night flight activities it is necessary to equip aerodrome, and light for visual aids for navigation etc.

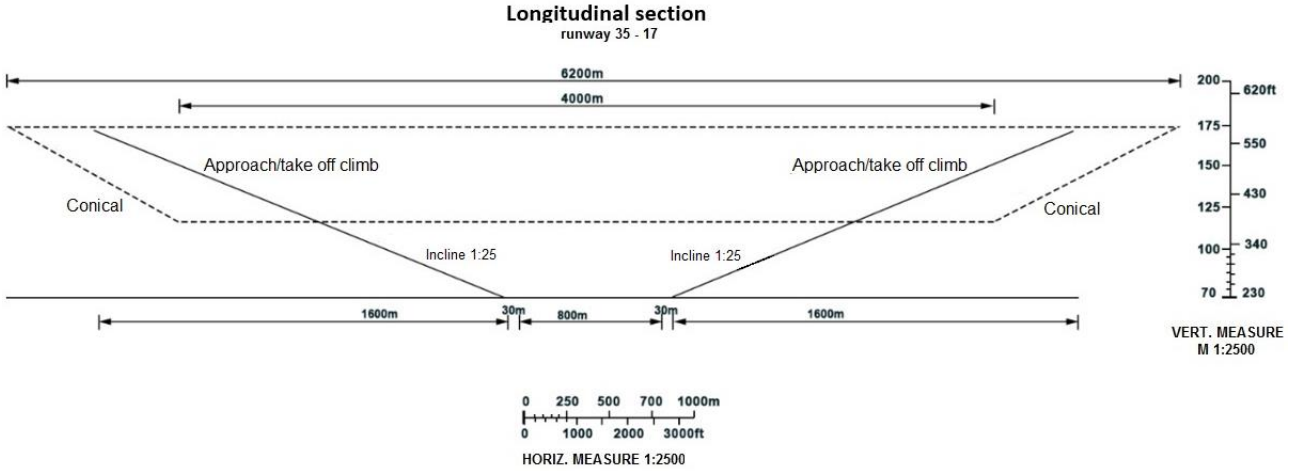


Fig. 4 Obstacles limitation surfaces, longitudinal section L3.

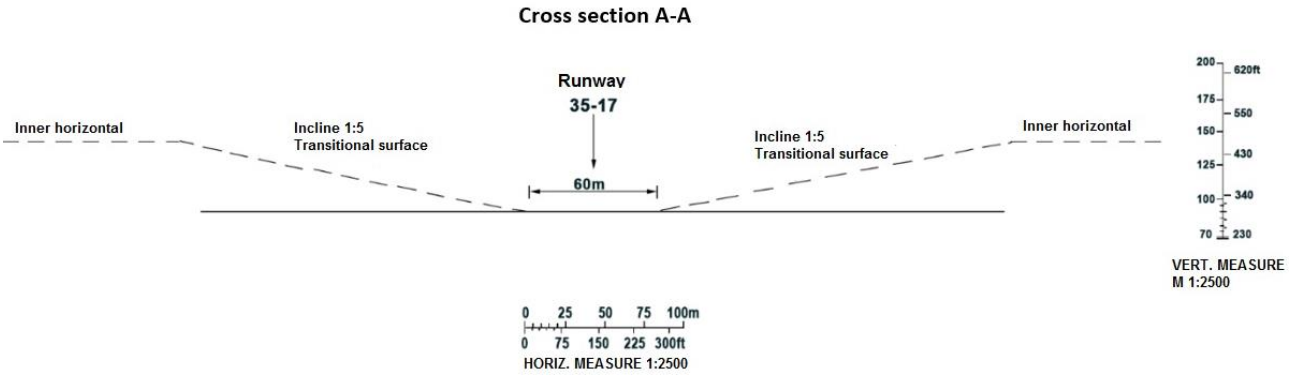


Fig. 5 Obstacles limitation surfaces, cross-section L3.

Fig. 6 Obstacles limitation surfaces of selected location, L3 floor plan.

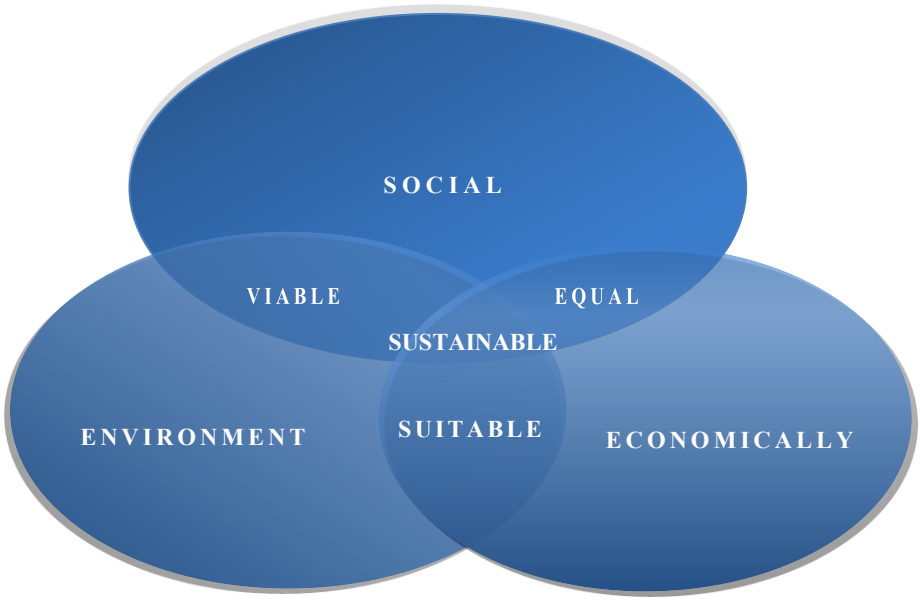


Fig. 7 Sustainable development.

6. Sustainable Development

The selection of the location for the Gevgelija aerodrome satisfies the present needs and the development possibilities of the future. The selection of the possible location is based on environmental sustainability, economic potential and socio-political needs on both the regional and national level. Ensuring the possible aerodrome development, aerodrome system sustainability and environment, the selected aerodrome location will satisfy the real present demands and anticipated future generation requirements.

Considering structural, institutional and financial consequences the selection of the location is viable, expected and tolerable. The basic requirements for determining the most favourable location are sustainable without the potential of sudden and uncontrolled collapse. The final Gevgelija aerodrome capacity depends on the already basic elements classification and aerodrome categorization. Basically, the aerodrome capacity will be determined by the runway operations (aircraft landing and take-off).

7. Conclusion

The development of air traffic and the lack of aerodrome infrastructure in the southeastern part of Macedonia leads to the question of planning an aerodrome for general aviation in the vicinity of Gevgelija city. The selected location is north of the Macedonian-Greek border. The selection process is mainly based on the conditions: topography, meteorology and navigation as well as geology, traffic, urban and ecology are also taken into consideration. The most favourable selected location satisfies the further expansion and construction off paved runway.

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