

“Feasibility Study for an airport in the South of Albania”



PREPARED BY:

**THIS IS AN UPDATED VERSION OF THE FEASIBILITY STUDY AMENDED BY THE MINISTRY OF
INFRASTRUCTURE AND ENERGY IN DECEMBER, 2019**



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1 ABSTRACT

The overall goal of the Master Plan of the Vlore airport is to describe the potential for the construction of an airport for civilian traffic in the town of Vlore.

The site of Vlore was chosen after the completion of the Feasibility Study for the South Albania Airport (FSSAA) carried out in the framework of the same assignment.

The specific objectives of the Master Plan include:

- Description of the general survey and of the visits to Vlora site
- Collection and review of the background data used for the traffic forecast and for the definition of the technical aspects
- Based on the definition of the area of influence for the suitable sites, traffic forecasts were conducted taking also into account of tourism forecast, potential and perspectives of air transport in South Albania
- According to the traffic forecast a proposed development of the Vlora airport was described in the three steps identified: 2022 (end of construction), 2026 (first step of development), 2030 (second step of development)
- Considering the features contained in the first phase of the airport development, a cost estimate of the construction was carried out for the Vlora airport

1.1 INTRODUCTION

The new Airport of Vlore will be built in accordance with applicable national and international laws, standards and regulations. Therefore provisions will be adopted for the maintenance of the safety requirements concerning flight and ground operations and, above all, for the issuance and maintenance of the airport certification.

The Master Plan was drawn up on the basis of the standards and recommendations of the ICAO Annex 14 and the Aerodrome Design Manual, and therefore the subsequent planning levels will have to verify, ascertain and adopt the international criteria for “airport certification” and for the Safety Management System (SMS)

In regard to the standards and recommendations of Annex 14, starting from the preliminary level the planning will have to accommodate some differences, of a limited extent, to take into account the Albanian national situation and the regulations and standards in force, especially in reference to the conditions of applicability, implementation and regularity of firefighting and rescue services, referring in any event to the regulation of the Fire Department, the Public Rescue Service and the Albanian Civil Defense for:

- the establishment of the firefighting and rescue service in accordance with the provisions of international and Albanian law;
- harmonizing emergency procedures at the airport with firefighting and rescue operations;
- harmonizing the functions of the license holder operator with the providing of air navigation services.

1.2 GLOSSARY OF TERMS

Friction: The phenomenon that allows the transfer of forces from a tire, while it rolls, to a paved surface. Friction is differentiated in:

- longitudinal friction
- lateral friction;

Friction is the condition in which the wheel, subject to the aforementioned forces, rolls without slipping. A quantitative measure of the phenomenon of is given by the “coefficient of friction” (μ), defined as the ratio between the tangential force necessary to maintain the uniform relative motion between two surfaces in contact (tire and pavement) and the force, normal at the surfaces, that causes the contact. The measurement of the friction coefficient is a practical method for evaluating the relative slipperiness of the pavement.

Estimated Surface Friction: This is understood as the overall verification of the “slipperiness” of the runway surface - due to the presence of contaminants and of weather conditions – made by the License Holder, for the purposes of aeronautical information, based on all the information available.

Aerodrome: A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure or surface movement of aircraft.

Aeronautical Ground Light (AGL): Any light specifically used as an aid to air navigation.

Approval: Provision by which the Autoriteti Aviacionit Civil, after the pertinent assessments have been made, formally expresses its favorable opinion regarding the Feasibility Study for the South Albania Airport.

Critical Area: An area of defined dimensions extending about the ground antennae of a precision instrument approach equipment within which the presence of vehicles or aircraft will cause unacceptable disturbance of the guidance signals.

Maneuvering Area: The part of an aerodrome used for takeoff, landing and taxiing of aircraft, excluding the aprons.

Movement Area: The part of an aerodrome used for takeoff, landing and taxiing of aircraft, consisting of the maneuvering area and the aprons.

Runway End Safety Area – RESA: An area symmetrical about the extended runway centerline and adjacent to the end of the strip primarily intended to reduce the risk of damage to an airplane undershooting or overrunning the runway

Cleared and Graded Area – CGA: That part of the Runway Strip cleared of all obstacles except for minor specified items and graded, intended to reduce the risk of damage to an aircraft running off the runway.

Sensitive Area: An area extending beyond the Critical Area where the parking or movement of aircraft or vehicles can affect the guidance signal to the extent that it may be rendered unacceptable.

Balked Landing: A landing maneuver that is interrupted due to an unexpected impediment.

Shoulder: An area adjacent to the edge of a paved surface so prepared as to provide a transition between the pavement and the adjacent surface.

Barrette: Three or more aeronautical ground lights closely spaced in a transverse line such that from a distance they appear as a short bar of light.

Braking Action: An estimate (not a measurement) by a pilot of the friction conditions and the directional control found when landing on a contaminated runway.

Ceiling: The height above the ground or water of the lowest layer of clouds below 6000 meters (20000 feet) that obscure more than one half of the sky.

Visibility Condition 1 Visibility sufficient:

- for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections with the other taxiways;
- for ATC personnel to exercise control over all traffic on the basis of visual surveillance.

Visibility Condition 2 Visibility sufficient:

- for a pilot to taxi and to avoid collision with other traffic on taxiways and at intersections with the other taxiways, but insufficient for ATC personnel to exercise control over all traffic on the basis of visual surveillance.

Visibility Condition 3 Visibility equivalent to an RVR of less than 400 meters.

Low Visibility Takeoff – LVTO: Takeoff operations from a runway with an RVR of less than 400 meters.

Low Visibility Operations: Takeoff operations with low visibility (LVTO) as well as CAT II and CAT III approaches and landings.

Aerodrome Traffic Density:

- a) Light – not greater than 15 movements per runway, or less than 20 total aerodrome movements;
- b) Medium – 16 to 25 movements per runway, or 20 to 35 total aerodrome movements;
- c) Heavy – 26 or more movements per runway, or a total of more than 35 aerodrome movements.

Declared Distances: The distances approved by the Autoriteti Aviacionit Civil for the runway of the South Albania Airport are the following:

- Takeoff Run Available – TORA: The length of the runway declared available and suitable for the takeoff run of an airplane.
- Takeoff Distance Available – TODA: The lesser distance between: 1.5 times the TORA; the sum of the TORA and of the length of the clearway, where it exists.
- Accelerate-Stop Distance Available – ASDA: The sum of the TORA and of the length of the Stopway, where it exists.

Landing Distance Available – LDA: The length of the runway declared available and suitable for the landing run of an airplane

Aerodrome Elevation: The elevation of the highest point of the landing area.

Aeronautical Beacon: A continuous or flashing aeronautical light on the ground, visible from all azimuths, that designates a specific point on the surface of the earth.

Aerodrome Beacon: An aeronautical beacon used to indicate the location of an aerodrome from aircraft in flight.

License Holder: The person, organization or enterprise entrusted, together with other activities or exclusively, with the task of administering and managing airport infrastructures and coordinating and controlling the activities of the various operators at the airport in question. The License Holder is the holder of the concession for the design, development, construction, adaptation, management, maintenance and use of airport systems, facilities and infrastructures, including the state property assigned to the airport, and the License Holder assumes the related responsibilities.

Runway Incursions: Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft.

Airplane Reference Field Length: The minimum field length required for takeoff at maximum takeoff weight, calculated at mean sea level (MSL), in standard atmosphere conditions and still air, and with zero runway slope. This length can be found in the Flight Manual or equivalent data-sheets provided by the manufacturer of the aircraft.

Frangible Object: An object of low mass designed to break, distort, or yield on impact so as to present the minimum hazard to aircraft.

Obstacle: All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

Hazard: Condition, object or activity that could be potentially harmful to air navigation or cause damage to people and vehicles.

Apron: A defined area at an aerodrome provided for the stationing of aircraft for the embarkation and disembarkation of passengers, the loading and unloading of cargo, fuelling, parking, and maintenance.

Holding Bay: A defined area where aircraft can be held or bypassed in order to facilitate the efficient ground movement of aircraft.

Aircraft Stand or Stand: A designated area on an apron to be used for parking an aircraft.

Runway: A defined rectangular area on an aerodrome prepared for the landing and takeoff of aircraft.

Dry Runway: A runway free of contaminants and visible moisture along its available length and width.

Wet Runway: A runway classified neither as dry nor as contaminated (runway whose surface is covered by a layer of water not exceeding 3 mm or on which there is sufficient moisture to make it reflective, without however significant areas of standing water).

Balanced Field Length: A runway for which the Accelerate Stop Distance Available (ASDA) is equal to the Takeoff Distance Available (TODA).

Contaminated Runway: When more than 25% of the runway surface area (also adding together several areas) within the available length and width is covered by:

- a layer of standing water more than 3 mm in depth, or slush, or loose snow equivalent to more than 3 mm of water;
- compacted snow that becomes a solid mass resistant to further compression that remains compact or breaks into pieces if collected;
- ice (including wet ice).

Non-Instrument Runway: A runway intended for the operation of aircraft using visual approach procedures.

Instrument Runway: A runway intended for the operation of aircraft using instrumental approach procedures.

1. Non Precision Approach Runway: An instrument runway served by visual and non-visual aid that provide directional guidance suitable for a direct approach.

2a Precision Approach Runway, Category I: An instrument runway served by an instrument landing system (ILS) and/or microwave landing system (MLS) intended for landing operations with a decision height (DH) not lower than 60 m (200 ft) and a runway visual range (RVR) not less than 550 m.

2b Precision Approach Runway, Category II: An instrument runway served by an instrument landing system (ILS) and/or microwave landing system (MLS) intended for landing operations with a decision height (DH) lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range (RVR) of not less than 300 m.

2c Precision Approach Runway, Category III: An instrument runway served by an instrument landing system (ILS) and/or microwave landing system (MLS) that also covers all of the length of the runway in use and intended for:

- (i) (Cat III A) operations with a decision height (DH) lower than 30 m (100 ft), or no decision height and a runway visual range (RVR) of not less than 200 m.
- (ii) (Cat III B) operations with a decision height (DH) lower than 15 m (50 ft), or no decision height and a runway visual range (RVR) less than 200 m, but not less than 50 m.

(iii) (Cat III C) intended for operations with no decision height and no runway visual range (RVR) limitation.

Damp Runway: A runway is considered as such when its surface is not dry, but the moisture is not such as to give it a shiny appearance.

Runway Holding Position: A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

- **Intermediate Holding Position:** A designated position intended for ground traffic control at which taxiing aircraft and vehicles shall stop and hold until further cleared to proceed, when so instructed by the aerodrome control tower.

Aerodrome Reference Point – ARP: The point whose geographic coordinates determine the location of the aerodrome.

- **Risk:** The possibility that an event may occur and its consequences or the possibility of loss or damage, measured in terms of severity and probability.

- **Aerodrome Identification Sign:** A sign placed on an aerodrome to aid in identifying the aerodrome from an aircraft in flight.

- **Runway Threshold:** The beginning of that portion of the runway usable for landing.

- **Displaced Threshold:** A threshold not located at the physical end of the runway.

- **Surveillance:** The activities implemented by the Autoriteti Aviacionit Civil to verify the fulfillment of the applicable requirements for the maintenance of a certification, as well as the ability of the certified organization to continuously maintain compliance with these requirements.

- **Obstacle Free Zone – OFZ:** The airspace extending upwards from the inner approach area, from the inner transition area, from the abandoned landing area and part of the Runway Strip limited by those areas, which is not penetrated by any fixed obstacles except for those required for air navigation purposes, of low mass installed on a frangible mount.

- **Runway Strip:** An area of specified dimensions including the runway and the stopway, if present, intended to reduce the risk of damage to an aircraft running off the runway and to protect aircraft flying over it when taking off or landing.

- **Taxiway Strip:** An area enclosing a taxiway and intended to protect aircraft operating on the taxiway and to reduce the risk of damage to an aircraft running off the taxiway.

- **Commercial air transport:** Traffic for transporting people or goods for profit. It therefore includes scheduled and charter air transport and air taxi service.

- **Noncommercial air transport or General Aviation:** Traffic other than commercial air transport; it basically includes the activities of flying clubs, flying schools, small private aircraft and business flying.
- **Taxiway:** A defined path on an aerodrome for the taxiing of aircraft and intended to provide a link between different areas of the aerodrome; it includes:
 - **Aircraft Stand Taxilane:** A portion of an apron designated as a taxi route intended to provide access to aircraft stands only.
 - **Apron Taxiway:** A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.
 - **Rapid Exit Taxiway:** A taxiway connected to a runway at an acute angle and designed to allow landing airplanes to turn off at higher speeds than are achieved on other exit taxiways, thereby minimizing runway occupancy times.
- **Runway Visual Range – RVR:** The maximum distance over which the pilot of an aircraft on the centerline of a runway can see the runway surface markings or the lights delineating the runway or identifying its centerline.
- **Stopway:** A defined rectangular area beyond the end of the TORA, suitably prepared and designated as an area in which an airplane can be safely brought to a stop in the event of an abandoned takeoff.
- **Clearway:** A rectangular area, on land or water, at the end of the takeoff run available and under the control of the aerodrome license holder, selected or prepared as a suitable area over which an aircraft may make a portion of its initial climb to a specified height.
- **Aerodrome Traffic Zone – ATZ:** An airspace of defined dimensions established around an aerodrome for the protection of the aerodrome air traffic.

2 BACKGROUND DATABASE AND SURVEYS

2.1 LIST OF MATERIALS, REFERENCES, PROJECTS AND DATA COLLECTED/TAKEN INTO CONSIDERATION:

- Albanian Air Code
- Regulation for certification and registration of aerodromes, under order 130 dated 09.11.2012
- International reference standards IATA, ICAO, EASA, etc
- Albanian National Transport Plan
- Transport Strategy 2016-2020
- Traffic forecast Kukës Airport, Sarandë Airport & Gjirokastër Airport (2008)
- Feasibility Study of Sarandë Airport (2004)
- Feasibility Study of Sarandë Airport (November 2002)
- Vectorial Map of Project Area (2015)
- First Five-Year Review of Albanian National Transport Plan (Antp)
 - a) Roads
 - b) Rail Transport
 - c) Maritime Transport
 - d) Air Transport
 - e) Logistics and intermodality
- Orthophoto and Level Curves
- Novosel's Geographical Study by the Army
- Archeological Service Agency
- Institute of Monuments of Culture
- General National Spatial Plan (GNSP 2015-2030)
- LATI Nav Charts
- Tirana International Airport, MasterPlan
- Instat
- Urban Plan of Gjirokastra City
- Urban Plan of Sarandë City
- Urban Plan of Vlora City
- Strategic Environmental Assessment for the National General Plan (March 2016)
- General National Plan (Map + report)

2.2 SITE INSPECTIONS IN VLORE

The December 14th, 2017 the Consultant has performed a preliminary site visit on the area of Vlore.

The January 10th, 2018, the Consultant has performed a second visit with helicopter in order to show a clearer picture of the areas for the construction of the airport. During this visit, various helicopter simulations were performed at a height of 50m.

Photos of Vlore area (Akerni)

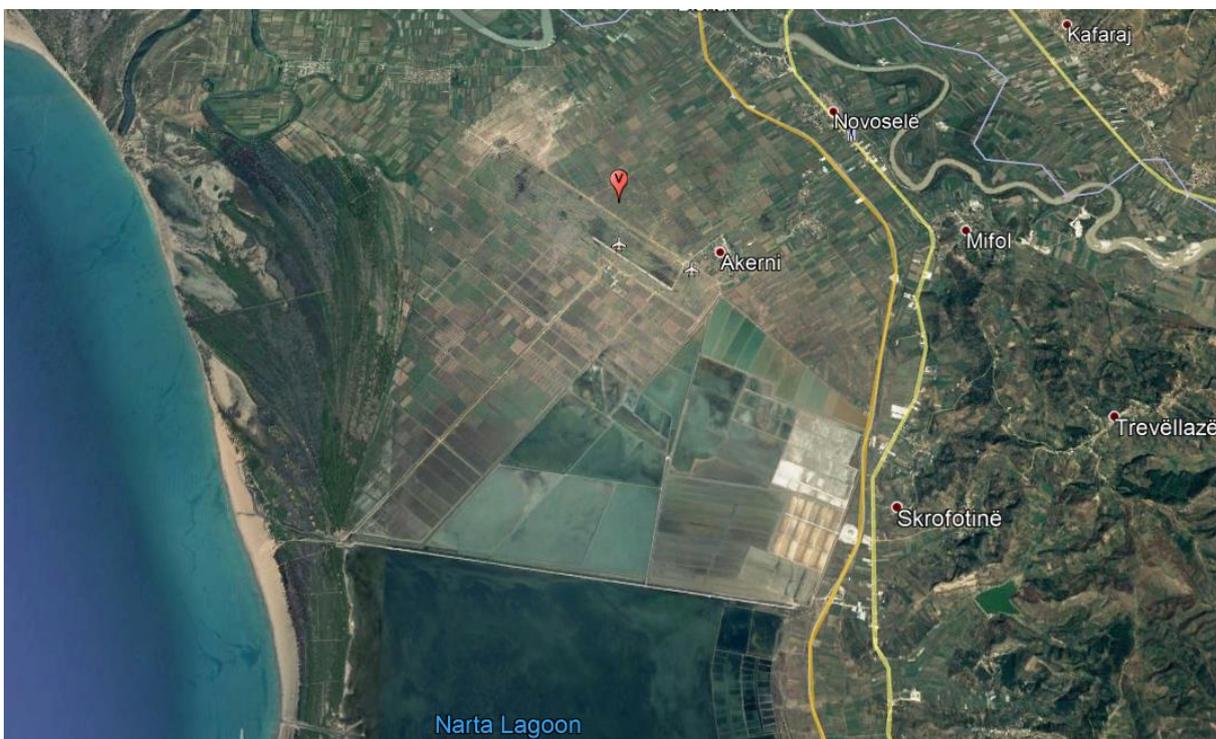


Figure 1: Location of New Airport - Vlore



Figure 2: Photo of the area where the new Airport will be built –Vlore (Phase 1)





Figure 3: Photo of the area where the new Airport will be built –Vlore (Phase 2)

2.3 URBAN PLANNING OF VLORE

Vlora Municipality is part of the Vlora District. The municipality is located about 140 km in the south of the Municipality of Tirana and about 150 km distance from the Mother Teresa Airport. In the north it is bordered by the Fier Municipality, in east with Selenica Municipality, in the south with Himara municipality and in the west stretches along the coastline of the Adriatic Sea. The capital of the municipality is the city of Vlora. According to the Census of 2011, the municipality has 104,827 inhabitants, although in the Civil Registry this municipality has a population of 194,147 inhabitants. The Municipality of Vlora has an area of 616.85 km². If the Census data is taken into account, the population density in this municipality is 169.9 inhabitants per km² and according to the Civil Registry data, the density is 314.73 inhabitants per km².

Vlora is currently the third largest and the second richest city in terms of the average income of the population in Albania. There are many constructions in the city and many projects have already been approved with the objective of transforming Vlora into an attractive tourist destination and its coastline as the center of reference throughout the country.

According to the General Plan of Vlora Municipality, the location of the new airport in Vlora is considered closer to the Novosela area, more precisely in Akërne.

The old Vlora airport, which is currently in the heart of the city, is without a suitable road network and surrounded by informal buildings.

Akërne The access road to Akërne is with a width of 5.0 m (3.5m asphalt +2 x 0.75 shoulders) unmanaged and completely amortized. The length of the road from Novosela -Akërne-Poro is 9.0 km. The length of the Fitore Road - Bishan -Poro -Delisuf is 10.5 km

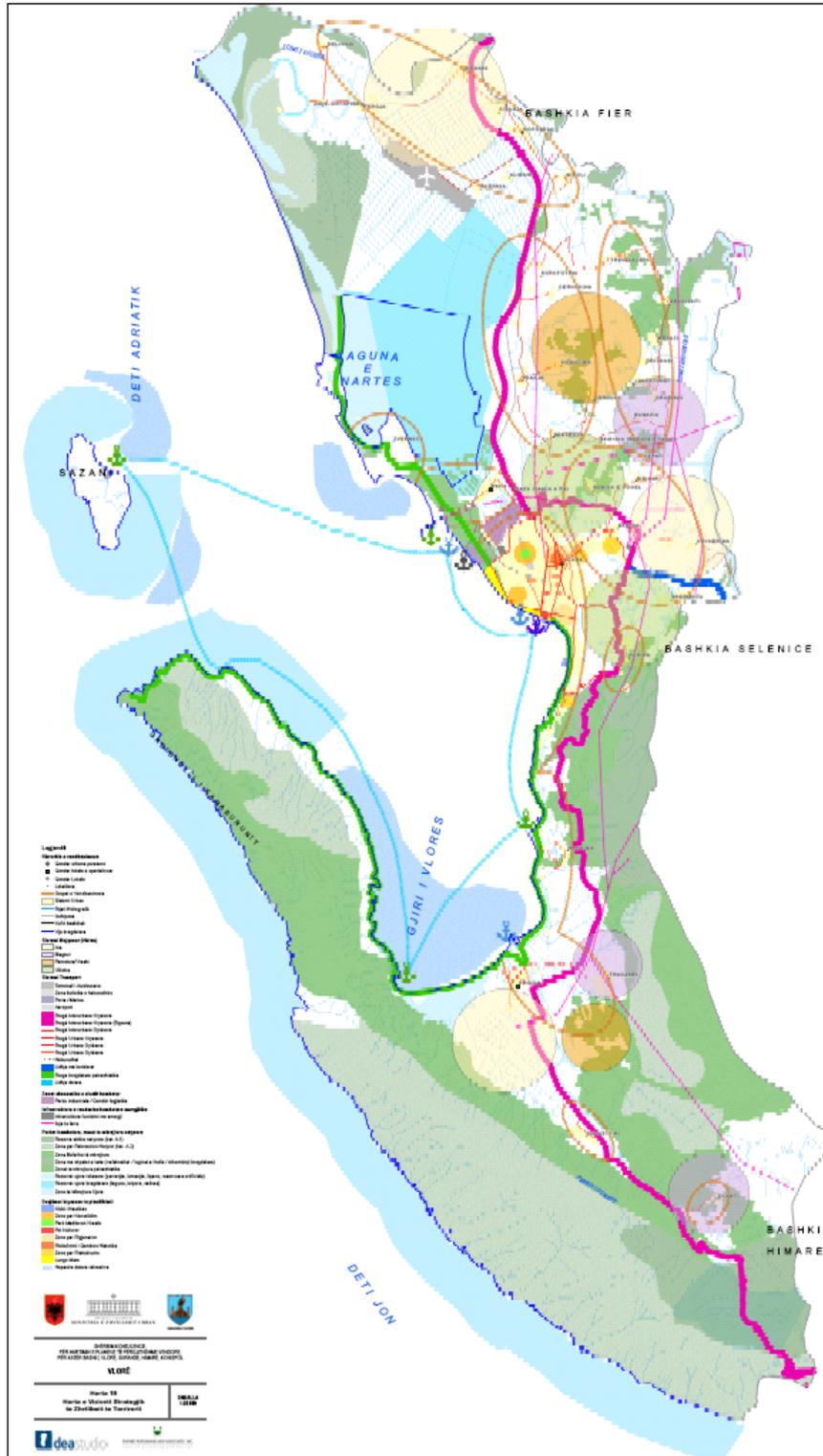


Figure 4: Map of the Territorial Development Strategic Vision

3 TRAFFIC STUDY

3.1 OBJECTIVE

Traffic forecast analysis objective is to calculate the future demand for air transportation. The traffic analysis is going to deal with the traffic forecast for the construction of the Vlora Airport.

The passenger traffic forecast will give existing and future traffic volumes. Traffic analysis is going to be based not only on the existing trends but of the market survey carried out by consultancy firm as well .

3.2 METHOTOLOGY

The demand analysis is based on the passenger and commodity volumes transported through air in Albania for the last 10 years .

The data collection process includes the following;

- Passenger interviews through survey conducted in Tirana International Airport;
- Official Statistics about the passengers using air transport in Albania;
- Typology of airlines operating at International Tirana Airport (classic, Low Cost or charter)
- Official data about Albanian Population and the catchment area of the Vlora Airport..

Some information is collected from feasibility studies and airport masterplans carried out by foreign consultancy companies as well as Albanian Institute of Transport.

3.3 DESCRIPTION OF MAIN AIRPORT IN ALBANIA

Tirana International Airport

The main Airoport in Albania is "Nene Tereza" called Rinas Airoport. Tirana International Airport is located 13 km north of Tirana and 16km from one the main Albanian Road Corridors.

Tirana Airport "Nene Tereza" is a 4E class airport with a 2735m long and 45m wide runway equipped with ILS Flight Instrumental Instrument. Critical aircraft that can use the airport are E-Code airplanes (Boing787 or Airbus A330). Today the airport is operated mainly by C- Code aircraft (Airbus 320 and 321). The apron can accommodate up to 17 C-Code aircrafts at the same time, while it is flexible to accommodate the D and E-Code aircrafts as well.

The airport is classified as Category I under ICAO and in respect of Fire Protection and Rescue Operations is Cat VII of ICAO

Tirana International Airport is constructed in 1957.

In the beginning Tirana International Airport is operating for military purposes and after 1958 its management went under the Ministry of Transport. Other airfields are used as basis for the accommodation of helicopters especially for emergency purposes. A huge development experienced air international transportation especially after the economic system changed in 1991.

The first step was the establishment of the Directorate for Civil Aviation, Air Traffic Control Center (ANTA) and in 1993 the General Directorate of Civil Aviation (DPAC).

Institutional developments in Civil Aviation after the 1990s have to do with the establishment of the General Directorate of Civil Aviation within the Transport Ministry and the establishment of the Air Traffic Control Center (ANTA). Then, in 1993, the General Directorate of Civil Aviation (DPAC) was established to return to the Civil Aviation Authority in 2010.

The first flights in year 1990 are carried out by ADA AIR – French Albanian company . In may 1992 it was Albanian airlines which started activity following international standards assisting and training technical and operational staff of the Tirana International Airport.

The main events with an impact in the development of civil aviation are the following :

2002 – 2011 Albanian Air Spatial Project (Lockheed Martin)

2004 – Albanian Government Concession to Tirana International Airport (BOOT);

2006 – Agreement on the Single European Sky;

2007 – The construction of Tirana International Airport new terminal;

2010 – Visa liberalization for Albanian citizens;

2014 – Albania candidate status to EU;

The above mentioned events have accelerated or decelerated the air passenger growth in Albania.

Kukes Airport

During 1999 the government of United Arab Emirates financed the construction of Kukes Airport. The airport is already constructed but is not in use for civil flights yet. The airport is located in Shtiqen in the south of Kukes with a distance of 6 km from its center. The runway length is about 1950 m.

3.4 ZONING

Zoning system of Albania is established in line with the existence of other socio economic data already collected by different institutions.

Many of the socio-economic data for the areas alongside the main transport corridors are at level of communes instead of other data which are at aggregated level .

In order to have a zoning system in line with previous studies conducted in Albania the consultant used the zoning system defined in the Albanian National Transport Plan II.

Review of existing documents

Many of the data are collected from the surveys. The consultant review the following studies as well.

- Review of Albanian National Transport Plan -2010
- Transport Strategy 2016-2020
- General Plan of Territory "Albania 2030" approved in 2016;
- National Strategy for Tourism Sustainable Development 2018 – 2022 (draft) January 2018;
- Law no 9312 dates 11.11.2004 "Concession agreement between Council of Ministers of Republic of Albania and Tirana Airport Partners sh.p.k for the construction operation, maintenance of Tirana International Airport.
- Law No.55/2016 for ratification of amendments to Law 9312 dated 11.11.2014 (waiver of exclusivity);
- Feasibility Study of Tirana International Airport Masterplan June 2000-SPIEKERMAN GmbH&Co
- Study "Traffic Forecast Kukes, Sarande and Gjirokaster Airport", Hochtief
- Review of Tirana International Airport Masterplan date 23 August 2015 –AviAlliance
- Data obtained from MEI, MB and INSTAT bulletins.

The study took into account the following

- Season variation of air passenger (following the monthly data collected from national statistics);
- The growth of socio - economic indicators.

Interviews with the passengers

Purpose

In order to find out the origin - destination of the trip or its purpose the consultant conducted the market survey. One of the most important question included in the interview form is about the origin/destination of the trip because together with catchment area is crucial for the calculation of passengers which will be accommodated by the new airport.

The Seed Consulting Company planned and conducted the survey during the period of time 27,28 and 2 January 2018. The interviews are carried out at the check in Area and the exit gates at Tirana International Airport.

There are 553 passengers interviewed by the staff. The following figure shows the interview form .

1 Stacioni:			Date:			Emri i Intervistuesit					
2	Kompania e Fluturimit me te cilen udhëtoni	Numri I personave qe udhëtojnë me ju	Qellimi Udhëtim	Sa here ne vit udhëtoni me avion per/nga Shqiperia	Origjina		Destinacioni		Kombesia	Vendbanimi	
					Vendi	Kodi	Vendi	Kodi			
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Airport Questionnaire

The interview form are registered manually and processed in excel afterward. Instead of names, it is inserted the code of origin and destination of the trip. The coding could facilitate the process of data filtering and calculation of different indicators.

Table 1: Zoning System

Town/City	ID	Town/City	ID
Berat	1	Vlore	36
Bulqize	2	Montenegro	37
Delvine	3	Kosovo	38
Devoll	4	Macedonia	39
Diber	5	Greece	40
Durres	6	Italy	41
Elbasan	7	Turkey	42
Fier	8	England	43
Gramsh	9	Austria	44
Gjirokaster	10	America	45
Has	11	Germany	46
Kavaje	12	Rusia	47
Kolonje	13	Nordic Countries	48
Korce	14	Afrika Veriut	49
Kruje	15	Azia	50

Kucove	16	Amerika Latine	51
Kukes	17	Irlande	52
Kurbín	18	Kanada	53
Lezhe	19	Zvicer	54
Librazhd	20	France	55
Lushnje	21	Serbi	56
Malesi e madhe	22	Ceki	57
Mallakaster	23	Ukraine	58
Mat	24	Slloveni	59
Mirdite	25	Belgjike	60
Peqin	26	Kroaci	61
Permet	27	Spanje	62
Pogradec	28	Holande	63
Puke	29	Luksemburg	64
Sarande	30	Rumania	65
Skrapar	31	Malte	66
Shkoder	32	Lindja e Mesme	67
Tepelene	33	Bosnje- Hercegovine	68
Tirana	34	Poloni	69

Catchment Area

The airport catchment area is defined as the geographic area starting from the airport, which can reasonably draw commercial air service passenger.

The catchment area of the new airport is calculated to cover the geographic area of Albanian towns/cities given in the following table.

Data collected from the survey shows that South airport can draw passengers from the towns given in the following table

Table 2: Catchment Area

Town/City	Number of Passengers
Berat	7
Delvine	0

Fier	28
Gramsh	0
Gjirokaster	7
Kucove	0
Lushnje	10
Mallakaster	0
Sarande	4
Tepelene	1
Vlore	47

Total passengers which probably use the new airport is about 15% of the total air passengers.

Survey Results

The trip purpose is a very important indicator of the feasibility report. The data shows that 75% of the trips are undertaken for tourism or visit. The following table shows the percentage of the trip by purpose.

Table 3: Concentrations across the purpose of the trip

Trip Purpose	Number	Percentage
Business	135	19%
Tourism	263	36%
Visit	284	39%
School	23	3%
Refuse	6	1%
Multiple purposes	14	2%

The question about nationality is introduced to understand the number of Albanians with Albanian or foreign citizenship visiting the country. The survey shows that about 88% of the passengers have Albanian nationality instead of 58% which are resident in Albania.

The following table gives details about the passenger nationality

Table 4: Data related to passengers by nationality

Nationality	Number	Percentage
Albanian	489	88%
Foreign	64	12%

Data about the country of residence are the following

Table 5: The data regarding the residence

Country of Residence	Number	Percentage
Albanian	319	58%
Foreign	234	42%

3.5 AIR TRAFFIC FORECAST

Air Traffic Growth is very much linked with GDP growth and population of the country. The number of tourists influences the volume of air passenger transport also.

GDP growth

The Albanian economy grew by 3.4% in 2016, driven by domestic demand. Improvements in employment and the growth of lending also increased domestic consumption. Exports contributed to 2.1 percentage points mainly affected by tourism services.

The fiscal deficit has fallen to 1.8% of GDP in 2016. In the medium to long term, the economic situation is expected to improve. GDP growth will continue to be at 3.5% levels. This growth will be mainly based on private investment growth and increased internal consumption.

Also due to economic growth and employment is expected to have a decrease in poverty level. Fiscal consolidation programs and other reforms are expected to reduce the foreign debt / GDP ratio below 60%.

The graph below shows the GDP in ALL from 2005 to 2016. As is evident from the graph, Albania has seen a steady increase in GDP with a slow down during global crisis years 2010-2013.

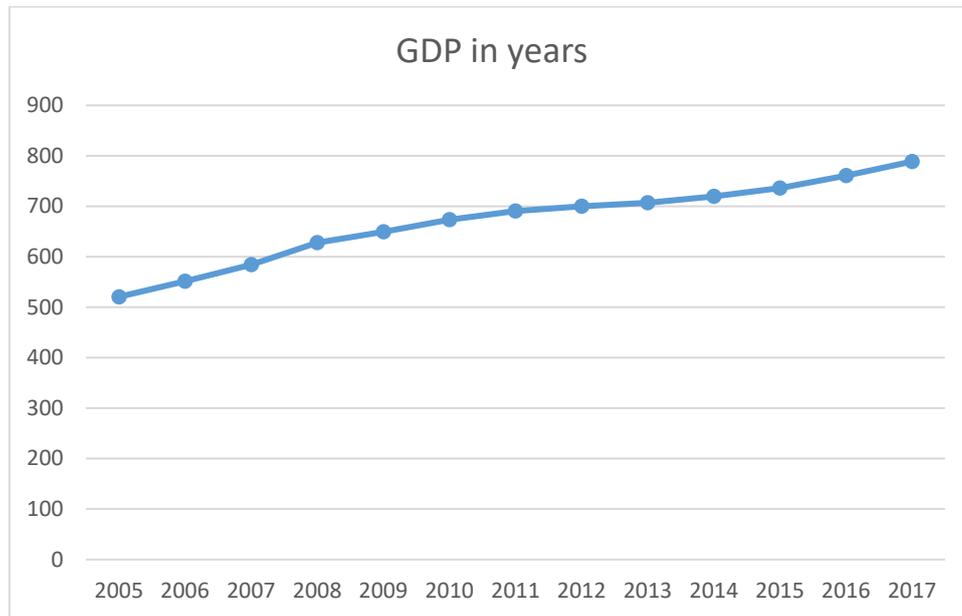


Figure 5: Graph of GDP change over the years

Monetary and World Bank Consultant has calculated the growth of GDP for upcoming years.

The table below gives GDP forecast for project years.

Table 6: GDP growth in percentage

GDP	Years		
	2019-2028	2028-2038	2038-2048
GDP growth	4%	4%	3.0%

Number of passengers in air transport

The number of passengers in air transport has always been increasing. Compared with other transport sectors, passenger air transport has had the largest growth rates in Albania.

The number of passengers using air transport has increased from 784,000 in 2005 to 2,630,000 in 2017. The average growth rates of passenger air traffic for 2005 to 2017 by about 11% per year

The chart below shows the performance of passenger air traffic growth for the years 2005-2017.

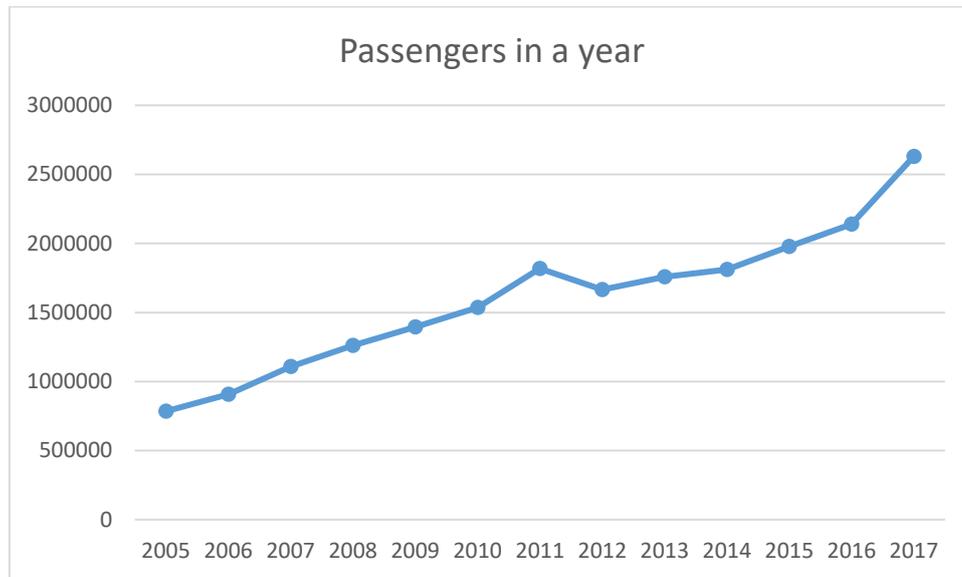


Figure 6: Air Traffic Growth for 2005-2017

A major impact on the increase of passenger air traffic was Albanian emigration and visa liberalization with the European community. About 30% of Albania's population lives outside its borders making it necessary and feasible from the financial point of view to travel to Albania by using air transport.

However, the number of trips using air traffic in Albania is low compared to other European countries. Currently, the number of trips (roundtrips) from and to Albania for residents is 0.29 while developed countries have about 1.5-2 trips per inhabitant which is a clear indication of the air passenger growth in the upcoming years.

Albania candidate status to EU together with the growth of Albanian economy will bring higher passenger and commodity volumes from/to Albania increasing the traffic volumes as well.

Population of Albania

The population of Albania is about 2 876 591. The data on population obtained from INSTAT show that the number of the population in Albania does not increase as in the 1990s but has reached an equilibrium. Looking at the years 2013-2017 we see that the population has not changed much in many years. The table below gives the number of inhabitants in Albania for the years 2013-2017.

Table 7: Number of inhabitants

	2013	2014	2015	2016	2017
Population	2,897,770	2,892,394	2,885,796	2,875,592	2,876,591

However, the population that is within the catchment area of the new airport are the districts of Berat, Fier, Vlore. The population of these counties accounts for 22% of the population of Albania.

Table 8: Population within the coverage area

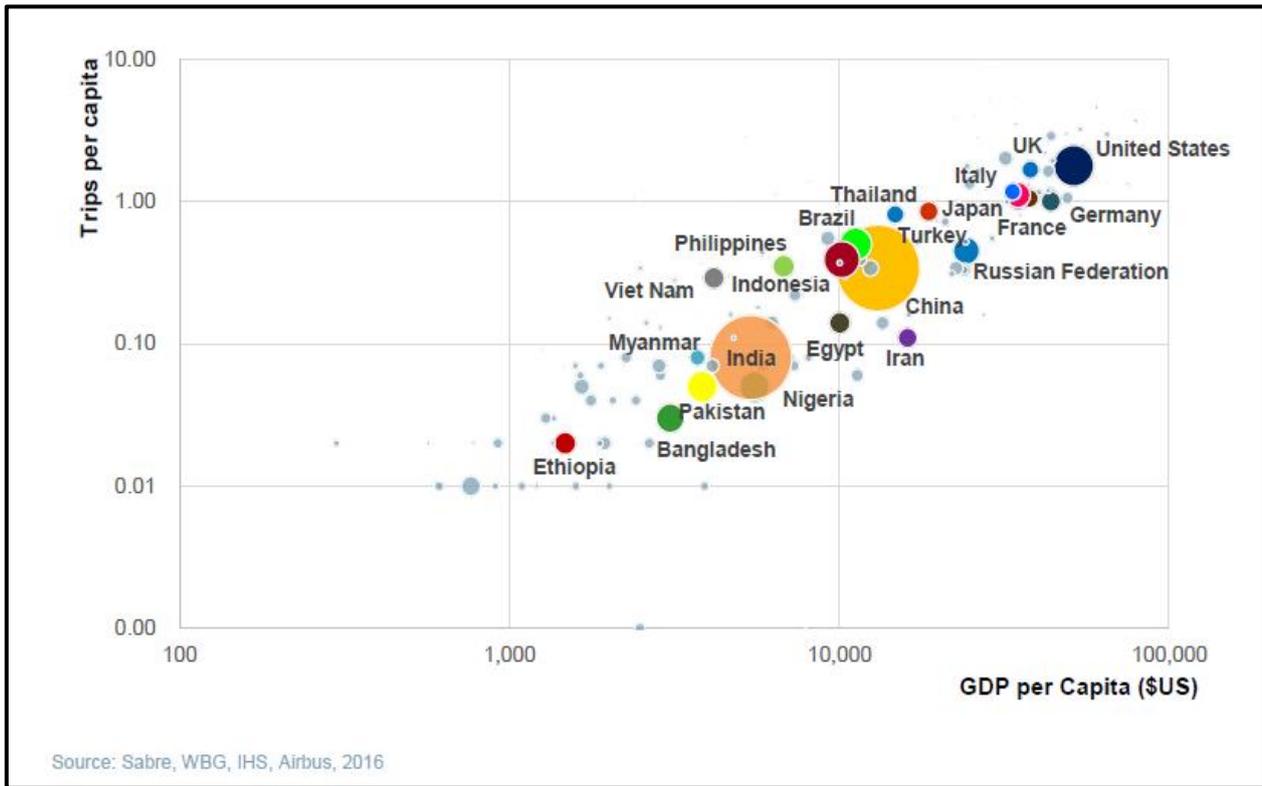
County / Prefecture	2017		
	M	F	MF
Berat	67,397	64,545	131,942
Dibër	65,742	59,837	125,579
Durrës	145,390	139,433	284,823
Elbasan	144,258	139,564	283,822
Fier	155,524	146,983	302,507
Gjirokastrë	33,191	32,748	65,939
Korçë	108,337	105,984	214,321
Kukës	40,925	38,634	79,559
Lezhë	65,642	63,377	129,019
Shkodër	103,370	104,554	207,924
Tiranë	427,915	434,446	862,361
Vlorë	95,850	92,945	188,795
Total	1,453,541	1,423,050	2,876,591

The consultant's prediction about the population pertains to one of the scenarios that the Institute of Statistics has calculated regarding the latter. Based on this scenario, the prediction of the Albanian population will not increase or decrease dramatically. In the short term, emigration will be an important economic source but on the other hand will increase the population that will return from emigration to reside temporarily or for longer periods in Albania.

International experience

International experience has shown that there is a close link between GDP growth, population growth and passenger air traffic growth. It is very important to note that in the study for the airport the forecast of traffic is made on the basis of GDP growth while the population is considered a constant variable.

To understand how much it is related to GDP growth with the increase in air passenger tariff is given the chart below, which is based on data from different countries with GDP per capita. Looking at the graph, it is evident that there is a correlation between the GDP and consequently the GDP per capita with the number of air passenger.



The Albanian experience has proved the same phenomenon. With GDP growth, there is an immediate increase in the number of air passengers.

This is reflected in the chart below which is based on the data base of GDP and the number of passengers per year.

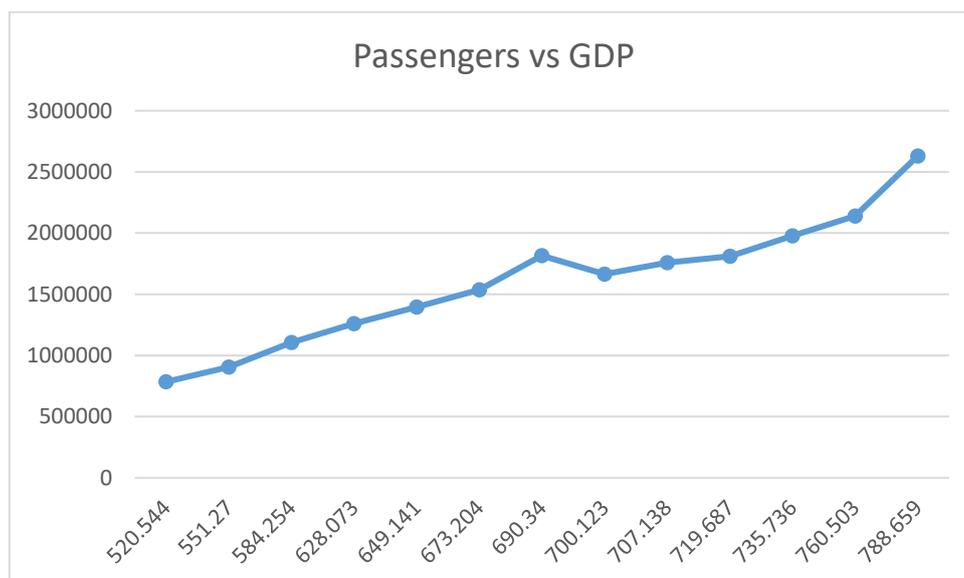


Figure 7: Passenger Growth in function of GDP growth

The consultant has calculated the linear regression coefficient of increasing the number of passengers depending on the GDP growth of Albania. Experience so far has led to annual GDP growth of around 3.5% a year, while the number of air transport passengers increased by 10.6% a year. So, as seen from passenger numbers, it is about 3 times the GDP growth of Albania.

Passenger Traffic Forecasting

The forecast of foreign and domestic passenger traffic that will use air transport is principally based on the forecast of GDP growth. The consultant prepared different passenger traffic growth scenarios. The scenarios are defined as base case, optimistic and pessimistic one.

Those scenarios have taken into consideration the specific situation in Albania:

- Removal of the market limitations by the review of the former Concession Agreement of TIA Airport;
- The touristic potential of the South of Albania and the Tourism Strategy of Albania;
- The increase of the passenger figures at TIA airport beyond the forecast of 2015 Master Plan;
- The low-cost capacity potential for Albania

The **Base case scenario** has normally followed the passenger trends in Albania where the increase of the passenger traffic is beyond the expectations and forecast

The **Optimistic scenario** has considered all the above on the positive way by assuming the response of the touristic accommodation structures in the south of Albania and the attraction of the low-cost companies due to the incentive policies of the new airport. The saturation of the TIA will also direct a good part of the increasing demand for charter flights to the new airport location.

On the other side, the pessimistic **scenario** has considered the absence of the necessary touristic accommodation on the same place with the touristic demand in the area. The pessimistic scenario also takes into consideration any slow down on the passenger growth.

The correlation coefficient of GDP with passenger growth rates is given in the following table :

Table 9 : The correlation coefficient according scenarios

Scenario	Years		
	2019-2028	2029-2038	2039-2048
Base Scenario	2.0	2.0	1.8
Optimistic Scenario	3	2	1.8
Pessimistic Scenario	1.5	1.5	1.0

Following the “base scenario” GDP correlation coefficient with passenger growth rates is projected to be 2. Based on these forecasts, traffic growth for the first 10 years will be 7.9% while in the other two decades it is projected to be 7% and 5.4%, respectively. The following table provides the forecast of correlation coefficients and the GDP growth forecast over the years.

Table 10 : Forecast of Correlation Coefficients and GDP Growth

Indicators	Years		
	2019-2028	2028-2038	2038-2048
GDP growth	4%	3.5%	3.0%
Correlation coefficient	2	2	1.8
Passenger growth	7.9%	7.0%	5.4%

While the number of foreign and domestic passengers that will use air traffic in “base scenario” is given in the table below. The predictions of the number of passengers will increase by 2.8 million in 2019 to 18 million in 2048 whereas in the optimistic scenario the number of passengers is foreseen to be 26 million and in the pessimistic one around 10 million.

Table 11: Increasing the number of passengers per year

Scenario	2019	2028	2038	2048
Base Scenario	2,828,665	5,626,287	11,067,759	18,726,896
Optimistic Scenario	2,927,829	8,060,516	15,856,256	26,829,140
Pessimistic Scenario	2,779,084	4,677,286	7,802,162	10,485,453

In an optimistic case it is assumed that the number of trips per inhabitant will increase from 0.29 to 2.2 in 2048 comparable to the level of European developed countries.

New Airport Traffic Forecast

To make forecasting of new airport passenger traffic, the consultant has analyzed the monthly variation of passenger traffic for 2016 - 2017. If we look at the graph it is understood that the months of June, July, August and September are the months that have the highest number of passengers or the months that tourists come to Albania.

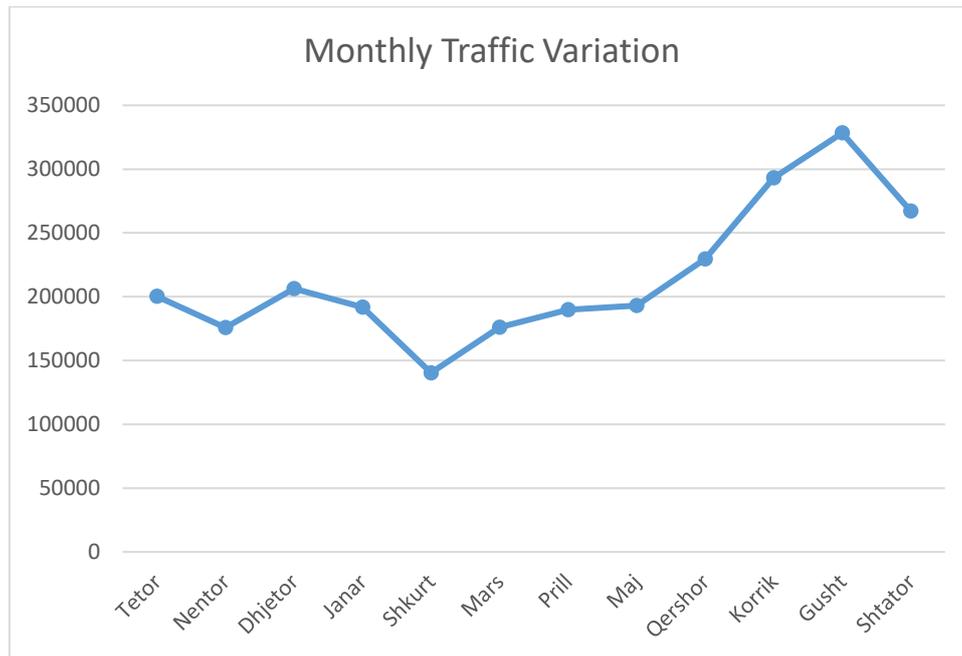


Figure 8: Monthly Traffic Variation

During the summer period, peak season, the number of passengers is about 1,334 thousand passengers with a monthly average of 266 thousand passengers, while in the rest of the year, the cooler period (fall-winter-spring) the number of passengers reaches 1,473 thousand.

Table 12 : Number of passengers during different periods of the year

Summer period	Total	Average
Summer period	1,334,091.00	266,8180
Winter period	1,473,173.00	184,1463
Difference		82,6718

The difference from 82,671 passengers for the summer months are tourists, one percent of which is anticipated to be frequented by the southern Albania area from Vlora to Saranda.

Based on the interviews made about 15% of the passengers are from the catchment area of the new airport. However, the Vlora airport consultant has assumed that only half of them will use the Vlora airport. Regarding the considered touristic passengers, we predict that around 20% of them will use the Vlora airport .

The following table gives each airport the percentage of passengers expected to be accommodated by these airports.

Table 13: Percentage of passengers expected to be accommodated by these airports

Period	Vlora Airport	
	Percentage	Passengers
Passenger Winter Period	8%	117,854
Passenger Summer Period	8%	73,659
Tourist Summer Period	20%	82,672

Based on GDP growth, number of passengers and catchment area at airport, the consultant has calculated the number of passengers expected to be used in the case of the construction of the airports of Vlora,

The following table gives the traffic forecast for the airport. It is worth mentioning that the construction period of the airport is 3 years while in the fourth the authority will prepare the procedures and certify the airport security. The airport is foreseen to be in full operation on the fifth year.

Table 14: Traffic forecast

Years	Base scenario	Optimistic Scenario	Pesimistic Scenario
	Airport Vlores	Airport Vlores	Airport Vlores
2022	369,581	425,682	343,708
2023	399,148	476,764	364,330
2024	431,080	533,976	386,190
2025	465,566	598,053	409,361
2026	502,811	669,819	433,923
2027	543,036	750,197	459,959
2028	586,479	840,221	487,556
2029	627,533	899,036	513,153
2030	671,460	961,969	540,093
2031	718,462	1,029,307	568,448
2032	768,755	1,101,358	598,292
2033	822,567	1,178,453	629,702
2034	880,147	1,260,945	662,761
2035	941,757	1,349,211	697,556
2036	1,007,680	1,443,656	734,178
2037	1,078,218	1,544,712	772,722
2038	1,153,693	1,652,842	813,290
2039	1,215,993	1,742,095	837,689
2040	1,281,656	1,836,168	862,820
2041	1,350,866	1,935,322	888,704
2042	1,423,812	2,039,829	915,365
2043	1,500,698	2,149,980	942,826
2044	1,581,736	2,266,079	971,111
2045	1,667,150	2,388,447	1,000,244
2046	1,757,176	2,517,423	1,030,252
2047	1,852,063	2,653,364	1,061,159
2048	1,952,075	2,796,645	1,092,994

4 ENVIRONMENTAL ASPECTS

4.1 PURPOSE OF EIA AND APPLIED METHODOLOGY

General Considerations

Based on Law No.10440, dated 7.7. 2011 "On Environmental Impact Assessment", appendix I, item 7; letter b; "Construction of airports with a base length of 2200 m or more of the runway " is subject to a detailed procedure of Environmental Impact Assessment.

The purpose of drafting the EIA is to provide information to decision-makers and the public on the environmental consequences during implementation of the proposed project in order to promote development that respects environmental protection by identifying appropriate prevention and mitigating measures.

Note: Please find attached a separate annex for environmental aspects.

The main objective of the EIA is to identify the potential negative environmental impacts of the proposed project. The EIA process takes into consideration:

- Analysis of location alternatives and respective environmental impacts;
- To improve the environmental proposal plan;
- To ensure that resources are used properly and efficiently;
- To identify appropriate measures to mitigate potential impact of the project;
- To establish conditions for construction;
- To help decision-making and public information.

The Environmental and Social Impact Assessment Report based on the purpose of the proposed project is designed taking into account the most important environmental issues, including the environmental receptors identified in the feasibility study phase, of which the most important ones can be mentioned :

- To provide information on the location of the proposed project and analyze the environmental features;
- To provide information on the technical project, for the pre-construction phase, construction and its duration.
- To assess potential impacts on the surrounding environment and the residents of the project area;
- To describe the measures for reducing or avoiding the analyzed impacts;
- To develop an environmental monitoring plan to keep impacts under control;
- To give needed information for the project implementation for local institutions, community and other interested groups;

- Conclusions and recommendations on the importance of the project regarding negative and positive impacts as well as its social significance.

EIA Scope of Work and Methodology for the Proposed Project

Drafting of the ESIA report is done in the framework of fulfilling the legal obligations according to Law no. 10440, dated 07.07.2011 "On Environmental Impact Assessment", for projects that require a study of environmental impact assessment, since at the stage of feasibility study.

Upon approval of this project and the announcement of the winning company for the construction of the airport, this EIA report will be subject to other application procedures until obtaining the Environmental Declaration from NEA, including a series of public consultations to be conducted in the framework of this application.

The main objective of EIA is to outline possible environmental and social impacts, to present mitigation measures for the reduction of identified impacts and to draft a monitoring plan as one of the conditions for ongoing follow-up and monitoring of the main environmental indicators.

Methodology Followed on ESIA's Drafting

The methodology followed for drafting the environmental impact assessment is based on the criteria and standards according to DCM No. 912, dated 11.11.2015 "On the Approval of the National Methodology of the Environmental Impact Assessment Process", which describes the stages to be followed for the application and development of the detailed ESIA's procedure as well as a checklist that includes the relevant information that should contain the preliminary or detailed ESIA report.

The procedure followed for drafting environmental and social impact assessment is based on DCM No. 686, dated 29.07.2015 "On the Approval of Rules, Responsibilities and Deadlines for the Development of the Environmental Impact Assessment Procedure (EIA) and the Decision Transmission Procedure of the Environmental Statement;

There are five stages on developing an EIA procedure:

- Phase 1, announcement by developer for intent to initiate the procedures for a detailed ESIA;
- Phase 2, consultation with NEA ,the ministry, other institutions, public and NGOs on the issues they seek to address in the detailed ESIA report;
- Phase3, NEA's communication with the developer on issues that it and the consulted parties seek to address in the in-depth ESIA report;
- Phase 4, drafting of detailed EIA report from developer and public hearings consultations,
- Phase 5, application for environmental statement ,drafting and signing of environmental statement.

EIA Category of Proposed Project

Based on the law No. 10440 "On Environmental Impact Assessment "; article 9, this project requires "Detailed Environmental Impact Assessment", referred to Annex 1; point 7 /letter b) "Construction of runway airports with a base length of 2100 m or more". **In the sense of this Law, "airport" means airports which comply with the definition given in the Chicago Convention of 1944 establishing the International Civil Aviation Organization (Annex 14 to this Convention).**

4.2 EXISTING ENVIRONMENTAL CONDITIONS FOR THE PROJECT AREA

General Considerations on The Existing Situation of Environment in the Project Area

Overview of the location of the proposed airport in Vlora

The location of the new airport proposed for the South of Albania lies at the former Mifoli military airport near the village of Akerni, Novosele, Vlore. The proposed location for the new airport is located near the Narta Lagoon, Vlora's Salt Lake and the Vjosa river. On the south side it borders on the Narta Lagoon about 5 km from the protected natural landscape. The west side is bordered by the coastline about 6.4 km away. On the eastern side about 200 m away, there are several houses built recently, after the closure of the airport ('98-99), while the village center of "Akerni" is located about 500 m from the nearest point of the perimeter of the former Mifoli airport area. About 3 km away in the southeast direction are the salt fields. On the north side it is bordered by the Vjosa river which is 3.5. km away, while Vjosa delta is about 10 km away.

Major water resources in the Project Area

General considerations

The proposed location for the construction of the South Albanian Airport is part of the Vjosa's basin. Water resources in the project area are not affected by industrial releases or inherited environmental contamination. The only factor for contamination of water quality is untreated sewage discharged including septic pits.

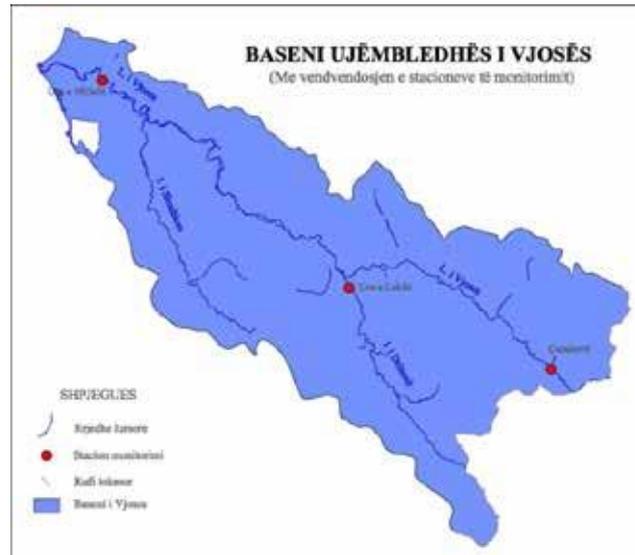


Figure 9: Vjosa Catchment Basin

Drino Aquifer $Q = 90 - 110 \text{ l/s}$

Usage coefficient $K = 0.4 - 0.5$

Kafaraj Aquifer $Q=700 \text{ l/sec}$, Usage coefficient $K=0.4 - 0.5$

Novosela Aquifer $Q=720 \text{ l/sec}$, Usage coefficient $K=0.5 - 0.7$

The total amount of water currently used is about $90 - 110 \text{ l / sec}$ in Buduk, Gjirokastra area. There are 700 l / sec in Kafaraj. In Novoselë, $Q = 720 \text{ l / sec}$. The usage coefficient varies from $K = 0.5$ to 0.7 .

Water quality assessment is regularly monitored by the National Environment Agency. Based on the environmental quality report, the quality of the Drino and Vjosa basin results in a good quality category.

Water quality monitoring is based on Water for rivers and lakes law, and on DCM No 177 dated. 31.03.2005 - "Allowed levels of urban discharges from sewage treatment plants for coastal areas."

According to this Directive, river waters are classified into five classes, where moderate state or third class is considered to be the minimum acceptable level category of the quality of river waters.

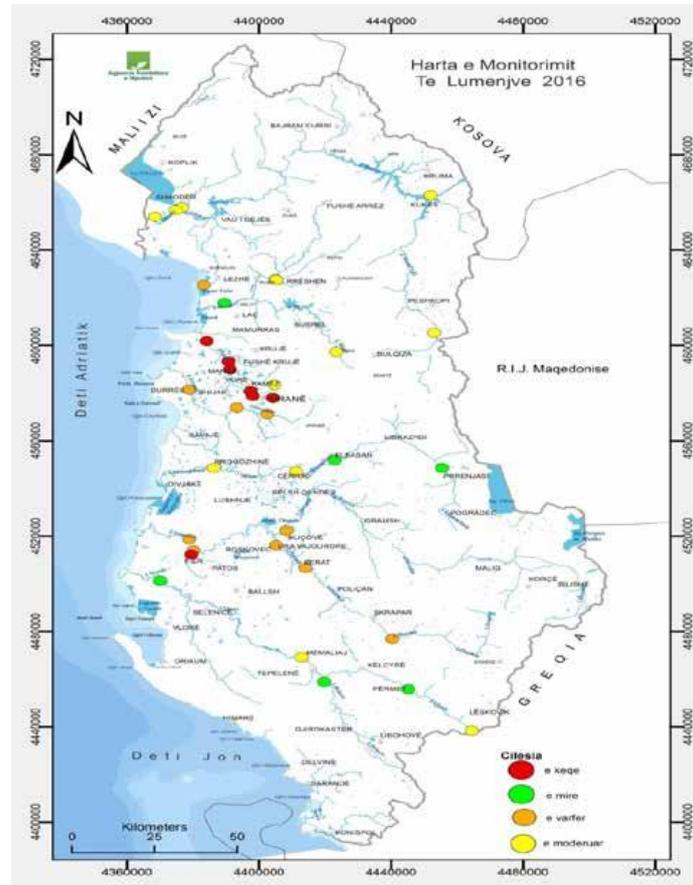


Figure 10: Surface water quality

River waters are evaluated with an alkaline pH of from 7.5 to 8.5 and within the allowed range (<8.5).

The table below shows the basin quality classification for 2016:

Cilësia	Baseni Drini - Bunë	Baseni Ishëm - Erzen	Baseni i Shkumbinit	Baseni i Semanit	Baseni i Vjoses	Baseni i Matit
Klasa I – Gjendje e larte						
Klasa II – Gjendje e mire					II	
Klasa III – Gjendje e moderuar			III			III
Klasa IV – Gjendje e varfer	IV					
Klasa V – Gjendje e keqe		V		V		

Table 15: Basin Water Quality for 2016

The pollution risk is moderate, favoring are the natural conditions of aquifer horizons in the screened depths between them and clay layers. The only surface source of pollution can be the Vjosa river.

Vjosa and Drinosi due to limestone precipitation in their watershed are among the less erosive rivers of Albania. Its stiff flow rate reaches 212 kg / sec, average turbidity 1087 gr / m³ and annual 997 ton / km alluvium module. The Vjosa and Drinos streams have a mean mineralization of 335 mg / lit and 286 mg / lit respectively.

In the region there are some of the largest karst water resources in our country, such as the resources of Viro, Libohova, Këlcyra and Cold Water in Tepelenë. In addition to these resources, there are many smaller ones as well as dozens of streams and rivers flowing into the River Vjosa and Drinos. They continually serve as their feeder.

The largest streams, streams and rivers have in periods of rainfall and in the months when snow blows. The latter enriches the region's hydrographic network. The relief is typically mountainous. Rises, such as mountainous and hilly ones, preserve the overall Albanian orientation from the Southeast to the Northwest. In the mountainous relief are distinguished the high necks, with regular erosion forms, which represent natural monuments with geoscientific values. The climate in the region we study is typical Mediterranean with hot summers and cold winters, with the exception of the Kalivaçi area up to the Mifoli Bridge which is characterized by a hot summers and winters without snow. In this region fall 1700-1800 mm of rain per year.

The Vjosa Basin where the project area is also referred to, referring to the average monitoring values classifies in good condition - Class II¹.

4.2.1.1 The quality of underground water resources in the project area

Based on the data of the Environmental Status Report 2016¹, NEA, we are presenting the status of water quality for the monitored points.

Basin	Location	pH	Na	Ca	Mg	Fe	NH4	Cl	SO4	NO3	No2	Mp	Mth	Fp	Water assessment	Evaluation
Vjosa	St Gjrokaster Buduk	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	Very good physical and chemical properties	😊
	St.B Budrisht – Gjrokaster	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	Very good physical and chemical properties	😊
	Vanister	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	😊	Very good physical and chemical properties	😊
	St.Novosele	😊	😊	😊	😬	😊	😊	😊	😊	😊	😊	😊	😊	😊	Very good physical chemical properties with increasing tendency Mg.	😬

Table 16: Water quality at the Vjosa basin

😊 Value within the norms 😬 High values over the norm 😡 Very high values over the norm

¹ Environmental Report 2016 NEA

-  Value within the norms
-  Good quality
-  Moderate quality
-  Bad quality

Code	Stacionet	Class O ₂	Class NBO ₅	Class NH ₄	Class NO ₂	Class NO ₃	Class P-total	Basin 2016
Vj3	Drino river, Lekli Bridge	 I	 II	 I	 I	 I	 I	 III
VJ5	Mifoli Bridge	 I	 III	 I	 I	 I	 III	

Table 17: Water quality at the Vjosa basin

➤ **Problems appearing on Vjosa and Drino rivers**

- Landing due to end erosion in some of its sectors.
- Erosion of agricultural land and coasts in certain sectors such as Lazarat, Palokastra, Subash Bridge and Virua of the Drino river and Frakull, Trevellazën, Mifol, Varibob, Bishan, of Vjosa river, etc.
- Damage and demolition of engineering objects such as bridges protective works and embankments (Drinos-Odrie segments, Hekal-Selishte-Hambar, Mifolit-Ada bridge), motorways etc.
- Degradation of the flow channel structure in certain sectors, especially in Drino river.
- Flooding mainly in the downstream stream of Vjosa river.
- Inert and urban pollution in river bed, bacterial contamination of water, visual pollution, damage to the river landscape and vegetation of the river bed, damage to aquatic fauna, etc. mainly in the Drino River

Water resources near the proposed airport in Vlora

The water resources near the projected area of the project are the Vjosa River, the Narta Lagoon and the Adriatic coastline.

The project area is distanced from the banks of the Vjosa River and the Narta Lagoon from 4 to 5 km respectively.

Recommendations:

The construction and operation of the airport is not expected to have an impact on the quality of groundwater or surface water, not only due to the distance from the project area but also to the project's own characteristics. During the construction phase it may be expected to have an impact on the increase in turbulence rainwater in contact with the construction site, which joins the surface waters of nearby drainage channels or rivers. This is a temporary and well-managed impact with the protective measures applied by the contractor.

The implementation phase of the project is not expected to have an impact on water quality. The waste water will be managed through a regular sewerage system and sewage treatment prior to their discharge.

The city of Vlora has a sewage treatment plant. Gjirokastra has no improper treatment of sewage.

The plant that collects the polluted waters of the Sarandë and Ksamil areas is designed for a population of 70,000 inhabitants and has a capacity of 12,240 m³ / day. In many villages and units like Metek, Shelegar, etc., as well as in the informal areas of the city of Saranda, we have the use of septic tanks. In Cuke the sewage treatment plant has begun construction in the area of Cuka².

Usage of Land in the Project Area

General Considerations

According to the National Land Classification System (SKKT), the lands are divided into four descent based on climate change, natural vegetation, altitude, slope, soil formation factors and their physical and chemical characteristics³

Land Dissemination⁴:

- Subalpine pasture ranges between 1,600-2,700 m
- Beech and pine forests ranging from 1,000 to 1,600 m
- The oak forest range 600-1,000 m high
- Mediterranean shrub to 0-600 m height

The above descent show the distribution of lands, which follows a rule followed by height and vegetation. These soils are called zonal soils. Their characteristics are related to the fact that their formation has occurred in specific biological, geological, topographical and climatic conditions and their location is well-defined by altitude. The lands of one descent are not found in any other descent.

² PPV Saranda 2016(General Local Plan)

³ Zdruli & Lushaj, "Overview of soil information and soil protection in Albania" (ppt)

⁴ Zdruli & Lushaj, 2001.

In areas where land formation is not simply related to natural vegetation and altitude, the land is considered azonal and includes lands of alluvial origin, powdery, salt and undeveloped or primitive lands. They can be found throughout the descent of the aforementioned lands.

According to the territorial classification of land, rough lands include about 50% of all land, clayey lands about 30%, and sandy lands include 20%.

As far as their depths are concerned, the lands differ in:

- Deep lands dominating flat coastal areas.
- Surface soil that dominates in hilly and mountainous areas.

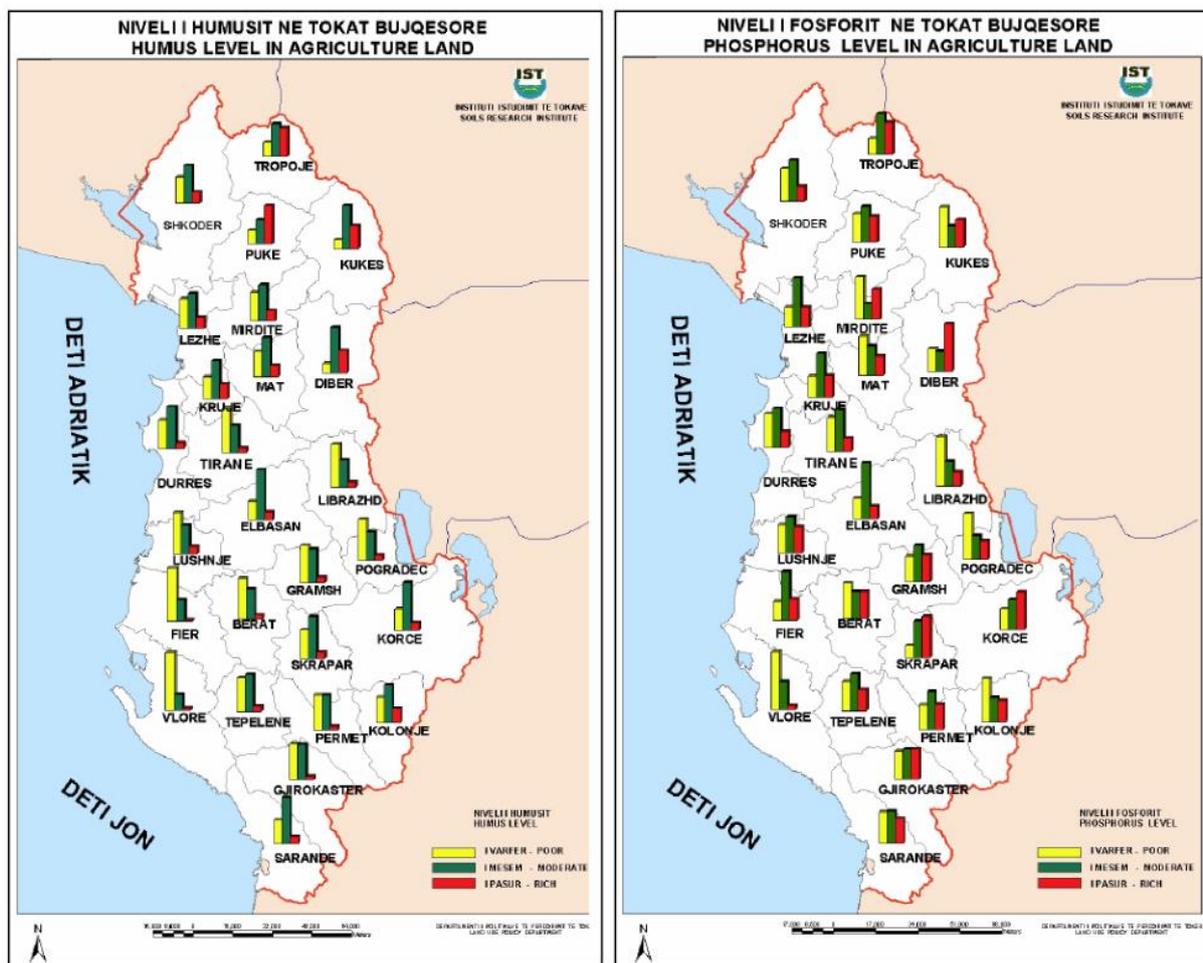


Figure 11: Humus level in agricultural land

Source: "Land Resources and Soils of Albania: Current Problems and Trends," Lushaj, Zdruli, 2007

As it can be seen in the proposed area of the project it is : Vlora, most of the lands are mainly characterized by poor humus and low levels of phosphorus.

Factors contributing to the acceleration of soil erosion, such as natural (irregular periodic rainfall, shallow lands, large slope, soil material fragility) and anthropogenic factors (such as steep landing, deforestation, grazing without criterion and misuse or mismanagement).

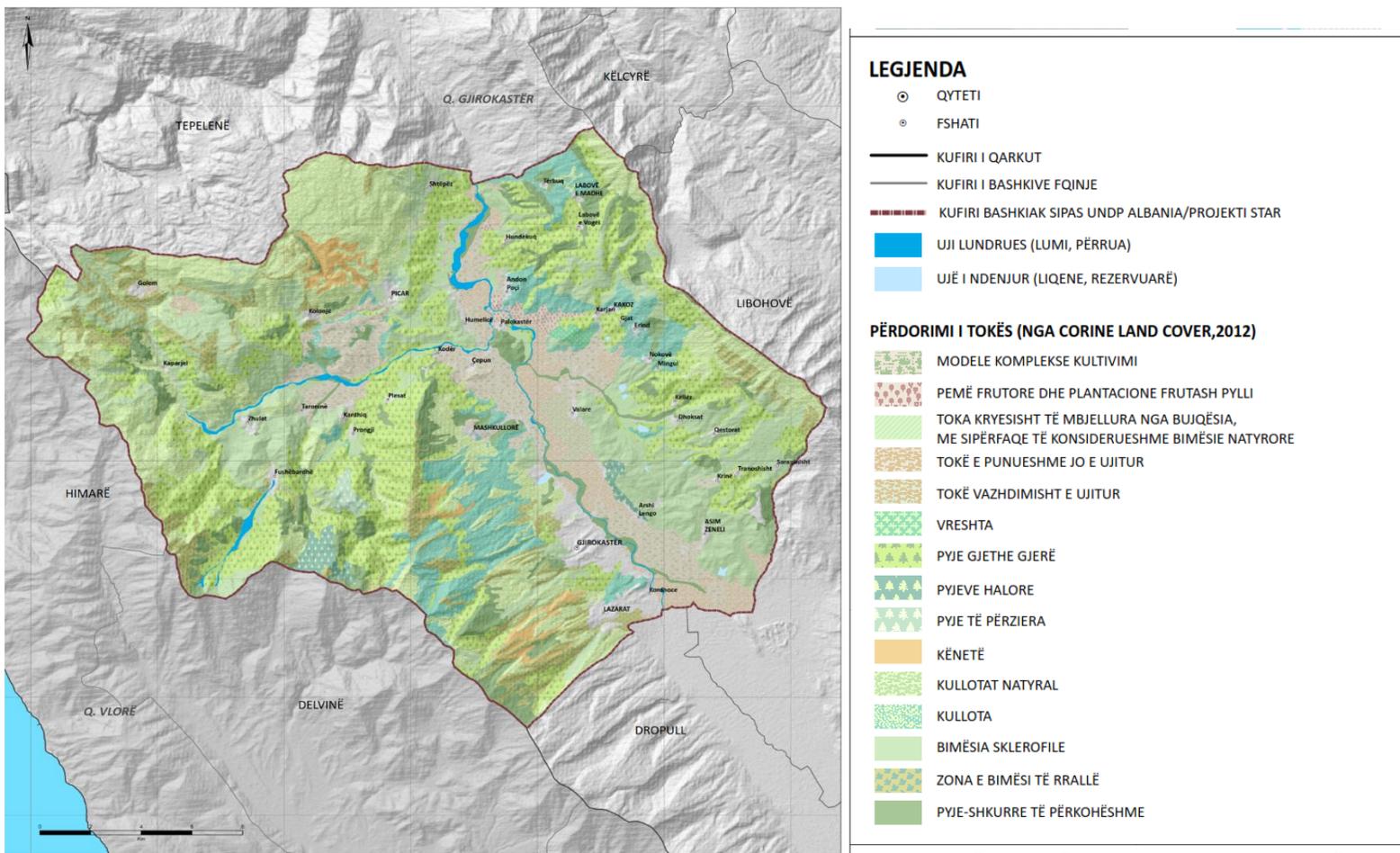
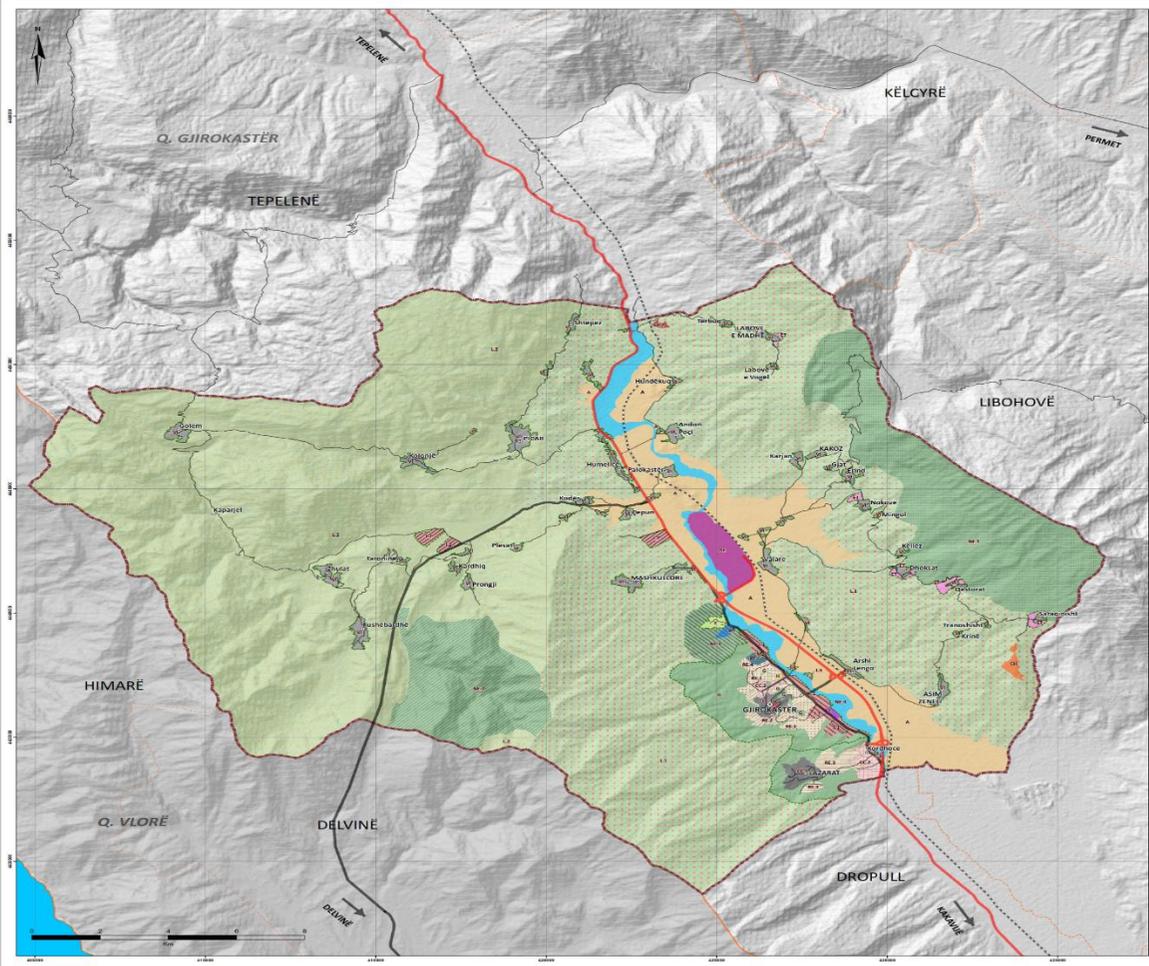


Figure 13: The state of the natural resources in the project area

As can be seen from the above map the project area including the Arshi Lengo village is characterized by coniferous vegetation. The other part of the area where the construction of the airport is proposed is mainly arable land and not irrigated.

From this point of view, the construction of the airport in the proposed area would not affect the quality of the land, biodiversity or would create a problem in erosion or degradation.

PLANI I PËRGJITHSHËM VENDOR, BASHKIA GJIROKASTËR
PARASHIKIMI I PËRDORIMIT TË TOKËS : KATEGORITË BAZË DHE NËNKATEGORITË, FUNKSIONE DHE AKTIVITETE



Zonimi i përdorimit të tokës	Kategori (sipas VETG 07/2013)	Kodi
NE.1 - zona natyrore 1	Naturore	01
NE.2 - zona natyrore 2	Naturore	02
NE.3 - zona natyrore 3	Naturore	03
NE.4 - zona natyrore 4	Naturore	04
NE.5 - zona natyrore 5	Naturore	05
NE.6 - zona natyrore 6	Naturore	06
NE.7 - zona natyrore 7	Naturore	07
NE.8 - zona natyrore 8	Naturore	08
NE.9 - zona natyrore 9	Naturore	09
NE.10 - zona natyrore 10	Naturore	10
NE.11 - zona natyrore 11	Naturore	11
NE.12 - zona natyrore 12	Naturore	12
NE.13 - zona natyrore 13	Naturore	13
NE.14 - zona natyrore 14	Naturore	14
NE.15 - zona natyrore 15	Naturore	15
NE.16 - zona natyrore 16	Naturore	16
NE.17 - zona natyrore 17	Naturore	17
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NE.19 - zona natyrore 19	Naturore	19
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NE.98 - zona natyrore 98	Naturore	98
NE.99 - zona natyrore 99	Naturore	99
NE.100 - zona natyrore 100	Naturore	100

REPUBLIKA E SHQIPËRIE
 KESHILLI KOMUNAL I TERRITORIT

MBIRAZHET
 KRYETARI I K.K.T.
Z. EDI RAMA

ZO/MBIRAZHET
 ZH. EGLANTINA GUERMI
 MINISTËR I ZHVILLIMIT URBAN

KESHILLI BASHKIAK
 Miratuar me vendimin e Keshillit Bashkik, nr. ____ datë ____ 2016
 Kryetari i Keshillit Bashkik, Bashkia Gjirokastrë
Z. Roland Karali

Kryetari i Bashkisë Gjirokastrë
ZH. ZAMIRA RAKI

MBIRAZHIM ME VENDIMIN E K.K.T.-SË NR. ____ DATË ____ 2016

LEGIJENDA

- CEYFI II
- FISIUMI
- KURPËR I QORRËZIT
- KURPËR I BASHKISË
- KURPËR I BASHKISË SËMUNDËR (BASHKISË) / BASHKISË
- VIA E GJITHËRË
- ALTEZIRADË (A)
- PRUEJE RYTERORDE/NE DYTËSORE (C)
- HEMULURIDE
- LIQENI I VIRIDIT
- BRIGJET URBANË KRYESORE (E)
- BRIGJET LOKALE (F)
- LUMI DRIND

PËRDORIMI I TOKËS

- NE.1. ZONA NATYRORE 1 (TE PRODUKIMIT)
- NE.2. ZONA NATYRORE 2
- NE.3. ZONA NATYRORE 3
- NE.4. ZONA NATYRORE 4
- PI. SHËRBIMET PUBLIKE
- RE.1. BANIMI 1
- RE.2. BANIMI 2
- RE.3. BANIMI 3
- RE.4. BANIMI 4
- T. TURIZMI/REKREACIONI
- LI. INFRASTRUKTURA 2 (ZONE LANDRIT)
- V. VENDIMOR
- A. TOKA BUDGJETORE
- MAZ. ZONA USHTARAKE
- R. REKREACIONI

PLANI I PËRGJITHSHËM VENDOR, BASHKIA GJIROKASTËR

H.18 PARASHIKIMI I PËRDORIMIT TË TOKËS : KATEGORITË BAZË DHE NËNKATEGORITË, FUNKSIONE DHE AKTIVITETE SHKALLA 1:50000

BASHKIA GJIROKASTËR

GAJA S.A.

SH. ÇUKARI
 DREKTOR I FUNKSIOE PUBLIKE
 ADMINISTRIMT DHE KONTROLLIT TË TERRITORIT

Figure 14: Proposed land use map according to PPV (proposed airport area according to this plan is near the proposed project area stained maple map)

4.2.1.2 Soil condition in the proposed project region, Vlora

The proposed location of the airport is in accordance with the General Local Plan⁶ in which the construction of a new airport is also planned (referred to as the N5 Buffer Zone of the airport which is ment and predicted to preserve the site for a new potential airport)⁷

The area of study is included in the strip of brown soils (HK). These are the characteristic land for the Mediterranean coast and extend to 600 m. These soils are mainly formed on eluvial, alluvial, sedimentary, sedimentary and less magmatic deposits. The vegetation is composed of Mediterranean bushes.

The soils have long humus horizons, subarctic mechanical medium and light, granular granular structure, expressed and descriptive from the roots. These soils contain 2-4% humus that is reduced in depth. Soils generally rich in nitrogen and poor in phosphorus. The thickness of humus reaches 10-50 cm and are rich in calcium carbonate in the range of 15-20%, have good physical properties and good structure, water capacity up to 27% .The soil is generally clayey and deep alyer which ranges from 0.5 to 1.5 m thick which creates suitable conditions for agricultural use.

The human activity in this area from the improper use has brought about a negative impact on the collapse of the physical sustainability of the lands by the destruction of large masses of land for construction and other economic activities. Anthropogenic activity is increasingly favoring land damage and its misuse exacerbates the nature of the act that interferes with its laws.

Gray-brown ground: stretching to most of the area of the region part of the project.

Alluvial lands: occupy the area near the riverbed of Vjosa River. These are light and shady soils. At the shore of the sea alluvial lands are replaced by ranches where pedogenic processes are very weak. These lands are very poor and are littered.

Salted lands: The saltification of these lands is related to the affinity with the Narta lagoon and the infiltration of the sea in the light coastal areas.

According to PPV (general local plan)-216 for Vlora, the construction of this airport is in accordance with the local plan (Referring to the following map.

⁶ Local Planes, For Four Municipalities, Vlora, Saranda, Himara, Konispol November 2016

⁷ <http://bashkiavlore.org/2016/12/10/plan-zhvillimi-vlore/>

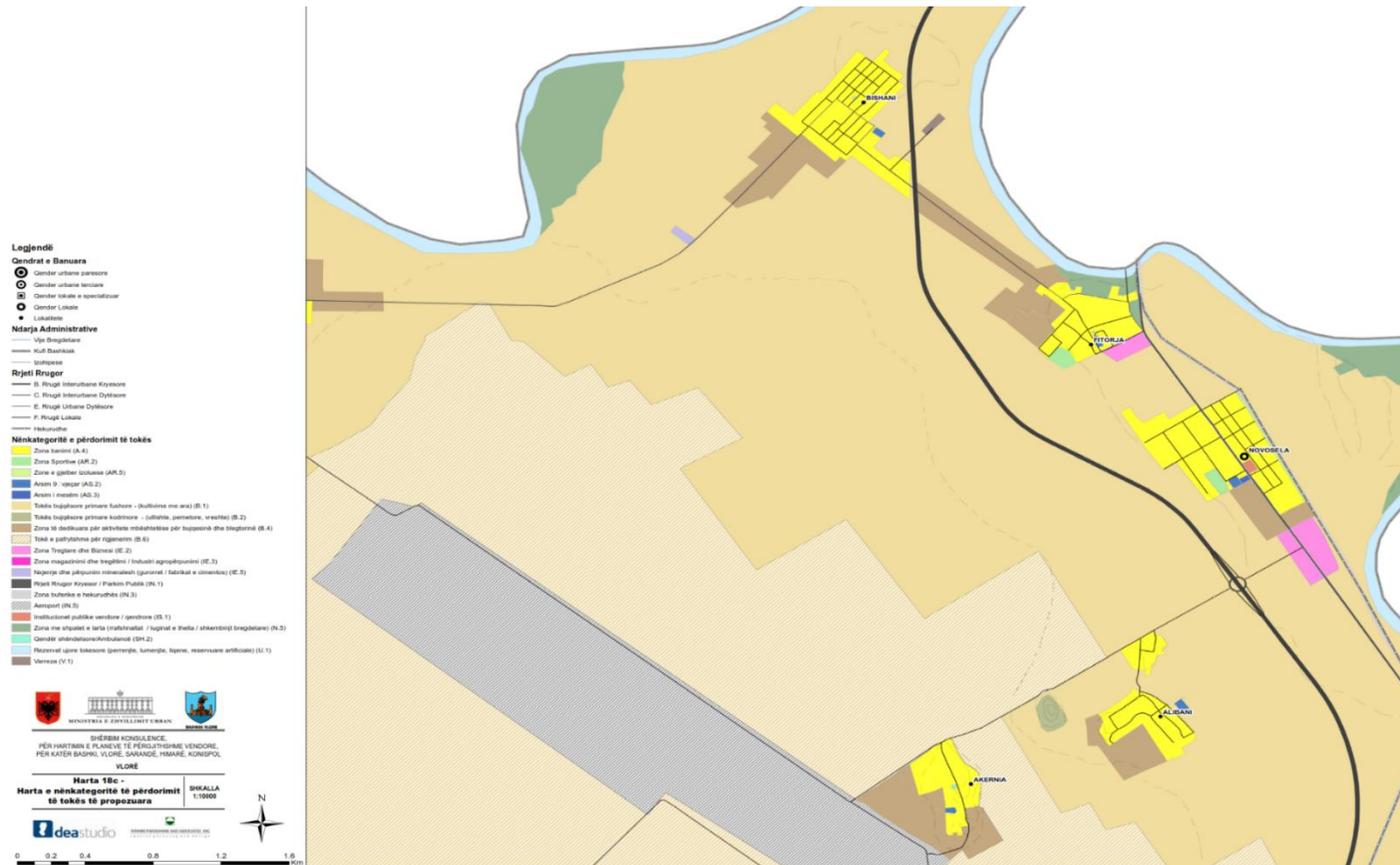


Figure 15: Proposed land usage map according to PPV for the Project Area

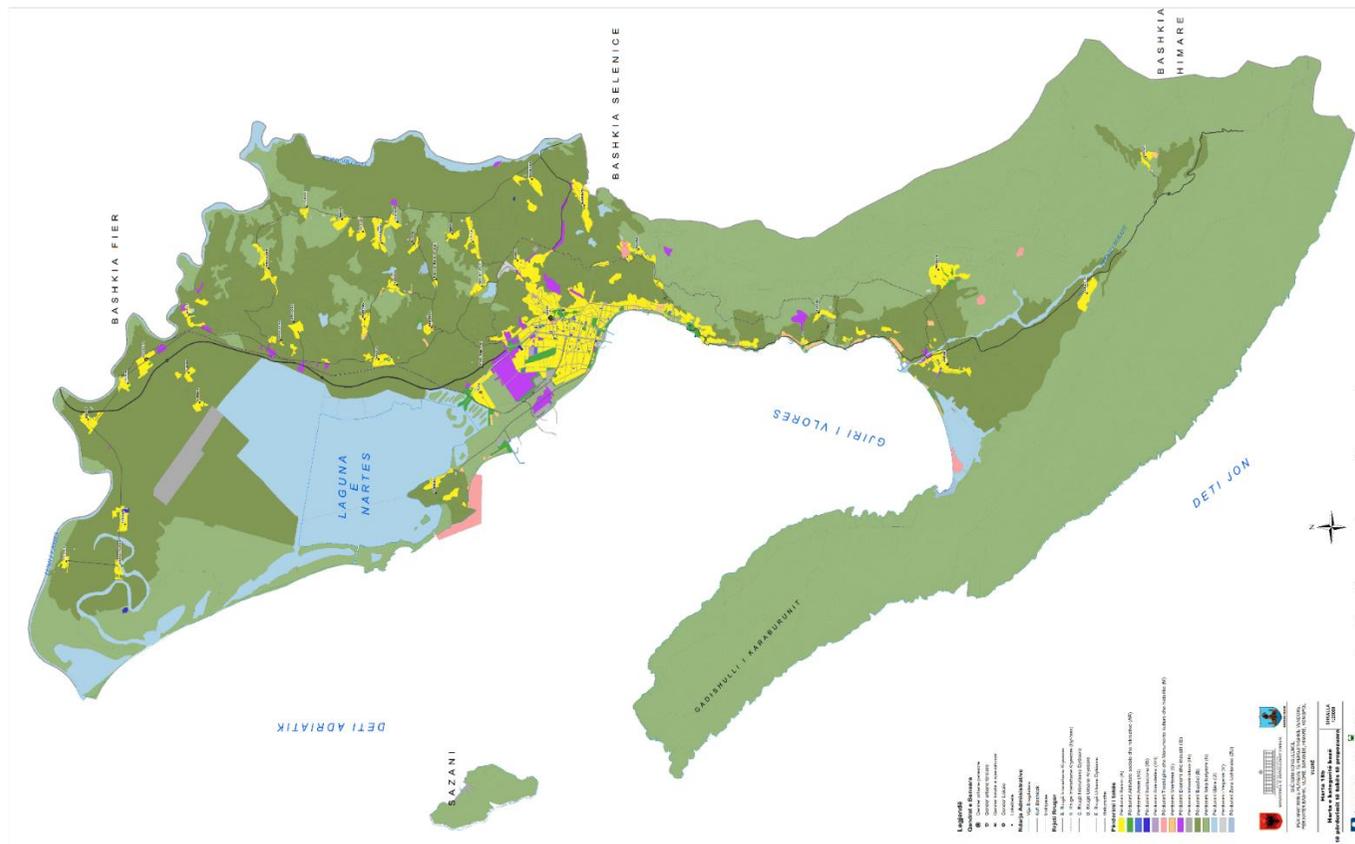


Figure 16: Usage of land map for Vlora area

4.2.2 Air Quality in the Airport Site

Albania's air quality monitoring network includes key cities such as Tirana, Elbasan, Durrës, Fier, Vlora, Shkodra, Korça and the monitoring was carried out by the National Agency of Environment for the February-December 2016 period for key air quality indicators.

The monitoring parameters at the stations are:

- Carbon monoxide (CO) in milligrams per cubic meter (mg / m³)
- Sulfur dioxide (SO₂) in micrograms per cubic meter (µg / m³)
- Oxides of Nitrogen (NO_x)
- The monitoring parameters at the automatic stations are:
- Carbon monoxide (CO) in milligrams per cubic meter (mg / m³)
- Sulfur dioxide (SO₂) in micrograms per cubic meter (µg / m³)
- Nitrogen oxides (NO_x) in micrograms per cubic meter (µg / m³)
- Ozone (O₃) in micrograms per cubic meter (µg / m³)
- Dust particles of less than 10 and 2.5 microns (PM₁₀ and PM_{2.5}) in micrograms per cubic meter (µg / m³)
- Benzene expressed in micrograms per cubic meter (µg / m³)

No	Stations	Location	Indicators
1	Vlora	School yard "24 Maji" 40°27'48.28"N 19°29'12.94"E	PM ₁₀ , SO ₂ , NO ₂ , O ₃ , CO, BTEX

Table 18: Monitoring stations

➤ Data of PM₁₀

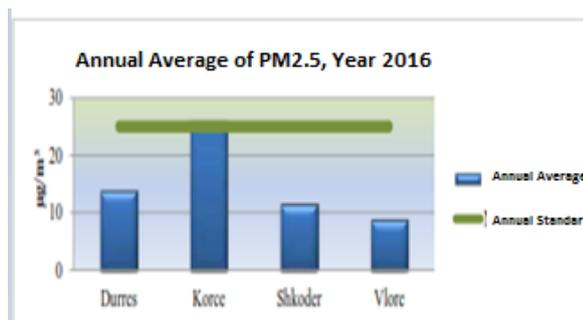
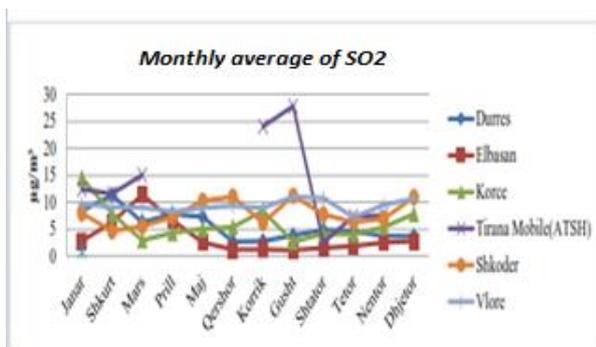


Figure 17: Monthly values and annual averages of PM₁₀

It is noticed that in Vlora station values have exceeded only in December, where the monitored value is 53.24 µg / m³. At the Vlora station, the average annual monitored values are below the EU norm and are 23.06 µg / m³.

➤ *Data of PM_{2.5}*

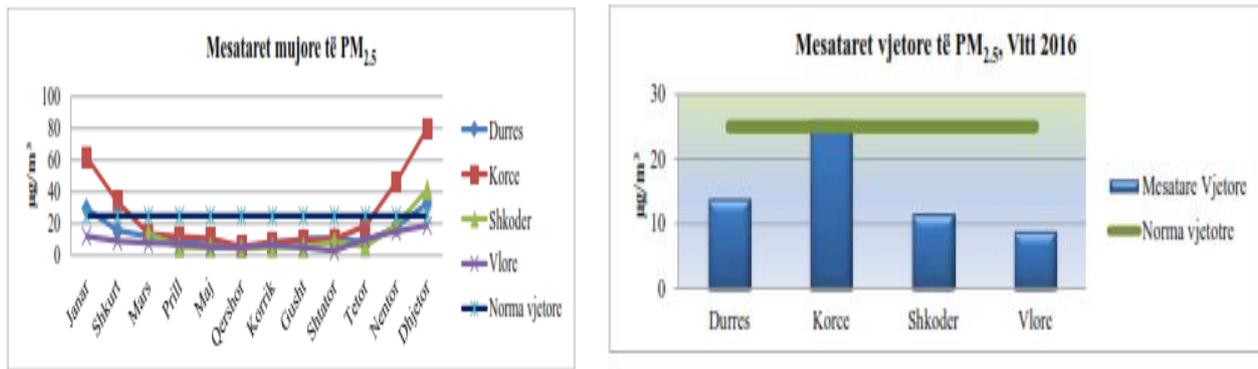


Figure 18: Monthly values and annual averages of PM_{2.5}

At Vlora stations the annual monitored values are about 50% lower than the EU limits and air pollution from PM_{2.5} in the area near the monitoring stations does not pose any problems.

➤ *Data of NO₂*

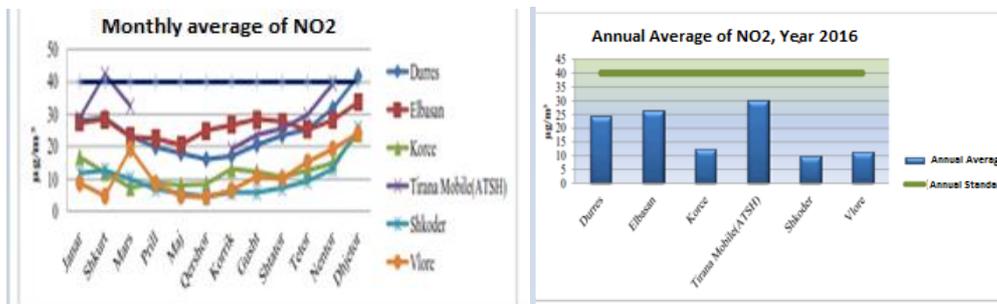


Figure 19: Monthly and average annual NO₂ values

Based on the annual average data monitored at the above mentioned stations it turns out that there is no exceedance of the EU annual limit values in any of the monitored stations.

➤ *Data of SO₂*

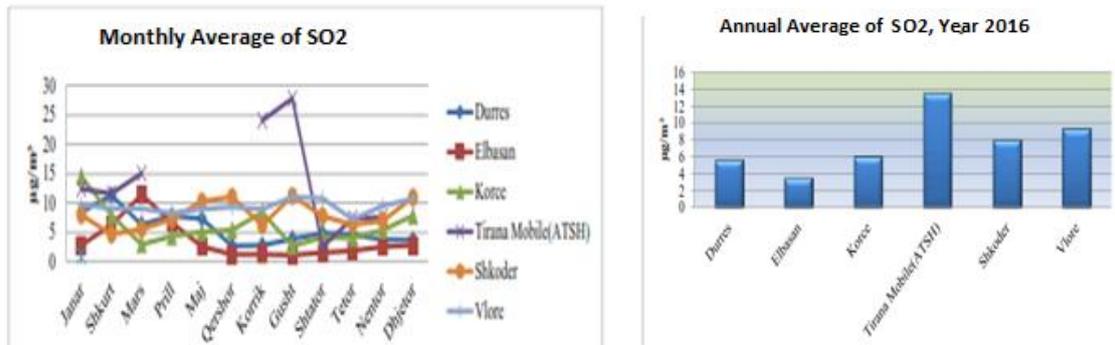


Figure 20: Monthly values and annual averages of SO₂

There is no exceeded values of SO₂ compare with EU limit values in any of the monitored stations.

➤ *Data of O₃*

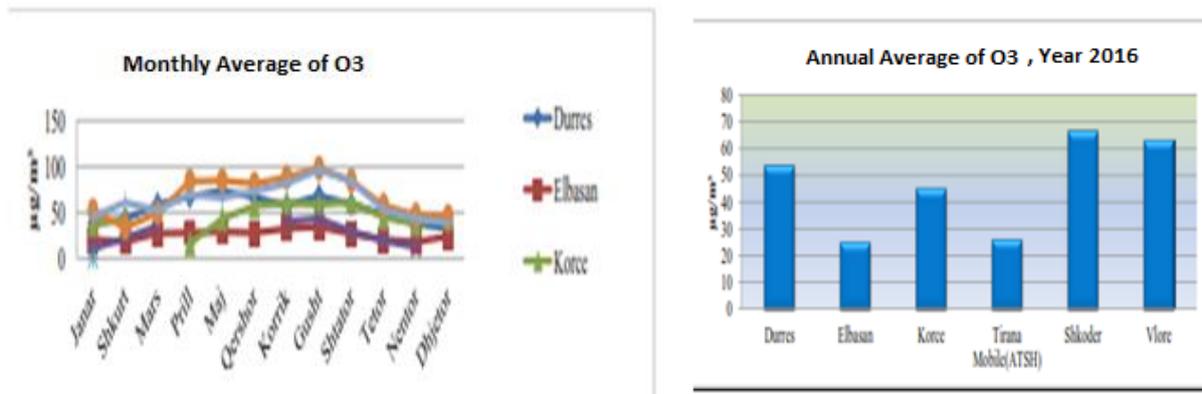


Figure 21: Monthly values and annual averages of O₃

The highest annual values were monitored at the Shkodra and Vlora stations where the values are 66.93 µg / m³ at Shkodra Station and 63.34 µg / m³ at the Vlora station. High levels of Ozone in urban background stations occur due to high temperatures and high levels of solar radiation.

➤ Data of CO

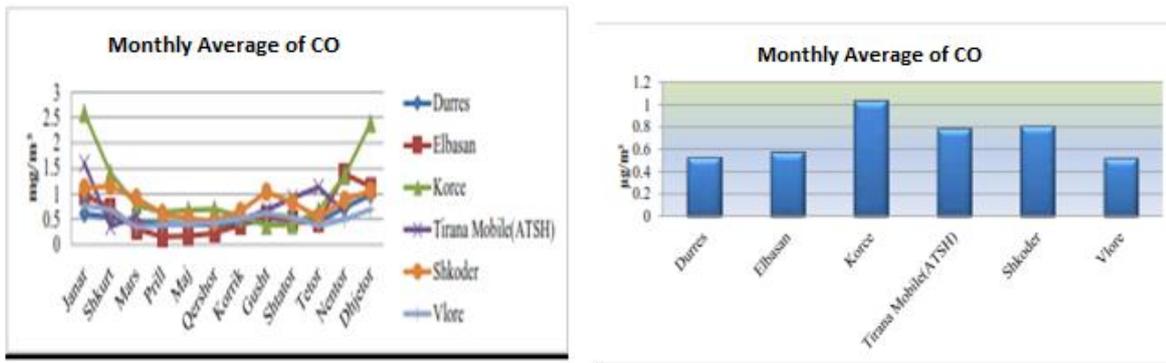


Figure 22: Monthly values and annual averages of CO

➤ Data of benzene

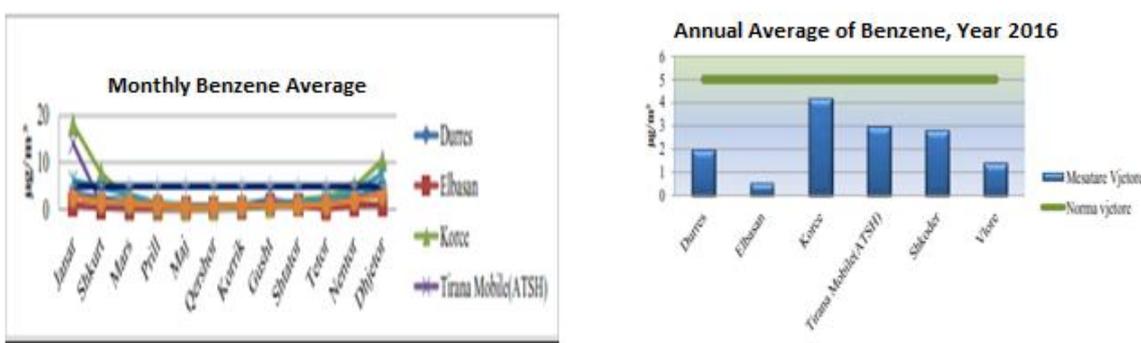


Figure 23: Monthly values and annual averages of benzene

Air quality monitoring at the three proposed locations for airports was not carried out and there was no interest, given that the proposed areas are relatively untouched by air contaminants (far from industrial zones, far from urban areas and road network the main). Monitoring was conducted in residential areas where air quality is expected to be most affected by pollution

Recommendations:

The construction and operation of the airport in Vlora is not expected to have a significant impact on the air quality of the surrounding area. During construction phase, this impact is manageable and potentially controllable through mitigation measures that need to be implemented to reduce the airborne particles level.

The Environmental Management Plan, which will be drafted and implemented by the construction company guarantees minimal impact both during the construction phase and during the implementation phase of the project.

4.2.3 Noise monitoring in the studied area

Exceedings in the % of WHO standard of the average noise values in the 4 points monitored during the day, (6:00 to 23:00) for the city of Vlora.

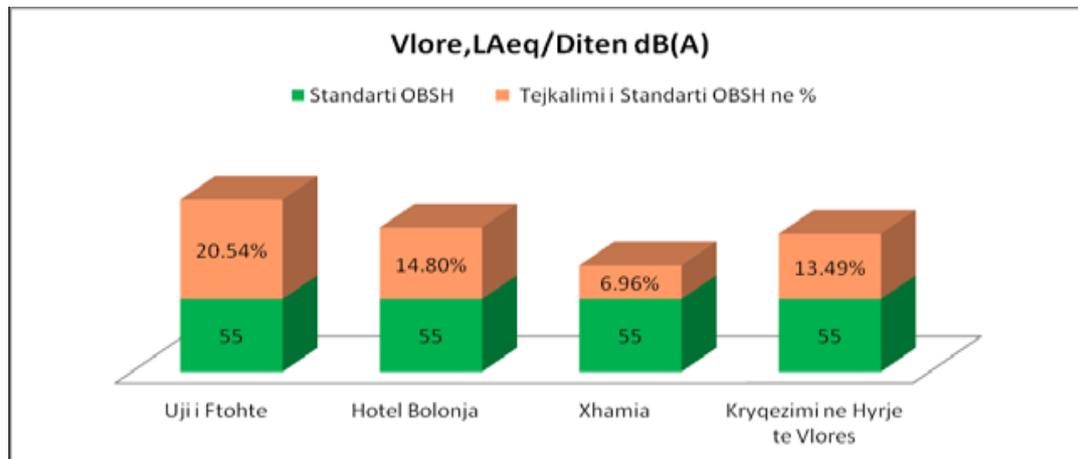


Figure 24: Exceedings in % of WHO standard of average noise values per day

From the chart above it is noticed that at all points monitored in the city of Vlora LAeq / Day exceed the standard of WHO. The highest exceedings compared with WHO standard it was at "Uji I ftohte " monitoring point at 20.54%, while the lowest exceedings compared with WHO's standart with 6.96% it was at monitoring station "Mosque/Xhamia". Exceedings in% of WHO standard of noise values in the 4 monitored night spots, (23: 00–6: 00) for the city of Vlora.

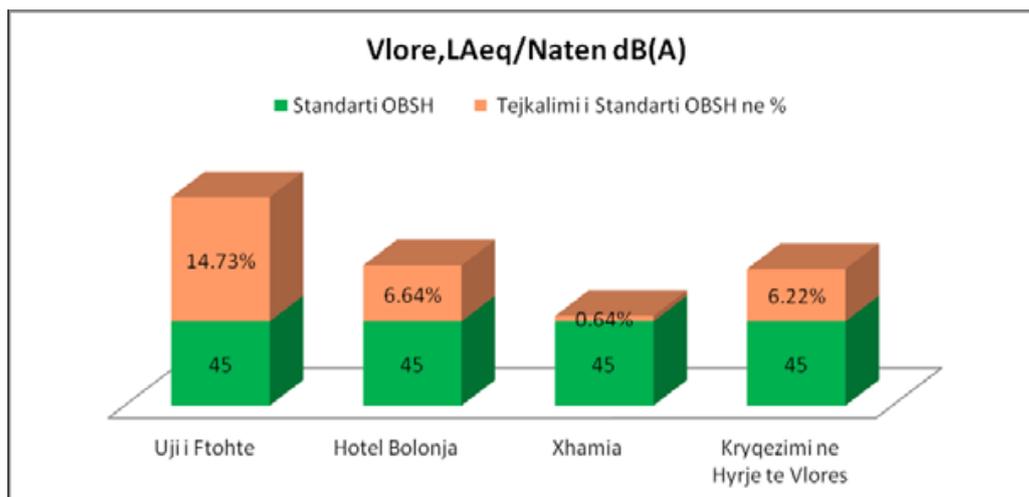


Figure 25: Exceedings in% of WHO standard of average noise values per day

From the chart above⁸ we note that at all points monitored in the city of Vlora / LAeq / Night exceed the WHO's standard. The highest exceedings compared with WHO standard it was at "Uji I ftohte /Cold Water" monitoring point of 14.73%, while the lowest one it was at the monitoring station at "Mosque" with 0.64%.

	Cities	LAeq/Day dB(A)	LAeq/Night dB(A)
1	Vlore	62.67	47.95
2	Sarande	59.97	46.63
3	Gjirokaster	60.6	48.67
Standart of WHO		55	45

Table 19: The average value of monitored Noise¹⁴ level for Day and Night, year 2016.

LAeq/Night dB(A)	Year 2014	Year 2015	Year 2016
Vlore	62.2	63.22	62.67
Sarande	62.3	60.75	59.97
Gjirokaster	-	-	60.6
Standart of WHO	55	55	55

Table 20: Average Noise Levels of monitored cities, LAeq / day, years 2014-2016

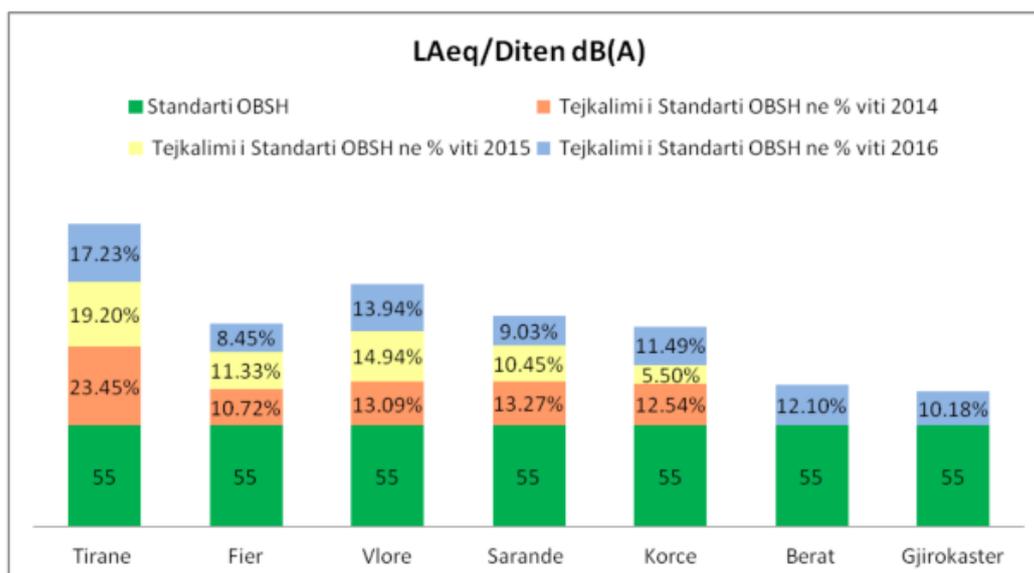


Figure 26: Exceedings in % of WHO standard

⁸ Environment Quality Report 2016 National Environment Agency

From the graph we can see that the city of Vlora has a small increase in noise level day (LAeq / Dite) compared to 2014.

From the noise monitoring analysis it is concluded that the impact of traffic or any other external factor that causes noise at the moment of monitoring may be the cause of the decrease or increase in the level of urban noise at monitored stations.

LAeq/Night dB(A)	Year 2014	Year 2015	Year 2016
Vlore	50.35	51.77	47.95
Sarande	46.1	46.51	46.63
Gjirokaster			48.67
Standart of WHO	55	55	55

Table 21: Monitored City Noise Levels Noise Levels, LAeq / Night, 2014-2016.

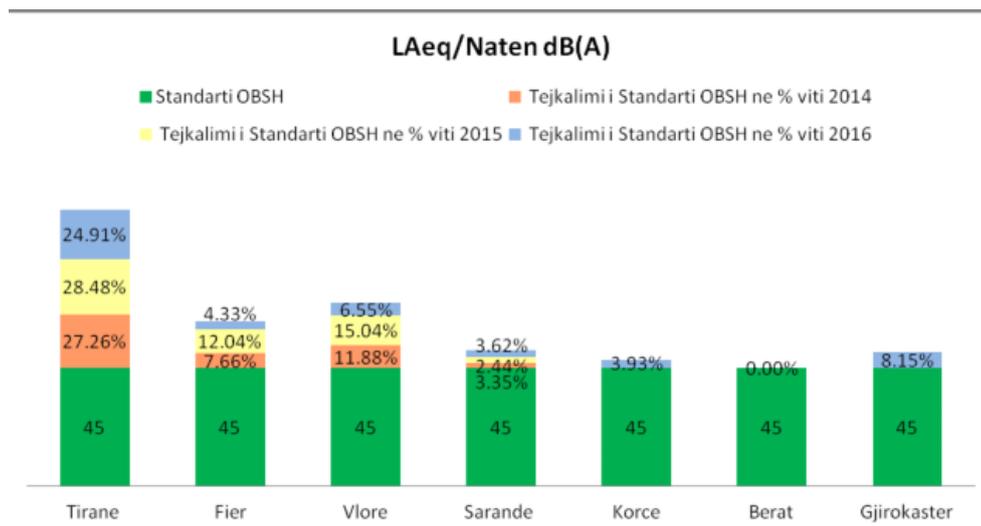


Figure 27: Exceedings in% of WHO standard

From the graph it can be seen that for year 2016 in all the monitored cities there is a decrease in night noise level (LAeq / Night) compared to 2015 and 2014. Exceptions are made by the city of Saranda, which seems to have an increase by 2016 of night noise (LAeq / Night) compared to 2015 and 2014.

Noises are becoming an increasingly serious concern for the mental and physical health of the population.

The Impact of Noises in People's Health.

- Noise pollution causes about 10,000 cases of premature deaths in Europe every year.

- Road traffic is the main cause of noise in Europe. About 125 million people are affected by this phenomenon.
- Approximately 20 million adults suffer from fatigue/ sleeplessness due to the noise factor.
- Over 900,000 hypertension cases are caused by noise every year.

To reduce the noise impact in the urban community it is recommended:

- Obtain a green protective barrier and trees planted between residential and main roads, as one of the most eco-friendly measures to reduce the level of pollution.
- Determine by regulation the distance between roads and buildings.
- Take in consideration noise reduction since at the design of new constructions (institutions, schools, hospitals, roads, etc.)
- Ensure periodic control of noise-generating of vehicles.
- Introduce interventions in road signage, where to include in the signals that relate to noises as well as placing them at certain points.
- Decision-making for negative effects that cause noise in physical and mental health of the population.
- Public education/awareness is the most important requirement. Noise reduction intervention programs may be unsuccessful without the participation of the public.

➤ **Recommendations regarding the implementation of the project:**

The impact on noise levels is one of the major environmental impacts that will affect the community that is near the proposed airport location. Referring to low flight capacity, this impact is expected to be not very significant and localized.

- a) at this step, feasibility study , with no any flights operating , noise monitoring close to the project area doesn't have any importance and doesn't make sense from the point of noise level assessment, as the area is not effected from the noise .This airport will be almost the only main noise emission source during implementation phase in this area .
- b) during the next, more detailed, design steps, the present background noise will be measured and noise modeling will be implemented
- c) after the airport will start working, noise detection stations will be allocated in the more sensitive spots in order to measure and monitor the effective perceived noise level to the sensitive receptors.

Noise modeling is suggested to be conducted during the airport utilization phase by which the most sensitive noise receptors will be defined. Isolating noise and reduction noise measures will be taken/implemented by the project developer for the most sensitive receptors monitored (residential buildings) as well as supplementary management measures to reduce this impact to the allowed noise levels will be implemented by the developer. If necessary, noise monitoring and modeling will also take



into consideration the relocation of any noise-sensitive residential building if the reduction measures taken won't be effective.

4.2.4 Waste management in the area where the project is proposed

From the data analysis it is noted that the amount of urban waste per inhabitant per day for 2016 is 0.9 kg / person / day.⁹

Protecting the environment and the health of people from pollution and damage caused by solid (household, commercial) and debris waste (construction and destruction) requires the implementation of approved legislation on waste management in which the rules, techniques and its methods of treatment, which lead to the reduction of waste and the reduction of their environmental impacts are described.

No	Region	Total number of beneficiaries of service	Annual Quantity of Solid Waste (ton)	Annual Quantity Inert /debris Waste (ton)	Quantity of Solid Housing Waste/urban (kg/person në ditë)
2	Vlorë	249920	89186	83054	1.0

Table 22: Waste generation by region, for 2016

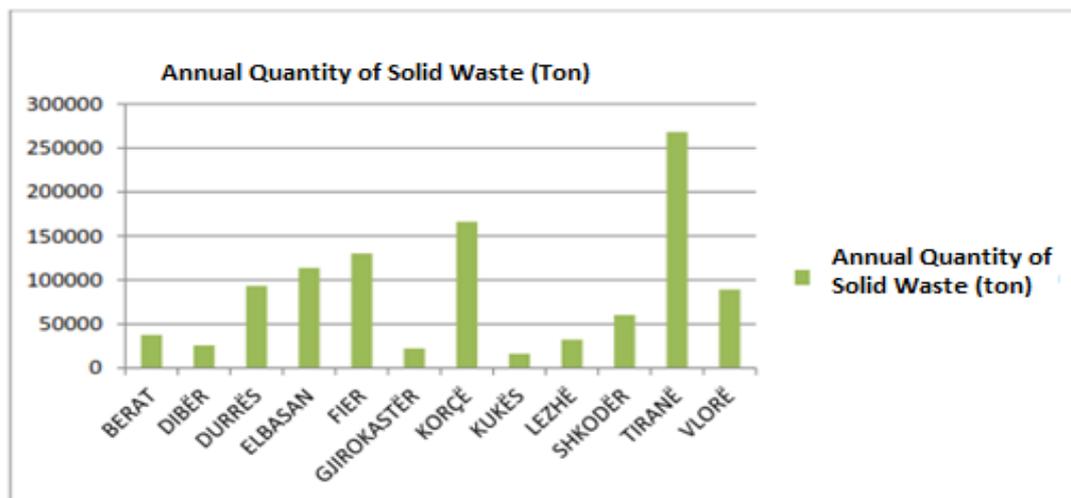


Figure 28: Quantity of Solid Waste

⁹ Environment Report 2016 NEA

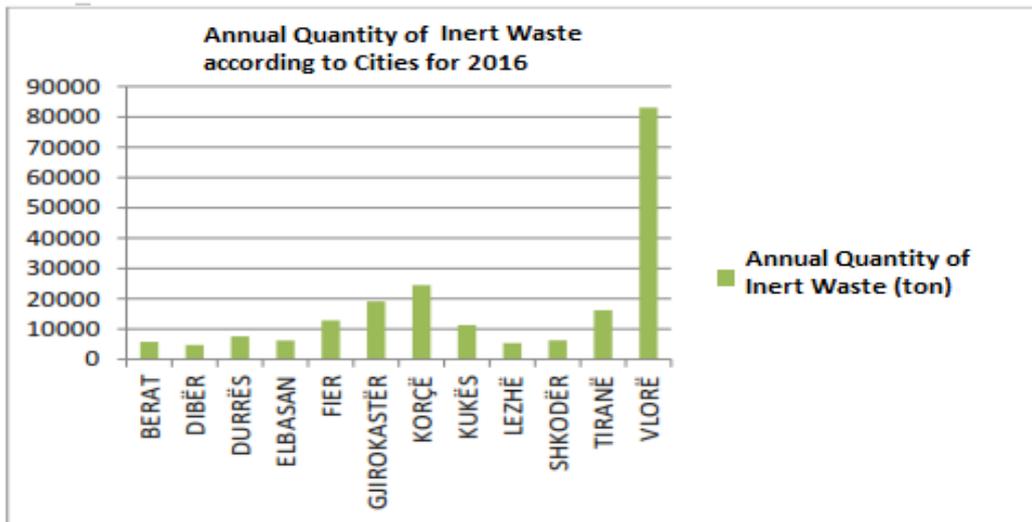


Figure 29: Inert debris Waste

As it can be seen from the chart, Vlora Region has the largest amount of inert waste generated by Korca, which means that in these two districts building activities are still continue to have big influence. The amount of waste generated is lower in 2016 than in all the years from 2011 excluding 2014. We think one of the reasons for this reduction is the new administrative division that has affected the improvement of urban waste collection and reporting by the local government which means that the waste are collected and managed much better and not thrown away as before.

Generation of urban waste per inhabitant by counties and country level for 2016.

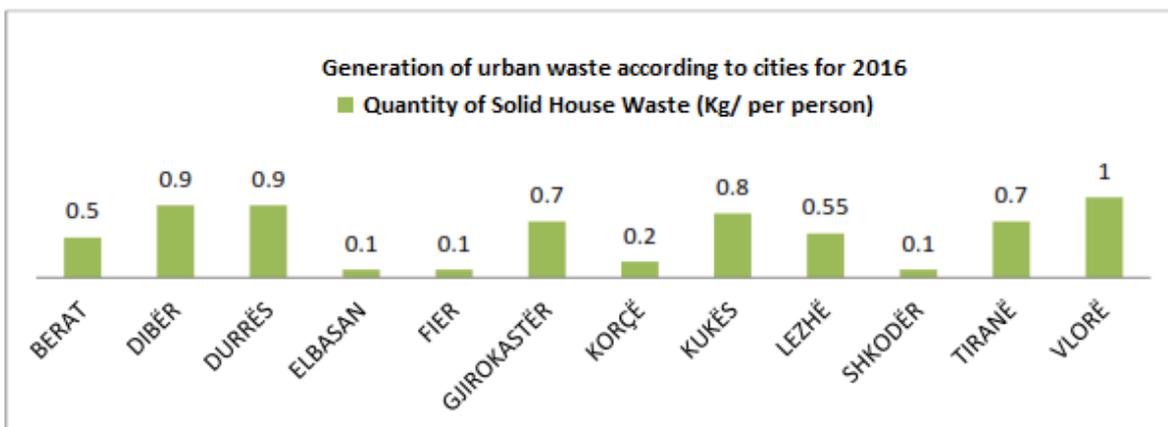


Figure 30: Generation of urban waste according to cities and country for 2016

Vlora Region leads with the highest amount of urban waste per person per inhabitant with 1.5kg / person / day followed by Region of Diber 0.9 kg / person / day. Durres county 0.9kg / person / day, Kukes county 0.8kg / person / day.

Dangerous hospital waste - public hospitals - 2016

City	Dangerous hospital waste (kg)	City	Dangerous hospital waste (kg)
Vlore	20795.46	Vlore	26059.33

Table 23 : Dangerous hospital waste - public hospitals – 2016

The construction and launching operation of the new southern airport is not expected to have a significant impact on the management of waste generated due to construction activity (inert waste or during the utilization phase (mainly urban waste). Landfill of urban waste in the respective region enables all waste generated to be efficiently managed, it is sufficient to apply the legal procedures for collection, transport and storage of waste with a licensed subcontractor with license III B and the unique waste code. The generated waste register should be regularly reported 2 times a year to environmental institutions.

➤ **Recommendation:**

Waste management generated by the construction activity but also during the operation of the airport will be done in accordance with the legal requirements of Law No.10463, date 22.09.2011 "On integrated waste management" amended.

Waste generated by the construction phase but also during the operation of the airport will be transported to the approved landfills through licensed waste transport subcontractors, also equipped with the unique waste code. Any waste transfer will be accompanied by a transfer note from the site of generation of the waste to the final disposal site or treatment.

Dangerous waste generated will be collected in special places within the premises of the company and transported to the place of treatment only with licensed companies for this purpose. Transfer notes and reports to the counterpart institutions will be kept and reported on a regular basis.

4.2.5 The Current Environmental Situation which May Be Encouraged by Project Development

Based on the existing environmental issues of the study area identified by previous studies, the study area is characterized by slough areas with contaminated groundwater in the vicinity. The soil is highly risked by flooding of heavy rainfalls and the flooding of Vjosa river.

The implementation of this project both in the construction phase and in the airport utilization phase does not affect or exacerbate existing identified environmental situation in the project area as the project itself has no such impacts during its implementation. The following maps present the existing problem areas of the project area and that of geologic risks.

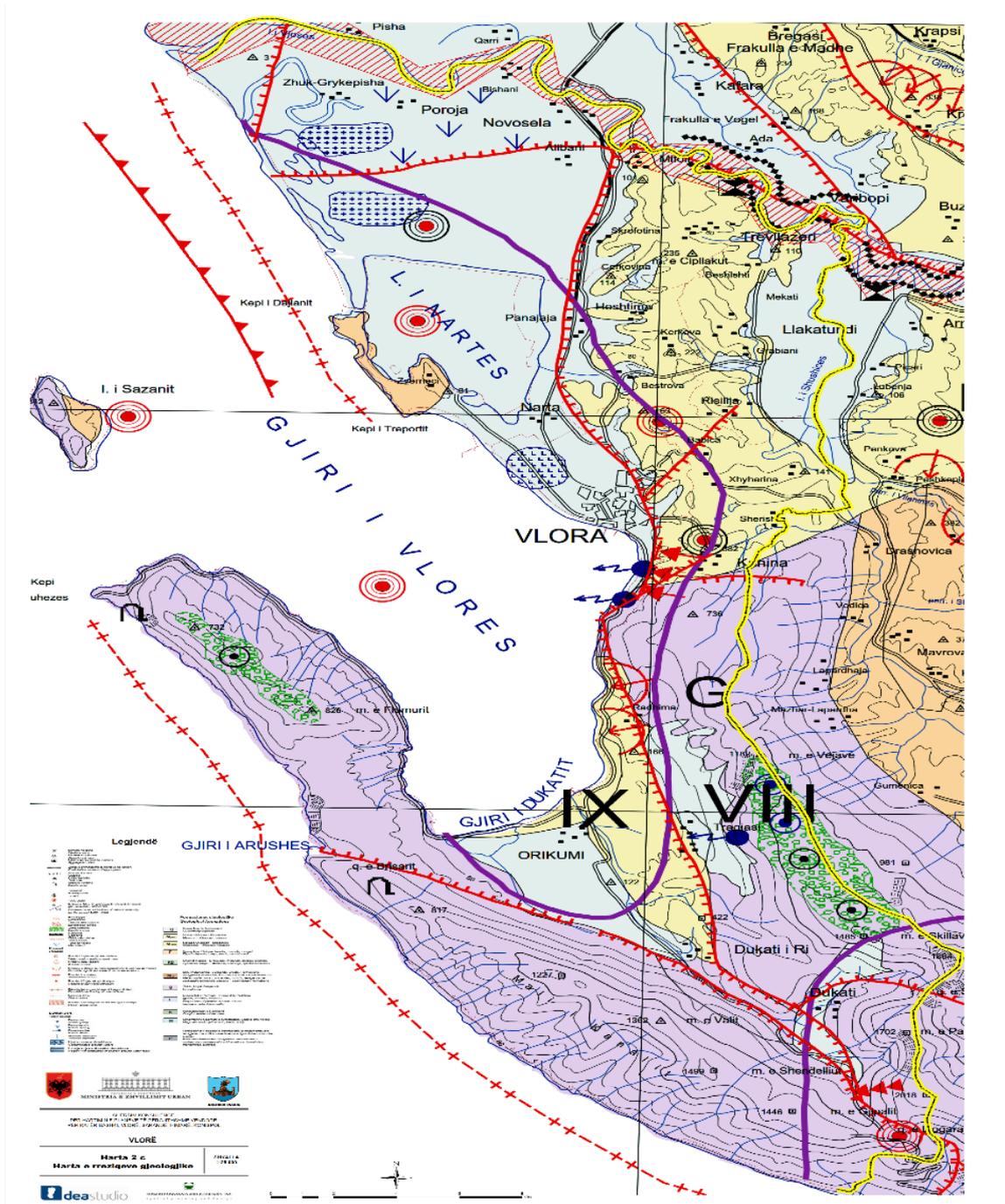


Figure 31 :Map of sensitive existing Environmental issues¹⁸

¹⁸Referred to PPV -2016 for Vlorë

4.3 AFFECTED FLORA IN THE PROJECT AREA

The vegetation in the proposed area of Vlora Airport

This area is made up of a saline wetland vegetation, which is mostly surrounded by water ponds or water depressions. All ecological and anthropogenic factors in the area are clearly considered. The dominant vegetation is Salty Mediterranean Meadows (*Juncetalia maritima*). This is a habitat that, according to the latest botanical estimate, is threatened, and this is expressed in the fact that its surface at the regional level is quite fragmented

Vegetation is predominantly dominated by *Juncus maritimus* but in some cases it co-locates with *Juncus acutus*, *Scirpus nigricans*. Species characteristic of this habitat are *Juncus maritimus*, *J. acutus*, *Carex extensa*, *Aster tripolium*, *Plantago crassifolia*, *Blackstonia perfoliata*, *Centaurium tenuiflorum*, *Orchis coriophora*, *Aeluropus littoralis*, *Juncus gerardii*, *Puçinellia festuciformis*, *Artemisia coerulescens*. Other species that accompany are in the study area are *Lipia nodiflora*, *Tunica saxifraga*, *Teucrium pollium*, etc.



Figure 32: The vegetation in the proposed area of Vlora Airport

Fauna in the project area

Amphibians and reptiles of wetlands

Water Amphibians can be divided into two groups:

Closely linked to the aquatic environment during almost the entire life cycle. Partially linked to the aquatic ecosystem during the life cycle.

Five types of amphibians and two hybrids from five groups can be mentioned, namely: (*Triturus cristatus*), (*Triturus vulgaris*), the frog of the Balkans (*Rana balcanica*), epirot frog (*Rana epirotica*), lesson

frog (*Rana lessonae*), feeding and reproducing by passing the lethargic period of sleep in the water environment. After this period they move outdoors in terrestrial environment.

Quite amphibious, especially younger generations (millions of eggs and larvae) after the fall of water levels, reservoirs and canals, are endangered due to human intervention (irrigation, farming practices, etc.)

Four types of water reptiles, two types (*Emys orbicularis*) and (*Mauremys caspica*) and two types of snakes (*Natrix natrix*) and (*Natrix tessellata*) are seriously endangered.

In the water areas located near residential areas where garbage is disposed of, compared to the previous 15 years, it is noted a decrease in the number of amphibians and reptiles: (*Bufo bufo*), (*Bufo viridis*), (*Hyla arborea*), the frog of the Balkans (*Rana balcanica*), epirot frog (*Rana epirotica*), snakes (*Natrix natrix*) and (*Natrix tessellata*) etc. During periodic drainage, cleaning and drainage of irrigation channels during the winter period (the lethargic period) it is noted damaged of some types of green frogs. Amphibians play an important role in natural equilibrium, but they have great ecological, zoogeographic and economic importance.

For more than 30 years, a large number of green frogs have been collected and exported, a phenomenon that continues to this day.

Birds of aquatic environments (watercourses, rivers, streams)

The most common diving birds are family representatives (*Podicipedidae*), (*Phalacrocoracidae*) etc. Is also mentioned "Çafka".

The same bird species meet in riverside but their numbers have fallen far enough year after year. In the nesting period, human anxiety, especially hunting has had a major negative effect because birds are highly related to the colonization sites. Abandoning the country, due to human concerns, for example they have released the eggs can cause immediate reproduction of the breeding process. Such action acts on the reproductive memory of birds, causing complete abandonment of the nests. Quite adverse this kind of anxiety has for birds living in colonies. Another negative factor in the reproduction process is the lack of suitable habitats for colonization and insufficient nutritional resources.

Birds of agricultural lands of degraded terrains

Agricultural lands and degraded terrains are of paramount importance for the wintering, nesting and transit of birds. From the point of view, the birds of the agricultural lands are divided into winter, nesting and transitory.

"Djerina" are a very important category of agricultural lands, which are currently exploited by wintering-nesting and transitional migratory birds.

During the winter season on farm lands are invented many bird species. The plain area is rich in birds because some of them come from cold areas. Here they find abundant food. Characteristic of agricultural lands and those left unturned are some sparrows and wings, representatives of the Order *Passeriformes*. This abundance of sparrows is prey to other wild birds. In agricultural lands only a part of the birds (31 species) can find habitats suitable for nesting. Most (about 60 species) use this territory as a

second habitat to provide food. At present, agricultural areas of the study area are characterized by variability of agricultural crops. They are divided into small plots, planted by villagers for their family needs. During the migration period the number of birds increases. There are about 129 species in the field area, while in the hilly area only 60 species.

Protected Areas

Based on Law no. 81/2017 "On Protected Areas" Article 14, we have these categories of protected areas which are:

- a) "Strict natural reserve / scientific reserves (category I)";
- b) "National Park (category II)";
- c) "Natural monument (category III)";
- d) "Managed natural resources / natural park (category IV)";
- e) "Protected landscape (category V)";
- f) "Protected area of managed resources (category VI)".
- g) "Municipal Natural Park (category IV)";
- h) "Green crown (category V)"

While the category of natural monuments is divided into:

a. Gjeo-monuments:

- Geological objects: unique strips or fossils, rare geological structures and formations;
 - Geomorphological objects: shapes and landscapes of relief created or modeled by rivers, ice, karsts, etc;

b. Hydro-monuments:

- Karst sources,
- Mining resources;

c. Bio-monuments:

- Hardwoods with early age,
- Habitats with rare or endangered plant societies;

Based on the network of protected areas, published by AKZM, (http://akzm.gov.al/index.php?option=com_k2&view=item&layout=item&id=68&Itemid=368&lang=en), the project trail presents this situation with regard to protected areas or nature monuments.

The proposed airport location is located near the Narta Lagoon and is part of the Vjosa-Narte Protected Landscape Area, Fifth category, which could potentially affect the values of this area due to the noise emitted and the presence of aircraft (mainly impact on birds that populate this lagoon and the salt of Vlora (flamingo).

Protected Area "Vjosa-Narta Protected Landscape Category: Fifth, According to Decision No. 680, dated 22.10.2004.

The area with a surface of 19738 ha is located in Vlora Region and Vlora district.

Based on Law no. 81/2017 "On Protected Areas", Article 20, point 4, "The construction of this airport is permitted only after obtaining permission from the National Territorial Council.

Routes by which to the destination: Following the national road Vlorë-Fier (Vlorë-Kriporja-the coast of Narta-Hidrovorë), or Vlorë-Forest of the Zvërnec village-wine.

Special Representatives of Flora and Fauna: Contains typical Mediterranean vegetation, salty soils as well as in the northern part of the River Vjosa River. Narta is the second lagoon in the country for importance for water birds, being a very important IBA (20000 dimer birds and over 40 species). Place the food for pelican (*Pelicanus crispus*) and regularly meet the flamingos (*Phenicopterus ruber*). The surrounding lagoon features a rich flora and fauna typical of Mediterranean wetlands. The Zvernec area is called for coastal beauties intertwined with its cultural and traditional assets, which are potential for tourism development. On its shore there is the forest and xhin (*Pistacia lentiscus*) forest.

Referring to the Law no. 81/2017 "For Protected Areas", Article 20 thereof, referring to the category of protected areas (Protected Landscape (category V) explicitly have these limitations to be respected for construction in this area:

"Protected landscape" is managed to protect the landscape values of the area, biological diversity, as well as for recreation and fun. This category includes land / sea / public or private owned water. In a "protected landscape" applies the degree of protection that has the main object:

- a) Empowering the harmonious interaction of nature with culture to protect landscape quality, traditional land use, construction practices and social and cultural manifestations, characteristic of the area;
- b) supporting those lifestyles and economic activities that are in harmony with the nature and preservation of the spiritual and cultural constitution of the local population;
- c) elimination, where necessary, and prevention of land use and carrying out activities that are inappropriate in size and / or content;
- d) Creating opportunities for public enjoyment through recreation and tourism, in accordance with the character and magnitude of the core characteristics of the area;
- e) Encouraging scientific and educational activities that assist in long-term development and well-being of the local population and in providing broad public support for the protection of the environment of such protected areas;
- f) bringing economic benefits and contributing to the growth of local population welfare through the use of natural products, such as forests and fish production, and services such as clean water or income derived from the appropriate forms of tourism.

Activities that change land use such as construction, sewage treatment at farms, construction of highways, seaplane and urban areas, as well as similar activities, are allowed to be exercised only if the entity seeking to perform the activity is provided with permission from the National Council of Territory.

In the management plan of this area , according to the management subdivisions, it is clearly determined the allowed, prohibited activities and those for which a permit issued by the competent authorities is required, according to the Albanian legislation in force.

Referring to the management plan of this landscape protected area , Vloëra Airport is located in the protected landscape area VJOSE NARTE, and belongs to *C & B Zones*.

The proposed location of the airport is in accordance with the General Local Plan of Vloëra.

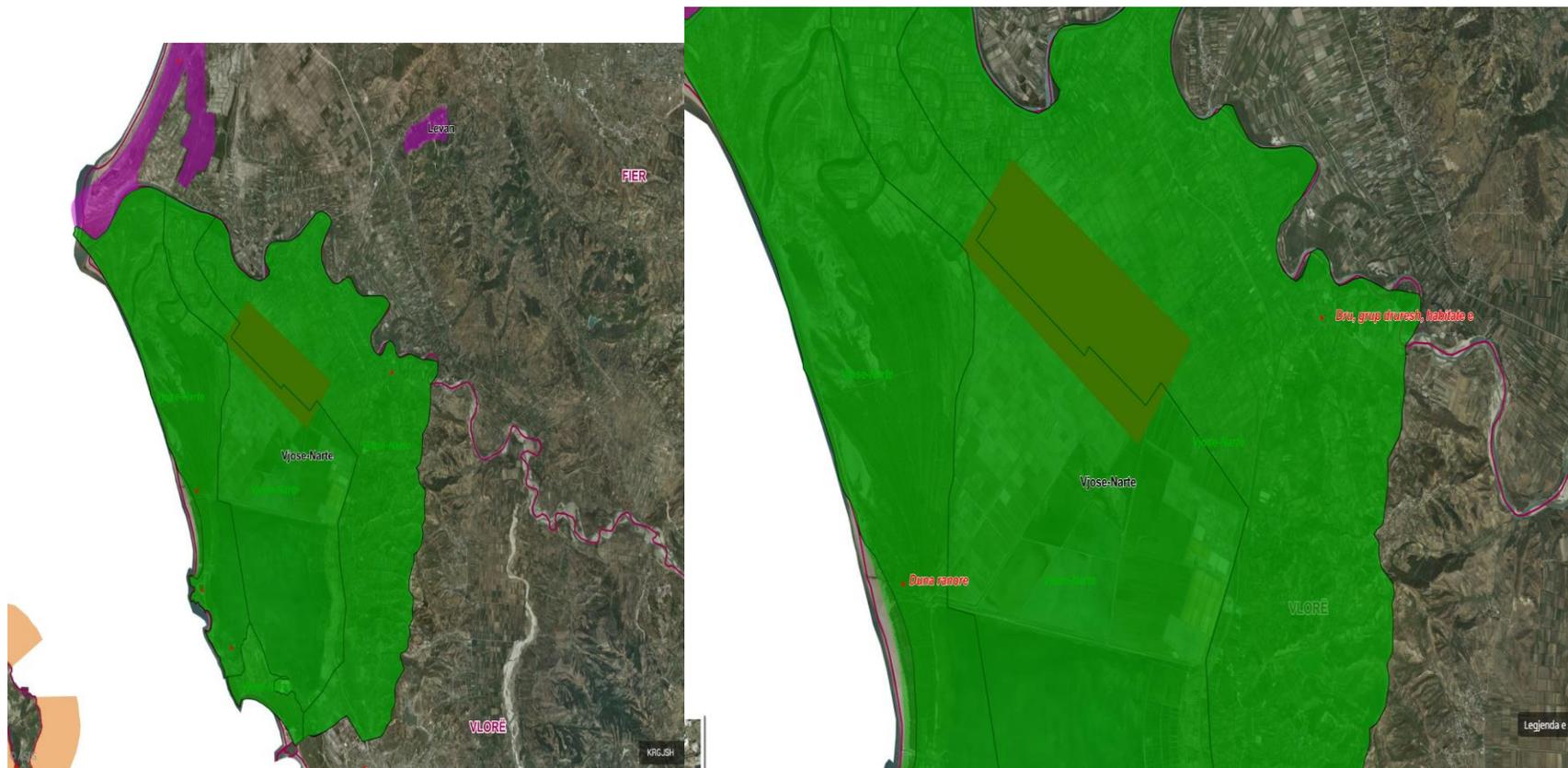


Figure 33: Protected Landscape VJOSA – NARTA - and proposed project area (spots within the green area on map)

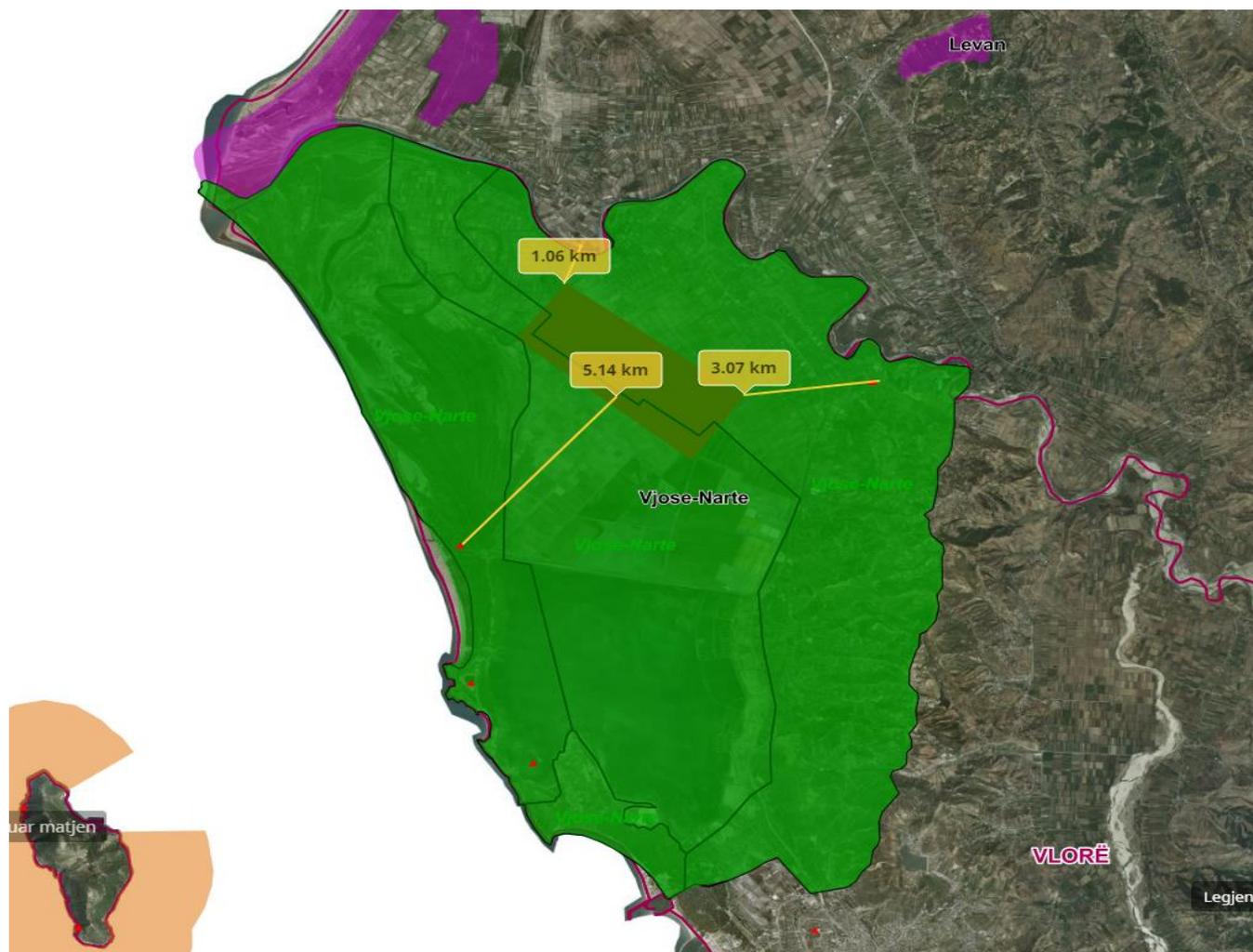


Figure 34: The distance of the proposed project area with regard to nature monuments and water resources

Local Governance Unit Administering the Project Area

The proposed project area of the south airport in Vlorë belongs to the Vlorë County.

Nr	Local government units					
	County	County Center	Municipality	Municipality Center	Component administrative units	Cities and villages in their composition
	Vlorë	Vlorë City	Vlorë	Vlorë City	Novosela	Villages; Novoselë, Aliban, Bishan, Mifol, Poro, Dëllenjë, Delisuf, Trevllazër, Cerkovinë, Skrofofinë, Fitore, Akërne

Table 24 :The administrative division of proposed project areas in Vlorë



Figure 35: The map of the administrative division of the project areas

Population Dosage and Demographic Forecasts:

Population Projections: Population projections in the Municipality of Vlora up to 2031 are based on the methodology and model used by INSTAT on the basis of which population projections for Albania, and especially for the counties, have been carried out. In this case, projections for the Vlora Region have been used to carry out the population projections for the Municipality of Vlora and the municipal administration units of this municipality.

People projection 2011-2031 Municipality of Vlora					
Administrative unit	2011	2016	2021	2026	2031
Vlorë	79513	82598	83420	82807	81859
Orikum	5503	5717	5773	5731	5665
Qendër	7621	7917	7995	7937	7846
Novosels	8209	8528	8612	8549	8451
Shushica	3981	4135	4177	4146	4098
Vlora Municipality	104827	108894	109978	109170	107920

Table 25: Projections of the population by 2031

Source: INSTAT 2011, consultant estimates

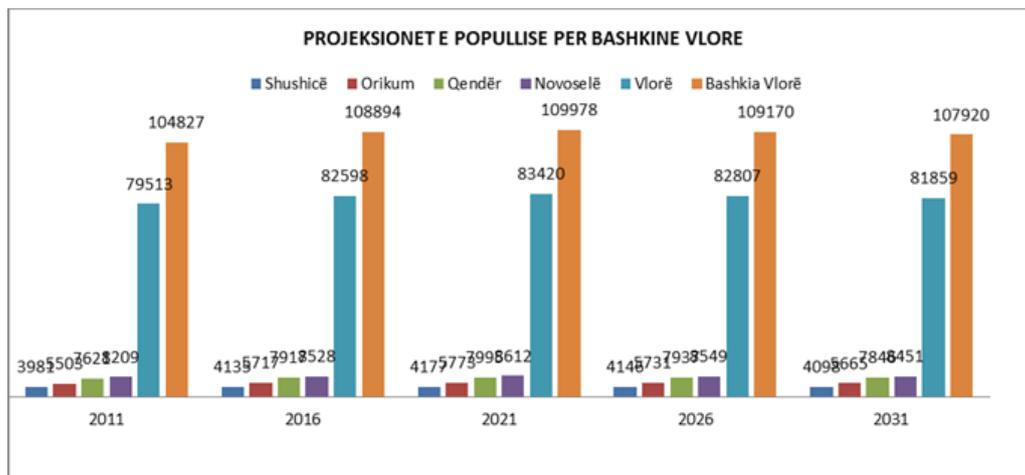


Figure 36: Projections of Population by 2031

Residential status of the Houses				
	Total	Houses of persons with ordinary residence	Housing destined for secondary or seasonal purposes	Uninhabited house or inhabited by persons not included in the census
Municipality:				
Orikum	4074	1581	1189	1304
Novosele	3477	2333	156	988
Qender	3505	2120	326	1059
Shushice	2099	1100	68	931
Vlora	38620	22351	5825	10444
Total	51775	29485	7564	14726

Table 26: Residential status of the Houses

Source: INSTAT, Census 2011



Figure 38: Proposed land use map PPV -Vlore 216

IN5- The buffer zone of the airport which is designed and foreseen to preserve the site for a new potential airport.

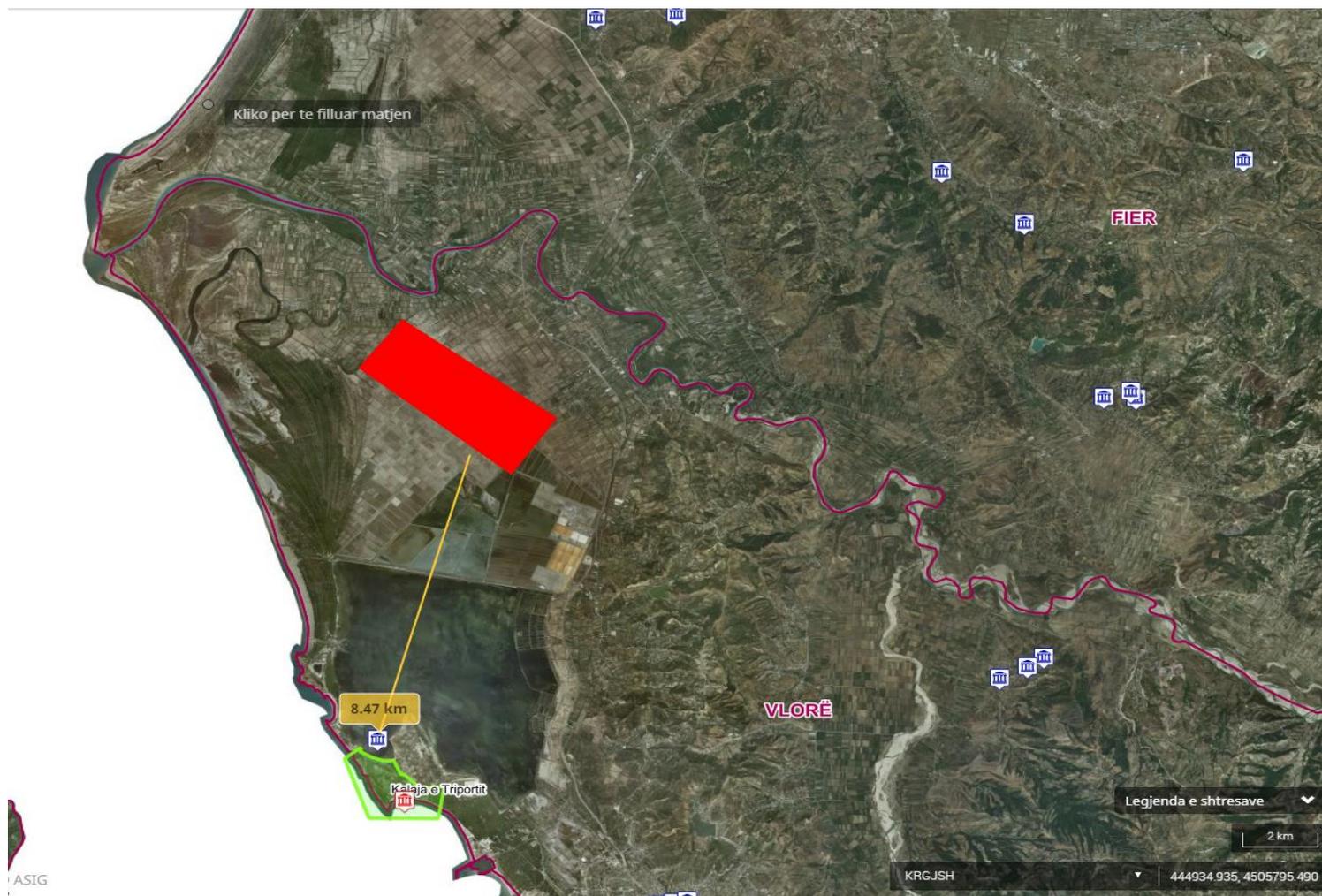


Figure 39: Map of cultural monuments referred to as the project of Vlora

In close proximity to the Vlora area, these cultural monuments are located:

- St. Mary's Monastery: 10,000 m in the airline
- Treport Castle and Antique Wall at Sea: 11 500 m in air distance
- The remains of the Church of Saint Koll: 15,500 m in air distance
- Armenian town: 16 200 m in air distance
- Apartments of Resmi Qerim Kasaj: 16 000 m in air distance
- Gurzezes Castle: 16 200 m in air distance
- Cakran town: 17,000 m in air distance
- Ferro Fetahu's house: 17,000 m in air distance

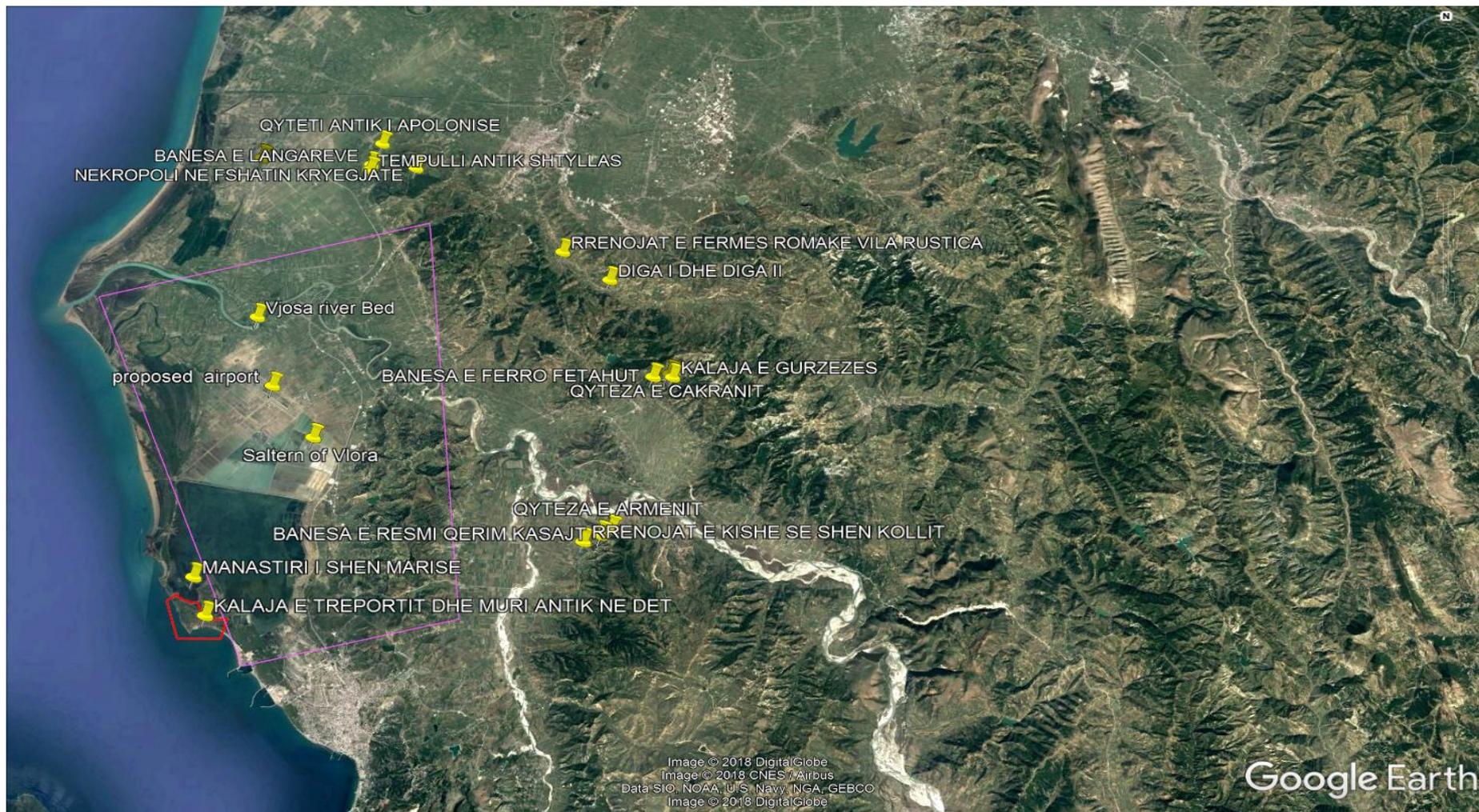


Figure 40: Location of archaeological sites and cultural monuments near the proposed Vlorë area

4.4 CONCLUSIONS

The location of the new airport proposed for the South of Albania lies at the former Mifoli military airport near the village of Akerni, Novosele, Vlore.

The proposed location for the new airport is located near the Narta Lagoon, Vlora's Salt Lake and the River Vjosa.

On the south side it borders on the Lagoon of Narta about 5 km in the aerial protected natural landscape. The west side is bordered by the coastline about 6.4 km away from the airport. On the eastern side about 200 m away, there are several houses built recently, after the closure of the airport (98-99), while the village center of Akerni is located about 500 m from the nearest point of the perimeter of the former Mifoli airport area.

About 3 km off the airstrip in the southeast direction are the salt fields.

On the north side it is bordered by the River Vjosa 3.5 km in the air, while Vjosa shed is about 10 km away.

The proposed airport location is located near the Narta Lagoon and is part of the Fifth Class Vjosa-Northeast Protected Landscape Area, which could potentially affect the values of this area due to the noise emitted and the presence of aircraft (mainly impact on birds and the birds that populate this lagoon and the salt of Vlora (flamingo).

Referring to the area management plan, Vlora Airport is located in the protected landscape area VJOSE NARTE, and belongs to C & Zone B

The proposed location of the airport is in accordance with the General Local Plan of Vlora.

Final evaluation of the site of Vlora

The following is an analysis the site of Vlora according to the criteria, sub-criteria and evaluation system set out above, in compliance with the DCM no. 912, dated 11.11.2015 "On the Approval of the National Methodology of the Environmental Impact Assessment Process".

Nature and biodiversity:

- The proposed airport according to this alternative does not affect surface water resources. Near the project square there are drainage channels which are maintained or systematized without affecting their function even with the construction of the airport.
- The proposed airport location is located near the Narta Lagoon and is part of the Fifth Class Vjosa-Northeast Protected Landscape Area, which could potentially affect the values of this area due to the noise emitted and the presence of aircraft (mainly impact on birds and the birds that populate this lagoon and the reef of Vlorë (flamingo). Referring to the management plan of the

area, the Vlora airport is located in the "Protected Landscape" VJOSE NARTE, and belongs to C & Zone B.

- In the study area there are drainage channels. During the construction phase of the airport, this impact is assessed relatively low due to the limited airport area, the few species in number or importance not relevant to the proposed airport area. During the phase of operation this impact is not expected .
- The route of the road according to this alternative goes mostly to poor, mostly derelict land used for grazing. The impact during the construction phase of this airport according to this alternative is estimated to be low, not significant. The surrounding land values will grow much more after the construction of this airport compared to the actual values it has.
- During the construction phase, this impact is not expected. However, due to the location of the Narta Lagoon and the part of the Vjosa-Northe Category 5 Protected Landscape Area, this impact will be particularly expected in the birds that populate the Narta lagoon or migratory birds. Birds can be affected by aircraft flights not only due to noise but also damage to aircraft. Most of the clashes with birds occur near the airports and at low altitudes. The grassy fields around the airport are a real oasis for birds, and give them abundant food. They attract all bird species, including migratory birds, who go down to large airports as the time of pilgrimage approaches. The use of audio-visual equipment to intimidate birds from airports is a mitigating measure to this impulse.

Social and environmental impacts

- The new airport location extends to the former military airport of Mifolo near the village of Akerni, Novosele, Vlore. On the eastern side about 200 m away, there are several houses built recently, after the closure of the airport (98-99), while the village center of Akerni is located about 500 m from the nearest point of the perimeter of the former Mifoli airport area. These houses are more affected by the noise of aircraft during the airport utilization phase. This airport is of limited capacity and the number of flights expected in it is no more than 2-3 per day. The maximum number expected is to be up to 5 flights per day. This is a factor that significantly reduces this noise impact. It will be advised to be made during the airport exploitation phase to assess the impact on the residential areas to take and noise reduction measures in the estimated impacted facilities. Noise suppressors will need to be installed in noise-rated buildings
- The use of land in the project area for agricultural purposes is very low. Currently, the land is inundated or used for grazing. This is also due to the poor agro-soil quality of the land.
- The risk of accidents during the operation of landing or take off. Mostly, these risks are possible and may increase the housing facilities close to the airport.
- Cultural objects / cultural monuments are not affected by the construction phase of the airport as none of them is in the footsteps of the proposed project. But during the aircraft operation

phase, while the estimated risk of accidents is potentially high, there is propensity, very small, that during the possible accidents we have damage to any of these objects. This impact is considered as possible although with low probability.

- During the construction phase of the airport there is no need to move the community. But during the operation phase, when noise assessment and modeling is performed, if the noise level in any particular object is highly evaluated, and Noise reduction measures will not be effective, then potentially it will also take into account families' recruitment in other unattended areas.

Other environmental problems such as waste, rehabilitation etc.

- Environmental impacts from the offensive phase such as noise, air emissions, traffic impact due to increased transport from vehicles are considered relatively sensitive to the community in the vicinity because of the limited possibilities of using alternative modes of transport during vehicle circulation in local roads.
- There are no environmental problems or contamination inherited in the project area that would be affected by the project.
- The area has the capacity and resources to find raw materials not far from the project area. There is no pressure on finding these natural resources.
- The area around the proposed project does not have any activities in the zone, the impact of which would have cumulative effect referring to the impacts of the proposed project.

5 GEOLOGICAL ASPECT

5.1 INTRODUCTION

This project represents a Master Plan of the airport of Vlora after the completion of a feasibility study of an airport in the south of the country.

The air transport service in the South of the country is provided indirectly - mainly for international tourists first through Tirana Airport and secondly through the Corfuz or Janina Airport of Greece.

Tirana Airport, being the only international airport in the country, is located at a distance of 145km from Vlora and is not considered as appropriate to cover the travel needs of international tourist flows south of Albania.

Upon request from "Seed Consulting", the company "NORD COMAT sh.pk" has completed the Geological Survey of Engineering for the Vlora area for the construction of the South Airport.

This report provides all the information about the geological construction of the region, tectonics, hydrology, seismicity, as well as on-site investigations and their results for the Vlora site.

The study includes geological drilling, sampling and laboratory testing to determine soil resistance and derived geotechnical parameters.

Conclusions and recommendations regarding current conditions and continuation of work in this project are summarized at the end of this study. The statements of all the works carried out as well as their results are summarized in the Annexes attached to this study.

The main chapters are as follows:

Geomorphology and Hydrology with the following subsections :

- a) Geology of the area
- b) Hydrogeology

Seismicity with the following subsections :

- a) Design parameters in the construction area (Vlora, Saranda, Gjirokastra)
- b) Calculation of seismic load
- c) Base Shear Force

Seismoactive faults zones in Albania

Description of field works, with the following subsections :

- a) Description of field works by exploratory borings (Method of drilling and sampling)

- b) Description of field works performed with drilling equipment and lithological profile
- c) The physical-mechanical parameters of the layers
- d) Conclusions

Analysis of alternatives

Methodology of Alternative Analysis

- a) The methodology used for evaluating alternatives.
- b) Evaluation System
- c) Comparison and point evaluation

5.2 GEOMORPHOLOGY AND HYDROGEOLOGY

In this area there is an existing runway that is out of function. The relief of the area is entirely flat, 2-3m above sea level. In rain time the area is covered by the waters. In the east of the studied area passes the Levan - Vlora highway. The sector is connected to the highway with a secondary road. To the south of the area is Narta lagoon.

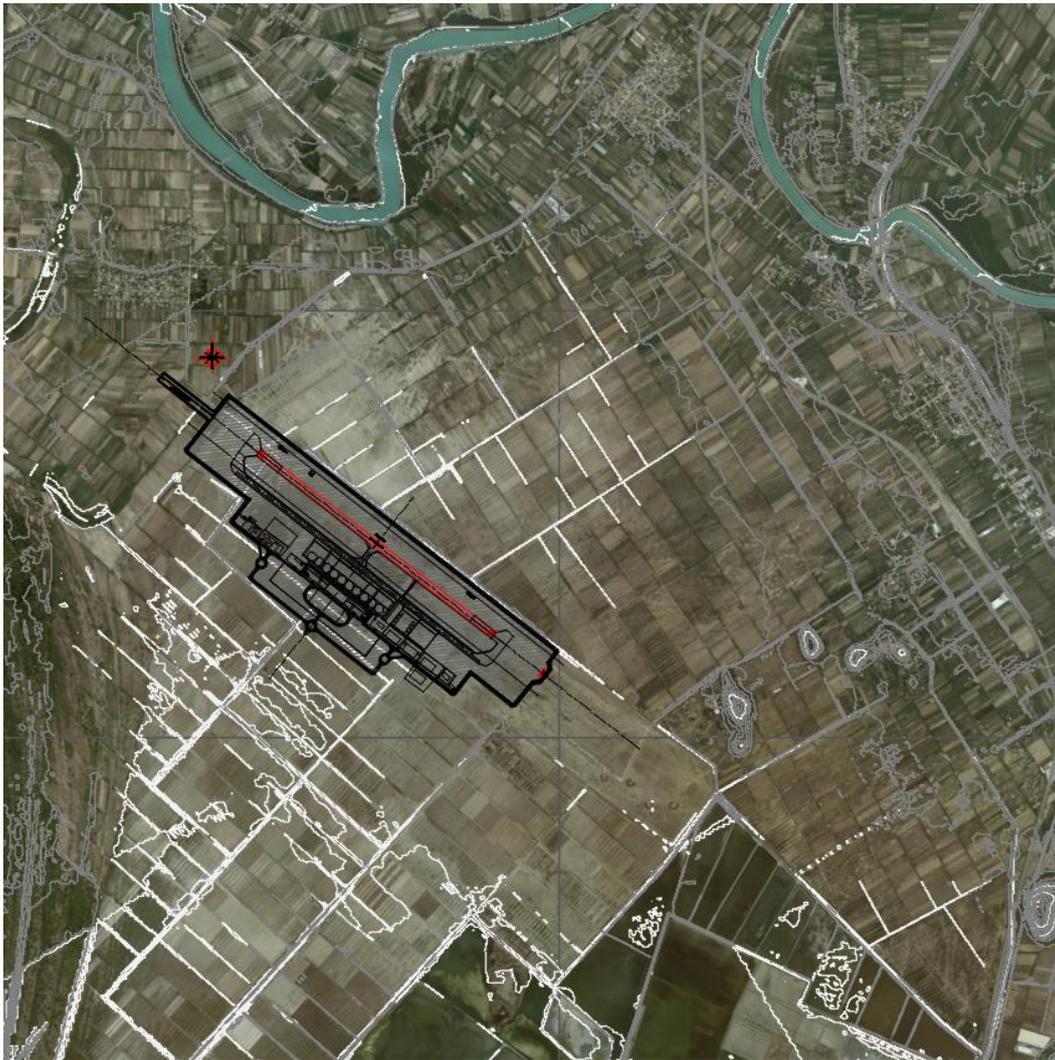


Figure 41- Airport Plan in Vlora

Geology of the area

In the geological setting of the zone are found the Quaternary deposits and the terrigenous Pliocene deposits. The terrigenous deposits are part of the terrigenous rocks of the Periadriatic depression, where are distinguished clearly two lithostratigraphic units nominated as the formations "Helmësi" and "Rrogozhina".

Lower Pliocene – (Formation Helmësi) - N_2^{1h}

The formation "Helmësi" is distributed in the structures Frakull-Ardenice-Divjake, where is outcropped the its Uppermost part. Lithologically this formation is constituted by clayey layers and clayey-sandy packs with thin layers until in massive clays with the characteristic azure color. In the uppermost part, the siltstones and the sandstones are increased, dominating in the profile so passing in the formation "Rrogozhina".

Middle Pliocene – (Formation Rrogozhina) - N_2^{2R}

This formation is distributed in the regions of the structures of Frakullë–Radostinë, Ardenicë–Divjakë and in the syncline of Myzeqe. The deposits of the formation "Rrogozhina" are a normal continuity with the formation "Helmësi" and are represented by sandstones, conglomerates and gravels with thick and medium layers, alternated with siltstones and clays. Their thickness is 50-100m until about 1000m.

Quaternary Deposits- Q

The Quaternary deposits have a considerable distribution in the surface of the region. These deposits are more found in the valley of Vjosa river and in its littoral.

Holocene Deposits– Qh

These deposits have a wide distribution on the surface of the region, and according to the conditions of the formation, they are divided into two parts: marine formations and continental formations.

-Lower Holocene deposits (Qh₁)

They are represented by marshy deposits, clays, siltstones, sands, peats etc. and are distributed in all the studied region, near the dried marshes, as near of the villages Akerni and Novosele. Many years ago these fields have been parts of marsh.

- Lower Holocene Deposits- (Qh₁)

They are represented by alluvial-marshy deposits, clays, sands and gravels. They are distributed at the right of Vjosa river's current, near the villages Akerni and near the village Novosele sector. A wide distribution they have near the village Akerni. Having a considerable distribution they serve as agricultural lands with high productivity.

Upper Holocene – Qh₂

These deposits are distributed in the western part of the region, and are extended parallelly with the shoreline of the sea, in the form of a belt with a width that changes the extension in the inside of the

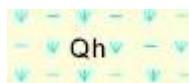
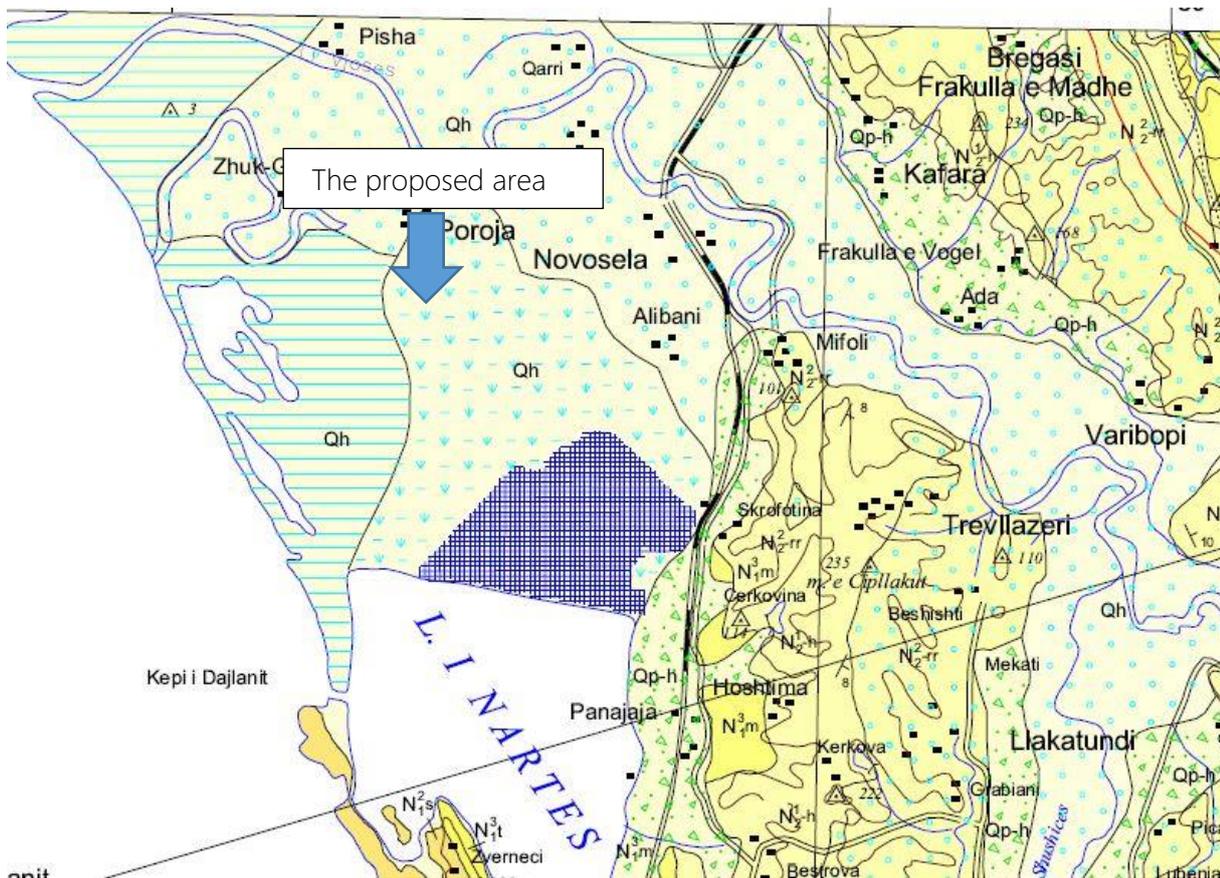
continent. From 500-1000 m. until 3000 m. This belt may reflect the movement of the beaches in the different times and are represented by deposits of the Vjosa river's bed: gravels, sands, clays, lean clays.

Always these deposits are met in unconformity and are represented by aluvial deposits and coastal – marine sands, also and by eluvial-deluvial-proluvial deposits.

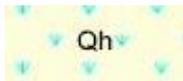
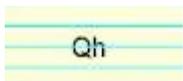
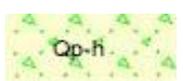
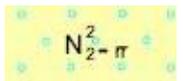
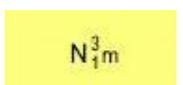
Coastal-marine sands deposits - Qh₂^(Rd)

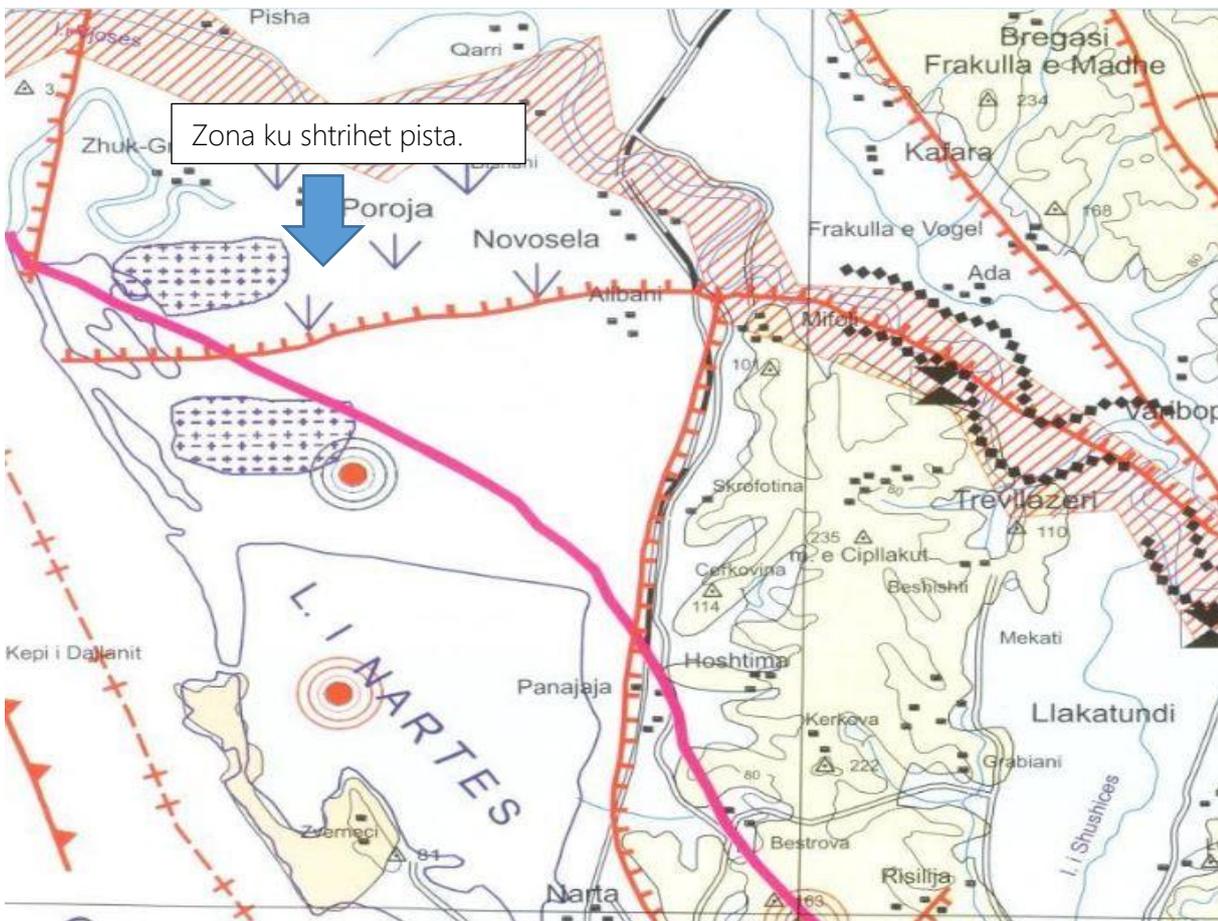
The coastal-marine sands deposits are distributed in the most western part of the region and are extended paralelly with the shore line and the beach.

The coastal-marine sands form the recent beaches and the arosen surfaces of dunes. They are constituted by sands, grey color, fine grained, frequently with pieces of shells (Bivalvia and Gastropodes). Regarding the mineral content, more dominant are carbonates pieces and of heavy minerals as chromites, ilmenit etc. Their thickness is varying from 0 m. in East until 20-50 m.in West. These deposits are determined as of marine origine, because are formed in marine and lagoonal conditions.



Holocene. Alluvial - marshy deposits, clays, sands and gravels.

	Qh	Holocene. Alluvial - marshy deposits, sands and gravels.
	Qh	Holocene. Lagoon deposits. Clay, alevrite, sands and organic waste.
	Qp-h	Pleistocene-Holocene. Aluvial - proluvial deposits. Sands and gravels
	N ₂ ^π	Middle Pliocene. Sandstone e conglomerate.
	N ₃ ^{1m}	Mesinion. Sandstone, clay and evaporate.



	Active faults.
	Exploitation sector of aggregates.



Flood-prone area.



Region with fluctuation of shallow ground water table.



Marshland.



Earthquakes

Hydrogeology

The studied zone is part of the Adriatic Depression and precisely is situated in the South of lower current of Vjosa River in the field of Novosela-Poro.

The aquiferous horizon is constituted by Quaternary deposits, having in the composition lean clays, sands and gravels.

The underground waters have a subartesian characteristic. Their main nutrition is Vjosa River.

The direction of the movement of the underground waters is parallel with the direction of the movement of the river current. The Adriatic Sea is serving as a drainage zone. Filtering characteristics and the waterbearing of the gravels are high ($k_m=200-250$ m/d and $q_s=50-60$ lit/sec). The quality of the waters, near the nutrition zone are good ($M_p < 0.5$ gr./lit), but beyond the nutrition zone, the mineralization is increased and the waters are undrinkable ($M_p=1-3$ gr/lit).

In the South of the studied zone is the Narta Lagoon. It is situated in the southern extremity of the coastal Depression, near of Vlora town and has a surface of 41.8 km². The Narta Lagoon is separated from the Adriatic Sea by a narrow belt of litoral, constituted by alluvial dunes, having a length 8 km. and width 100-1400 m. The litoral is formed by sediments of Vjosa River.

The Narta Lagoon communicates with the Adriatic Sea through two channels and as consequence its waters are salty. From the Narta Lagoon is discharging in the Adriatic sea about 12,9.10⁶ m³ or 1.83 m³/sec. The temperature of the waters is varying fro 1-35 grade C. The main place in the mineralization of waters is constituted by the ions Cl and Na.

5.3 SEIMICITY

In the global seismic zonation, Albania belongs to Alpine-Mediterranean seismic belt, that is one of the most active in the world. The region includes blocks relatively rigid as Adriatic, some sectors of Alpine belt, Alps, Carpathian, Balkan Mountains, Dinarides, Albanides, Helenides and Hellenic Arch and Anatolian belt as well as inner basins like Tirren, Aegean, Panonian and Black sea. The most seismic part here is Aegean and surrounding zone, where are included Greece, Albania, Montenegro, South Bulgaria and West Turkey.

Almost every year this area (34-43o N; 18-30o E), is hit by an earthquake with $M > 6.5$ (Papazachos, 1989).

The seismicity of Albania is characterized from an intensive seismic microactivity ($1.0 < M \leq 3.0$), from many small earthquakes ($3.0 < M \leq 5.0$), from rare medium-sized earthquakes ($5.0 < M \leq 7$) and very seldom from strong earthquakes ($M > 7.0$).

Generally the earthquakes of Albania and the surrounding regions, have shallow focus. Their depth is 10-25 km.

Seismic design parameters in the project area

Design parameters according to KTP

The current and official documents concerning seismic design parameters of Albania are the Seismic Regionalisation Map of Albania by the Seismologic Institute in Tirana and the "Design Seismic Norme KPT – No. 2 – 89", edited in 1989 by Seismological Institute of Tirana and Construction Ministry.

The Seismic Regionalisation Map shows that all the project area is evaluated with an oscillation intensity of VII degree.

In the "Design Seismic Norms KPT-No.2-89", the influence of local ground conditions on the seismic action shall be accounted for by three subsoil categories I, II, III, as described in (Table3.1)

In the "Design Seismic Norms KPT-No.2-89", the influence of local ground conditions on the seismic action shall be accounted for by three subsoil categories I, II, III, as described in (Table 1)

Soil category	Description
I	<ul style="list-style-type: none"> All kinds of rock (excluding weathered rocks) Compact gravel Marl (not weathered)
II	<ul style="list-style-type: none"> Weathered rocks and marls Gravel sands, coarse and medium grained sands compact and

	semi compact <ul style="list-style-type: none">• Fine grained sand-compact• Clayey sand and sandy clay-stiff, semi-stiff and stiff –plastic• Stiff plastic clay
III	<ul style="list-style-type: none">• Fine grained sand- semi compact• Dusty sand compact and semi compact• Clayey sand and sandy clay fro medium stiff to soft plastic• Clay from medium stiff to soft plastic

Based on the table above, our study area is part of the area with the expected seismic intensity of VIII degree according to MSK - 1964, Category III.

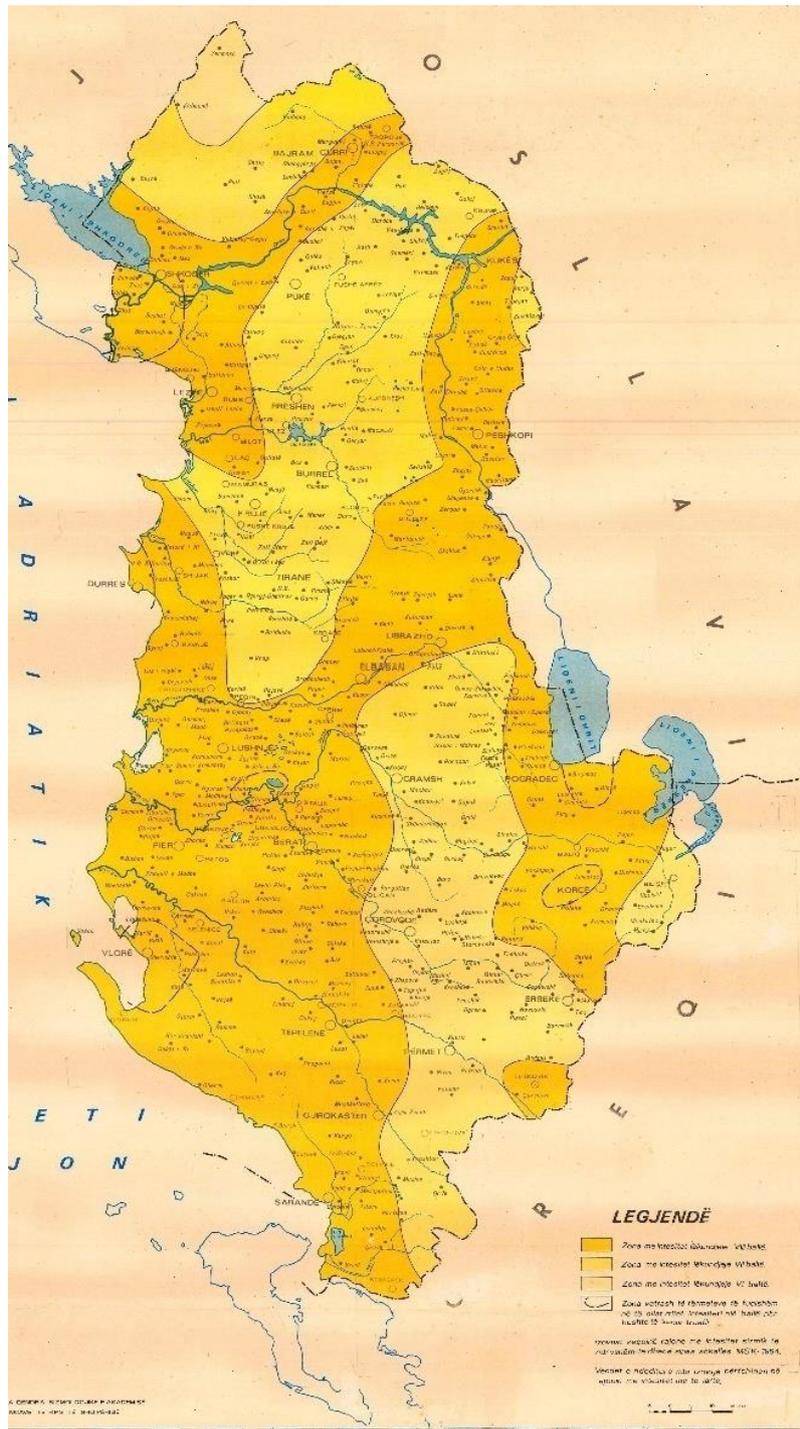


Figure 42- Seismic Zonation Map of Albania

Design Response Spectrum

For calculation of buildings and different structures with spectral method, in the case of horizontal seismic forces, the spectral acceleration design values S_a is defined by the following (based on “Design Seismic Norms KPT-No.2-89”):

$$S_a = k_E \times k_r \times y \times \beta \times g$$

where:

k_E : seismicity coefficient depending on Seismic (see Table 3.2)

k_r : building importance coefficient (see Table 3.3)

y : structural coefficient (see Table 3.4)

β : dynamic coefficient, the value of which are dependent on the free vibration period (see Fig. 3.2);

g : gravity acceleration

Seismicity Coefficient k_E

Category of soil	Seismic intensity (MSK-64)		
	VII	VIII	IX
I	0.08	0.16	0.27
II	0.11	0.22	0.36
III	0.14	0.26	0.42

Building Importance Coefficient k_r

Transport structures		
Category	Description of building and structures	Importance coefficient k_r
I	Railway or road bridges with special importance and all other bridges with light bay HD: HD \geq 50m.	1.5

II	Railway or road bridges with light bay (HD): a) 30m < HD < 50m b) 18m < HD <= 30m c) HD <= 18m	1.3 1.2 1.0
III	Railway or road tunnels with length (L): a) L >= 500m b) 100 <= L < 500m c) L < 100m	1.5 1.3 1.0
IV	Retaining walls.	1.0

Structural coefficient, ψ

Category	Description of building and structures	Structural coefficient ψ
X	Bridges:	
	a) with reinforced concrete understructure b) with concrete understructure	.25 .28
XI	Retaining walls:	
	a) with reinforced concrete b) with concrete and stone	.25 .28
XII	Underground structures.	.25
XIII	Hydraulic structures as barriers and other structures like them:	
	a) with site materials b) with concrete and reinforced concrete	.25 .35
XIV	Other hydraulic structures as tower for water, tower for entering in tunnels, equilibrium tower etc.	.35

β : dynamic coefficient which is determined from the below formulas and from Fig.3.2:

- For first soil category

$$0.65 \leq \beta = 0.7/T_i \leq 2.3$$

- For second soil category

$$0.65 \leq \beta = 0.8/T_i \leq 2.0$$

- For third soil category

$$0.65 \leq \beta = 1.1/T_i \leq 1.7$$

Where:

T_i : Fundamental period of free vibration which shall be carried out using the methods of structural dynamics, or by means of approximate formulae which are based on the principles of structural dynamics.

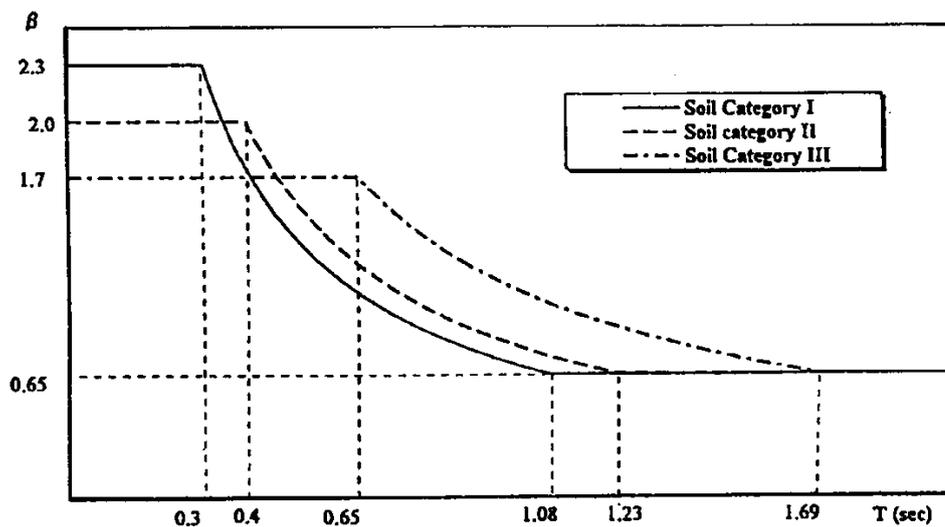


Figure 43: Dynamic Coefficient

Base Shear Force

The seismic base shear force E_{ki} for each direction is determined as follows (based on "Design Seismic Norms KPT-No.2-89"):

$$E_{ki} = k_E \cdot k_r \cdot \psi \beta_i \eta_{ki} \cdot Q_{ki}$$

Where:

k_E , k_r , ψ – are coefficients defined as mentioned above.

β_i – is dynamic coefficient corresponding to the "i"-th mode of vibrations.

η_{ki} – the coefficient of the seismic load distribution, which answers to the "i" forms of the own oscillations of the construction at the "k" level; this coefficient is determined as 2.6.5 or 2.6.6. paragraph of the "Design Seismic Norms KPT-No.2-89".

Q_k – is the weight of the engineering work, which is concentrated in the “k” level and is determined in base of calculating loads (permanent or temporary) reduced with combination coefficients of the table (3.3) in conformity with the point 2.3.4. of the “Design Seismic Norms KPT-No.2-89”.

Vlore

According the Albanian Code of the Designing KTP N.2-89, the seismic coefficient, or the acceleration of the soil, expressed, in dependence of the gravitation -g, is determined based on the category of the soil and its seismic intensity, taken for the concrete construction’s site.

So for our construction’s site, the values of these parameters, for the evaluation of the acceleration are:

a-Category of Soil – III

b.-Seismic Intensity -8.0 degree (MSK-64)

According the Table 2, of the Albanian Antiseismic Code KTP N.2-89, for the III d category of the soil and for its seismic intensity 8 degree (MSK-64)– the seismic coefficient will be: $0.25g \times 2/3=0.166g$.

According the Albanian Code of Designing, the seismic action in a construction’s site is presented through the elastic specter of the reaction of the horizontal maximal acceleration of the soil, that is calculated from the relation below :

$$S_a(T) = k_e B(T)g$$

Where k_e - the coefficient of seismicity expressed in g, $B(T)$ - dynamic coefficient ,that is depended from the period of the vibration of the soil.Including in this relation and the parameters : k_r -coefficient of the importance of the object and n -coefficient of ductility and of the extinction of the structure. As result are taken the projecting values of the acceleration.

The parameters for the concrete site are: Intensity 8.0 degree (MSK-64), soil of III-d category, $k_e=0.25g \times 2/3 =0.17$, $B(T)=2.0$ and the maximal spectral acceleration: $S_a(T)=0.17 \times 2.0=0.442 g$.

5.4 SEISMOACTIVE FAULTS ZONES IN ALBANIA

In the map of the seismoactive faults of Albania are presented all the active structural elements by the type of deformation (normal fault, reverse fault,thrust and back-thrust,strike-slip, flexure, diapir evaporite dome) and their chronology of activity. Based upon a seismotectonic synthesis, three longitudinal and two traverse seismoactive zones have been detected in Albania(Aliaj 1988). (Fg.5) as follows:

1. The Ionian-Adriatic thrust fault zone NW up to nearly NNW trending.
2. The Shkodra-Mati-Librazhd graben fault zone NW trending.
3. The Peshkopi-Korca graben fault zone N-S trending.

4. The Shkodra-Tropoja normal fault zone NE trending.
5. The Elbasani-Dibra normal fault zone NE trending (Aliaj, 2000a).

The Ionian-Adriatic seismoactive zone is a thrust fault zone is composed of a large segment, which continues along the western coasts of Montenegro, Albania and Greece, In this zone is included and the region of Novosela-Vlora, where will be constructed the Aerodrome of Vlora. This zone is divided into three segments by the Shkodra-Peja (Scutari-Pec) and Vlora-Tepelena transversals, as follows:

- a) Northern segment, WNW trending, is consisted of Kruja (Dalmatian) zone, pure compression thrust faults.
- b) Central segment, N to NNW trending is consisted of Periadriatic Depression oblique compression thrust faults, due to oblique convergence of the Albanian orogen with the Adriatic Plate. This segment of active thrust faults Segmenti is followed for 130 km from Lezha to North of Vlora.
- c) Southern segment, NW trending, is consisted of mainly Ionian zone pure compression thrust faults. The zone of active thrust faults is followed for over 250 km, from Vlora to Konispol and beyond in Greece, along the Ionian coasts.

These active faults are the cause of the generation of the powerful earthquakes, that have hit this zone.

It is important to present some data on the Butrinti depression :

In North-West of the Lake of Butrinti and of Saranda town, under the waters of of Ionian sea, from the marine seismic works ,performed by some foreign companies, are evidenced Pliocene marine sediments, transgressive and in unconformity above the Ionian structures ,shred with normal faults (Aliaj etc.). This fact suggest that due to a tectonics with a regimen on the extension ,in Pliocene are formed some horst-graben structures .At the front of the Ionian thrust ,in the grabens ,formed at Pliocene ,were placed marine basins ,as Pliocene basin of Butrinti and other basins towards NW, plunged under the waters of the Ionian sea .It seems that in this zone there was present a local tectonics in the the extension, that has been active and at the beginning of Quaternary. So was formed the Lake of Butrinti, meanwhile the Ionian sea continued to be plunged.

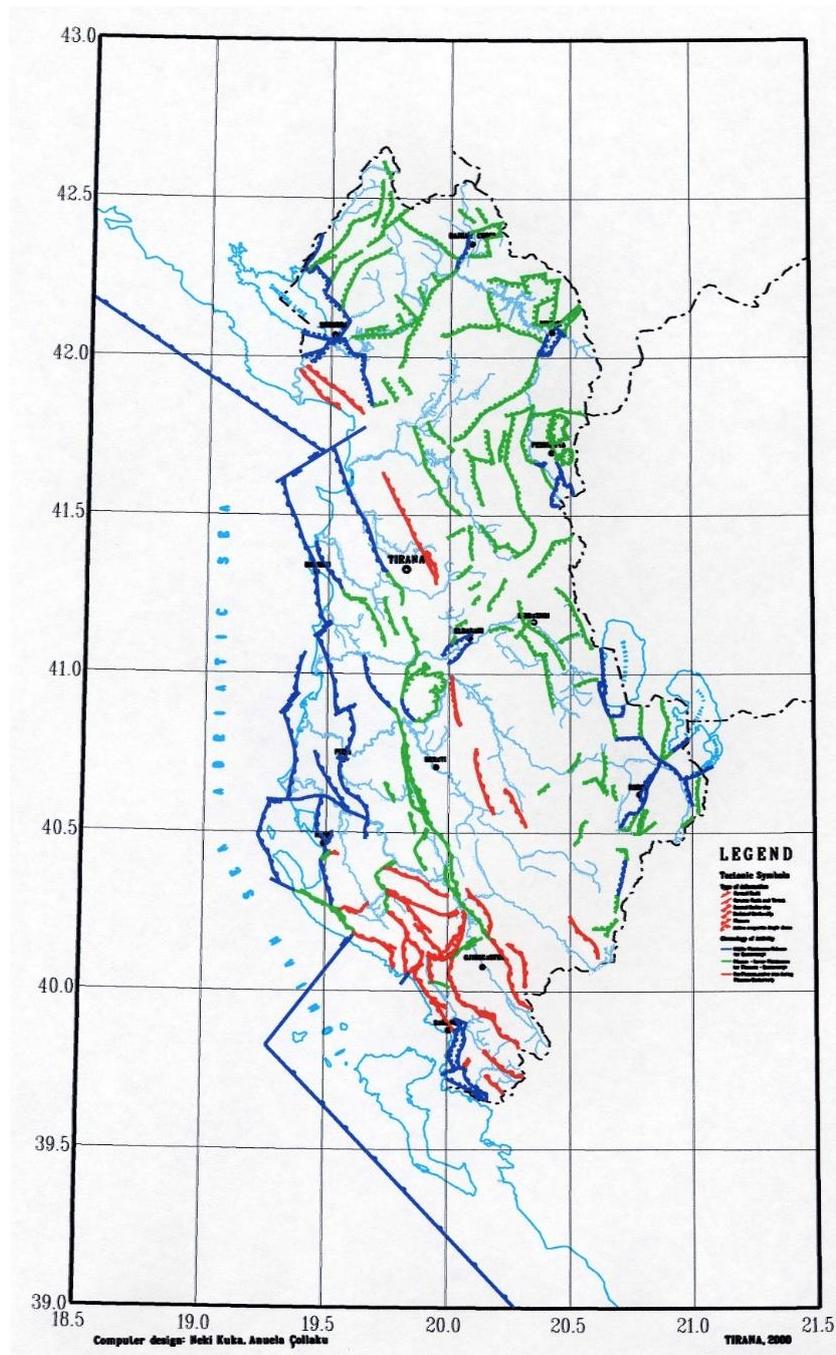


Figure 44- Map of the Active faults zones in Albania

5.5 FIELD WORKS BY EXPLORATORY BORINGS

For this project, there were carried out 2 exploratory borings during the first phase and 3 exploratory borings during the second phase. The investigation depth and their location are shown in Table 4.1 and Table 4.2. The plan of these fieldworks along the road line is shown in Annex 1.

Description of works according to classical surveys

Method of drilling

Geological drilling for this project was carried out by drilling equipment (mounted on a truck). The technique used is drilling with rotation. Drilling is carried out by advancing with a karotier (core drilling) with a diameter of $\phi = 100\text{mm}$, length 1.0. The well is protected with fencing pipe (casing), which is (metal pipe with a diameter of $\phi = 150\text{mm}$).

After finishing a drilling maneuver with core drilling, is entered a casing tube. The well must be cleaned until the drilled depth, taking care that the earth structure should not to be destroyed. During all the time the well is filled with water, until in the neck. The depth of the exploratory borings is different from each other, depends from the client's request, the goal of the putting in evidence of landslides' plans and depended by the earths of the encountered rocks, during the drilling. The method of drilling and sampling is performed according the recommendations of the standards ASTM and BS.

Sampling

The samples are taken off from the core drilling, under the pressure of water. The length of the drilling maneuvers is performed according the orders of engineer that leads the field works. The staff of the drilling works of the NORD COMAT Company has demonstrated always a great attention to the orders of the engineer and have applied them correctly.

For the geological and geotechnical withstudies, it is foreseen to be taking a variety of different samples that will serve for the identification of earths' characteristics.

The boreholes samples are taken off at the moment the soil was coming out from the core drilling. At the beginning, the sample is documented visually and after, it is placed in a plastic container. This act helps to preserve the samples natural humidity, the plastic is wrapped with adhesive. All the samples are preserved in special boxes, to ensure that they are damaged during transport. At the same time, the staff is instructed to preserve the samples in fresh sites and to keep them away from the effects of solar radiation, both during transport and in the laboratory.

The samples transported in NORD COMAT Laboratory are all tested for the determination of physical and mechanical characteristics. The tests and their results are detailed in Appendix no.2.

Investigating and Interpreting Results.

Description of field works performed with drilling equipment and lithological profile, during the first phase

There have been 2 drilling, the depth of which goes up to 10m from the surface of the natural soil.

The layer No.1 is met in Bh. 1 at the depth (0.0-0.5)m, and in Bh. 2 at the depth (0.0-2.0)m.

The layer No.2 is met in Bh. 1 at the depth (0.5-4.0)m, and in Bh. 2 at the depth 2.0-3.0 m.

The layer No.3 is met in Bh. 1 at the depth (4.0-7.20)m, and in Bh. 2 at the depth (3.0-7.40)m.

The layer No.4 is met in Bh. 1 at the depth (7.20-10.0)m, and in Bh. 2 at the depth (7.40-10.0)m.



Figure 45- Photo while drilling, BH. Nr.1



Figure 46-Photo of the sample, BH. Nr.1



Figure 47- Photo while drilling, BH. Nr.2



Figure 48- Photo of the sample, BH. Nr.2



Figure 49- Photos of the area covered with water after rainfalls

Geological – Lithological BH.No.1

GEOLOGICAL-LITHOLOGICAL Bh No.-1						
Objekti: Report on the Engineering-Geological study of the construction's site of the Aerodrome of Vlora.						
scala 1:100				December 2017		
Bh. no.- 1 Depth: 10.0m.						
Compiled by:Eng. Defrim Shkupi Eng. Aranit Kacdedja						
Indeks geological	Quote layer	Depth layer	Lithological Columns	Thicness layer	Geological-Lithological Description	Level water underground
		0.5	①	0.5	Is represented by marshy deluvial deposits of Quaternary (Q4del+ken). Middle clays, silty, brown color, with humidity, plastic, on the average compressed.	0.7
		4.0	②	3.50	Is represented by marshy Quaternary deposits (Q4kenetore). Muddy clays until running ones, saturated with water.	
		7.20	③	3.20	Is represented by del+lagoon+marshy deposits of Quaternary (Q4del+lag+ken). Clays pan, silty, grey color, with humidity, plastic until strong plastic, compressed.	
		10.0	④	2.80	Is represented by marine+lagoonal deposits of Quaternary (Q4det+lag). Fine-grained and middle-grained sands, much silty, with humidity, grey color, a little compressed.	

Geological – Lithological BH.No.2

GEOLOGICAL-LITHOLOGICAL Bh No.-2						
Objekti: Report on the Engineering-Geological study of the construction's site of the Aerodrome of Vlora.						
scale 1:100				December 2017		
Bh. no.- 2 Depth: 10.0m.						
Compiled by: Eng. Defrim Shkupi Eng. Aranit Kacdedja						
Indeks geological	Quote layer	Depth layer	Lithological Columns	Thickness layer	Geological-Lithological Description	Level water underground
		2.0	1	2.0	Is represented by marshy deluvial deposits of Quaternary (Q4del+ken). Middle clays, silty, brown color, with humidity, plastic, on the average compressed.	1.0
		3.0	2	1.0	Is represented by marshy Quaternary deposits (Q4kenatore). Muddy clays until running ones, saturated with water.	
		7.40	3	4.40	Is represented by del+lagoon+marshy deposits of Quaternary (Q4del+lag+ken). Clays pan, silty, grey color, with humidity, plastic until strong plastic, compressed.	
		10.0	4	2.60	Is represented by marine+lagoonal deposits of Quaternary (Q4det+lag). Fine-grained and middle-grained sands, much silty, with humidity, grey color, a little compressed.	

The physical-mechanical parameters of the layers

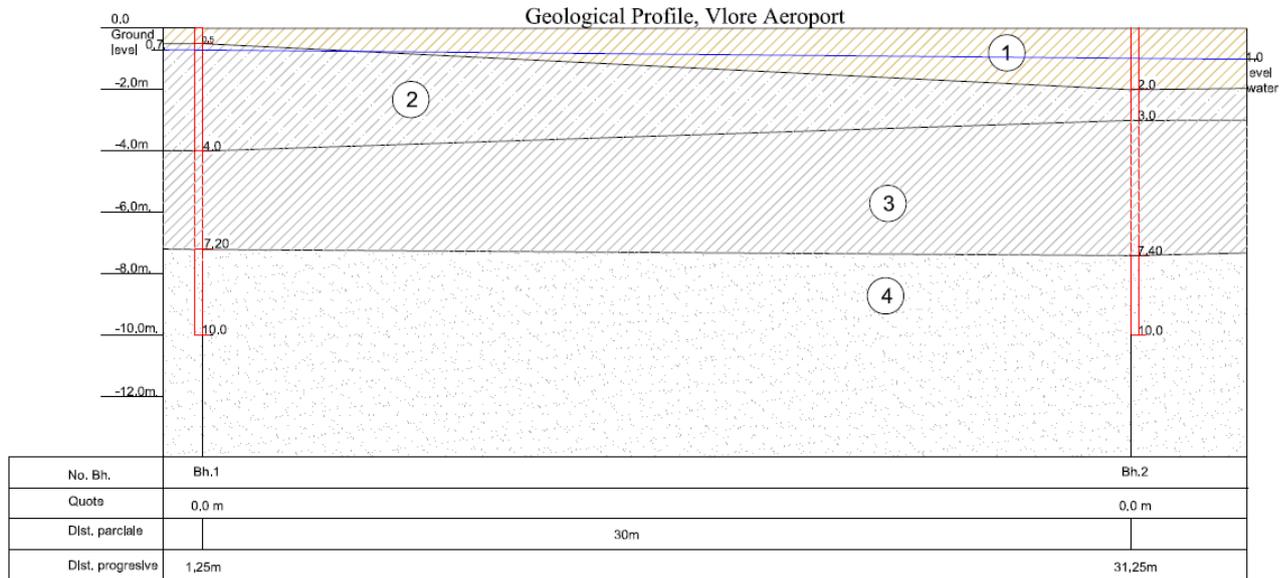


Figure 50- Geological Profile, Vlora

Based on the data taken from the drilling works in the construction site, with the sampling of the disturbed and undisturbed structures of the samples, the recognition of the field and also on the archival documents we have precised the engineering-geological conditions of the construction's site. Below we are presenting the physical-mechanical characteristics for each layer.

Through the lithological-geological columns, with horizontal-vertical scale 1:100, where is presented the position of each layer in extension and in the depth, also there is presented and the level of the underground waters, founded during the drilling and after 24 hours (after the stabilization), In the construction's site are found four layers.

Layer no. 1- Medium clays, silty, brown color.

Layer no. 2- Muddy clays running, saturated with water.

Layer no. 3- Clay pan, silty grey color.

Layer no. 4- Fine-grained and middle-grained sands, very silty, grey color.

Below we are presenting the physical-mechanical characteristics for each layer :

Layer no. 1- Is represented by marshy deluvial deposits of Quaternary (Q4del+ken). Middle clays, silty, brown color, with humidity, plastic, on the average compressed.

Grain Size..

Sandy fraction	13.7 %
Silty fraction	.66.3 %
Clayey fraction	20.0 %
Atterberg's Limits	
Upper Limit of plasticity	37.1%
Lower Limit of plasticity	23.1%
Number of plasticity	14.0 %
Natural Moisture	28.2%
Specific gravity	27.0 KN/m ³
Skeleton weight	14.8 KN/m ³
Density bulk	19.0 KN/m ³
Angle of inner friction	16°
Module of deformation	7800 kPa
Cohesion	14.7 kPa
Allowed charge	..157 kPa

Layer no. 2- Is represented by marshy Quaternary deposits (Q4kenetore). Muddy clays until running ones, saturated with water.

Layer no. 3- Is represented by del+lagoon+marshy deposits of Quaternary(Q4del+lag+ken). Clays pan, silty, grey color, with humidity, plastic until strong plastic, compressed.

Grain Size

Sandy fraction.....2.5 %

Silty fraction56.5 %

Clayey fraction41.0%

Atterberg's Limits

Upper limit of plasticity45.4%

Lower limit of plasticity23.3 %

Number of plasticity.....22.1 %

Natural Moisture28.4%

Specific gravity.....27.1 kN/m³

Weight of skeleton.....15.4 kN/m³

Density bulk19.8 kN/m³

Angle of inner friction17°

Module of deformation.....9640 kPa

Cohesion.....24.5 kPa

Allowed charge216 kpa

Layer nr. 4- Is represented by marine+lagoonal deposits of Quaternary (Q4det+lag). Fine-grained and middle-grained sands, much silty, with humidity, grey color, a little compressed.

Sandy fraction	47.04 %
Silty fraction	52.96%
Density bulk	18.0 kN/m ³
Angle of inner friction	280
Module of deformation.....	18000 kPa
Allowed charge.....	190 kPa

Conclusions

- The construction's site is constituted by marshy deposits of Quaternary, that are represented by clays pan, middle clays and muddy clays, with humidity until saturated with water, brown and grey color, a little until on the average compressed.
- The level of the underground waters, measured during the drilling, almost arrives at the surface. At the borehole Bh. 1 the level of the underground waters is met at the depth (0.7)m and in the borehole Bh. 2 at the depth(1.0)m.
- During the winter period, the construction's site is inundated by the waters of the rain.
- The engineering-geological conditions of the construction's site have weak physical-mechanical characteristics.
- The layers No.3 and No.4 have good physical-mechanical characteristics.

5.6 EVALUATION OF THE SITE OF VLORA

A general evaluation of the site of Vlora was made, taking into consideration the main criteria and sub-criteria related to geological aspects.

- The studied zone in the Field of Novosela (Vlora) represents a smooth terrain, constituted by the consolidated Quaternary deposits.
- The site in the Field of Novosela (Vlora) have the principal layers (3 and 4) stable at the extension and at the depth and not having a lenticular development.
- In Vlora, the mineral of pyrite is absent.
- The predominant diameter is of silty fraction.
- The site of Novosela (Vlora) is constituted by geological formations, where is missing the cavity and the fracturation. The layers, caught during the geological works, have a bedding totally horizontal.
- The site of Novosela (Vlora) is a part of the Periadriatic Depression, more precisely it is its south-western extreme. In this sector are not observed faults or tectonical dislocations. The layers that constitute the site are quasi horizontal. According the seismic point of view, the site is included in the zone with a considerable seismicity. The maximal intensity in the zone is counted 8 degree.
- The possibility of the atectonical superficial movements is foreseen and at the cases of the artificial interventions. Regarding the stability of the surface, the site of Novosela (Vlora) is well stabilized.
- Regarding hydrogeological conditions, the area of Novosela (Vlore) is a zone directly impacted by surface waters and the water content in their formations is over 30%.

6 HYDRAULIC AND METEOROLOGICAL ASPECTS

6.1 BACKGROUND

The zone under study is included in the Southern and Central Mediterranean Climatic Zone of Plains. Annual precipitations oscillate from 950-1200mm. Snowfall is a very rare event.

Minimum absolute temperatures oscillates from -3 deri -5 °C; only in very rare cases the values of these temperatures are lower. The period of freezing is very short and the number of frozen days may reach 12-15 days per year.

The wind in general has two main directions. During the winter period predominate the northern and southeast directions. During the summer predominate the winds from northwest direction.

In these zones very high values of wind velocity are observed.

Hydrolometeorological investigation covering Phase 1 started in December 2017. The Final Report contain:

- Site visit
- Review of feasibility studies, existing hydrological reports and data and collection of additional reports and data, including information on major floods.
- Hydro meteorological information used.
- Data on Climatic conditions and hydrological computations.

Site Visit

The zones of Old Airports of Vlora, Gjirokaster and Saranda was visited on 14 of December 2017, as part of a general inspection. The main objective of this visit was to recognize the zones under study and in particular to identify general morphological conditions and existing hydrometeorological stations as well as the existing hydraulic structures.

- The site visit started in Vlora and the end of the site visit was at the Saranda (see photos in ANEX).

After the site visit we identified the general morphological conditions of airports and surroundings and the data we need for the preparation of Final Hydrometeorological Report.

6.2 CLIMATIC CONDITIONS

The zone under study is embrased into the Mediterranean Climatic Subzones of Central and Southern Plain. Thus, the annual precipitations oscillate between 950-1200mm. Snowfall is a rare phenomenon and a stable snow layer is almost never observed.

The minimum absolute temperatures oscillate between -3 deri -5 °C; only in very rare cases lower values of minimum temperatures can be observed. The period with freezing days is short and the number of days with frost may arrive values until 12-15 per year, during which the values of minimum temperatures are decreased below 0°C . Wind bows in general from two directions. During the cold season predominates the wind from southeast and north and during the warm season predominates wind from northwest direction. The maximum wind velocities in this zone, during the warm season, takes values until 40 m/s and more in Vlora.

Sunshine Duration

In the table 1 the monthly values of sunshine duration are given in hours for the station of Vlora. From these data, it can be seen that the maximum values of this element are observed in July and the minimum values in December. The mean value for the whole year is 2721 hours.

Table 27 Monthly sunshine mujor (hours).

Station	1	2	3	4	5	6	7	8	9	10	11	12	year
Vlore	126	138	182	225	280	322	376	344	272	209	131	111	2721

Air Temperature

Air temperatures are an important climatic element, which express the magnitude of solar energy in the vicinity of Earth.

In the table 2 the average monthly values are given. From these data it can be seen that the maximum values are reached in July and August (24 °C) and the minimum value in January (9.2 °C). The average value for the whole year is from 17.9 °C.

Absolute minimum temperatures oscillates from -3 deri -5 °C; only in very rare cases they may take lower values. Frozen period is very short and the number of days with frozen days may take the values from 12 to 15 per year, during that the values of minimum temperatures may reach values under 0°C .

As for the absolute maximum temperatures their values may overcome $40-41$ °C. The highest values of absolute maximum temperatures is 42.2 °C.

Table 28 Average Monthly Air temperatures (0°C).

Station	1	2	3	4	5	6	7	8	9	10	11	12	year
Vlore	9.2	10.0	11.4	14.4	18.3	22	24.1	24.2	21.6	17.9	14.1	10.8	16.5

Precipitations

Precipitations are an important element for the design of hydraulic structures, particularly the data on rainfall intensities.

In the tab. 3 the monthly values of the precipitation, for an average year, are given. From these data it can be seen that the average maximum values are observed in months of the winter and the minimum ones in month of July. The average value for the whole year is about 950 mm.

Number of days with precipitation layer bigger than 0.1 mm oscillates between 85 and 100 days. In general the maximum precipitations are not torrential.

Snowfall is a rare phenomenon and an important and stable layer of snow is not observed in this zone. The maximum layer of snow generally reaches the value of 5 - 10 cm and very rarely 15-17cm.

Table 29: Monthly precipitations (mm).

Station	1	2	3	4	5	6	7	8	9	10	11	12	year
Vlore	126.1	99.5	83.5	69.6	53.5	22.8	16.7	29	57.9	111.5	148.4	136.3	955

Air Humidity

Air humidity is also an important meteorological element which influences road traffic.

In the table.4 the inter-annual distribution of this element is presented. From this figure the average value of humidity is observed in the winter season (79-80-%) and minimum value in the warm season (63- 67%). In fig 6 the inter-annual distribution of relative humidity for station of Kamza is presented, where it can be seen that the values of this element oscillate within a small interval.

Table 30: Relative humidity (ne %)

Station	1	2	3	4	5	6	7	8	9	10	11	12	vit
Vlore	66	65	66	67	67	64	61	62	66	68	69	67	66

Fog

Fogs are composed by small water particles remained in state of suspension in the air and which cannot be seen by open eyes. Fogs in general have a grey color and in rare cases the visibility may reach several meters.

In the airport design, it is important to know the number of days with fogs and their duration. The number of days with fogs changes considerably from a place to the other. The analysis of number of days with fogs shows that there is not an order in the distribution of fogs in different months of the year. However, in hilly zones, the number of days with fogs is greater in the early autumn, in the winter and in early spring. In the zone under study the average number of days with fog is 7 - 8 days/year, with a maximum in the months of winter and spring period. (see tab. 5).

Table 31: Number of days with fog.

Station	1	2	3	4	5	6	7	8	9	10	11	12	year
Vlore	0.1	0.1	0.4	0.4	0.3	0.0	0.3	0.1	0.1	0.1	0.1	0.3	2.3

From the table it can be seen that the number of days with fogs in the zones of Vlora and Saranda but in Gjirokastra site this number is relatively high.

Wind

Wind is also another meteorological element which has an important influence on the air traffic.

The wind velocity and direction varies significantly from one zone to another under the influence of the relief of the zone. Thus, in Vlorë the strongest winds are those of S and SW directions.

In the tab. 6 the average wind velocities for each directions are given and in fig. 7 the corresponding wind roses are presented.

Table 32: Average wind velocities according to the directions (in m/s)

Station	N	NE	E	SE	S	SW	W	NW
Vlore	3.3	2.8	2.8	3.3	5.5	5.2	3.7	4.6

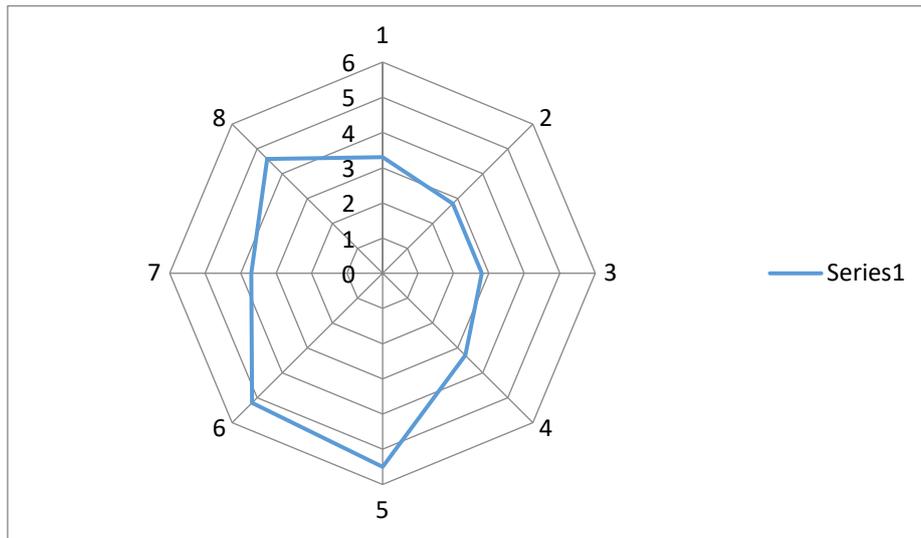


Figure 51: Average wind speed according to directions. Vlore

In the tab. 33 the wind frequency, according to the directions, is given and in the fig. 8 the corresponding wind roses are presented.

Tabela 33: Wind frequency according to directions (in %).

Station	Calm	N	NE	E	SE	S	SW	W	NW
Vlore	40.2	3.5	6.7	17.1	3.2	7.6	5.3	6.5	9.8

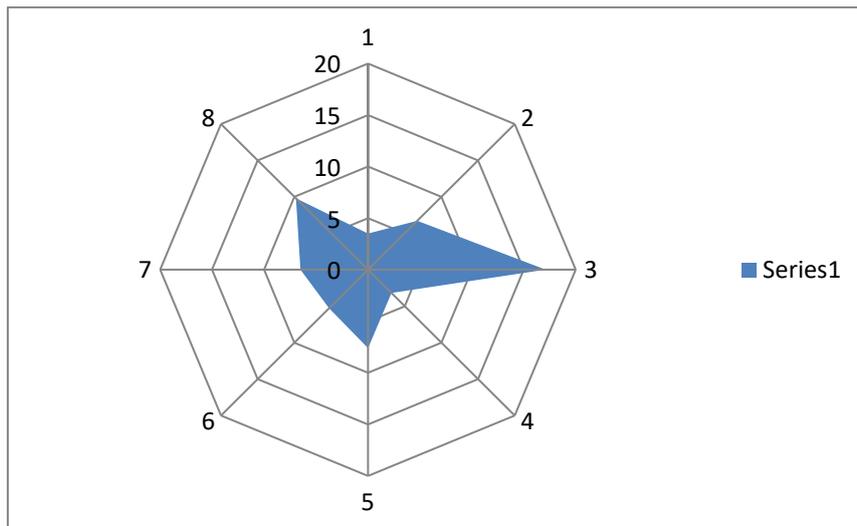


Figure 52: Wind recurrence according to directions (in%) Vlore

Concerning to observed maximum wind velocity in the study zones they take values until 40 m/s and more in Vlorë.

The tables with data on wind and wind roses given in this report are based on annual average values which are presented in the monographs "Climate of Albania" and "Atlas of Climate of Albania". With this data is not possible to establish the corresponding radar charts of winds.

To establish these kinds of charts daily wind data are needed which are not available for us. Probably they can be found in IGJEUM (Insitute of Gjeosciences, Water and Environment). We requested them by letter without receiving any answer yet.

Meanwhile, we found some data on wind in the monographs "Climate of Albania"

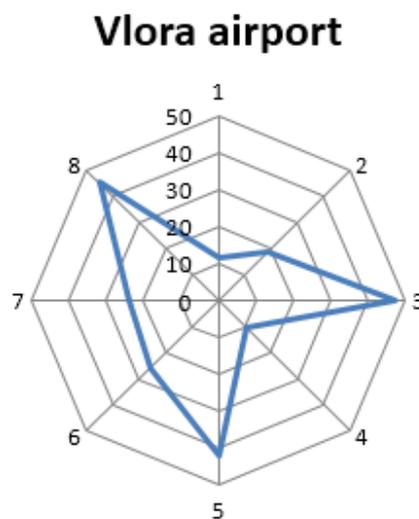


Figure 53:Rose Wind Vlora

Meanwhile, we found some data on wind in the monographs "Climate of Albania". These data show that the frequency of wind velocities with the magnitude higher than 10 m/s, which corresponds to 20 noddles, is only 2% .

One noddle is equal to one mile per hour and the calculations are made we will have:

$$1 \text{ noddle} = 1 \text{ mile per hour} = 1856 \text{ m}/3600\text{s} = 0.52$$

$$20 \text{ noddles} = 0.52 * 20 = 10.3 \text{ m/s.}$$

Taking into consideration this calculations we think that a frequency less than 25 for the winds with velocities higher than 10m /s (or 20 noddles) can be neglected and for the orientation of the runway, the winds of N or NW and S and SE can be considered.

6.3 HYDROMETEOROLOGICAL COMPUTATIONS

Heavy Rains Analyses

For the analyses of heavy rains lasting less than 24 hours, the data registered are used. Based on these data series of maximum duration of rainfalls are established for 10, 20, 30, 60, 120, 180, 360, 720 and 1440 minutes.

Calculated rainfalls, required for the design of hydraulic structures are obtained using the statistical method.

The occurrence probability of heavy rainfall depth for certain duration is calculated using theoretical Gumbel distribution

$$X_p = a + \frac{1}{\alpha} Y_p$$

where Y_p –reduced variable:

$$Y_p = -\ln[-\ln(1 - p)]$$

$$\text{where : } \frac{1}{\alpha} = \frac{\sigma_x}{1.28} \quad \text{and } a = \bar{x} - 0.45\sigma_x$$

In the above expressions \bar{x} dhe σ_x are respectively the mean and standard deviation of the series.

Using this methodology the rainfall depths and intensities for meteorological stations of Vlora, Gjirokaster and Saranda were calculated.

The results for Vlora station are presented in tab..

Table 34 Rainfall depths (mm). Vlora Station

t(min)	T=100 years	50 y	20 y	10 y	5y
360	153	136	114	97	79
120	98	87	73	62	51
60	76	68	57	49	40
30	51	46	39	33	28
20	43	39	33	28	24
10	27	24	20	18	15

Table 35 Rainfall Intensities (in mm/min). Station of Vlore

t(min)	100 y	50 y	20 y	10 y	5y
360	0.42	0.38	0.32	0.27	0.22
120	0.82	0.72	0.61	0.52	0.42
60	1.27	1.13	0.95	0.82	0.67
30	1.7	1.53	1.3	1.1	0.8
20	2.15	1.95	1.65	1.4	1.2
10	2.7	2.4	2.0	1.8	1.5

Using the data of the tab. the Intensity- Frequency – Duration Curves (IDF Curves) are calculated, which are used for the computation of maximum discharges in small watersheds (fig.13).

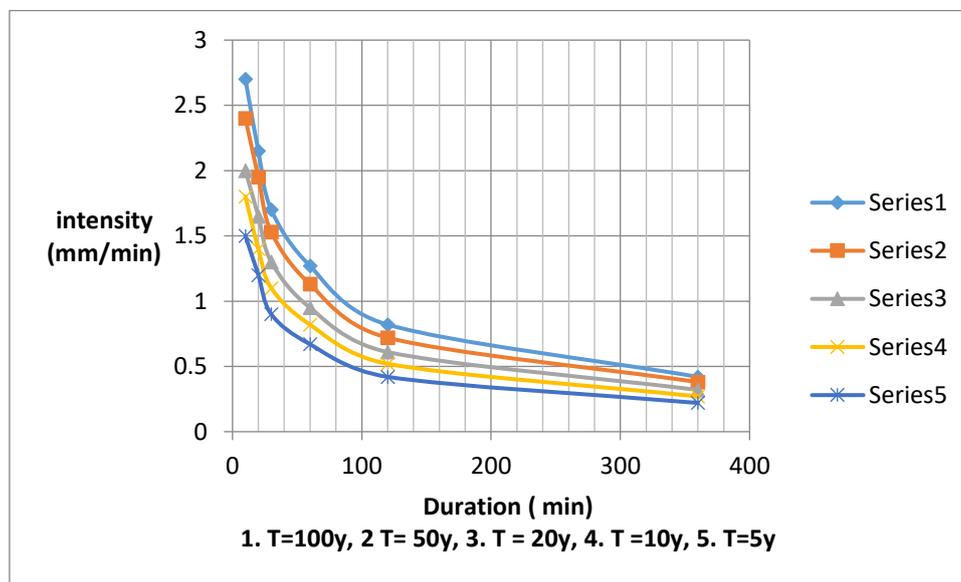


Figure 54: Curves IFD. Vlore

Flooding considerations

This airport can not be touched from the floodings of Vjosa River or from other rivers because it is located far from these rivers. The waters of Vjosa River can not cause the flooding of Akerni zone. Meanwhile, the data given by IGJEU for the stations at Mifoli and Pocem over Vjosa River are not useful for the estimation of the floodings of the Vlora Airport. At the same time, in this zone are not identified torrents that can cause floodings. For this airport the data on rainfall intensities are given (tab. 9,10). By means of these data the discharge or the volume of waters that can be drained by the drainage system that has to be designed (distance and the depth of drains).

6.4 ANNEX (PHOTO NGA SITET)



Figure 55: View from the area where the new Vlora Airport will be built

7 DESIGN CRITERIA OF THE SOUTH ALBANIA AIRPORT

This section deals with the physical characteristics of the airport that must be considered for its certification. The specifications related to individual RWY requirements are associated to an alphanumeric code. This classification is different from the one linked to the type of operations allowed by the presence of - instrumental or sight - air navigation aids.

The new infrastructure project shall meet the law requirements applicable to the new South Albania airport as well as comply with security measures implementation in an integrated manner.

7.1 SAFETY MANAGEMENT SYSTEM

The License Holder must use a Safety Management System (SMS) that describes the organization's structure, as well as the tasks, powers and responsibilities of the employees, and ensure that activities are carried out in a documented and monitored manner. The SMS management system must include:

- determination of security policies of the License Holder;
- assignment of responsibilities and duties, and issuance of guidelines for employees, sufficient to allow the implementation of company policies and safety standards;
- continuous monitoring of safety standards;
- recordings and analysis of deviations from applicable standards;
- definition and implementation of corrective measures;
- assessment of adequacy and effectiveness of the procedures implemented by the organization.

The License Holder must also prepare regular checks of the safety management system, including procedures for the observance of its own duties, and also taking into account the impact of any activity carried out by other entities within the airport, and ensure that checks are carried out by expert and appropriately qualified personnel in accordance with a testing program approved by the Autoriteti Aviacionit Civil.

7.2 CONDITIONS FOR A CERTIFIED AIRPORT OPERATION

- The conditions to operate a certified airport are taken from the ICAO standards.
- The airport must be available to all, under the same conditions, during normal flight times for aircraft takeoffs or landings.
- Flight operations at the airport cannot be carried out without proper fire system/rescue services required by international and Albanian regulations.

- Any physical change to the characteristics of the airport, including the construction of new buildings or changes to existing ones as well as any visual aid can take place only after prior approval by the Autoriteti Aviacionit Civil Albania (AAC).
- Every transit area open to the public that crosses or surrounds the airport area, located inside or outside the airport, must be adequately marked with signs warning people about possible dangers associated with the presence of aircraft. When the new airport will be completed, the License Holder will have the obligation, within its duties, to immediately notify the AAC of any event that can have an impact on flight infrastructures and their systems, or on the operational characteristics related to aircraft approach, takeoff, and circling of aircraft that can endanger or damage a civil aircraft, its occupants, or any other person.

Further conditions, which allow the airport to operate safely, can be established by the AAC by taking into consideration the circumstances and situations of the specific airport.

The new License Holder will therefore have to inform the AAC of any change in the data related to its competence related to the South Albania airport contained in the AIP – Albania.

7.3 CLASIFICATION OF THE AIRPORT ON THE BASIS OF ITS RUNWAY CHARACTERISTICS(AERODROME REFERENCE CODE)

South Albania Airport Code

Given the geometrical characteristics of critical aircraft mentioned above, the Aerodrome Reference Code, on the basis of which characteristics of surfaces, and protective areas and lateral and longitudinal obstacle-free reference planes are established, the alphanumeric code can be identified based on ICAO standards and consists of:

- a number taken from the value of the “Reference Runway Length of the Aircraft” referred to the aircraft in use on the airport which requires greater takeoff length;
- a letter identified by the wingspan or maximum width of the main landing gear of the largest aircraft that is expected to operate in the airport, whichever of the two parameters requires wider runway characteristics.

The reference code is determined for the purpose of identifying the characteristics of the associated surface areas. This Reference Code is not related to the strength of the pavement.

No.	Field Length (*)	Letter	Wing Span	Landing Gear Width
1	Less than 800 m	A	up to 15 m not included	up to 4.5 m not included

2	from 800 m to 1,200 m not included	B	from 15 m to 24 m not included	from 4.5 m to 6 m not included
3	from 1,200 m to 1,800 m not included	C	from 24 m to 36 m not included	from 6 m to 9 m not included
4	1,800 m and beyond	D	from 36 m to 52 m not included	from 9 m to 14 m not included
		E	from 52 m to 65 m not included	from 9 m to 14 m not included

(*)minimum field length required for takeoff at the highest certified takeoff weight, at sea level, in standard atmospheric conditions, calm air and zero gradient of the runway, as specified in the specific flight manual and established by certified authorities, or equivalent data provided by the aircraft manufacturer.

The Reference Code for South Albania Airport is determined in **4E**

Certainly, in case of a change in the type of critical aircraft, for example if the Boeing B737/800 is used, which has a wingspan of 39.50 m, the reference code would rise to 4D, but with the consequence of having a flight runway with a takeoff distance of at least 2,300 m, notwithstanding the considerations for any issues due to temperature, altitude, gradient, and wind.

7.4 RUNWAY

The word 'runway' refers to a rectangular area within the airport area suitable for landing and taking off of aircraft. Depending on whether the runway is instrumental or by sight, specific characteristics are applicable. The Autoriteti Aviacionit Civil Albania shall therefore establish the distances declared on the basis of verification of the data provided by the designers in the phase I of the License Holder.

Length

The appropriate length of a RWY, as known, is aeronautically subordinated to how the different aircraft models - within the same families - can operate with or without limitations. Further details regarding the determination of the RWY on the basis of the critical aircraft according to the AAC are reported in the Chapter on "Considerations related to the Length of the RWY". The dimensions of the Flight Runway are

shown below, starting from the First Phase (in which the New South Albania Airport is built) up to the Third Phase of maximum development of flight infrastructures:

- First Phase 3,000 m;
- Second Phase: 3,200 m;

Width

The width of the new runway was determined on the basis of the dimensions established by the ICAO Regulations, which indicate values compared to the Airport Code as shown in the table below:

Code Number	Code Letter					
	A	B	C	D	E	F
1	18 m	18 m	23 m	-	-	-
2	23 m	23 m	30 m	-	-	-
3	30 m	30 m	30 m	45 m	-	-
4	-	-	45 m	45 m	45 m	60 m

Runway Width

The combinations of numbers and letters were determined on the basis of the typical aircraft dimensions.

7.5 AERONAUTICAL DATA AND QUALITY REQUIREMENTS FOR AERONAUTICAL DATA

The aeronautical data relating to the airports taken into consideration by the Feasibility Study were recorded on the basis of the documentation made available by the Albanian Authorities and consistently reported in the three positions of the assessed airport sites. The data accuracy index must however be of a high degree in the various successive levels of the design, so as to represent a certainty equal to at least 95%.

The geographical coordinates of the three examined airport positions, identified with latitude and longitude, must be transferred to the National Agency for Flight Assistance of Albania (Albcontro;). These data must be expressed in the terms set by the World Geodetic System. The geographical coordinates of the three sites identified are as follows:

Latitude and Longitude

- Vlora: 40°35'56.08" N – 19°26'15.03" E;



7.17 MARKING AND LIGHTING OF OBSTACLES AND UNSERVICEABLE SURFACE AREAS

The marking and lighting of obstacles and unserviceable surface areas must comply with the requirements for marking and lighting of obstacles inside and near the airport grounds, located in the area below the boundary surface of the obstacles.

Any items that are located outside the boundary surface of obstacles, with height above ground level equal to 100 m and 45 m above water, must be treated as an obstacle to air navigation. Likewise, all objects with a height of less than 100 m that are a risk to air navigation must be treated as obstacles.

7.18 RISK OF IMPACT WITH BIRDS AND OTHER ANIMALS

Impacts with birds and other wildlife (wildlife strike) can cause serious damage to aircraft and propulsion systems, especially jet engines. In order to minimize the phenomenon of the presence of wildlife flocks on airport areas, the subsequent design stages should implement mitigation actions to prevent risks of wildlife strike on the basis of a naturalistic-environmental study including risk assessment.

7.19 AERONAUTICAL GROUND LIGHTING

Basic Requirements

The Aeronautical Ground Lighting (AGL) serves to provide crews with information for stabilizing the trajectory of aircraft in reduced visibility conditions and at night. AGL consists of a set of "lights" having different characteristics, otherwise called "signals." The latter term normally defines the actual device that emits the light beam required, and which consists of a lamp, reflector, lenses, colored filters, transparent casings, metal structure, electrical connections, mounting and fixing systems. The AGL systems used on runways for precision and non-precision approaches must be high intensity, usable both day and night.

For night operations the runway must be equipped with at least one illuminated windsock and landing direction indicator that complies with the airport standard requirements.

Special attention must be paid to lighting in the following areas:

Instrument runway - Code 4:

A rectangular area, symmetrical with respect to the runway centerline and its extension, with a width of 750 m on each side and extending up to a distance of 4500 m from the instrument runway thresholds.

Elevated Lights

Elevated runway, stopway and taxiway lights must be frangible. Their maximum height must be such as to guarantee an appropriate separation from the propellers and the engine nacelles of the jets.

Inset Lights (semi-flush and/or flush).

Signals with an inset structure may be slightly protruding (semi-flush) or coplanar (flush), with respect to the airport pavement in which they are inserted. They must be designed and installed in such a way as to support the weight of an aircraft whose wheels pass over these lights, without causing any damage to the aircraft or to the lights.

Separate intensity adjustments or other effective methods should be provided to ensure that the following systems, if installed, can operate at compatible intensities:

- approach lighting system;
- runway edge lights;
- threshold lights;
- runway end lights;
- touchdown zone lights;
- runway centerline lights;
- taxiway centerline lights.

The photometric characteristics of the various lights must be considered acceptable by the AAC.

Aeronautical Beacons

An aerodrome or identification beacon is provided to aid pilots in locating and identifying the aerodrome at night. It must be found at all airports open to nighttime traffic, except in cases where the AAC defines this requirement as unnecessary following a specific aeronautical study.

7.20 APPROACH LIGHTING SYSTEM

For this type of approach the Feasibility Study has foreseen the adoption of a Category I precision approach system consisting of a CAT I Approach Lighting System. It will consist of:

- a row of lights placed on the extension of the runway centerline up to the distance, where practicable, of 900 m from the threshold;
- a row of lights constituting a wingbar, 30 m wide and placed at a distance of 300 m from the threshold.

The CAT I Approach Lighting System will consist of fixed lights of variable white color. Each light position along the centerline can consist, alternatively, of:

- a single light source in the first 300 m past the threshold;

- two light sources in the next 300 m;
- three light sources in the remaining 300 m, in order to provide indications on the distance from the threshold.

An ILS locator that crosses the plane of the lights should be considered an obstacle and consequently reported.

Visual Approach Slope Indicator - VASI

The Visual Approach Slope Indicator (VASI), provides flight crews with information concerning both the approach angle adopted and the trajectory to be followed to fly over any obstacles.

The slope of the approach path and the height adjustments of the light beams must be appropriate to the type of aircraft using the approach path.

When an ILS is installed on a runway with T-VASIS, the location and elevation of the light units must be such that the visual approach angle corresponds, as much as possible, with the ILS glide path.

PAPI and (A)PAPI

The PAPI system is composed of 4 equi-spaced light units, equipped with two or more lamps with a fast transition light beam and arranged along a wingbar located, where physically possible, on the left side of the track. If information on roll angle is required that cannot be obtained from other visual aids, a second bar must be installed on the opposite side of the runway.

Runway End Lights

The runway end lights will be red and indicate the end of the runway with full lift, available for maneuvering the aircraft based on the declared distance. If the threshold coincides with the end of the runway, bidirectional red-green signals can be used.

Stopway Lights

The stopway of a runway used for nighttime operations must be marked by fixed red unidirectional lights, with the light beam directed towards the runway.

Stopway lights will be installed:

- (a) at the sides of the stopway along its entire length, in continuation and with the same spacing as the runway edge lights, as well as
- (b) at the end of the stopway, along a straight line at a right angle to the runway centerline and not more than 3 m from the outer edge of the stopway.

Taxiway Lights

The taxiway centerline lights will be used to guide the aircraft moving on taxiways and aprons, or that enter or leave a runway, in RVR<400 m conditions. For light traffic density, if there are taxiway edge lights and the centerline markings, these lights may be omitted.

Taxiways used also at night, especially if with complex intersections, or with special configurations, or if they are part of a standard taxiing route, must be equipped with centerline lights also for RVR≥400 m conditions. The requirement will not be applied for a light traffic density, or when the on-board lights and the taxiway centerline markings provide adequate guidance. Therefore, in the subsequent planning levels, the characteristics of the guidance lights for the maneuvering to the aprons must be specified

7.21 APRON LIGHTING AND VISUAL DOCKING GUIDANCE SYSTEMS

Apron Lighting

The edges of the aprons must be marked with blue lights. The alternative use of blue reflectors will be allowed if this does not affect the safety of operations.

The aprons for aircraft intended for nighttime activities must be illuminated with suitable floodlights. These should preferably be aimed in several directions, in order to provide adequate lighting levels and to avoid possible glare or shadow areas.

This type of lighting must also be provided in the “de-icing/anti-icing” areas and at the remote aprons, if requested by AAC, provided that it does not confuse the pilots maneuvering on the taxiways or adjacent runways.

The light spectrum emitted by the floodlights must be such as to allow the recognition of the colors used on the apron for the equipment and ramp vehicles, as well as for the signs marking obstacles and information and mandatory signs.

Guidance lights for maneuvering toward the aircraft stands

In RVR<400 m conditions, guidance lights must be provided for aircraft maneuvering toward stands and to the de-icing/anti-icing stations. These lights must coincide with the apron markings. If control methods considered acceptable by AAC are used for maneuvering aircraft toward the stand, the presence of the guidance lights will not be required.

7.22 OBSTACLE LIGHTING

See the information given above under “Marking and lighting of obstacles and unserviceable surface areas”

7.23 LUMINOUS INTENSITY CONTROL OF THE AGL SYSTEMS

AGL systems made up of high intensity lights can be used in various conditions of visibility and ambient light. Under certain conditions, the additional approach lighting on the displaced runway thresholds and the TDZ lighting, adjusted to the highest light intensity values, may cause unacceptable levels of glare for flight crews during takeoff alignment. The adjustment of brightness of the AGLs will therefore have to be related to the needs of flight crews. With the exception of lighting of obstacles and aeronautical lights, all AGLs that emit more than 150 candelas in the direction of an approaching aircraft must be individually controllable, thus ensuring an adjustment of all AGLs. It is therefore essential that the brightness and orientation of each light are correct.

7.24 AUXILIARY POWER SUPPLY OF AGL SYSTEMS

An auxiliary power supply must be provided for AGL systems used for precision and non- precision instrumental runways, and for AGL used for non-instrumental runways used for night operations. In particular, the auxiliary power supply must serve the signal lamp and minimum lights required to allow air traffic control personnel to operate correctly.

7.25 INSTALLATION OF AGL SYSTEMS

As a rule, an AGL system consists of a single control and monitoring equipment and several series circuits with constant current.

7.26 SIGNALING DEVICES, HORIZONTAL AND VERTICAL SIGNS

Signaling devices and horizontal and vertical signs provide guidance and information to pilots. These devices must be visible and clear; therefore they will have to be repainted, cleaned or replaced as soon as their visibility is compromised.

The chromatic characteristics of the signaling devices and of the horizontal signs must be considered acceptable by the AAC.

Signaling Devices

An airport must have at least one windsock and signaling devices if required by AAC. The airport will be equipped, in a position deemed appropriate by AAC, with a signal lamp capable of producing white, red, and green lights. For the same purpose, pyrotechnic lights or rockets must be available.

Windsocks

The South Albania airport has been provided with 2 windsocks of the following regulatory characteristics.

The windsocks will be made of fabric, resistant to air flow and weathering and of a truncated conical shape and colored, so as to stand out from the surrounding background, so as to be visible from at least 300 m in height.

The colors to be adopted are either white or orange, or a combination of white and orange, or white and red, or black and white. The combination consists of five alternating bands, being the first and last of the darker color.

7.27 VERTICAL SIGNS

Vertical signage consists of two different categories of tables:

- a) obligation
- b) information.

The tables will be rectangular, the longest side horizontal, and the alphanumeric designation will be reserved only for intermediate waiting positions.

7.28 HORIZONTAL SIGNS– “MARKINGS”

The markings are usually painted on the pavements of the movement area, in order to provide:

- perspective information;
- a guide for aligning and positioning aircraft;
- the identification of the runway and its threshold.

Markings shall be white for RWY and yellow for TAXIWAY.

7.29 AERONAUTICAL INFORMATION

Information to be made available

The aeronautical information will be provided by the Albanian Flight Assistance Agency, which is responsible for the provision of the “Aeronautical Information” Service - AIS, through the publication of the AIP-Albania (Aeronautical Information Publication), and related amendments (Variants and Supplements to normal cycle or AIRAC), of the Aeronautical Information Circulars – AIC and NOTAM (Notice To Airmen). The entity that owns or processes the data being published is responsible for the correctness of the data. Regardless of the data source of the Albanian Flight Assistance Agency, such entity will be responsible for the correspondence of what is published to the data received.

7.30 RISK PREVENTION AND MANAGEMENT

Emergency planning will enable it to deal with emergencies that may occur at or near the South Albania airport; it has the purpose of minimizing the effects with particular regard to the safeguard of human lives, of properties, and the environment and for maintenance of the operations on the airport. Examples of emergencies are, in addition to those relating to aircraft:

- sabotage,
- hijackings,
- fire,
- natural events,
- etc..

For the purposes of planning, the possible risk situations deriving from the activities that take place in the airport must be assessed. In relation to the size, complexity, and type of activities that will take place in the airport the following are to be considered:

- handling of goods,
- of chemicals,
- of hazardous materials,
- of fuel,
- etc..

7.31 CONTINGENCY PLAN AT THE AIRPORT

The contingency plan at the airport allows for dealing in a well-structured manner with potentially dangerous events which could occur within the premises, selecting the necessary procedures to coordinate a response action by various organizations or services, inside and outside the airport. The contingency plan shall be applied to emergencies occurring on the airport grounds or in areas adjacent thereto; in the event of an accident all emergency services, available infrastructures at the airport and any procedures developed need to be **effectively deployed for immediate response** and then for **subsequent support to first aid activities** by the local organizations in charge. Any extension of the application area of the contingency plan requires approval by AAC, in coordination with other subjects and Entities involved.

The contingency plan is adopted by AAC which, for the purpose of its approval, shall consider the characteristics and requirements of the services and entities involved, including:

- Firefighters,
- ATS organization,
- Police,
- Security services,
- Health care,
- etc.,

and, in agreement with the latter, drafts the contents of the relevant part of the plan.

The contingency plan defines the roles in the event of an emergency; completion of individual parts of the plan is guaranteed by the subjects listed in the plan itself, which shall be responsible for their respective technical action.

7.32 CONTINGENCY MANAGEMENT

The contingency plan includes three phases:

- a) knowledge and communication, where the most prominent role is played by the ATS system, in charge of immediately informing rescue agents about the emergency;
- b) emergency, where the main players, at least in the very early stages, are the Fire Brigade and the Health Unit;
- c) post-emergency, including assistance to unharmed passengers, to passengers' relatives on site, adoption of the necessary aeronautical procedures, etc..

The future license holder, which needs to have precise knowledge of the airport potential and organization, shall be the subject in a position to ensure operational connection between phases b) and c), linking the relevant assistance requirements and resources at the airport.

It shall select, as part of the facilities available at the airport, suitable rooms to be used as "emergency operations center", which need to be made immediately available as soon as a contingency occurs. It shall also appoint one person in charge of this center for the specific contingency, with the task of acquiring and disseminating information to the organizations involved for more effective action during the emergency, as well as liaise with the departments in charge at AAC as appropriate.

The license holder shall make sure that the communication system between the "emergency operations center" and all organizations involved is appropriate for the requirements of the airport in emergency conditions. The said system needs to include alarm devices suitable to inform of the contingency at once.

The license holder shall make sure that, in the event of an emergency, suitable resources are available at the airport, including:

- a) vehicles to transport the injured;
- b) first aid rooms;
- c) qualified staff, health care equipment and materials for first aid;
- d) rooms for assistance to victims and those unharmed;
- e) any further means and equipment as required.

7.33 RESCUE AND FIREFIGHTING

The South Albania airport, where commercial transport is carried out, shall be equipped with all necessary rescue and firefighting facilities.

The said rescue and firefighting services shall be rendered by public or private organizations, located and equipped as appropriate.

Suitable facilities and services shall be made available for assistance in the case of airports close to the sea or to water bodies, to swamps and marshy areas, or to areas where environmental conditions are hazardous, if a significant part of approaching and takeoff operations is expected to take place above such areas.

Service Delivery

All rescue and firefighting services at the South Albania airport shall be delivered in compliance with the general requirements established by AAC.

The relevant technical regulations applicable for any rescue and firefighting services shall be those issued by the Firefighting Department, Public Assistance and Civil Protection at the Ministry of the Interior.

Expected Level of Protection

The AAC office in charge of establishing the firefighting class of the South Albania airport is allowed to authorize operations with aircraft whose category is higher than that of the airport if their number of movements is limited and not occurring on a regular basis. As a rule it is acceptable to have a protection level for the airport which is lower by one class compared to that of the aircraft. The airport classification for the purpose of rescue and firefighting operations might need to be increased if the type of aircraft using the airport should.

In this case the license holder shall draft a specific assessment document detailing the new traffic requirements and compatibility between the latter and the infrastructure and operational capacity of the airport.

Rescue Equipment

All rescue and firefighting vehicles shall be fitted with emergency equipment suitable for the airport protection level according to the requirements issued by the Firefighting, Public Assistance and Civil Protection Department. The said rescue vehicles and the relevant equipment shall be appropriate for the airport configuration.

Alarm and Communication Systems.

A visual, acoustic and telephone alarm signal shall be installed for rescue and firefighting staff members, in the firefighting station and at any location which may be enabled by TWR. A suitable connection system shall link the said TWR to each firefighting station as well as to all rescue vehicles.

Access routes in the event of an emergency

At APT South Albania there will need to be access routes to be used in emergency cases, where the ground conditions allow for their construction, to facilitate the objective of minimal response times. Special attention shall be paid to the positioning of rapid access routes to approach areas outside the airport grounds.

For the reasons above, the airport fencing shall allow for access to outside areas through breakaway gates.

The service roads to the airport may be used as contingency access routes if they are appropriately located and constructed. These emergency access roads must be able to hold the weight of the heaviest vehicles which will be using them and accessible under any weather condition. Any road surfaces that are within 90 m of the runway axis shall be treated to prevent erosion and rubble on the runway.

Finally, there needs to be sufficient vertical space free from raised buildings to allow for transit of heavy duty vehicles.

7.34 FIREFIGHTING STATIONS

The firefighting stations used by the aforesaid organizations, also for shelter of the vehicles provided, shall be located on the airport grounds, in order to guarantee response times appropriate to the contingency. This means that arrangements for satellite firefighting stations need to be made possible whenever the required intervention times cannot be covered by one single station. The location of firefighting stations shall guarantee direct and free access to the runway for any rescue and firefighting vehicles.

7.35 RISK PLANS

Today the civil aviation sector is characterized by the highest level of safety among the various transport systems. This achievement is based essentially on the high levels of safety reached in terms of aircraft and airport certifications, using the most advanced international standards available technologically and following state-of-the-art principles.

Further guarantee is provided by the presence of qualified staff and of certified aeronautical operators.

Notwithstanding the level of safety already achieved, the possibilities of accidents occurring cannot be excluded which might affect the areas adjacent to airports.

These areas, until the present day, have been urbanized in accordance with standards which mandated their use in a way which needed to be safe and compatible with the aeronautical business; the purpose of risk plans, through carefully designed land development managements, is to strengthen the protection levels in the areas adjacent to airports.

Careful management of land development in the areas adjacent to airports is also essential with a view to ensuring the possibility of rescue and firefighting services (RFFS) intervening successfully in the event of an accident, as required by ICAO under Annex 14 and in the relevant technical documents, most notably with regard to areas adjacent to the airport grounds.

The Municipalities concerned shall draft risk plans aimed at protecting the area adjacent to the South Albania airport against any risk associated with airport activities.

Provisions for Drafting the Risk Plan

Notwithstanding the preservation of existing buildings and activities at local level, the following guidelines are applicable to new settlements in terms of containing the anthropic load and selecting compatible activities, which the Municipalities shall articulate and describe in detail as part of the risk plans in line with the town planning and building license regulations.

- **Protected Area A:** the anthropic load should be limited to the greatest possible extent. This means that there shall be no further residential building in the said area. Non-residential activities are possible, with low land indices, involving the discontinuous presence of a limited number of people.
- **Protected Area B:** small-scale residential building activities are possible, with low land indices, and non-residential activities with medium land indices, involving the presence of a limited number of people.
- **Protected Area C:** a reasonable increase in terms of residential building is possible, with medium land indices and new non-residential building activities.
- **Protected Area D:** in this area, characterized by a minimum level of protection and aimed at ensuring local development in an appropriate and coordinated manner with airport operations, the requirement is to avoid targeted completion of highly crowded building activities, such as extremely concentrated shopping malls, conference and sports centers, intensive land development, etc...

The following shall be avoided in protection areas A, B and C::

- highly crowded settlements such as extremely concentrated shopping malls, conference and sports centers, intensive land development, etc... ;

- building of schools, hospitals and sensitive targets in general;
- activities which might involve a risk of fire, explosion and/or environmental damage.

Risk plans shall be drafted on the basis of airport development plans; if the latter are not available, the risk plans needs to be drafted on the basis of the current situation.

When drafting their risk plans, Municipalities are allowed to adjust the perimeter and extension of protected areas based on the configuration of the land.

Adoption of Risk Plans

The risk plan shall be drafted by the Municipality whose jurisdiction includes the protected areas; if these areas include more than one Municipality the plan shall be drafted in a coordinated manner.

AAC, after having received the risk plan from the Municipalities, expresses its opinion on the basis of aeronautical assessments.

For assessments purposes, AAC shall take into account the aeronautical data which characterize the South Albania airport within the current and future scenario as outlined in the development plan, reporting any needs for adjustment.

Any significant changes to these parameters, if they have an impact on the risk plans adopted, shall be notified by AAC to the Municipalities for the purpose of assessing their impacts on the territory, and possibly to update the relevant plan.

7.36 RUNWAY INCURSIONS

By runway incursion reference is made to any event which might occur on an airport surface involving the unexpected presence of an airplane, vehicle or person in the protected surface area allocated for landing or takeoff of the plane.

By protected area, reference is made to an area which also includes parts of the TAXIWAY located between the RUNWAY-Holding Positions in force and the RWY in use.

Signaling is mandatory in the event of runway incursions.

For the purpose of analyzing events other than an accident, the said events are classified based on their seriousness according to the following categories:

- "serious incident"
- "major incident"
- "significant incident"
- "no safety effect"
- "not determined"

7.37 AIRPORT FIREFIGHTINGS SERVICE CATEGORY

In the New South Albania Airport, rescue and firefighting services and equipment will have to be set up so that Public or Private Organizations, duly positioned and equipped, may be responsible for providing firefighting services. It is implied that the “Firefighting Station” in this specific case is normally located inside the airport.

It should also be understood that the foregoing includes **the availability of suitable equipment and services for the rescue** and also of **special firefighting vehicles**.

Level of protection to be included

- 1) The international standard specifies that the level of protection required at the airport for rescue and firefighting must be appropriate to the **category** determined using the principles set out in points 3) and 4), except where the number of movements of airplanes in the highest category that normally uses the aerodrome is less than 700 in the three consecutive months with greater traffic intensity; in this case the level of protection must be consistent with the current standard. It should be noted that both a takeoff and a landing are a movement.
- 2) The level of protection provided at the airport for rescue and firefighting will be the same as the aerodrome category determined using the principles set out in points 3) and 4) (ICAO - Annex 14 - Volume 1).
- 3) The category of the airport was determined according to the following table which is based on the **longest airplanes that normally use the airport and their fuselage size**. (To categorize the airplanes using the airport, first their overall length and then the width of the fuselage were assessed.)
- 4) If, after selecting the appropriate category for the length of the longest plane, the aircraft’s fuselage width is greater than the table width for that category (see Table column 3), the actual category for that plane to be considered will be the next higher category.
- 5) The guide to categorize the aerodromes for rescue and firefighting and to provide the rescue and firefighting services and equipment must be provided in the Airport Services Manual.

Table 36: Categories of aerodromes for rescue and firefighting purposes

Category APT	Overall length of the aircraft	Max. fuselage width
(1)	(2)	(3)
1	from 0 m up to 9 m not included	2 m
2	from 9 m up to 12 m not included	2 m
3	from 12 m up to 18 m not included	3 m
4	from 18 m up to 24 m not included	4 m
5	from 24 m up to 28 m not included	4 m
6	from 28 m up to 39 m not included	5 m
7	from 39 m up to 49 m not included	5 m
8	from 49 m up to 61 m not included	7 m
9	from 61 m up to 76 m not included	7 m
10	from 76 m up to 90 m not included	8 m

During the planned periods of reduced activity, the level of protection available may be not less than that required for the highest category of the aircraft that is expected to use the aerodrome during that period without considering the number of movements.

Response Time

The Response Time is considered as the time between the initial call to the Rescue and Firefighting Services, and the time when the first responding vehicle is in the position to spray foam at a rate of at least 50% of the discharge rate.

The operational purpose of the rescue and firefighting service has been set to reach the response time of 2 (two) minutes and not more than 3 (three) minutes, at the end of each runway, as well as in every other part of the Movement Area, in optimal visibility conditions and surface conditions.

8 DEVELOPMENT PHASES FOR SOUTH ALBANIA AIRPORT

The Feasibility Study examined the time limits, to be confirmed by the Ministry of Transport and AAC, indicating the First Phase with the period required for the construction of Flight Infrastructures and anything necessary to make the New South Albania Airport complete, accessible, and operational. While the Second, and Third development Phases were scheduled at 4-year intervals, from the completion of the First Phase.

The time thresholds are as follows:

- Simulations for airport operations and Certification starting from 2021
- First Phase (completion of works) 2022
- Second Development Phase 2026
- Third Development Phase 2030

The following illustrates the components of the airport system organized by Development Phases that will allow them, if the traffic data assumed in the socioeconomic survey will be reasonably reliable based on the increase in traffic, an adequate expansion both land-side and air-side summarily indicated as 2nd PHASE and 3rd PHASE.

Another topic to be dealt with separately by the Albanian Airport Authorities is that related to “Flight Assistance Services” and “Air Navigation Services” for which some basic notions are reported below.

8.1 FLIGHT SERVICES AND AIR NAVIGATION SERVICES

The feasibility study for the New South Albania Airport (NSAA) examined possible sites to verify, for each of them, strengths and weaknesses with the specific intent to identify an area that, compared to the others, shows conditions better able to guarantee air traffic safety and security. However, the study did not consider the so-called “flight procedures” to be assigned to the aircraft that will operate on NSAA, due to the specific competence of the Albanian National Agency for Flight Assistance (Albcontrol)

Therefore, some general indications that must be carried out by the “Flight Assistance Service and Air Navigation” are reported below, with the purpose of ensuring safety and regularity of air navigation.

The system consists of the airspace, the necessary means and personnel, as well as the organization responsible for planning and managing all the vehicles and services.

The Flight Assistance Service is divided into four distinct services:

- Air Traffic Services – ATS;
- Aeronautical Information Service – AIS;
- Aeronautical meteorology service (MET);
- Telecommunications service (TLC);

while the Air Navigation Services (ANS) in compliance with the regulations in force are divided into:

Air Traffic Services, which include:

- 1 – Air Traffic Control Service, including Area, Approach and Airport control services;
- 2 – Flight Information Service;
- 3 – Advisory Service for Air Traffic;
- 4 – Alarm service.

Aeronautical Meteorology Services;

Aeronautical Information Services;

Communication, Navigation and Surveillance Services.

8.2 FORECASTS FOR PASSENGER TRAFFIC

Most of the scheduled traffic is expected to consist, also in the short/medium term, of medium-sized aircraft (149 seats - Boeing 737/700).

MASTER PLAN - TRAFFIC FORECASTS FOR 2030					
YEAR	PASSENGERS	VARIATION	MOVEMENTS	VARIATION	PAX/MOV
2021	0	0.000%	0	0.000%	0.00
2022	369,581	0.0000%	3,285	0.0%	112.51
2023	399,184	8.0100%	3,384	3.0%	117.98
2024	431,080	7.9903%	3,620	7.0%	119.07
2025	465,566	7.9999%	3,874	7.0%	120.18
2026	502,811	7.9999%	4,184	8.0%	120.18
2027	543,036	8.0000%	4,518	8.0%	120.18
2028	586,479	8.0000%	4,880	8.0%	120.18
2029	627,533	7.0000%	5,173	6.0%	121.32
2030	671,460	7.0000%	5,483	6.0%	122.46
2031	718,462	7.0000%	5,757	5.0%	124.79
2032	768,755	7.0000%	6,045	5.0%	127.17
2033	822,567	7.0000%	6,347	5.0%	129.59

Table 37: Traffic data taken from the socioeconomic report and determination of the catchment area.

For capacity verification, the number of peak hour movements was calculated as the ratio between **TPHP = Typical Peak Hour Passengers** and the average number of passengers per aircraft. The value of TPHP was determined as a percentage of annual passenger traffic using the factors proposed by the FAA (for airports with traffic between 400,000 and 600,000 passengers, the FAA suggests that the TPHP can be estimated as 0.09% of annual traffic). The average number of passengers is given by the ratio between total traffic and the number of movements.

	2022	2026	2030
TPHP	333	453	604
Pax/movement	112.51	120.18	122.46
Movements PH (arr+depart)	3	4	5

Table 38: Estimated number of movements in peak hour

According to the FAA parameters, the capacity is given as a function of the traffic mix index which is given by the percentage of commercial aircraft plus three times the percentage of wide-body aircraft.

8.3 FIRST PHASE ACTIVITIES

The first phase interventions essentially concern the works for the construction of the flight infrastructures, plants and buildings necessary to ensure the operation of the new South Albania Airport in terms of safety and security.

Preliminary activities that will be quantified in a specific economic assessment document (expropriation of land, expropriation of buildings, hydrological reclamation, remediation of war devices, deviations from below/above services, deviations of interfering traffic, connections to general utilities - electricity, drinking water, any gas network, etc.) are excluded from the following description.

Precision Approach Runway CAT I

- Length (3000 m and 3200 m optional)

The length of the RWY was established in relation to the characteristic field length of the critical aircraft that the airport infrastructure is expected to use. This length will be adapted to the context in which the RWY, among the three sites examined, will be inserted:

Altitude of the airport;

Reference temperature;

Average longitudinal slope.

The characteristics of the Vlorë site is as follows

Altitude of the airport	m 1.5 a.s.l.
Reference temperature	°C 16.5
Average longitudinal slope of the RWY	p 0.2%

Number and Magnetic Orientation

Vlore longitude 19°26'15.03"E latitude 40°35'56.08"N

Airport Usability Factor

By airport usability factor refers to the percentage of time during which the use of the RWY is not precluded because of the wind component of crosswinds (ground wind that forms 90° angles with respect to the central axis of the RWY). In this specific case, the maximum crosswind components are:

20 Kt for aircraft with a field length of 1500 m or more.

Width

Being a 4E code airport, classified according to the characteristics of the critical aircraft.

Drainage System

The feasibility study included a sewage collection system on the RWY shoulder edges for rainwater falling on the RWY with a size of 100x100 cm, equipped with a trap made of specially shaped prestressed concrete to collect the water that will be conveyed through a hydraulic network system to the final delivery (presence of watercourses or in adequately sized collecting tanks), after oil removal and sand removal treatment.

Other Physical Characteristics

Among the important features of the RWY, the following parameters were also taken into consideration:

- *Strength*: calculated to withstand the stresses of the aircraft that will use it (Heavy aircrafts without including A380, B747/400 or its equivalents).
- *Surface*: the RWY will be built so as not to cause negative phenomena for aircraft takeoff and landing operations, in particular a suitable coefficient of friction must be guaranteed in case of wet RWY;

- Shoulders

The RWY was equipped with shoulders on both sides.

Exit Runway

In the absence of the Taxiway parallel to the Runway to allow the aircraft to access the Apron and park in the marked Stands, the project envisaged the construction of an exit runway with the following characteristics:

Airport Paving

The choice of material used to construct the Pavement Structure of airport depends on the use and the local ground conditions. Runway pavement surface is prepared and maintained to maximize friction for wheel braking. The airport apron is the area of an airport where aircraft are parked, unloaded or loaded, refueled, or boarded. For a major airport, where the ground conditions permit, the most satisfactory type of pavement for long-term minimum maintenance is concrete. Although certain airports have used concrete pavements for the Runway, this is generally found to be unnecessary, the expansion joints across the runway permits relative movement of the concrete slabs. Where it can be anticipated that major settlements of the runway will occur over the years because of unstable ground conditions, it is preferable to install asphaltic concrete surface, as it is easier to patch on a periodic basis, when this appears necessary.

Passenger Terminal

In compliance with IATA recommendations in the "Airport Development Reference Manual" to express the actual capacity in number of passengers/hour, the Design modulated the dimensioning of the Passenger Terminal (Traffic Unit - UT) through a first verification of the UT subsystems referring to the table relating to the quality of service for airports with passenger traffic <1,000,000/pax/year.

Determination of TPHP (Typical Peak Hour Passenger)

The typical day and peak of traffic for proper sizing of airport systems (and in particular the Passenger Terminal, in all its functional and operational components) is calculated using the Busy Day criterion which is defined by the IATA as the second day in terms of traffic of the average week calculated during peak months, of the year taken as reference.

Once the busiest day is determined, passenger traffic is determined at peak hour (TPHP - Typical Peak Hour Passenger) to be used in the sizing of the aforementioned airport systems.

The reference year for the New South Albania Airport, as can be seen from the "Socio-Economic Report of the Catchment Area", was assumed in 2022 with an expected number of potential passengers as estimated below:

	VLORE
At the end of 2022	369,600
At the end of 2026	502,800
At the end of 2030	671,500
At the end of 2040	1,281,650

Table 39: Passengers whose maximum concentration will be recorded during the summer.

In the absence of the historical traffic data, the forecasts in the Short and Medium Term for the determination of the TPHP were assessed on the basis of two follow-up procedures:

- a) Data obtained from an on-site survey carried out on a significant sample of respondents at the Tirana APT which involved the entire Albanian region;
- b) Reference to the standards reported by the IATA standards, from which it was possible to assume that the maximum peak of passengers may occur on Saturday and the second peak on Sunday.

During the peak hours, the maximum number of passengers (arrivals + departures) was valued at 450 passengers (reference value as TPHP).

By reporting this number to the annual passengers, the percentage ratio coefficient between the annual flows and the peak hour, which is equal to 0.2%, was calculated, compatible with the recommendations by the FAA – (*Federal Aviation Administration*).

TPHP as a percentage Annual Flows	Total Annual Passengers
30,000,000 and over	0.035
20,000,000	0.040
1,000,000	0.050
500,000	0.090

Table 40: Typical Peak Hour Passengers

Criterion for the calculation of TPHP for the following years

As regards the value of TPHP for the subsequent years indicated in the Master Plan, it was not possible to adopt the standard criterion for calculating the TPHP (deduced by multiplying the percentage coefficient by the number of passengers/year of the following years) for the following considerations.

The current infrastructure is currently inadequate and will be subject to significant reorganization (the works primarily involve lengthening the runway and enhancing it in terms of carrying capacity); this will entail the possibility to operate with fleets of different types of airplanes which are today the reference for the medium-haul market.

The lack of adequate infrastructure has had and still has an impact on the number of annual passengers using the Salerno airport; the historical data of 2011 cannot therefore be taken as a reference to be able to deduce, with certainty, the natural growth rates and consequently the number of passengers per year.

Upgrading and expansion works for the airport will directly result in a significant increase in the number of passengers, as indicated in detail by the update of the Traffic Plan.

It is for these reasons that, since the standard criterion for calculating TPHP for the following years cannot be implemented, the Master Plan referred directly to the percentage values recommended by the FAA and indicated in the table above. In fact, by applying these values to the number of passengers/year indicated in the Socio-Economic Report, we find the theoretical TPHP values used for the sizing of future infrastructures.

Table 41: Values of TPHP –Masterplan Phases

Time Periods related to the Implementation Phases of the Master Plan	Operational PHASES Master Plan	Number of pax per year	Coeff. % FAA	TPHP
- New South Albania Airport Infrastructure Works (opening to air traffic starting from 2022).	1 st PHASE	369,600	0.10%	370
- From 2023 to 2026	2 nd PHASE	502,800	0.09%	450
- From 2027 to 2030	3 rd PHASE	671,500	0.08%	550
- From 2031 to 2040	---	1,281,650	0.05%	650

Dimensioning of the Traffic Unit and related subsystems (Passenger Terminal)

The functional organization of the passenger terminal is based on criteria of operational functionality and management efficiency, which have led to the identification of an organizational scheme that meets the specific needs of obtaining a good service level.

The analysis referred to the dimensioning of the Traffic Unit (TU) in the medium term considers appropriate operational parameters and allows defining the points of contemporary attendance in the various rooms of the airport and the amount of queues to the different control filters, starting from the expected traffic volume at typical peak hour.

We have therefore identified the surface square meters available for each passenger in the different environments and the maximum queue times for the different control filters, comparing them with internationally defined standard values; in this way, the service levels at which the various subsystems of the airport operate were determined.

Once the arrival and departure flight times were defined consistently with the expected traffic volumes during peak hours, i.e. reproducing the operating conditions of the system, the behavior of passengers and accompanying persons in the simulation period considered was identified using a statistical methodology.

The most important data, in the examination of the flows present in the airport, are:

- airplane load factors and percentage of passengers in transit;
- inflow curves for passengers, accompanying persons and receivers at the airport;
- parameters relating to the number of accompanying persons and baggage per passenger;
- flight opening and closing times, flight call time, gate assignment and release times;
- average operation times for the various control devices;
- average route times;

- passenger behavior (percentage of passengers who buy the ticket at the airport and/or check in at the gate; percentage of passengers who go to the duty free shop, percentage of passengers subject to currency or customs control; the various environments of the time available before flight departure, etc.);
- physical characteristics of the air terminal (common atrium or separate atrium for traffic components, sequence of control filters and number of desks available; “open” or “closed” gates, baggage reclaim, etc.).

Analysis of terminal demand/capacity

The demand/capacity analysis of the new passenger terminal was set to predictable activity at the “typical” peak hour.

To proceed to the study of the individual environments that make up the Passenger Terminal, it was necessary to define the amount of traffic in the typical peak hour related to the various components that from time to time affect the sub-system in question.

The values of the typical peak hour of passenger traffic are identified for 2022 (369,581 pax/year), the forecast values for 2026 (approximately 502,811 pax/year) and for 2030 (approximately 671,460 pax/year); these results are shown in the following table.

Table 42 - Typical peaks per traffic component.

	2026	2030	Calculation method
TPHP	453	604	
International PH (a+d)	362	483	80% TPHP
International departures	119	119	80% seats charter flight 149 seats
International arrivals	119	119	80% seats charter flight 149 seats
Domestic PH (a+d)	340	453	75% TPHP
Domestic departures	204	272	60% national traffic PH
Domestic arrivals	204	272	60% national traffic PH

The concept introduced is that of the SERVICE LEVEL that the airport Authority wants to achieve in the various areas of the airport.

The categories corresponding to the service levels identified are (see “Guidelines for Airport Capacity/Demand Management”):

- A. excellent service level; free flow conditions; no delays; excellent level of comfort;
- B. very good service level; stable flow conditions; very few delays; very good level of comfort;

- C. good service level; stable flow conditions; acceptable delays; good level of comfort;
- D. adequate service level; unstable flow conditions; acceptable delays except for short periods of time; adequate level of comfort;
- E. inadequate service level; unstable flow conditions; unacceptable delays; inadequate comfort level;
- F. Unacceptable service level; intersecting flow conditions; collapse of the system and unacceptable delays.

IATA recommends a minimum area per person, in the various areas of the airport, according to the level of service for the user (the levels are indicated by "A" to "E" in descending quality).

The coefficients used to define the levels were taken from the *Airport Development Reference Manual 8th edition*.

Level of Service Standards (Sq. Meter/Occupant)						
	A	B	C	D	E	F
Check-in Queue Area	1.8	1.6	1.4	1.2	1.0	SYSTEM BREAKDOWN
Wait/Circulate	2.7	2.3	1.9	1.5	1.0	
Hold Room	1.4	1.2	1.0	0.8	0.6	
Bag Claim Area (excl. claim device)	2.0	1.8	1.6	1.4	1.2	
GIS	1.4	1.2	1.0	0.8	0.6	

Table 43 - Level of Service Standards - Airport Development Reference Manual 8th edition. April 1995.

The study of this Master Plan was carried out by analyzing each single subsystem in relation to the IATA standards with service level "B".

The analysis procedure provided the values of simultaneous attendance in each environment of the traffic unit and the amount of queues at the various passenger control filters. These indicators, compared with the values that define the capacity of the various sub-systems, make it possible to verify the adequacy of the project to the expected traffic volumes.

In the arrivals and departures hall, the maximum number of simultaneous presences is influenced by the distribution of passengers in the terminal before the departure of the flight, the percentage of time spent in the hall, the number of accompanying persons and receivers per passenger.

As regards the areas relating to incoming flows, entry into the passenger terminal is not distributed over a wide period of time as for departures, but is concentrated in a limited period subsequent to the moment of arrival of the flight.

The ratio between the maximum contemporary presences and the available areas makes it possible, by analyzing the "crowding index" obtained, to identify the level of service that can be achieved in each environment.

Taking into account an average of one accompanying person per passenger, both on arrival and departure, and a number of baggage items to be carried in the hold equal to 1 per domestic and international passenger, the required area of the terminal was calculated as indicated below in the table.

The percentages of space allocated to service areas, commercial areas, administrative areas and technical areas were assessed as a percentage of the total area, according to generally used parameters.

The term **traffic unit** refers to the set of areas dedicated to the purely transport function of the passenger terminal, namely transit and waiting of travelers and baggage handling.

Within the traffic unit, operational spaces must also be provided for Institutional and Public Authorities that have a control function on passenger traffic (Police, Guards, Customs, etc.).

The dimensioning of spaces intended for the travelers is done according to the number of people present at the same time in the different areas in the project traffic situations (typical peaks), while the number of devices (check-in counters, control filters, etc.) must be such as to allow waiting time for queued passengers related to the level of expected quality of service.

As is well known, the socioeconomic conditions of Albania have a decisive influence on the development of its infrastructures and on the related investment and financing policies.

With the variation of some context factors (economic-financial resources, level of accessibility development and intermodality, etc.) the perspectives that are developed within the Master Plan also vary.

Among the various **factors of possible deviation of forecasts**, the following are highlighted in particular:

- traffic fluctuations in relation to the maintenance of routes by carriers;
- lack and/or loss of funding for airport development initiatives.

On the basis of the indications provided in the “Airport Development Reference Manual”, a reference source for the preparation of forecast data in the construction of airports worldwide, the following parameters were defined for the definition of the components of the Traffic Unit (TU) of the South Albania Airport in 2030.

PASSENGER TERMINAL - TRAFFIC UNIT IN 2030*			
Subsystem	Traffic forecast (2030)	sq.m./pax	Theoretical sizing (2030)
	pax departure PH	sq.m.	sq.m.
Departure Hall	362	2.3	1,249
	Domestic PH (a+d)	sq.m.	sq.m.
Queue in Check-in Area	453	1.6	133
	Domestic PH (a+d)	sq.m.	sq.m.
Departure Hall: Domestic Departures	453	2	498
	International departures (charter flight 149 seats)	sq.m.	sq.m.
Departure Hall: International Departures	119	1.4	275
	International arrivals (charter flight 149 seats)	sq.m.	sq.m.
Passport control queue on arrival	119	1.2	36
	Domestic PH (a+d)	sq.m.	sq.m.
Baggage reclaim area	453	1.8	448
	pax arrival PH	sq.m.	sq.m.
Queue in customs control area	362	1	17
	Domestic PH (a+d)	sq.m.	sq.m.
Arrival Hall	453	1.5	561
Sub-total			sq.m.
			3,216
Share for service spaces, lobbies, routes (30%)			965
Share for walls, partitions, connectives (20%)			643
Theoretical area of the traffic unit			4,181

Total traffic units (TU)	4,181
Commercial unit (30% TOT)	3,216
Administrative unit (20% TOT)	2,144
Technical areas (11% TOT)	1,179

Theoretical area of the passenger terminal	10,721
Total passenger terminal	10,800

	Pax departure PH	Minutes/Pax	Estimate 2030
Check-in counters	362	1.5	10 counters
	International departures (charter flight 149 seats)	Minutes/Pax	Estimate 2030
Passport control at departure	149	0,5	2 stations
	Pax departure PH	Baggage/Pax	Estimate 2022
Security checks	362	1.5	1 unit
	International arrivals (charter flight 149 seats)	Minutes/Pax	Estimate 2022
Passport control at arrival	149	0.5	2 stations
	Domestic PH (a+d)	Minutes	
Baggage claim belts WB	ND	ND	N device
Baggage claim belts NB	ND	ND	N devices

* Note: The data shown in the table are parameterized on the trend traffic forecasts made on the basis of the Economic and Social Report and Definition of Catchment Area.

The expected traffic levels for the airport of South Albania therefore theoretically require an airport area of approximately 10,800 square meters in the medium-long term.

Regarding the check-in, the hourly capacity is evaluated as the product of the number of check-in counters and the number of operations that each one can carry out in one hour. Considering the average check-in time of 1.5 minutes, each desk can do 40 check-ins an hour.

Forecasts for air terminal in 2030 show 10 check-in counters, and therefore a total hourly capacity of 400 check-ins.

Table 44 - Passengers departing at peak hour.

	2022	2026	2030
Pax departure PH	200	272	362

The right sizing of the infrastructure is a prerequisite for the expected increase in demand to be met in conditions of efficiency and regularity, with adequate levels of service, and in compliance with the safety standards currently required in the air transport sector.

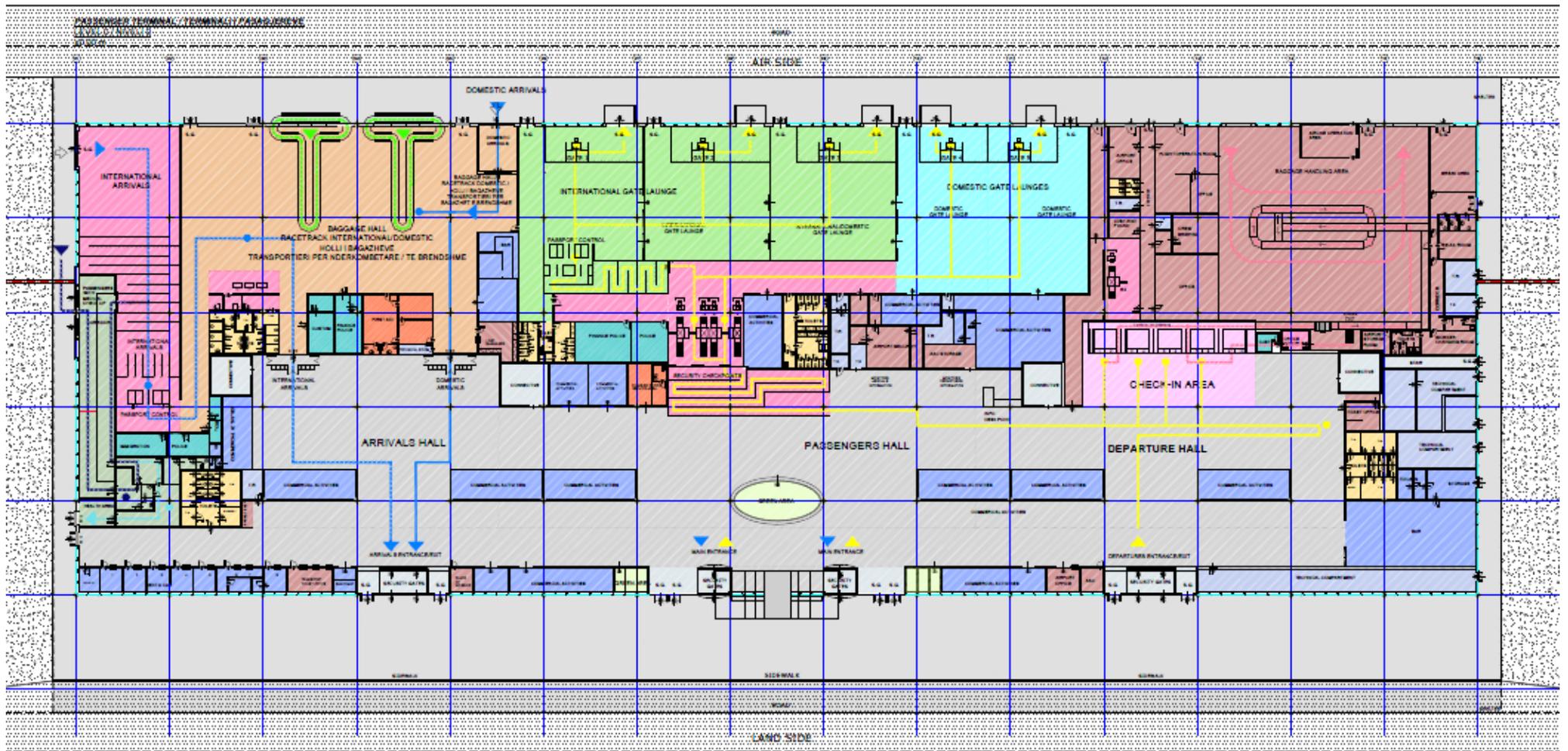


Figure 56: Passenger terminal layout

Parking Areas

As for parking for users, the following table shows the results obtained for the South Albania Airport with the use of the different existing sizing criteria.

Table 45 Estimated parking needs

Source	Criteria	Number of parking places			
		2022		2030	
		Min	Max	Min	Max
FAA (for non-hub airports)	1 place for every 500-700 departing passengers per year	528	739	959	1,343
Road and Transport Association of Canada	Short-term parking: 1.5 places per peak passenger (TPHP)	500		906	
	Long-stay parking spaces 450-600 places per 500 thousand passengers per year	616	821	1,119	1,492
	Total	1,115	1,727	1,727	2,398

It is clear that the respective criteria provide different results. The parking requirements can still be assessed around 530 places in 2022 and 1,120 places in 2030.

State Body Office Building

It was considered as appropriate since the First Phase (which is expected to be completed in 2022 after the simulation of the actual airport operation) to provide a building for Albanian State Authorities Offices to house the staff of the sectors responsible for managing flight functions, customs control and airport management. The layout dimensions are 14x22 m for a surface area of 308 sq.m. on the ground floor and 166 sq.m. on the first floor for a total of 550 sq.m..

Combined with the building, a reserved parking area for authorized cars was provided. Access will be through the customs gate.

Health Area



The Health Area for control of any endemic flights was designed in the First Phase inside the passenger terminal and will be equipped with the necessary areas to select healthy persons from those that require special medical check-ups. For this purpose, adequate routes will be provided for the return of healthy passengers to the Customs and Passport check areas, while for those who will have to pass further checks in health areas outside the airport, a route will be created that leads directly to the ambulance parking located next to the emergency room. The health area must be equipped with separate equipment, furnishings and rest rooms for the employees.

Manned Customs Gate

The study of the Master Plan considered it useful and necessary to create two customs gates, one of which is manned and the other with access by call.

It will consist of a roofed building equipped with toilets as well as RX and MDT surveillance equipment for goods and people. Appropriate windows will allow the operators to visualize the type of vehicle that requires access by opening the first barrier to perform the necessary checks. A roof structure, which will cover the space between the two gates, will provide shelter from bad weather. The customs unit will be equipped with a video surveillance system and an anti-intrusion system. The area will be adequately lit by floodlight towers.

Control Tower and Technical Unit

To avoid interference with the 1:7 cone (transition surface $p = 14.3\%$) the new TWR was designed in such a position that it can be raised without drilling the inclined plane. The distance from the safety strip of the RWY will make it possible to reach a height of about 35 m allowing a wide visibility of both the end of the RWY and the aircraft apron, and of other areas that will be constructed in the subsequent phases of airport development. At the foot of the TWR, the project includes a "Technical Unit" containing all the services required for the control of weather data, flight plans, etc. Also, the Albania Flights Control Office will be located on the first floor with independent and separate access from the entrance of the Technical Unit, but with the possibility of access through alarm doors equipped with authorization badges.

The Technical Block will be located inside the 60x25 m intruder-proof fence and will include two floors with a 40x15 m rectangular layout on the ground floor (600 sq.m.), and with 300 sq.m. on the first floor. Parking spaces reserved for Control Tower personnel are provided between the indoor and outdoor areas.

The area will be adequately lit by floodlight towers.

Technological Centers

In a strategic position, but far from the Terminal Area, an adequate technical area was designed, in which the refrigerating thermal and air conditioning units for the Terminal will be located.

Vehicle Garage

The vehicle garage is a construction made of metal structure (pillars, beams) with insulated sandwich panel roofing and industrial concrete floor of adequate thickness to support the weight of vehicles to be protected from the elements. The side facing the RWY will be equipped with automated sliding doors, while on the other three sides it will be closed with pre-painted insulated metal panels. The systems for maintaining a temperature of at least 8°C to 10°C in winter and lighting for nighttime operations will be housed inside. It will hold a *battery recharger* for recharging electric vehicles. The height will be evaluated in relation to the largest vehicle to be admitted (buses, autolifts, de-icing vehicles, elevator baskets, service cars, etc.).

Albania Flight Control Offices

See section (6.3.9) Control tower and Technical Unit.

Fire Station and Emergency First Aid Station

Category of Airport Firefighting Service

In the New South Albania Airport, rescue and fire services and equipment will have to be set up so that duly located and equipped public or private organizations may be responsible for providing firefighting services. It is implied that the "Fire Station" in this specific case was normally located inside the airport.

It should also be understood that the foregoing includes the **availability of suitable rescue equipment and services** and also of **special firefighting vehicles**.

Level of Protection to be provided

- The international standard specifies that the level of protection required at the airport for rescue and firefighting must be appropriate to the **category** determined using the principles set out in sections 3) and 4), except where the number of movements of airplanes in the highest category that normally uses the aerodrome is less than 700 in the three consecutive months with the greatest traffic intensity. In this case, the level of protection must be consistent with the current standard. It should be noted that both a takeoff and a landing constitute a movement.
- The level of protection for the airport for rescue and firefighting will be the same as the aerodrome category determined using the principles set out in sections 3) and 4) (ICAO - Annex 14 - Volume 1).
- The category of the airport was determined according to the following table, which is based on the **longest aircraft that normally use the airport and their fuselage size**. (To categorize the airplanes using the airport, their overall length and then the width of the fuselage were assessed first.)
- If, after selecting the appropriate category for the total length of the longest airplane, the fuselage width of that airplane is greater than the table width for that category (see Table column 3), the actual category to consider for that airplane will be the next highest category.
- The guide for categorizing the aerodromes for rescue and firefighting purposes and for providing for rescue and firefighting services and equipment must be provided in the Airport Services Manual.

Table 46 Aerodrome categories for rescue and firefighting purposes

APT Category	Overall aircraft length	Max. fuselage width
(1)	(2)	(3)
1	from 0 m up to <9 m	2 m
2	from 9 m up to <12 m	2 m
3	from 12 m up to <18 m	3 m
4	from 18 m up to <24 m	4 m
5	from 24 m up to <28 m	4 m
6	from 28 m up to <39 m	5 m
7	from 39 m up to <49 m	5 m
8	from 49 m up to <61 m	7 m
9	from 61 m up to <76 m	7 m
10	from 76 m up to <90 m	8 m

	Boeing B737/700	Airbus A320
Length	33.6 m	37.57 m
External fuselage width	3.73 m	3.95

In relation to the two types of aircraft that will operate at the New South Albania Airport, in compliance with ICAO regulations, the Airbus A320 was taken as a critical aircraft for the calculation of the “Airport Firefighting Service Category.”

During the planned periods of reduced activity, the level of protection available may be not less than that necessary for the highest category of the aircraft that is expected to use the aerodrome during that period without considering the number of movements.

Response Time

The Response Time is considered as the time between the initial call to the Rescue and Firefighting Services, and the time when the first responding vehicle is in the position to spray foam at a rate of at least 50% of the discharge rate.

The operational purpose of the rescue and firefighting service has been set to reach the response time of 2 (two) minutes and not more than 3 (three) minutes, at the end of each runway, as well as in every other part of the Movement Area, in optimal visibility and surface conditions.

Fire Station

The new Fires Station will be built with two floors, divided as follows:

Ground Floor (air side)

- the stalls for firefighting vehicles will open toward the RWY and will be accessible through automated sectional doors
- ambulance garage and Rescue emergency room;
- mechanical workshop;
- vertical connectors with fire doors and metal emergency poles.
- city side (land side)
- Entrance;
- canteen and kitchen;
- restrooms;

- gym.

First Floor

- accommodations for fire personnel and related facilities with number of beds based on shifts;
- fire lookout tower;

The building will also be provided with a car park reserved for authorized personnel and a maneuvering area for firefighting equipment duly lit by floodlight towers. A metal structure is provided in the same area to support the water tank and foam tank with a suitable jointed loading system for immediate intervention.

Next to this there will be the concrete pipe of adequate length for washing the hoses. The building will be equipped with all the systems necessary to perform the specific functions and to accommodate the firefighter shifts.

The structure will be of the traditional type with foundations, pillars and beams in reinforced concrete and floors with reinforced concrete beam and masonry construction.

Water and Firefighting Tanks

The capacity of the tank will be adequately sized in the successive planning stages in relation to the consumption that will be calculated per the Traffic Unit based on the number of service blocks at the terminal, fire station, storage depots, workshops, vehicle garages and other buildings, and the simultaneous presence of passengers, accompanying/welcoming persons, airport employees, state bodies, etc., so as to constitute an adequate reserve in case of the lack of drinking water. Equally necessary will be the water accumulation tank that will serve as the fire reserve. The position of the tanks can be improved in relation to the needs of service efficiency.

Tanks for the collection and treatment of precipitation water

A series of tanks for the collection and treatment of precipitation water has been located at the perimeter of the airport grounds and also in intermediate areas, so that the rain falling on the flight infrastructure, on the paved areas, on the roads and on the roofs of the buildings can be recovered, after oil and sand removal, and



returned to the water table and partly reused for an irrigation system for the green areas at the airport site. These structures will be in reinforced concrete equipped with suitable inspection and control hatches as well as roof access for any necessary maintenance. The dimensioning will be perfected during the successive planning stages.

Electric Station

An Electric Transformation Station will be built for medium voltage electric power deriving specifically from at least two external stations on different lines so that the breakdown of one station does not prevent the operation of the other for supplying power to the various airport utilities. In any case, the airport will have “no break” and “short break” generators.

The lines will be carried to the inside of the airport through the construction of underground tunnels in compliance with current regulations. Any overhead lines that are present and that interfere with the aeronautical plans will also be buried.

Biological Purifier and Aircraft Waste Waters

An adequate network of collectors will collect the airport waste waters, which will be conveyed by means of sloping conduits into a biological purifier for the complete water treatment cycle. Its dimensioning will be developed in the successive planning stages together with that for the treatment of aircraft waste waters.

Special care will be taken in the construction of the conduit networks from the buildings to the purifier by laying the pipes with adequate slope and suitably sealed to avoid any percolation and environmental damage. In this case also the adequately purified water may be carried to a suitable final collection area, or in part used for the irrigation of the airport green areas.

Airport Director Accommodations

The AAC will indicate to the designers the possible construction of the accommodation for the Airport Director, indicating its location, its size and its type of finishing details, as well as its functional and distribution structure.

Electric station for Albania Night Flights Control



The power supply for the AGL systems will be centralized in a dedicated Night Flights station where all the Regulating Units will be housed and the mimic diagram for the precise control of any anomalies that may occur.

Fuel Depot

In consideration of the location of the areas examined in order to identify their suitability for the New South Albania Airport, it was found that there may be difficulties in having tank trucks arrive for refueling the aircraft, in the case of the request of the pilot of the aircraft. Therefore provision was made for the setting up of a skid-equipped "Fuel Depot" in a safe area distant from the other buildings for check the purity of the aviation fuel to be transferred to the tank trucks that will reach the aircraft apron. The area will be equipped with an entrance and exit gate, each separate from the other, to avoid hindering the movement of entering/exiting vehicles.

The depot area, which has been located near the customs gate to shorten the trip of the tank trucks inside the airport area, will be enclosed by a masonry fence H = 2.5m and equipped with offices and services for employees. The maneuvers area and the internal roads will be made of concrete suitably cast at a slope to collect any spills that will flow directly into the de-oiling plant. The fuel depot area will be illuminated by floodlight towers, which will ensure good visibility for any nighttime operations.

Airport Workshop

To avoid the inefficiency of vehicles with breakdowns removed from the specific service for which they were provided, the New South Albania Airport will be equipped with an airport workshop located in a special building equipped with the necessary equipment for the checking the functionality and efficiency of the vehicles. The workshop will be built with a metal structure and appropriately insulated sandwich panel curtain walls. The doors will be of the sectional type and will open electrically. In order to avoid serious health problems for the operators when working with closed doors, suitable exhaust extractors must be provided for the vehicles undergoing repairs/maintenance. There will also be a pit set up for inspections of the underside of the vehicles, or lifts with remote controlled operating systems.

This structure must also include a network for collecting polluted water or for fuel and oil leaks and conveying them to the purification system.



The workshop will have all the necessary equipment and rest rooms for the employees.

Ramp Vehicle Garage

The ramp vehicle garage is a construction made with a metal structure (pillars, beams) with insulated sandwich panel roofing and an industrial concrete floor of adequate thickness to support the weight of vehicles to be protected from the elements. The side facing the RWY will be equipped with automated sliding doors, while on the other three sides it will be closed with pre-painted insulated metal panels. The systems for maintaining a temperature of at least 8°C to 10°C in winter and lighting for nighttime operations will be housed inside. It will hold a *battery recharger* for recharging electric vehicles. The height will be evaluated in relation to the largest vehicle to be admitted (e.g. aircraft ramps, de-icing vehicles, 400 Hz current generator, drinking water tank truck, compressor, mobile generator, push-backs, etc.).



Warehouse and Depots

If it becomes necessary, in relation to the extent of the increase in passenger traffic and aircraft movements and on the basis of the demand for freight transport, some warehouses and depots to be rented to private individuals or organizations, and thus generating revenue on the service offered, may be built at the end of the first phase, i.e. by 2022. At other airports these structures are granted for a certain period (20-30 years) and then automatically pass into the ownership of the AAC.

Ramp Vehicle Parking Area

In following with the precise aim of maintaining a high level of airport safety and security, the Master Plan provided for the construction of an area, paved in bituminous conglomerate and directly linked to the aircraft apron, for parking the ramp vehicles offering service to the Airlines when they are not in use. The parking area will thus allow the ramp operator to know, based on the location of the aircraft, the position of the vehicle required and the time necessary to reach the stall, thus avoiding the wasting of time and increasing the efficiency of the service.

Maintenance Warehouse

In relation to the extent of the increase in passenger traffic and aircraft, a warehouse for spare parts or for ordinary maintenance work, for the maintenance of civil works and of electrical and mechanical systems may be built at the end of the first phase, i.e. by 2022. This structure will thus ensure immediate operations with considerable time savings compared to requests for work by private external providers.

