Proposal for an International Airport in Jerusalem's Horkania Valley

Preliminary Planning Background Document
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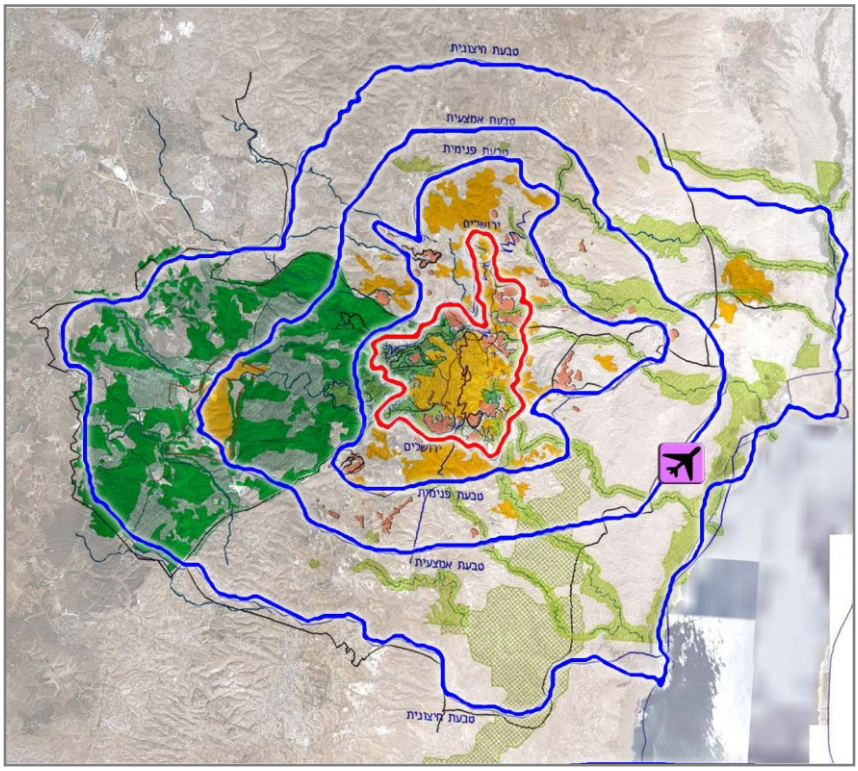
1. Introduction

The proposal for an international airport in Jerusalem, in the Horkania Valley, is part of a long-term master plan of a vision for Jerusalem as a tourist metropolis capable of hosting 10 million foreign tourists per year.

This International Airport Proposal for Jerusalem (Horkania) is presented as a solution to the anticipated shortage of overall air traffic capacity in Israel's central region, and especially in the Jerusalem area, as well as a potential joint project between Israel and the Palestinian population in Judea and Samaria.

The proposal for the airport includes two runways, to be opened in two phases, and is presented as the best alternative from an environmental, economic, security and strategic perspective for the central region of Israel as detailed below:

- Geographic area available for development
- Quick access and connection to transportation and infrastructure both for metropolitan Jerusalem as a central tourist attraction as well as to other areas, such as metropolitan Tel Aviv, the Dead Sea area, the Muslim population in Judea and Samaria, and Israel in general.
- The necessity to copy existing military facilities alone without copying civilian facilities.
- The project will serve as a national aviation center, but is located outside the shadow of the ground traffic burden radiating from metropolitan Tel Aviv.
- The project will be part of the development trend of Jerusalem towards the east and will help establish Israel's capital as a center and global city.
- The direct and quick connection to Ben-Gurion Airport will be an opportunity for a double aviation center of two airports, which will provide an incomparable level of service.
- The project's potential as a joint operation between Israel and the Palestinians in Judea and Samaria may serve as a basis for a regional aviation center connecting the aviation movements to and from the east and west.



2. The Rationale of the Project and the Need for a New Airport

2.1 **The Future of Air Transportation:**

- In the coming decades, the field of air transport should continue to evolve and become more efficient through the advent of new aircraft models and operational cost and fuel consumption savings, and will constitute the main means of transportation for long distance travel.
- The gradual increase of recreational and business flight habits of the local population in Israel, as well as the expected rise in foreign tourism to Israel, requires the continued rapid development of modern and comfortable facilities of airports, with access to population and tourism centers in Israel.

2.2 **Considerations for the Project of a New International Airport**

- In 2011, Israel currently has one international airport – Ben-Gurion Airport, which has a limited maximal air capacity, estimated at 16-18 million passengers per year, after completing all possible improvements in runway extensions.
- From 2012 on, the total aerial traffic at Ben-Gurion Airport is expected to reach between 12-18 million passengers annually, including about 6-8 million foreign travelers (3-4 million tourists per year) and about 7-10 million flights by Israeli citizens.
- The estimated planning and construction time of an international airport is about 10-11 years. Therefore, such an airport is not expected to operate before the year 2022.
- During this period, air traffic is expected to increase and Ben-Gurion Airport is expected to reach its maximal airport capacity, which shall create a significant barrier to serve the air traffic movement in Israel both for its residents and tourists who would like to visit.

2.3 The Need for a New Airport and the Location Choice

- In recognition of these constraints, in July 2011, the government of Israel charged the Transportation and Security Ministers with the task of proposing an alternative, supplemental airport to Ben-Gurion Airport by October 2011.
- Due to the absence of a feasible alternative location or grounds in central Israel, the proposals considered by for governmental decision are in the north or south and on the basis of an existing military airfield. The utilization of an existing military airport infrastructure can save time, planning, implementation, and direct construction costs. However, it will require the addition of an efficient and quick transportation system to the center of Israel, which will end up being extremely costly.
- The proposal to establish an international airport in the Be'er Sheva area may be a positive factor in the development of the Negev and would generate an integrated traffic system combining roads and railroads to the center of Israel, which would improve the general transportation connection of the Be'er Sheva area to the national center in Jerusalem – Tel Aviv.
- However, the airport in the Be'er Sheva area, if established, would not constitute a feasible supplement or replacement, in terms of accessible availability, for residents and visitors who wish to reach the northern-central area of Israel.
- A supplemental airport, as defined in international terms, is located within a distance of 60 km from the main/current airport.
- The forecast of significant growth and potential in the Jerusalem metropolitan area to host about 10 million foreign tourists per year depends, inter alia, on the availability of convenient air transportation nearby.

- An international airport in the metropolitan area of Jerusalem, if implemented based on the accepted criteria in terms of air and land, requires the consolidation of national and international agreements for the establishment of such an airport.
- The proposed site is being initially examined based on the above accepted criteria and is located in the Horkania Valley, east of Jerusalem, on land of the Gush Etzion regional council.

2.4 **An International Airport as a Joint Project by Israel and the Palestinians**

- After examining the aviation planning and land feasibility of the proposed project, its establishment can be examined as an opportunity to offer the Palestinians the ability to establish and operate a **joint airport**, which can contribute to Israel in transportation, economic, security and political fields.

Palestinian Considerations and Their Actions

The Economic Consideration. The Palestinians have a clear economic interest in the establishment of an international airport in Judea and Samaria, which will allow for the development and significant increase of tourism (which is expected to constitute an important source of foreign currency) and the transportation of goods and services. The establishment and operation of such a joint airport has a decisive economic impact on the Palestinian component. The transportation connection of roads and railways will connect the airport with Palestinian population centers, and existing and future tourist attractions.

An international airport under the joint management of Israel and the Palestinians, will be a catalyst for economic development without precedent in the Palestinian Authority, and will anchor the development of the economy/tourism of metropolitan Jerusalem common to both populations.

The Primary Palestinian Steps for the Establishment of an Airport East of Jerusalem. On October 20, 2010, the Palestinian Authority announced that it had evaluated and was prepared to establish an 'International Palestinian Airport' in the West Bank.

According to the Palestinians' plans, the airport will sprawl in the very same Horkania Valley east of Jerusalem. However, this is an 'Area C' location, which is currently under Israeli civilian and military control.

According to the Palestinian ministry of transport, in October 2010, the Palestinians filed an application to the Prime Minister of Israel to approve the construction of the airport.

Considerations of Israel

From a Security Perspective – the Israeli Air Force must maintain complete operational freedom, in a unified airspace, and maintain the security arrangements necessary to protect civil aviation to and from Israel. Through the establishment of this airport, Israel will maintain jurisdiction over the joint, now un-fragmented airspace and the Israeli Air Force will maintain its current response times and freedom of action in all the airspace west of the Jordan River and Dead Sea.

Supervision and control of the aerial movement will be in the hands of Israel and the operation of the airport will be in accordance with the leading Israeli and international standards in the fields of security and safety.

The aviation agreement between the parties will allow the opening of an international flight path that crosses the common airspace and allows flights to enter from the east, with an agreed upon compensation to the Palestinians. If Israel is given consideration to open an air corridor through which Israeli airlines are permitted to use international flight routes over the Arab countries, it will considerably shorten flights to China, India, and the Far East.

From a Transportation Perspective- The Horkanian airport is the best available option, between the Mediterranean Sea and Jordan, for an alternative airport to Ben-Gurion, and is a necessity in the event that its operations are temporarily damaged, or as a result of heavy traffic-- which, again, is expected to increase even in the next few years. From an operational perspective, in light of the expected congestion in the restricted space due to the heavy civil and military transportation traffic, Israel requires the ability to control all air traffic (including foreign aircrafts) in the airspace.

From an Economic Perspective – a joint airport may provide economic benefits to Israel, mainly in the field of tourism, as will be presented herein.

From a Political Perspective – a joint airport in the Horkania Valley can serve as an aerial bridge amongst all of the Middle Eastern countries.

In Summary

Both Israel and the Palestinians have shared interests in the fields of transportation and economics, which strongly support the establishment of a joint airport in the Horkania Valley. Such a project will increase the economic potential for both populations and therefore create incentive for co-development and cooperation. A condition for the establishment of an airport east of Jerusalem in the foreseeable future therefore requires agreement between both parties, which can be based on this incentive, and mutual exchanges between the parties in the framework of negotiations.

The above indicates that the establishment of a joint airport in Horkania is possible under the following assumptions: there exists technical feasibility, as well as transportation and economic profitability, and that an agreement can be reached between the parties on political and security-related matters. In light of the above, Israel can perform feasibility and viability testing as well as the independent planning of the airport already. If it is found to be actually feasible, then Israel can present the project as a joint venture and execute it in a way that best accommodates the political conditions.

3. International Airport – Jerusalem Horkania Valley

3.1 Characterization of the Proposed Airport

The proposed airport in Horkania is designed using two parallel runways for dual operation at a 4-E grade-- suitable to serve all civilian passenger aircraft currently in service globally, as well as those planned for future aviation.

The airport capacity is planned to accommodate about 20-30 million passengers per year.

The proposed location in the Judean desert's Horkania Valley has a width of about 1.5 kilometers, a length of approximately 4 kilometers, and is at the height of sea level. At its northern and eastern sides, the topography drops sharply to the sea level of the Dead Sea. On the western side are the jutting edges of the Jerusalem Mountains, which reach over 800+ meters, and on the southern side there are a number of high hills.

The proposed plan utilizes all of the valley's area for the establishment of an airport, which will include two parallel runways of 3800 meters in length. Between them there shall be taxiways, aircraft parking and various branches of passenger terminals, which will be found at the northern entrance of the valley.

The main passenger terminal will serve mostly passengers; with ticketing services, checking baggage, passport inspection and customs, and baggage claim for returning visitors. From this structure, passengers will be transported to the appropriate branches using boarding trains, which will travel the length of the airport with stops at every branch.

The runways will be equipped with facilities for landing in all weather conditions with a grade of at least 1.

3.2 Design Alternatives:

Alternative sites which were evaluated as proposed locations include:

A. **The Nevatim Airport** – a military airfield east of Be'er Sheva, which is at a significant distance from greater Jerusalem and Tel Aviv.
B. **The Megiddo Airport Site** – Up north, it is also at a significant distance from the population centers of Jerusalem and Tel Aviv.

3.3 Master Plan for the Development Stages of the Airport:

As mentioned above, the proposed airport has two runways that will allow its development in two main phases, during each of which one runway and the appropriate aerial and land infrastructures for its operation will be developed. The transition from stage A-1 runway to stage B-2 runways will take place in accordance with the extent of actual operations and will allow, as stated, the increased capacity of annual travelers from about 20 million per year in stage A to about 35 million in stage B.

4. The Aerial Aspect – Potential Analysis

Planning the runways and flight safety levels is performed in accordance with Annex 14 of the ICAO for E-4 level runways in accordance with the details specified herein:

4.1 <u>Runways:</u>

* Two runways at a length of 3800 meters and width of 60 meters plus margins of 7.5 meters per side.
* The runway shoulders will be 60 meters beyond each edge.
* The distance between the axes of the parallel runways – 1194 meters.
* The geographic direction of the runways 018-198.
* The height of the runways varies between 5 to 25+ meters respectively, and inclines of less than one percent.

*** Declared distances:**

LDN	ASDA	TODA	TORA	RUNWAY
3800	3860	4100	3800	02
3800	3860	4100	3800	20

4.1.1 *Taxiways* – parallel to the runway length, with a width of 25 meters with 3 quick exits from each direction (total 6 quick exits).

4.1.2 Waiting and passing area at the beginning of each runway.

4.1.3 *Runway paths:*
Width of 300 meters and length of 3800 + 60 + 60 = 3920 meters

4.1.4 *Runway and safety area (RESA) paths:* At sizes of 240x120 meters following the runway axes and beyond the runway paths.

4.1.5 <u>Flight Safety Levels at Takeoff and Landing</u>

A. In the direction of the south: from the bases of the runways and a length of 3,000 meters at a slope of 1:50, and from there for a length of 3,600 meters at a slope of 1:40, and from there a length of 8,400 meters at a slope of 1:50.

B. In the direction of the north: from the bases of the runways and for a length of 300 meters at a slope of 1:50, from there for a distance of 3,600 meters at a slope of 1:40, and from there a length of 8,400 meters in a horizontal plane, with the addition to the takeoff plane: on the basis of the flight safety levels at takeoff and landing and with a width of 180 meters, with a unified slope of 1:62.5 for a distance of 15,000 meters.

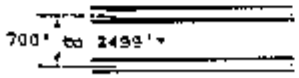
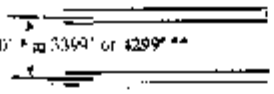
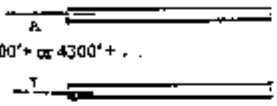
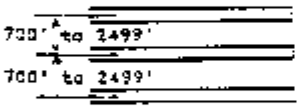
4.1.6 *Transition Planes:* At a slope of 1:7 to the height of the horizontal plane.

4.1.7 *Horizontal Plane:* At a height of 45 meters above the highest runway and with a radius of 4,000 meters from the base of the center for flight safety levels at takeoff and landing and their disciplines.

4.1.8 *The Conical Plane:* At a slope of 1:20 with a radius of 6,000 meters from the base of the center for flight safety levels at takeoff and landing and their disciplines.

4.1.9 <u>Bird Restriction areas:</u>

Bird Zone A – at a radius of 1,500 meters from the base of the center for flight safety levels at takeoff and landing and their disciplines.
Bird Zone B – at a radius of 5,000 meters from the base of the center for flight safety levels at takeoff and landing and their disciplines. There is a problem of birds during migration seasons.

NO	Runway-use configuration	Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	IFR	Annual Service Volume Ops/Yr
1.		0 to 20	98	56	230,000
		21 to 50	[illegible]	57	195,000
		51 to 80	63	56	205,000
		81 to 120	56	45	250,000
		121 to 130	51	50	240,000
2.	 700' to 2499'*	0 to 20	197	59	315,000
		21 to 50	145	57	275,000
		51 to 80	121	56	260,000
		81 to 120	105	59	285,000
		121 to 140	94	61	340,000
3.	 3500' to 3399' or 4299'**	0 to 20	197	62	355,000
		21 to 50	149	65	285,000
		51 to 80	126	65	275,000
		81 to 120	111	72	300,000
		121 to 140	103	75	345,000
4	 3400'+ or 4300'+	0 to 20	197	149	370,000
		21 to 50	149	113	320,000
		51 to 80	126	113	305,000
		81 to 120	111	105	315,000
		121 to 140	103	99	320,000
5.	 700' to 2499' 700' to 2499'	0 to 20	194	61	385,000
		21 to 50	118	83	305,000
		51 to 80	171	65	285,000
		81 to 110	149	70	310,000
		121 to 140	129	75	375,000

* Staggered threshold adjustments may apply, see paragraph 4-6.
** Refer to paragraph 2-2.E

Figure 2-1. Capacity and ASV for long range planning

4.1.10 Topographic Irregularities

The cliff of the Judean hills exceeds the horizontal and conical plane beginning at 950 meters west of the western runway axis.

The vertices of the hills south of the runways, which exceed the southern flight safety levels for takeoff and landing, will be lowered to the plane border of 1:50.

4.2 Runway Capacity Analysis

Based on the table taken from the FAA document (AC-150/5060-5 CHG-2), it appears that an individual runway used for both takeoffs and landings, with a mix of various aircraft types and different speeds, - C mark 1, can perform about 240,000 aircraft movements per year (takeoffs and landings), while in a state of two independent runways – C mark 4 – approximately 370,000 aircraft movements can take place per year.

Multiplying the number of movements with the average occupancy of 125 passengers per plane, the standard calculation in the world of aviation today, results in: For a single runway, about **30 million** travelers per year; and for two runways, about **46 million** travelers per year.

Even with a more modest and realistic estimation, we would estimate 20 million travelers on one runway and 35 million per year on two parallel runways.

4.2.1 Flight Paths and Heights

At this stage, we have not yet coordinated and determined flight paths and the heights to and from the airport, nor their connection to existing international flight routes. This step will be performed as part of the construction of the proposed airport.

5. The Grounds – Passenger Terminals and Supplementary Functions

5.1 Passenger Terminals (in each stage)

The contour area will be about 16,000 square meters and at least two floors high.

5.2 Branches

Two main branches are planned for the length of the width of the planes in a contour area of 40,000 square meters each and at least two floors.

A commuter branch for short distance flights – a contour area of about 4,000 square meters and at least two floors.

A branch for travelers of general aviation (GA) – contour area of 1,400 square meters in at least two floors.

5.3 Freight Terminal

Contour area of about 18,000 square meters and at least two floors.

5.4 Control Tower and a Rescue and Fire Service Area

Contour area of about 1,400 square meters and as high as required when planning the tower.

5.5 Operational Fuel Area

In an area of approximately 6,400 square meters

5.6 Boarding Trains for Passenger Service

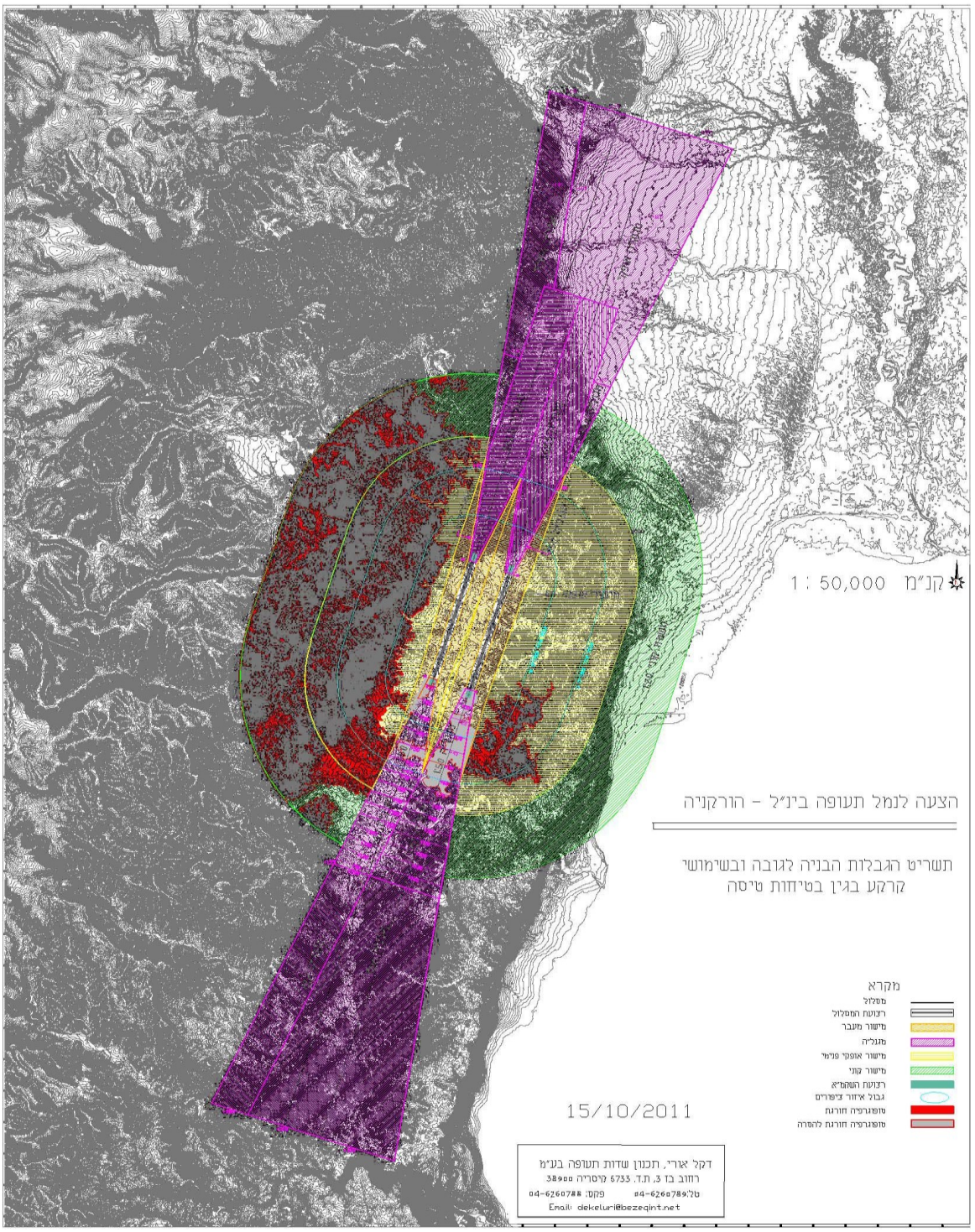
Two railroads on the ground or one above the other which will travel back and forth from the main terminal to the southernmost branch (about 4 kilometers).

5.7 Parking Lots

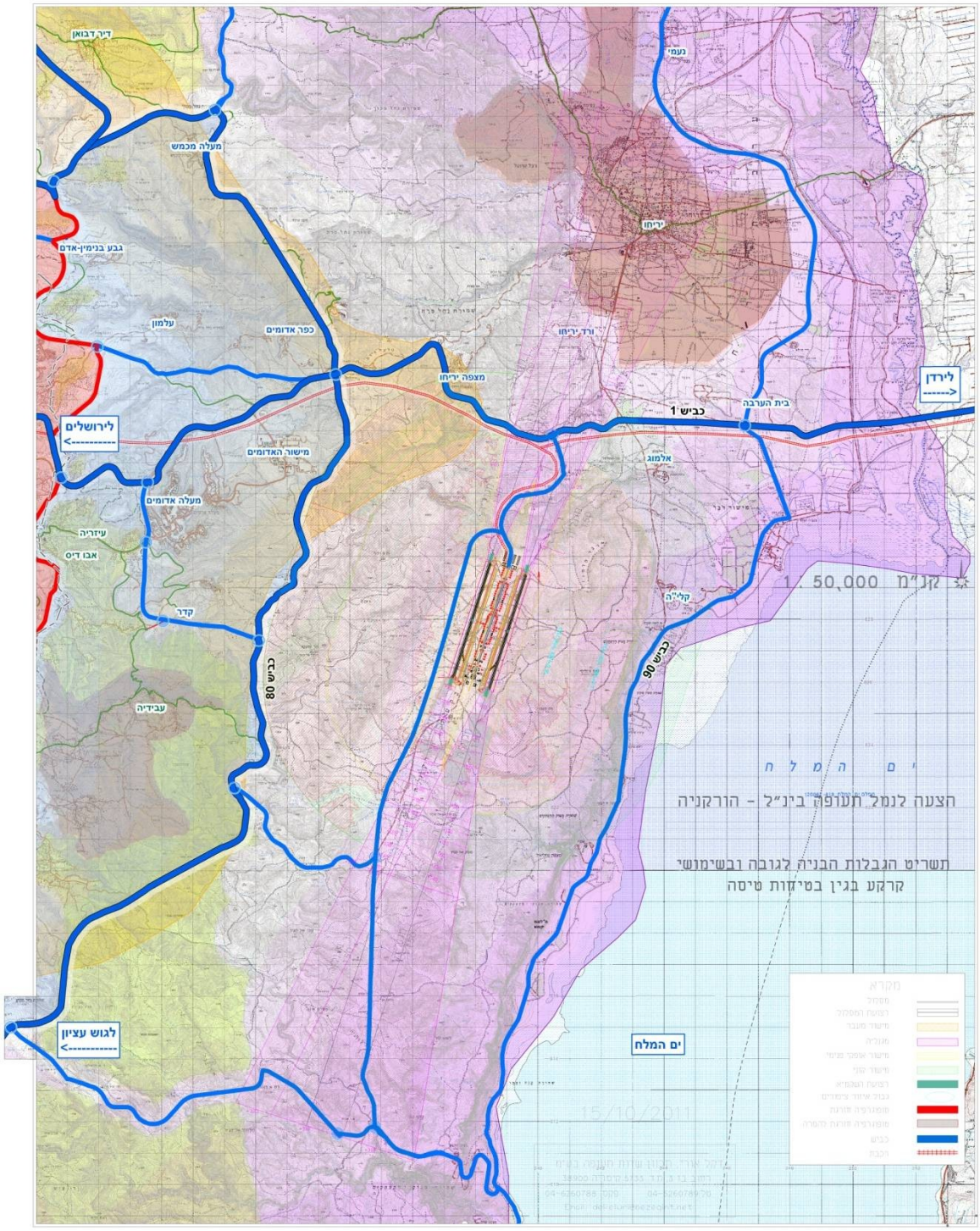
Two structures for car parking in front of the terminal, with a contour area of about 11,500 square meters. The number of floors will be calculated when the parking lots are designed.

5.8 Internal Roads – will be built along the length of the internal railway

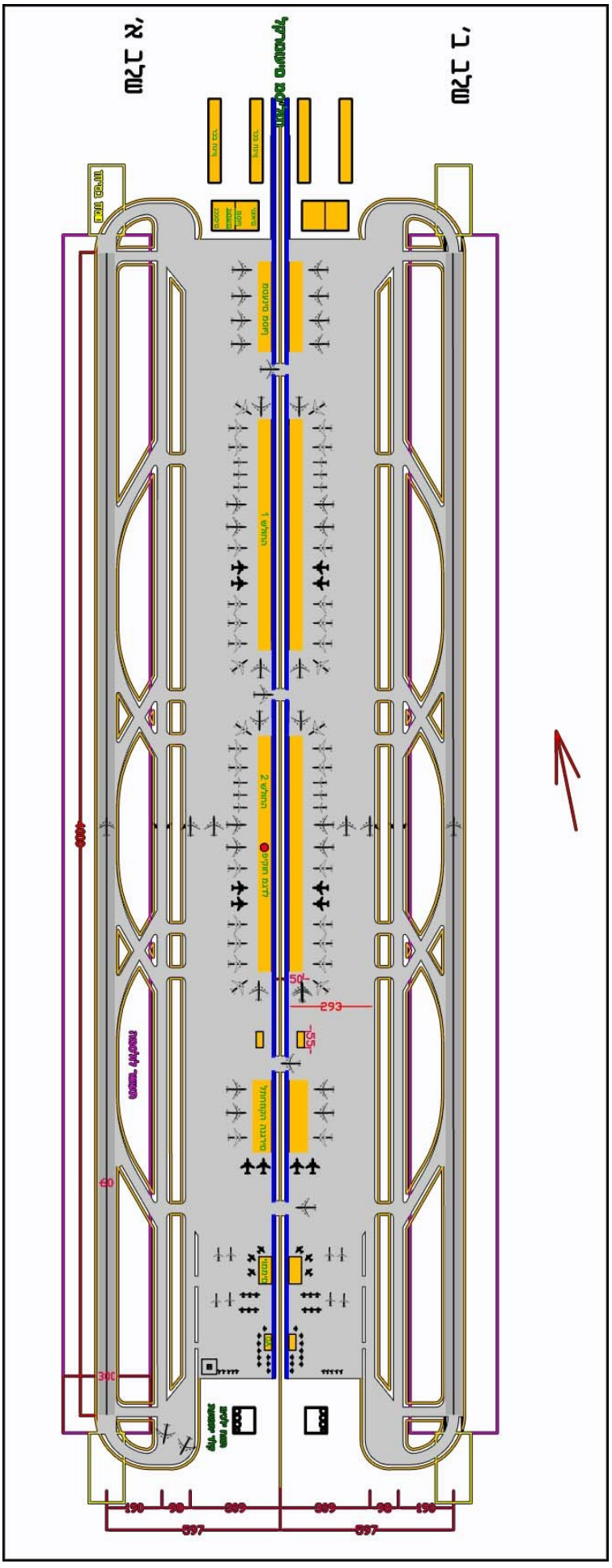
5.9 Layout of Building Restrictions and Flight Safety:



5.10 Map of Building Restrictions and Flight Safety



5.11 Airport Schematic Plan:



6. Transportation Aspects

An examination of the possibility of establishing an airport in the Horkania Valley, located approximately 6 kilometers west of the northern area of the Dead Sea, and at approximate sea level altitude, which will serve all existing types of commercial aircraft. In its complete form it will include two runways at a length suitable for international flights as well as direct transnational flights (with no stopovers). The airport will be developed in several stages until it reaches complete operation of at least 20 million travelers per year.

The proposed airport will serve a number of functions:

- Increase the capacity for airports in Israel given the expected increase in travelers.
- The airport will directly serve Jerusalem, the capital of Israel. The airport will be located at an aerial distance of approximately 20 kilometers from Jerusalem.
- Serve as a backup airport to Ben-Gurion International
- The airport will serve as a connection center for flights from the Arab countries to the west.
- It is likely that the airport will also serve the Muslim residents of Judea and Samaria.

In this document we present transportation considerations in the establishment of an airport and its operation. Map #1, at the end of the chapter shows the transportation system.

6.1 **Expected Transportation Demand**

The table below displays an initial estimate of the demand for the airport's land transportation.

Number of passengers per year	20,000,000	
Heavy traffic days per year	200	An assumption for the purpose of determining daily volume
Number of passengers per planned day	100,000	Total, in and out
Of them, number of passengers using public transportation and train	25,000	Slightly higher in comparison with the accepted global standard, due to the location of the airport
Passengers traveling by private car	75,000	
Net Fill Coefficiency	1.25	Does not include drivers who are not flying and escorts
PCU per day	60,000	
Of them, traveling on 1 west	50,000	Assumption of passenger division based on destination
Of them traveling on the 90 north	7,000	
Of them, traveling on the 90 south	3,000	

The airport will contribute about 25,000 commuters per day towards the Horkania-Jerusalem highway and thousands of daily commuters on Highway 90 heading north and south.

For these traffic volumes, in addition to the traffic not headed to the airport, in the short term there will need to be two traffic lanes per direction, in addition to crawl routes and steep inclines. In planning for the long term, rights should be retained for an additional lane in each direction.

6.2 Expected Facilities of the Transportation System at the Planned Target:
The transportation system that will serve the airport will be comprised of several components as follows:
Connection to the fast Tel Aviv highway – Ben-Gurion Airport – Jerusalem – Horkania – highway 90. This road will serve the traffic of travelers and cargo to the airport and will assist the functioning of the airport as a backup to Ben-Gurion Airport.
There will also be a railroad connection of a high standard, which will connect the airport to the national train network through Jerusalem. Likewise, there will be an option to continue the train east to Amman. The train's main function will be to serve passengers without vehicles.

6.3 Highway:
The eastern section of the highway (highway 90 – airport – Mishor Adumim) will be the currently existing highway 1 after geometric improvements and expansion to a two lane highway. There will be an option to continue the highway east in the direction of Amman. From Mishor Adumim, and west to the Ben Shemen interchange, there will be two routes: the northern route of Highway 45 until Road #443, and Road #443 until Highway 1 at the Ben Shemen interchange. The main route will be Highway 1, after many geometric improvements, to include: an underground tunnel crossing that transverses the city of Jerusalem and additional improvements in the area to the east to Shaar Hagay. Because of the costs and the planning situation, it appears that in the short term, the northern alternative will be implemented. The Ben Shemen interchange in the west will serve Highway 1.

The proposed solution has a number of advantages. The route proposed is well-connected to the national road system, specifically the northern and southern routes, including Highway 90 which allows access to the airport both from Eilat and Ramat Hagolan. This route also allows for the fast connection to Highway 6, which also allows for a convenient and quick connection to the airport and the main activity centers in the country. The route will also allow convenient access to border crossings at the Allenby Bridge, and from there to Amman and Jordan. This route will also allow for convenient connections to the Palestinian roadways in Judea and Samaria. The road will provide a quick connection to Jerusalem, Ben-Gurion Airport and Tel Aviv. As such, the airport will be able to fulfill its expected duties.

6.4 The Train:
The establishment of a rail connection and the old airport poses a different engineering problem – the height difference which reaches about 800 meters. In considering the 20 kilometer distance and the (unlikely) assumption of a unified slope, a gradient will be obtained of about 4%. The Israel Railway is designed to operate at a slope of 1.5% to a maximum of 2%. To construct a railway that will accommodate the Israel Railway, a significant extension of the route, through curves, would be required and will cost a significant amount, as well as severe damage to the landscape and environment.

There are modern trains (manufactured by the Canadian company Bombardier) which operates at a slope of up to 6%. Use of this train will allow the construction of a reasonable length, and a location parallel to the road.

It is proposed to use the Canadian technology. The train will connect the airport to the new train station in Jerusalem (under the central bus station in the west of the city).
Crossing the city will take place by underground tunnel. In Jerusalem, an additional station will be built, other than the new train station. Those traveling to the west of this train will have to switch trains at the Jerusalem station to continue their journey.
In the longer term, the extension of the new train to the west should be considered perhaps as far as Tel Aviv.

6.5 Comparison of Alternatives

In discussions regarding the establishment of the airport as a backup to Ben-Gurion Airport, a number of alternatives were raised.

- Nevatim
- Meggido

From as transportation perspective, these alternatives are significantly inferior to the Horkania airport.

The existing Nevatim airport serves as a significant military airport. Other than the difficulties expected in its expropriation from the military, the distance from the airport to central Israel is significant. Although the travel would take place using Highway 6, it is a distance of over 100 kilometers to the Dan region and about 140 kilometers to Jerusalem. There will be transportation difficulties for Muslim residents of Judea and Samaria, both back to Judea and Samaria, as well as to the countries east of Israel. It would, however be possible to add train service by connecting tracks to the Be'er Sheva railway.

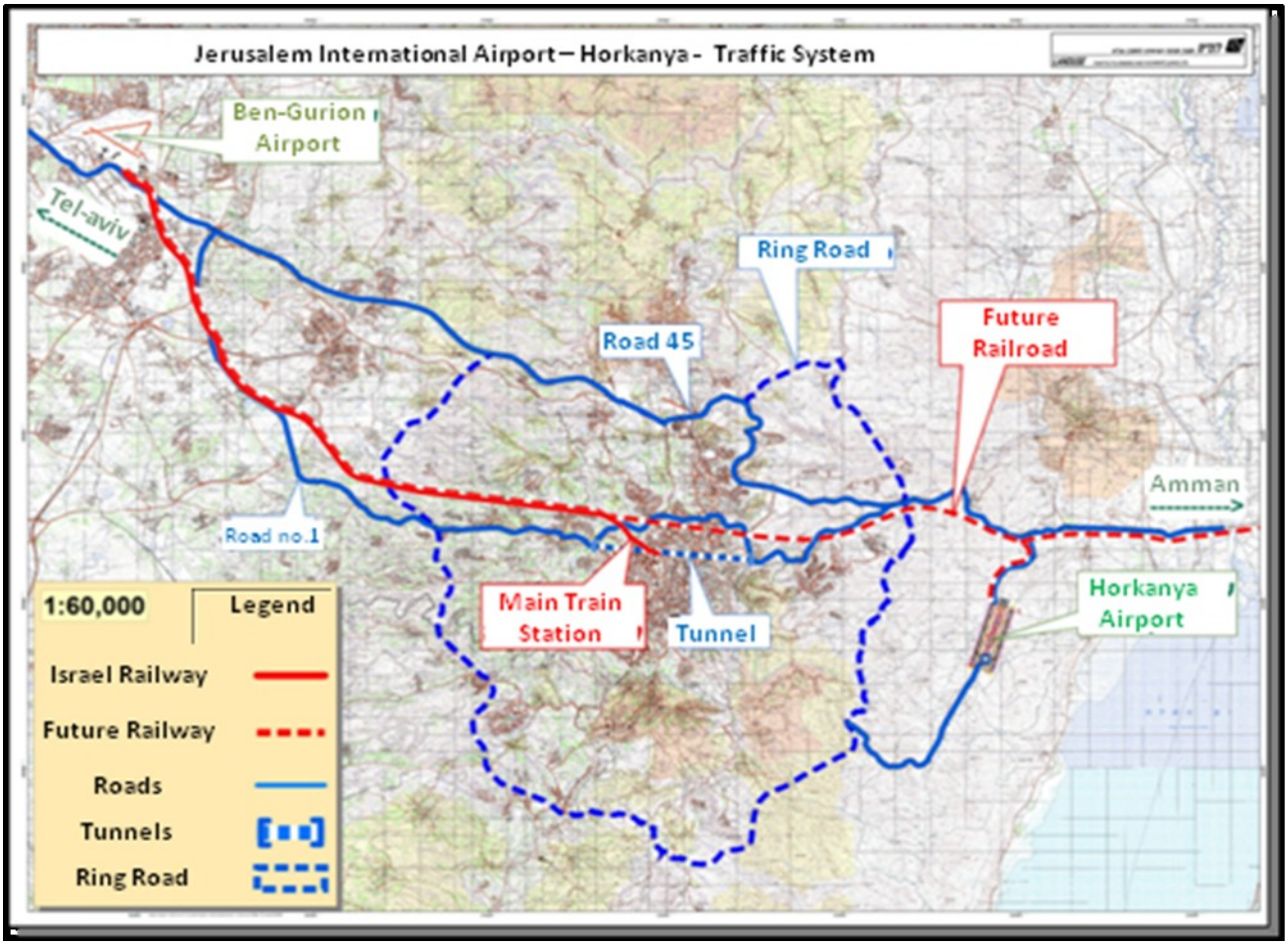
In the Meggido region, an airport can be established. Transportation to central Israel will take place using highways 65 (Wadi Ara) and 6. The distance to the Dan region is about 80 kilometers and the distance to Jerusalem about 120 kilometers. A railway link to the airport will be possible after the establishment of the Emek train. It will be relatively easy to serve residents of Judea and Samaria (though through Jenin).

6.6 Summary

The proposed transportation system for the service of the proposed airport in Horkania is mostly based on the existing and planned roads. Connection to the coastal plane will be in two ways: the northern route, highways 45 and 443, and the central route, using Highway 1. By transferring Highway 1 to a tunnel under the city of Jerusalem, we can ensure sufficient capacity and high quality of service.

The railroad connection to the airport will take place with a special train that is able to handle inclines of up to 6%. In the first stage, the train would be paved up to the new train station built in Jerusalem. In more advanced stages, the tracks would continue west on an orient parallel to Highway 1, possibly up to Tel Aviv.

6.7 Map of Metropolitan Jerusalem – Transportation Systems



7.1 Land Ownerships:
The area intended for the airport is a military training area for motorsports.

Ownerships
100% state owned.
IDF training area

The desert has a hiking site which will not be interrupted by the airport.

Summary:
- The planning will take into account the existing use and relate to it as such to allow for training without live ammunition.
- It will allow for desert hikes in the surrounding areas.
- It will devote exit and return points from the airport to desert hikes.

7.2 Heritage and Archaeology:
Horkania (Castellion, El-Merd, Charvat Merd) is an ancient fortress in the Judean desert.
Horkania is identified as an isolated dome 200 meters above the Horkania Valley (Al-Bukia) on its western edges. The site has not yet been excavated and the information regarding the remains of the location is based on surveys and measurements.

The fortress was built, it seems, by Alexander Yanni, although it might have been built by John Hyrkanus, the father of Yanni, and named after him.

First mention of the site is found towards the end of Shlomzion's reign, the wife of Alexander Yanni (76-67) BCE (Antiquities of the Jews, XII, XVI, C). Flavius Josephus tells that Horkania, together with Machaerus and Alexandrion, are the three forts that

the queen did not give up when she handed control of her strongholds to the Pharisees, because "that is where her principle treasures were".
The next time Horkania is mentioned is when Alexander II ran from Aulus Gabinius and "fortified the land's strongholds and built Alexandrion, Horkania and Machaerus which face the Arab mountains". In that same chapter it is written that "when the desperate Alexander almost lost hope, he sent delegates to request a pardon and to hand over the remaining forts, Horkania and Machaerus and he later also received Alexandrion. All of these forts were destroyed by Gabinius, to prevent a new war".
The water pools of the Horkania fort – another source that mentions Horkania and other forts is in the writings of the Roman historian Stravo who writes that "he (Pompey) gave orders to raze all the walls and, so far as he could, destroyed the haunts of robbers and the treasure-holds of the tyrants" (Stravo, Geography, 16, 2, 40).

As with any desert fort, there was an impressive water system that brought floodwater from nearby streams that were close to the foot of the fortress, which was located on top of a water channel that was partly open. In addition, there is a system of large cisterns in the fort. At the foot of the fortress next to the storage pool is an orchard used for different crops for the inhabitants of the fortress.

The orchard area of Horkania was established in the Byzantine period on the ruins of a monastery (Cenobite), by Saint Sabbas. The remains of the monastery are still visible today.

In the southwestern part of the fort, a cave with wall paintings of saints from the beginning of the Byzantine period was found. The wall paintings described the saints with names, some of which were unknown until their discovery. The paintings were vandalized and no longer exist.

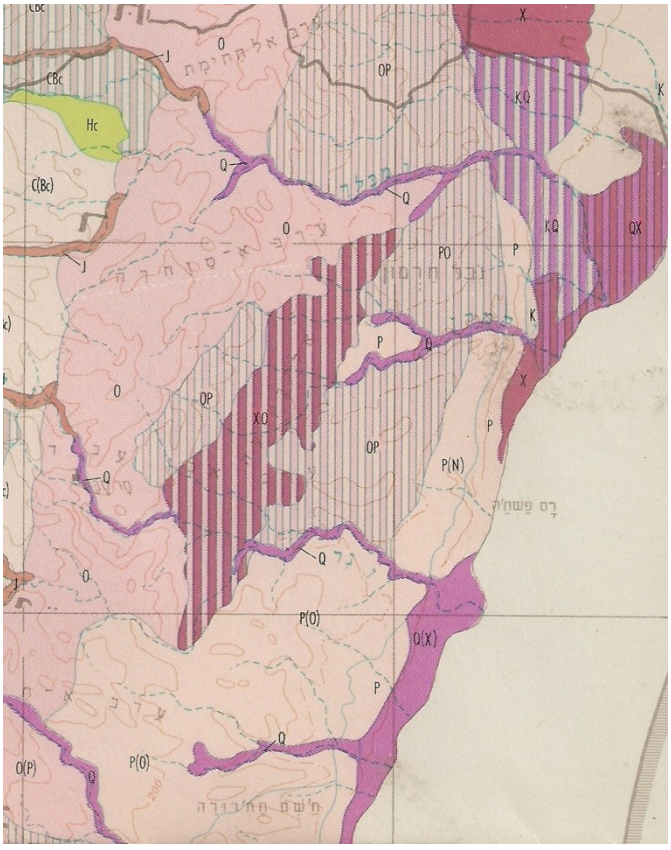
North of the site on the Sakaka River there are two tunnels each tens of meters long. The tunnels were surveyed by John Allegro in the 1960s and the lower of the two was also excavated in 2000 by O. Gutfeld. The excavator estimates that the tunnels were built in the second temple period and raises a number of suggestions as to the tunnels use: a prison for the enemies of Herod, and perhaps even for his son Antipater; a water system; a hiding refuge; and perhaps even a hiding place for one of the treasures of the copper scrolls, which mentions the Sakaka River as a site of great treasures. Another suggestion attempts to connect the location with worship of the sun and stars like that of a similar cave of the Persian god Mitras in Turkey. The lower tunnel has been sealed as to prevent any damage.

The Horkania Valley has been identified by a number of researchers as the Achor Valley where Achan was stoned because of the spoils of Jericho (Joshua 7:24). In the valley, remains of agriculture were found from the Israeli period, as well as remains of paths and military bases from the Roman period, along with a large number of tumulus and early round structures.

Nabi Musa and the Muslim Celebration

Seemingly, the Muslim leader Saladin initiated the tradition of marching after the victory against the Crusaders, in the battle for Jerusalem in 1187. The prevailing hypothesis is that Saladin established the holiday because although he decided to continue to allow the Christians to visit their holy sites in Jerusalem during Easter after he conquered the city, he suspected that they would take advantage of this opportunity to create chaos or reconquer the city. Therefore, he found a convenient excuse to ensure there would be Muslim masses in the area of the city in case of any trouble. This explanation is also consistent with the fact

that despite the Muslim character of the festival, it is celebrated based on the Orthodox Church's calendar and not that of Islam
as the holiday begins on the Friday preceding Easter's Good Friday. According to this schedule, the Muslim masses would be returning to Jerusalem just as the Christians were beginning to arrive for Easter.



7.3: Groups of Land:

The land in the Horkania Valley (based on the Israel land map of S. Rabikowitz)

X – Alluvian desert soils. Fertile soil deposited by rivers and stream.

– Skeletal brown desert soils.

P – Areas covered in desert rocks – rock outcrops.

N – Coveted lands – areas of land covered in rocks.

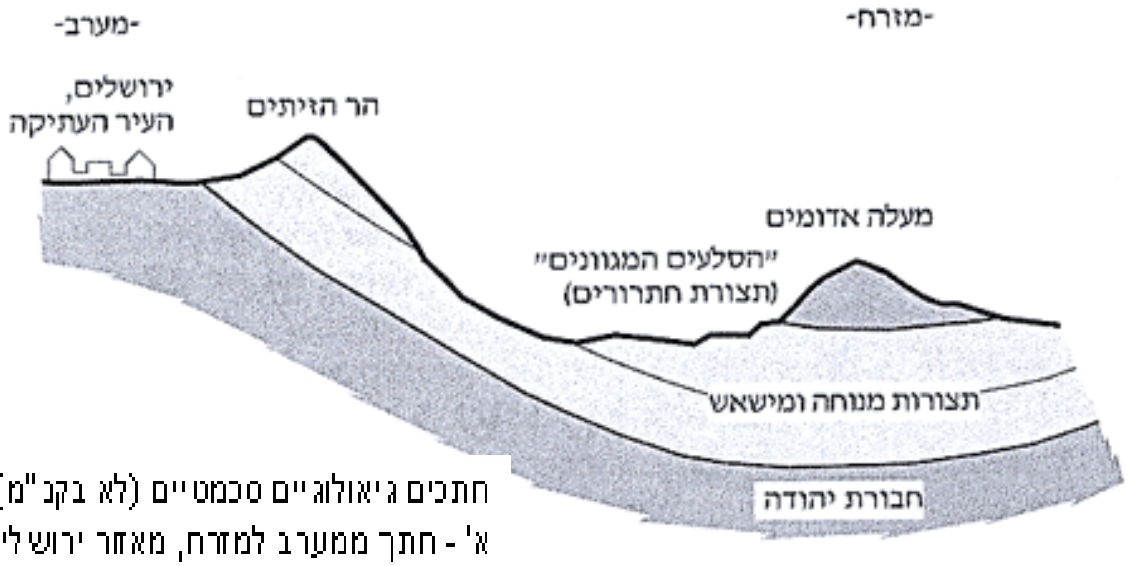
K – Rendzina of the valleys – land that has been weathered by soft rock types.

Q – Rough deserts of Aluvim – land with a considerable proportion of pebbles and fragments of flint and dolomite and rock hard limestone.

7.4 Geology:

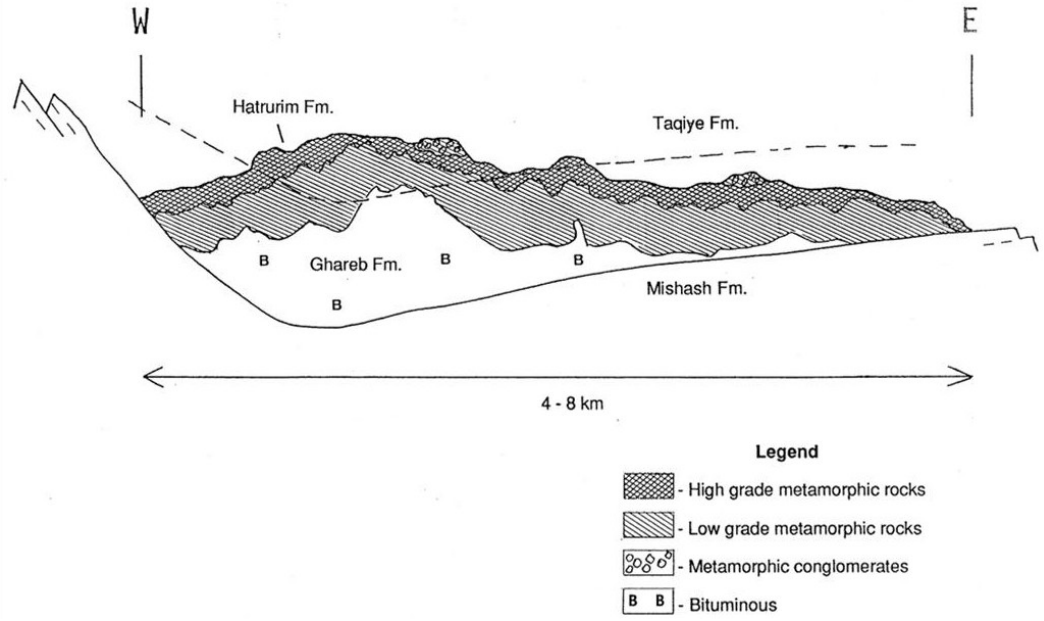
A map of the outcrops of the mottled zone in Israel and Jordan (where the organic material comes into contact with oxygen causing a combustion process which leads to

pyrometamorphism and the creation of rocks making it known as the “mottled zone”).

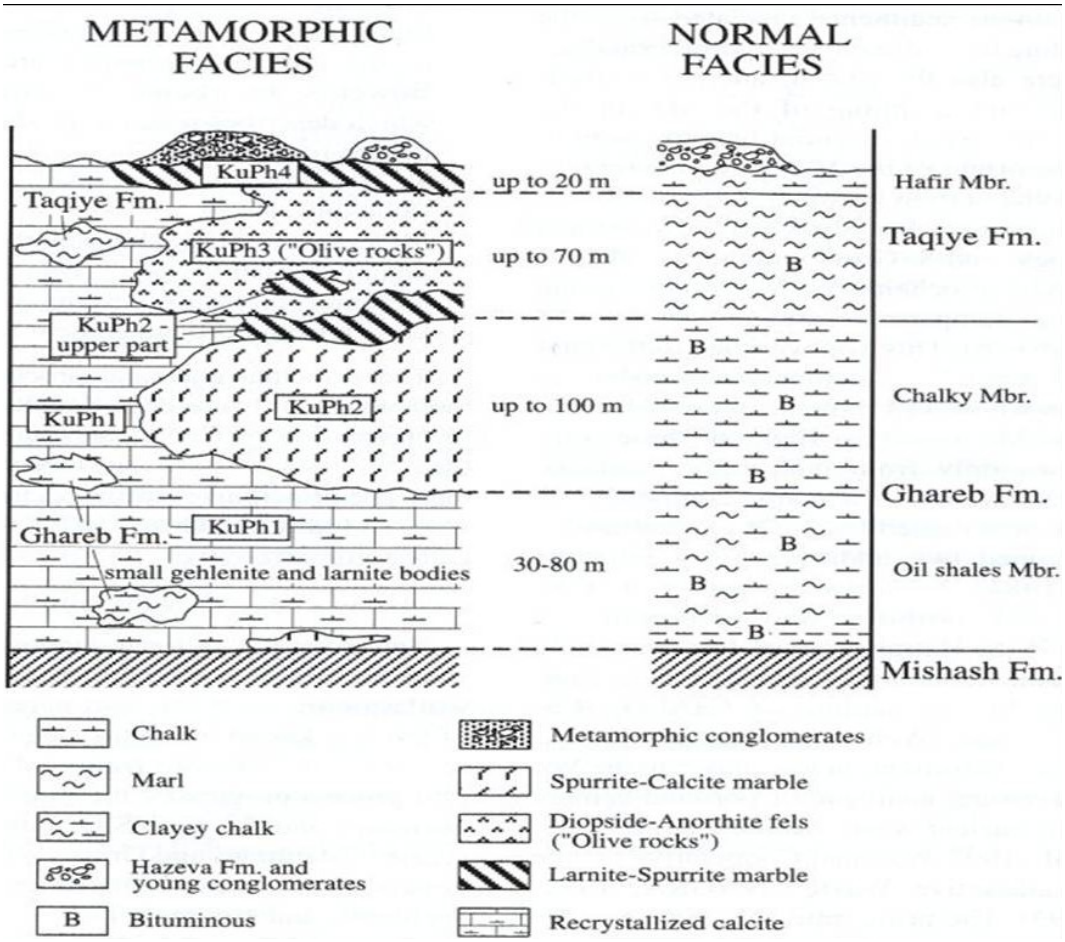


חתכים גיאולוגיים סכמטיים (לא בקנ"מ);
א' - חתך ממערב למזרח, מאזור ירושלים
עד מעלה אדומים.

A stat graphic illustration depicting the sea coordinates of the location's rocks (Ghareb and Taqiye) as well as the configuration of the transformation (the configuration of Hatrurim).



A theoretical geologic illustration through the configuration of hatrurim after the transformation. The metamorphic rocks are phenomena on the surface that are tens of meters thick.

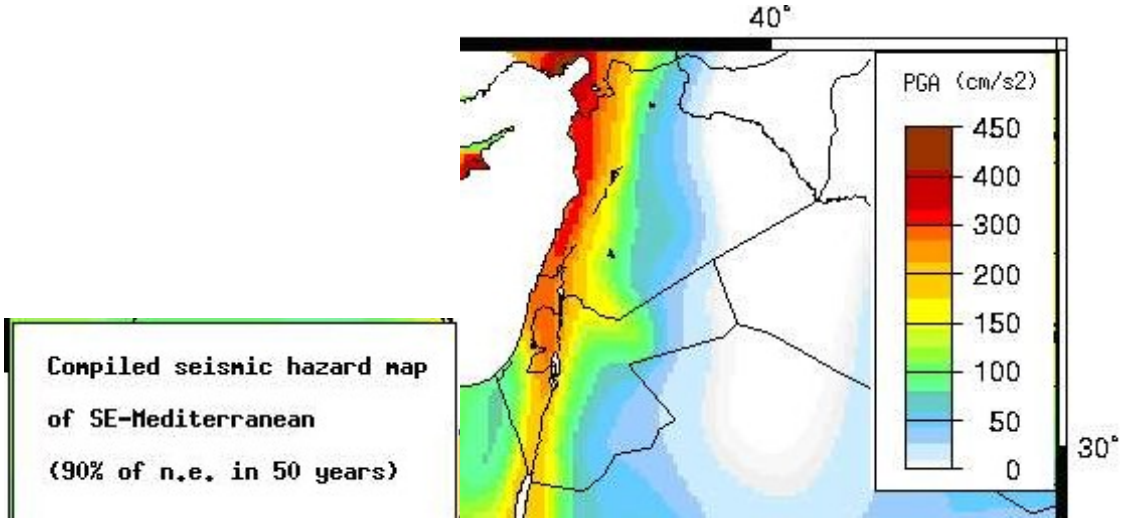


- Taken from the preamble to the National Master Plan 38 -
- The Seismic surroundings of Israel -

Geologic investigations to identify earthquake centers and their historical impact are performed first and foremost to determine the existing risks of earthquakes (SHA – Seismic Hazard Assessments – Reiter, 1990). According to the author's definition, the main component in defining the SHA is the determination of the nature of the earthquake's source in a given area. To determine the existing risk level, one should strive to determine key parameters well.

The date of the most recent activity in which the fragment was defined as active.
The maximal intensity of a tremor recorded in the region.
The turnover rate of tremors in the region.
The minimal return rate of strong tremors.
The intensity of movement on the active fragment.
From the large amount of knowledge accumulated on Israeli geology and tectonics, it appears that Israel can be divided into a number of provinces with geological characterizations with clear implications on the seismic risk of each district as follows:

- The Dead Sea Valley,
- The mountain region,
- The coastal plain and continental seat,
- The Carmel and valleys of the north,
- The expanses of the upper and lower Galilee



The Dead Sea Valley is an area that includes the Arava, Dead Sea, Jordan Valley, Kinneret Valley, the Chorazin Range, and the Hula Valley. The Dead Sea Valley is a part of the fault of the East African Rift, which begins in Tanzania, continues in East Africa, and concludes in Taurus Range of Turkey. In the area of Israel and its neighboring countries, along the length of the valley, there are a large number of faults. The Dead Sea Rift is an active seam between the length of Asia, similar to other active faults, which contain active earthquake areas. The Dead Sea Rift, therefore, is an active seismic center in our area. The Dead Sea Rift morphology is characterized by a long, narrow valley, which limits both axes by high ridges, with a very large topographical difference.

The valley has been and is currently filled with sediments, the source of which is the drainage system flowing to the valley, being as it is a drainage basis. The reason for the existence of this structure is the fault systems, which have a vertical component limiting the valley from its east and west. However, in addition to the vertical movement, there is a horizontal movement component, which, according to research, exists throughout the length of the

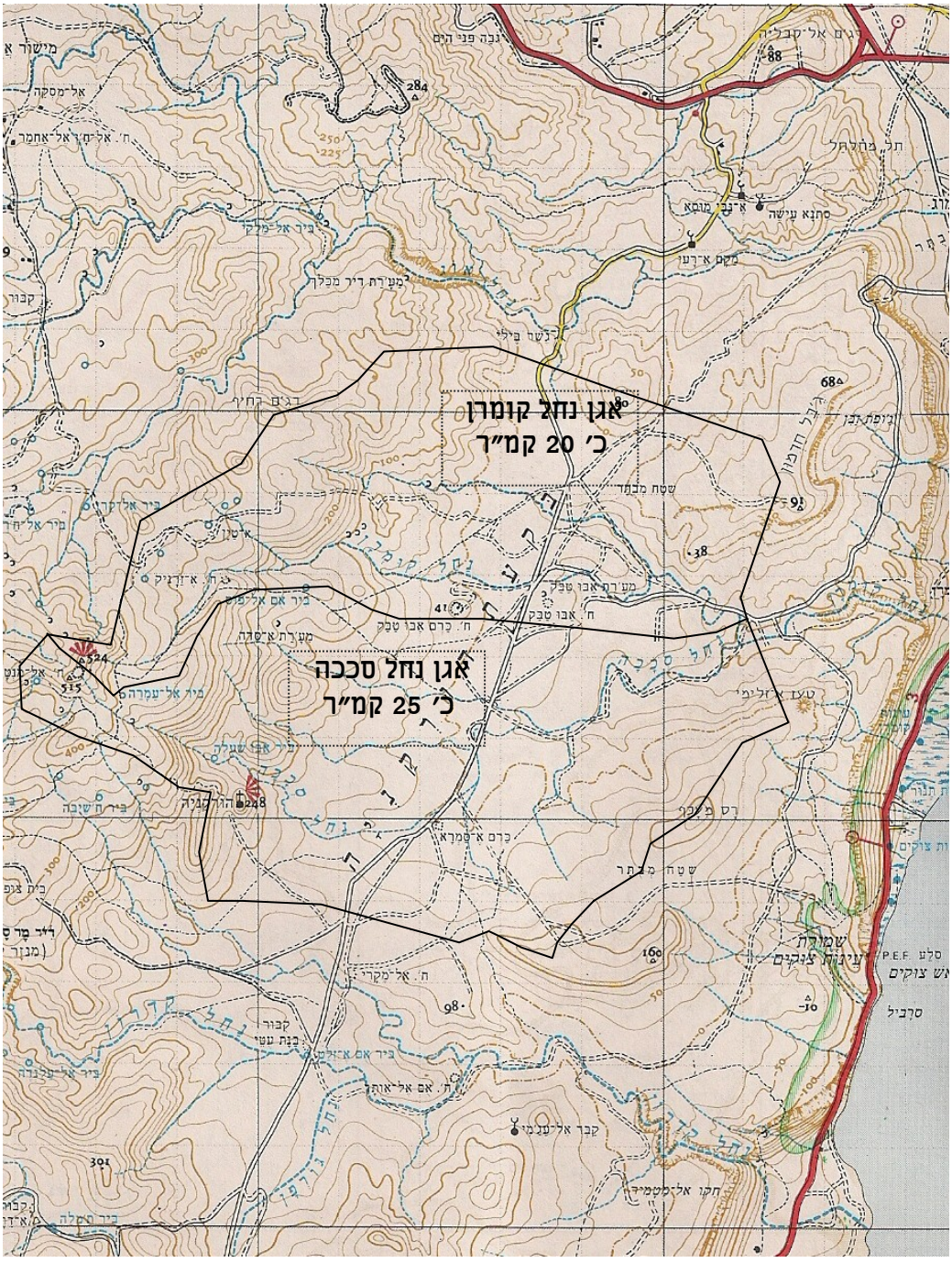
movement, which is estimated at about 105 kilometers over the last 20 million years. A number of research studies have found that movement has taken place over the vertical and horizontal faults during the past thousands of years.

This movement categorizes the area as an active fault area, and specifically, the geological fragments as active faults.

Evidences of tectonic activity that cause earthquakes are divided into direct and indirect evidence.

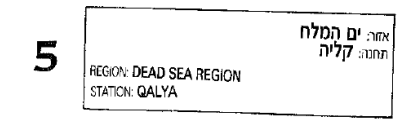
7.5 Streams and Drainage Basin:

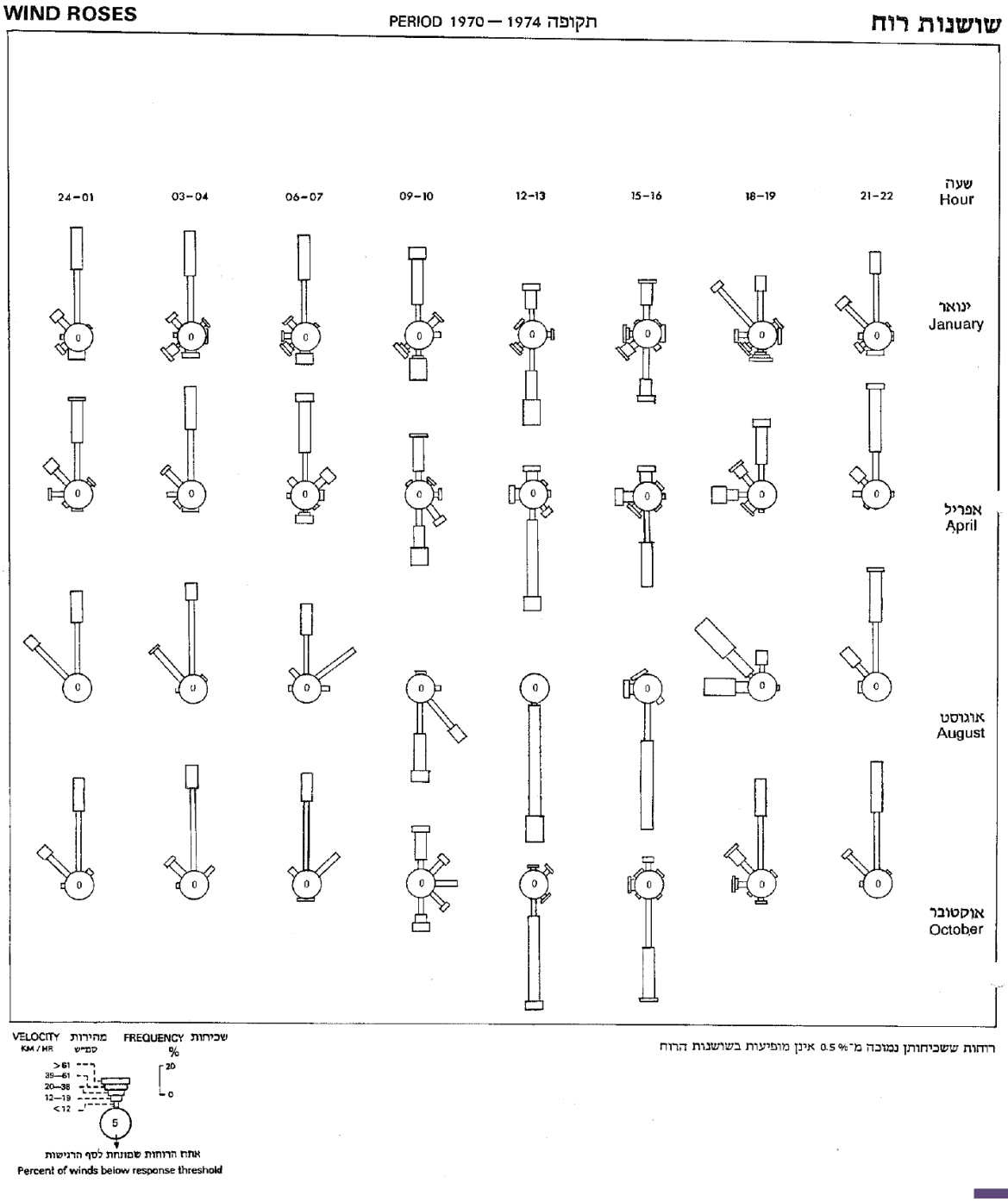
The area of the Horkania Valley is cut by three streams:
North of the airport is Nahal Og – a water basin of 115 square kilometers with a length

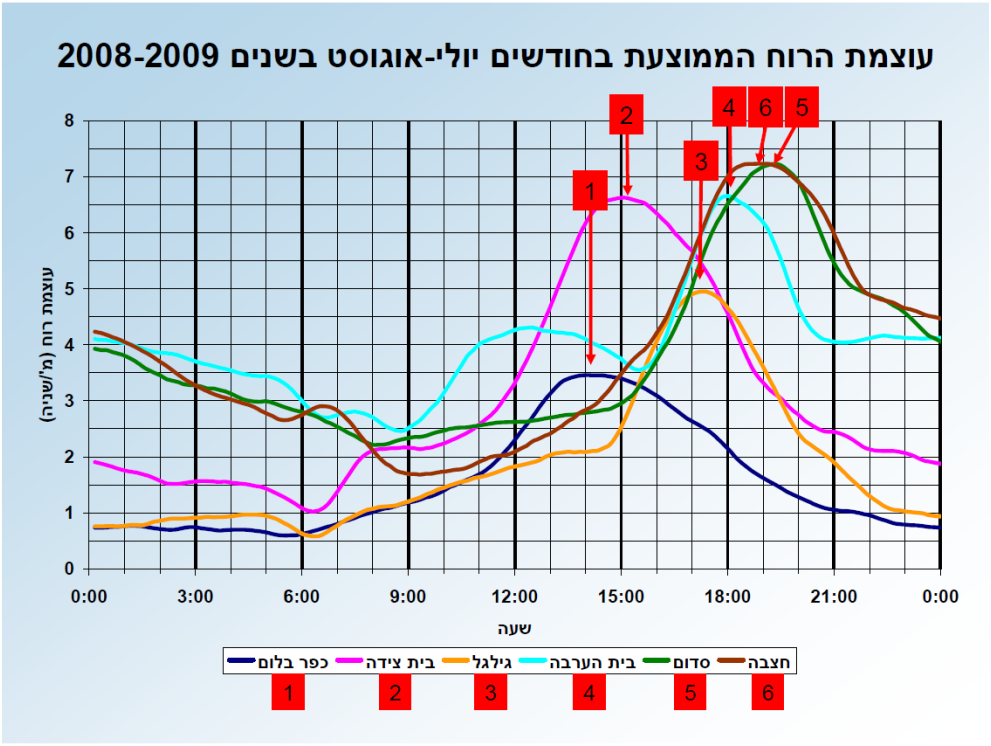


of 25 kilometers.
In the center of the area is Nahal Qumran – a water basin of 45 square kilometers at a length of 13 kilometers. The river's main tributaries are the Sakaka River and Wadi Abu above it – Nahal Avi Halehava – a nickname for Elijah the Prophet, and
Wadi Hashna.

7.6 Climate:



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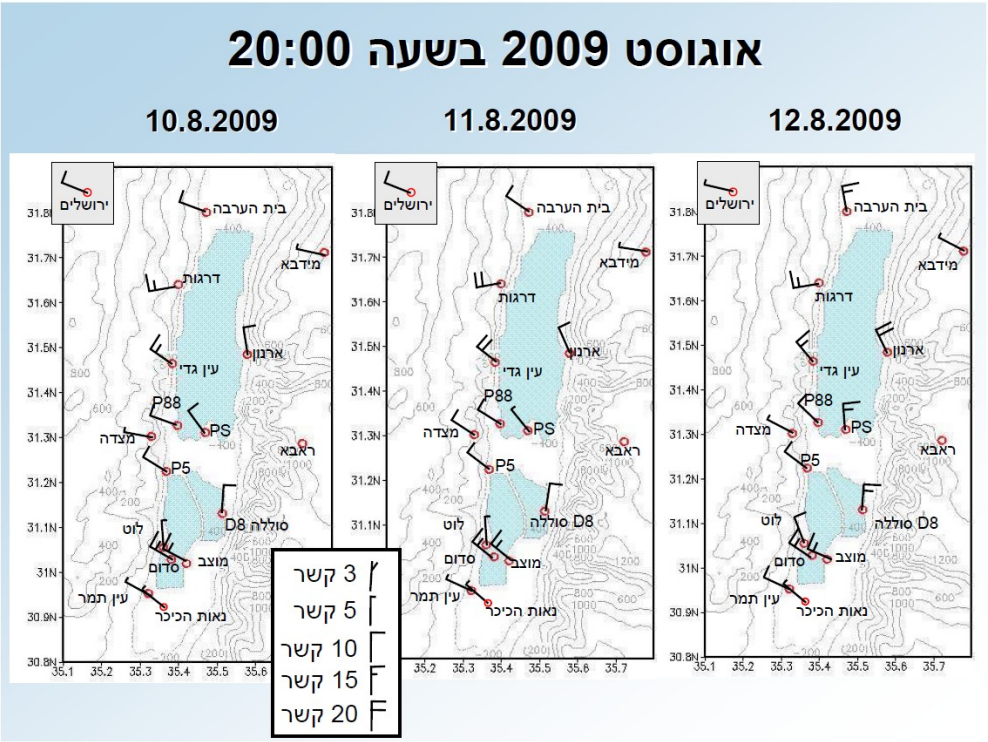
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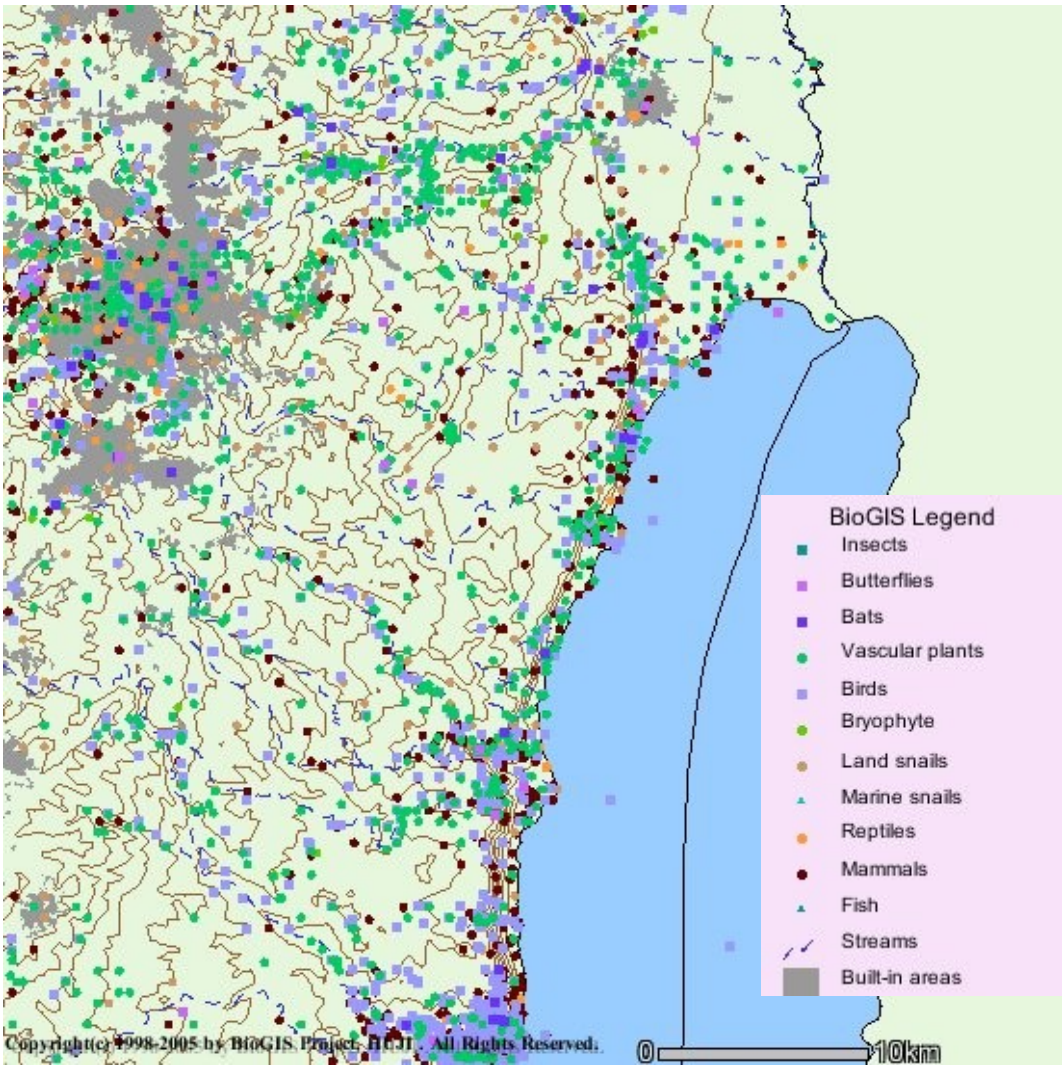
7.7 Vegetation Zones:

Phytogeographical Region	Climate	Precipitation (mm per year)	Gross configurations	Location in Israel
Irano – Turanian	A relatively warmer summer and colder winter than the Mediterranean Sea, because the area is more terrestrial. There is some freezing, but not within Israel	100-300	Arabian forest (not in Israel), in the Arabian Plains	The Lower Eastern Galilee, the Eastern Shomron, the East and South Judean Mountains, the Northern Negev, the Negev Mountain
Saharo-Arabian	2 seasons. Very large temperature differences between day and night	0-100, inconsistently	In the Desert Plain, grouped growth.	the Southern Negev, the Judean Desert

7.8 Biodiversity:



Osteichthyes (8 species in landlocked areas of the Dead Sea)	**Mammalia (25 Types)**	**Aves (72 Types)**	**Aves**
Aphanius dispar	Lipus Capensis	Fulica atra	Luscinia svecica
Aphanius mento	Gerbillus Dasyurus	anser	Coraciidae
Aphanius mento x Aphanius dispar	Hystrix	Bubo bubo	Chron
Capoeta damascina	Canis Lupus	Ardea cinerea	Halcyon smyrnensis
Garra rufa	Crocidura suaveolens	Ixobrychus minutus	Egretta garzetta
Oreochromis aureus	Sus scrofa	Ardeola Ralloides	Scotocerca inquieta
Oreochromis niloticus	Felis chaus	Falco naumanni	Chlidonias leucopterus
Tilapia zillii	Felis silvestris	Falco pelegrinoides	Motacilla alba
Bryophytes (11 types)	Capra	Falco tinnunculus	Motacilla flava
Aloina aloides	Dipodidae	Falco peregrines	Accipiter nisus
Entosthodon attenuatus	Herpestes	Falco biarmicus	Gyps
Fissidens arnoldii	Panthera pardus	Falco cherrug	Gallinula chloropus
Funaria hygrometrica	Mus musculus	Falco concolor	Oenanthe hispanica
Funaria pulchella	Psammomys Obesus	Tringa erythropus	Oenanthe leucopyga
Gigaspermum mouretii	Hyaena hyaena	Tringa totanus	Hirundo rustica
Pottia davalliana	Gazella	Tringa ochropus	Grus grus
Pottia starckeana	Gazella dorcas	Anas platyrhychos	Corvus rhipidurus
Pterygoneurum ovatum	Acomys russatus	Saxicoia rubicola	Aquila rapax
Tortula atrovirens	Acomys cahirinus	Upapa epops	Aquila chrysaetos
Tortula brevissima	Paraechinus	Milvus migrans	Ammomanes deserti
Reptilia (10 types)	Caracal caracal	Passer domesticus	Galerida cristata
Echis coloratus	Vulpes vulpes	Passer hispaniolensus	Buteo buteo
Psammophis Schokari	Vulpes cana	Oriolus oriolus	Buteo rufinus
Coluber Rogersi	Procaviidae	Turdoides squamiceps	Anthus pratensis
Coluber Rhodorhachis	Canis	Circus aeruginosus	Prinia gracilis
Agamma Sinatia		Circus macrourus	Streptopelia senegalensis
Varanus griseus	**Butterflies (13 types)**	Sturnus vulgaris	Monticola solitarius
Mesalina Guttulata	Danaus chrysippus	Alectoris	European Cuckia
Mesalina Olivieri	Carcharodus stauderi	Circaetus	Arocephalus stentoreu
Spalerosophis diadema	Thymelicus lineola	Lanius excubitor	Neophron percnopterus
Pseudocerastes Persicus	Polyommatus Ioewii	Ciconia ciconia	Aphanapteryx
Terrestrial Snails (15 types)	Artogeia rapae	Ciconia nigra	Cercomela melanura
Buliminus alepensis	Pontia daplidice	Gallinago gallinago	Turdus merula
Buliminus diminutus	Pontia glauconome	Athene noctu	Merops apiaster
Buliminus glabratus	Euchloe belemia		Anas crecca

Buliminus lamprostatus	Zegris eupheme		Cladorhynchus leucocephalus
Buliminus therinus	Belenois aurota		Tyto
Helix (Pelasga) engaddensis	Melitaea trivia		**Chiroptera (9 types)**
Levantina caesareana	Melitaea phoebe		Otonycteris hernprichi
Levantina hierosolyma	Melitaea deserticola		Eptesicus bottae
Sphincterochila fimbriata			Taphozous nudiventris
Sphincterochila prophetarum			Taphozous perporatus
Sphincterochila zonata			Tadarida teniotis
Sphincterochila zonata filia			Rhinopoma hardwickei
Sphincterochila zonata zonata			Rousettus aegyptiacus
Trochoidea simulata			Pipistrellus bodenheimeri
Trochoidea tuberculosa			Pipistrellus kuhli

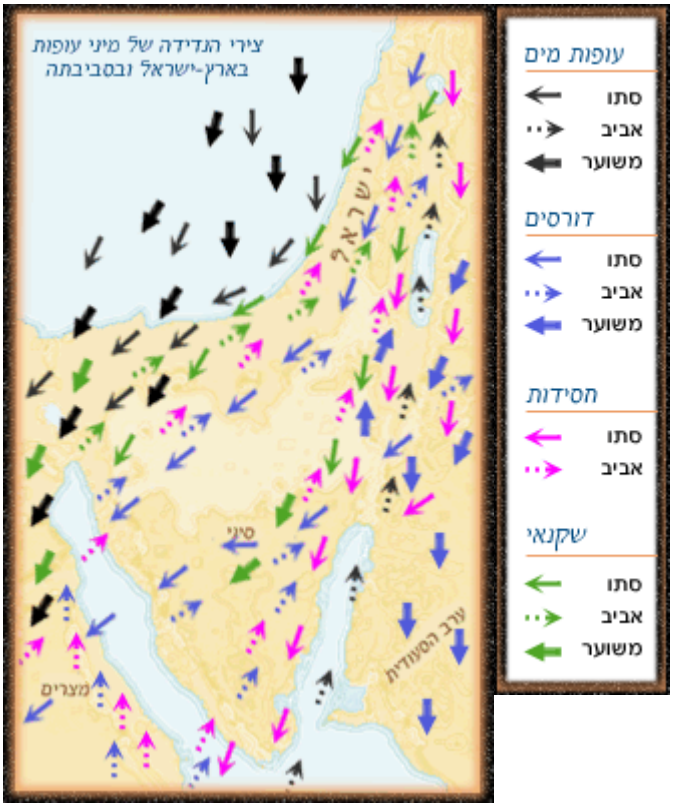
Vascular Plants (492 types)	**Vascular Plants**	**Vascular Plants**	**Vascular Plants**
Abutilon fruticosum	Lycium shawii	אלניה אזמלנית	Asparagus stipularis
Malabaila secacul	Lycium depressum	Halothamnus hierochunticum	Spergula falax
אגמון החוף	Achillea fragrantissima	Eclipta alba	Spergularia diandra
Mesembryanthemum forskalii	Suaeda palaestina	Alkanna strigosa	Astoma seselifolium
Mesembryanthemum nodiflorum	אכם חד-ביתי	Amberboa crupinoides	Aster subulatus
אהרונסונית פקטורובסקי	Suaeda asphaltica	Emex spinosa	אפיונת ים-המלח
Rhus tripartita	Suaeda aegyptiaca	Androsace maxima	Caralluma sinaica
Lavandula coronopifolia	Suaeda fruticosa	Anvillea garcinii	Digitaria sanguinalis
Lavandula pubescens	אליסון דמשקאי	Medicago laciniata	Tetrapogon villosus
Origanum dayi	Paronychia argentea	Medicago radiata	Erysimum crassipes
Urospermum picroides	Paronychia sinaica	Legousia falcata	Polygonum lapathifolium
ארכובית צפופה	Nasturtiopsis coronopifolia	Valantia hispida	Pteranthus dichotomus
Arnebia decumbens	Trigonella stellata	Ajuga chamaepytis	Chenopodium murale
Arenaria leptoclados	גרגרנית מדברית	Ajuga iva	Chenopodium vulvaria
Tamatix nilotica	Trigonella monspeliaca	חוחן ארצישראלי	Chenopodium ambrosioides
אשל הירדן	Trigonella	Hyoseris scabra	כף-חתול זוחלת

	arabica		
Tamarix tetragyna	Grewia villosa	Aizoon hispanicum	Aeluropus littoralis
אשליל שעיר	Galium setaceum	Aizoon canariense	Carrichtera annua
Cleome amblyocarpa	Galium tricornutum	Periploca aphylla	Onobrychis crista-galli
Matricaria aurea	Galium judaicum	Euphorbia serpens	Bongardia chrysogonum
בוצין המדבר	Galium hierosolymitanum	Ehuphorbia granulata	כשות ארצישראלי
Verbascum orientale	דבקת יריחו	Euphorbia chamaepeplus	כשות בבלי
Verbascum sinuatum	Rostraria smyrnacea	Sternbergia clusiana	כשות העקצים
Verbascum fruticosum	Leptochloa fusca	Malva sylvestris	כשות קצר-עלי
Gastrocotyle hispida	דוקרן מדברית	Malva nicaeensis	כשות שטוח-פרחים
בינית המדבר	Sorghum halepense	Malva parviflora	Chiliadenus iphionoides
Ballota undulata	Echinochloa colonum	Rumex cyprius	Parietaria alsinifolia
בלוטנית אפריקנית	Datura innoxia	Rumex pulcher	Parietaria judaica
Commicarpus helenae	Adonis dentata	Cynanchum acutum	Lotus peregrinus
בלומיאת בובה	Pergularia tomentosa	Lactuca orientalis	Launaea nudicaulis
Tricholaena teneriffae	Cetarach officinarum	Lactuca serriola	Arum palaestinum
Aegilops geniculata	Centaurea eryngioides	Phalaris minor	Plantago afra
Aegilops Kotschyi	Centaurea pallescens	Urginea maritima	Plantago lagopus
Aegilops peregrina	Centaurea iberica	Sinapis arvensis	Plantago ovata
Scilla hanburyi	Centaurea aegyptiaca	Sinapis alba	Plantago coronopus
Epipactis veratrifolia	Centaurea lanulata	Eryngium glomeratum	Fumana arabica
Arthrocnemum macrostachyum	Centaurea hyalolepis	Eryngium creticum	ליזרה נימית
Sarcocornia fruticosa	Herniaria hemistemon	Chrysanthemum coronarium	Phyla nodiflora
Roemeria hybrida	Herniaria hirsuta	Atractylis cancellata	Xanthium spinosum
Reboudia pinnata	Alhagi maurorum	Atractylis phaeolepis	Antirrhinum orontium
Crithopsis delileana	Hibiscus micranthus	Atractylis prolifera	לענית המדבר
Bassia eriophora	Scorzonera papposa	Atractylis carduus	לענית מצויה
בסיה שכנית	Scorzonera judaica	Atractylis serratuloides	לענת המדבר

Androcymbium palaestinum	Withania somnifera	Umbilicus intermedius	לפית שכנית
Vicia peregrina	Valerianella vesicaria	Nicotiana glauca	לפתית מצויה
Vicia sativa	Verbena officinalis	Diplotaxis harra	לשון-הפר המדברית
Bromus rubens	Gagea chlorantha	Diplotaxis erucoides	לשון-הפר המצרית
Bromus lanceolatus	Gagea reticulata	Inula crithmoides	לשון-הפר הסמורה
Bromus tectorum	Zygophyllum dumosum	Inula viscosa	לשישית הבוצין
Bromus fasciculatus	Micromeria nervosa	Lathyrus pseudocicera	מגלית שרועה
Veronica cymbalaria	Setaria verticillata	Cynodon dactylon	מגנונית כבונה
Veronica syriaca	זיפנוצה חבוי	Cistanche tubulosa	מגנונית פרושה
צמחים עילאיים	**צמחים עילאיים**	**צמחים עילאיים**	**צמחים עילאיים**
Ceratocephala falcata	זיפנוצה מדקרנת	ימלוח פגום	מוצנית קטנת-פרחים
Dactyloctenium aegyptium	זיפנוצה מחספסת	ינבוט השדה	מורינגה רותמית
Oligomeris linifolia	זיפנוצה ריסנית	יפרוק המדבר	מלוח מלבין
Eupatorium cannabinum	זמזומית המדבר	יפרוק זיפני	מלוח ספוגי
Torilis tenella	זערורית קטנה	יפרוק תלת-כנפי	מלוח קטן-עלים
גזר יושב	זעריר כוכבני	יתדן מפשק	מלוח קפח
Buglossoides tenuiflora	זקנונית הטבעות	כדן סגל	מלחית אשלגנית
Cyperus distachyos	זקנן שעיר	כוכב ננסי	מלחית הירדן
Cyperus laevigatus	חבלבל השיח	כלינית מצויה	מלחית הישימון
גמא נאה	חבלבל מגבב	כמנון כרתי	מלחית חומה
Teucrium capitatum	חבלבל סיצילי	כמנון שעיר	מלחית קשקשנית
Gypsophila arabica	חבלבל עדין	כנולאה ערבית	מלחנית הערבות
Stipa capensis	סולנום החדק	פרעושית משלשלת	קיקסית יהודה
מלעניאל קטן-פרחים	סוף מצוי	פרעושית ערבית	קלפיניה סרגלנית
Matthiola livida	סילון קוצני	פשטה שרועה	קנה מצוי
Matthiola aspera	סיסנית איג	פשתנית זעירה	קנה-סוכר גבה
מנתור מצוי	סיסנית הבולבוסין	פשתנית ססגונית	קנה-סוכר מצרי
מנתור קטן-פרחים	סיסנית הגנות	פתילת-המדבר הגדולה	קנכרוס קוצני
מסרק שולמית	סיפן סגל	צברת ההרים	קפודן בלנש
מציץ סורי	סירה קוצנית	צהרון מצוי	קרטם דק
מצלות מציצות	סכיכון משנן	צורית בלוטית	קרטם מבריק
מצלתים מצויות	סמר חד	צורית ספרדית	קרן-יעל סורית
מקור-חסידה גדול	סמר ערבי	ציצן פרסי	קרסולה מכונפת
מקור-חסידה גזור	סרפד הכדורים	ציצן קצר	קשוא הנביאים
מקור-חסידה חלמיתי	סרפד צורב	צללית נאה	רב-גולה ערבית
מקור-חסידה מדברי	עבדקן מצוי	צלע-שור ערבתית	רב-פרי מצוי
מקור-חסידה מעצה	עבקנה שכיח	צלף מצרי	רוביריאה שרועה

רוש עקוד	צלף סיצילי	עדעד הבצות	מקור-חסידה מצוי
ריסן דק	צלף קוצני	עדעד המדבר	מקור-חסידה קרח
ריסן נאכל	צמרורה אפריקאית	עדעד מאבק	מקור-חסידה שעיר
רכפה דקת-שבלת	צמרורת בואסיה	עירית צרת-עלים	מרגנית השדה
רכפה מגבששת	צמרנית הסלעים	עכנאי זיפני	מרוביון מצוי
רכפה צהבה	צפורן נקוד	עכנאי יהודה	מרוה ארצישראלית
רכפה קטנת-פרחים	צפצפת הפרת	עלקלוק צהב-פרחים	מרוה מצרית
רכפת בואסיה	צפרני-חתול ארצישראלית	עלקת נטויה	מרוה צמירה
רכפת ים-המלח	צפרני-חתול מצויות	עקץ-עקרב גלוני	מרוה ריחנית
רכפתן מדברי	צפרני-חתול עבות	עקץ-עקרב ים-מלחי	מרור הגנות
רתם המדבר	צפרנית דמשקאית	עקץ-עקרב מדברי	מרור ימי
שבלת-שועל נפוצה	צפרנית דקיקה	עקץ-עקרב עגל-עלים	מרור עדין
שבלת-שועל ערבתית	צפרנית מגוונת	עקצר מצוי	מרור קטן-קרקפת
שבר לבן	צפרנית מדברית	ערבה מחודדת	מרור שנהבי
שברק דביק	צפרנית מחורטת	ערטל מדברי	מרות ירושלים
שברק מצוי	צפרנית מקופחת	ערר כרתי	מרקולית מצויה
שברק נטוי	צפרנית משוננת	עשנן צפוף	מררית דמשקאית
שברק סיצילי	צתרה מדברית	פגוניה ערבית	מררית מצויה
שום ארדל	קדד ארצישראלי	פגוניה קטנת-פרחים	משין גלילי
שום האבקנים	קדד הסיף	פגוניה רכה	משערת זהבה
שום יריחו	קדד ים-המלח	פורסקליאה שבירה	נואית קוצנית
שום משלש	קדד יפה	פיגמית מגבששת	נוניאה נאה
שום צנוע	קדד מצליב	פילגון מדברי	נוציץ עטוף
שום קטוע	קדד משלחף	פילגון קפוץ	נוצנית כדורית
שופרית כרתית	קדד קדוש	פיקוס התאנה	נורית אסיה
שטה סלילנית	קדד קטבי	פלגית שיחנית	נורית ירושלים
שטת הסוכך	קוטב מכניף	פעמונית זיפנית	נזמית לופתת
צמחים עילאיים	**צמחים עילאיים**	**צמחים עילאיים**	**צמחים עילאיים**
שיזף מצוי	קזוח עקם	פעמונית ירושלים	נידת החוף
שיח-אברהם מצוי	קחון הנגב	פעמונית כוכבנית	ניסנית דו-קרנית
שכרון זהב	קחון חברוני	פרג זיפני	ניסנית זיפנית
שלהבית קצרת-שינים	קחון ים-המלח	פרג נחות	נירית הקמה
שלוחית קרחת	קחון מצוי	פרג סמור	נץ-חלב דק-עלים
שלוחית שעירה	קיצנית צפופת-עלים	פרגה מקרינה	נרדורית מזרחית
שלח הערבות	קיצת מסלסלת	פרגה ערבית	נשרן הדחן
שמשון השלחופיות	קיצת קנדית	פרנקניה מאבקת	סביון אביבי
שמשון ליפי	קיקסיה אשונה	פרסת-סוס דלת-תרמילים	סביון הערבות
שמשון מצוי	קיקסיה מצרית	פרעושית גלונית	סביון יפו
שמשון מצרי	קיקסיה צמירה	פרעושית מסלסלת	סביון צהב
	תלת-מלען פעוט	שרביטן מצוי	שמשון קהירי
	תלתן צמיר	שרביטן ריסני	שמשון ריסני
	תמר מצוי	שרכרך הסלעים	שנן עבה-שרש
	תמריר מרוקני	שרכרך ריחני	שנס המדבר
		ששן מאפיר	שסיע ערבי
		תגית ארגמנית	שעורה מכחילה
		תגית מצויה	שעורת התבור
		תודרה מעבה	שערור שעיר
		תודרה סיגית	שערות-שולמית מצויות
		תלת-מלען מצוי	שקד קטן-עלים

7.9 Bird Migration



Source: http://www.snunit.k12.il/vmuseum/birds/map_isr.htm

Bird Migration

Fall migration – from the last week of the month of August, until the end of the month of October, migratory birds flock *through our region* from northern Europe and continental Asia, through the skies of Israel, to the southern countries in the African continent.
Spring migration – in the months between March and May, the spring migration flocks through our area. In spring, the birds return to the northern countries that they came from.

During the migration period, many flocks of birds pass through the skies of Israel. Some of these flocks contain tens of thousands of birds. For example, in the fall of 1987, a flock of storks was observed that contained 25,000 birds over Jerusalem, and in the spring of 1989, a flock of 30,000 storks was photographed over the beach of the Mediterranean Sea.

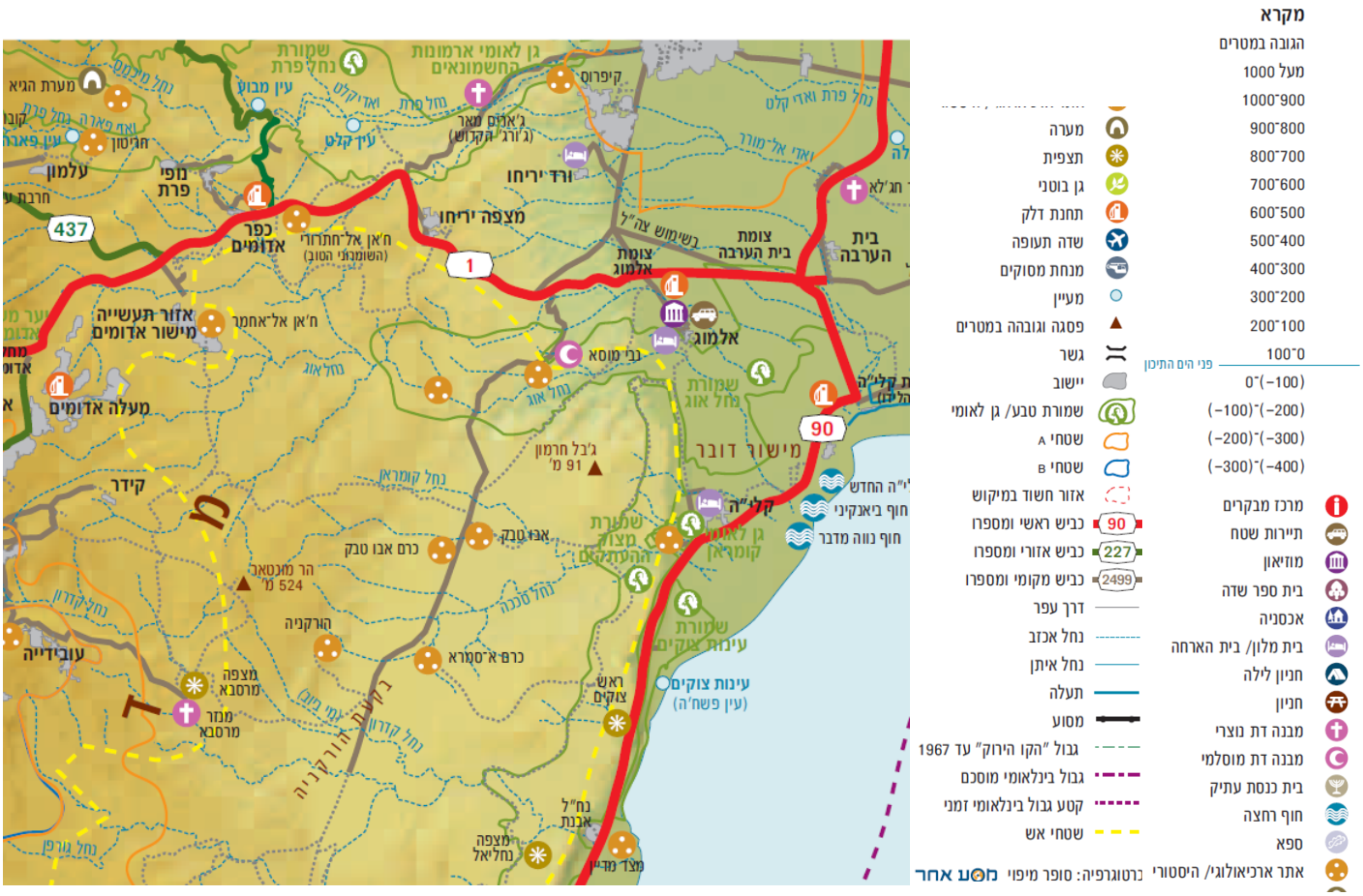
Some of these flocks land for the night, and for meals. Other flocks simply pass overhead on their way.

During the peak periods of the migrations, the moving flocks gather in the skies of Israel and form a convoy containing hundreds of thousands of birds. For example, in 1987, the spring migration that passed over Israel contained about 460,000 storks.

In fall migration surveys conducted in 1991, about 236,000 storks were counted, about 31,000 different pelicans and about 420,000 birds of prey of different species.

The international center for the study of bird migration at Latrun has performed, inter alia, joint research with the Israeli Air Force, regarding flight safety which has resulted in a reduction of 76% of the number of accidents caused by migratory birds.

7.10 Nature and Landscape



The planning will take into account the preservation and 'benefit' of the landscape, while avoiding damage and strengthening endemic species.

The green fields of the airport will be a type of oasis which will cause species to enter the airport area. This matter will take into account the type of vegetation as previously defined.

7.11 Water and Sewage

An allocation of 1.5 million cubic meters of water per year will be required to irrigate the green fields and provide for airport usage.

The sewage system will handle 7,000 cubic meters per day (compared to the 5,250 cubic meters per day at Ben-Gurion) while emphasizing a full reuse for local gardening.

7.12 Noise:

Currently, the background noise only exists when the area is used for training, as well as aircraft during Air Force training in the center of the area.

LDN units during day and night

LDN units summarize the acoustic energy that reaches a point in a bare field exposed to sound as a result of all of the events radiating noise throughout the day.

Events that take place from 10:00 pm from 6:00 am receive a "fine" of 10 dB(A).

This fine reflects the sensitivity of people to noisy events during nighttime hours. Any nighttime plane traveling between 10:00 pm and 6:00 am shall be considered ten planes of the same type during the day hours.

The following is a table which summarizes the average community response and reaction to an area exposed to aircraft noise. The table is based on findings of a United States aviation agency.

Noise level – LDN dB(A)	Average community Response	Community Reaction in the area
55 and below	Weak to moderate	The noise is not more significant than other environmental factors
60 - 65	Moderate	The noise can be considered a negative factor of the environment
65- 70	Significant	Noise is a significant negative factor of the environment
70 - 75	Strong	Noise is one of the most significant negative factors of the environment
75 and above	Very strong	Noise is the most signifi all negative factors of The The environment

Construction limitations due to aircraft noise – national master plan 2/4.

NMA 2/4 (partial national plan – Ben-Gurion Airport) defines aircraft noise areas in accordance with the level of noise:

In areas exposed to aircraft noise between LDN = 60 dBA and LDN = 65 dBA the building for noise sensitive land use would be acoustic building.

Noise sensitive land use should not be approved for areas exposed to aircraft noise over LDN=65 dBA.

The ministry's recommendations regarding other airports:

International airports as well as civil airports for international charter flights (grades 1, 2):

In areas exposed to aircraft noise between 55 dBA and 60 dBA, construction will be permitted which includes acoustic protection.

In areas exposed to aircraft noise over 60 dBA construction for noise sensitive land use is prohibited.

Airports for internal national flights as well as airports for agricultural or light aircraft (grades 3, 4):
In areas exposed to aircraft noise between 50 dBA and 55 dBA, construction will be permitted which includes acoustic protection elements.
In areas exposed to aircraft noise over 55 dBA, construction for noise sensitive land use is prohibited.
Israeli Air Force airports:
In areas exposed to aircraft noise between LDN=60 dBA and LDN 65 dBA, construction for noise sensitive land use will be permitted if it has acoustic construction.
In areas exposed to aircraft noise that exceeds LDN=65 dBA, construction should be prohibited for noise sensitive land use.

Acoustic treatment generally includes:
Windows heavily insulated against noise.
Ventilation methods that allow residents to stay indoors with closed windows.
The development of split air conditioning units, and the decline in related costs, allows the installed spaces considered to be sensitive to noise, usually in living rooms and bedrooms, to exist.

Economic Potential

8.1 Employment:

An international airport east of Jerusalem will serve the local population as well as tourists to and from Israel, and will constitute a significant employment center: both directly in regards to employees employed at the airport itself, as well as indirectly, in regards to the services and infrastructures nearby and related to the airport's operation. For example, the construction and continued operation, in addition to the joint management discussed, shall employ a scope of thousands of direct and indirect employees.

8.2 Land Uses, Urbanization and Tourism

An international airport encourages and obligates economic activity which, in light of the proposed location, will emphasize the developmental direction of Jerusalem to the east. Near the airport, and in the space between it and the city, new employment centers will be opened, characterized by their close proximity to the airport. A clear tourist locale which will benefit from the airport's proposed location is the northern area of the Dead Sea, which will now have tremendous potential for development as a tourist spot with thousands of hotel rooms.

8.3 Construction Costs:

A preliminary estimate of the direct investment included in the construction of stage A of the airport (including miscellaneous expenses) is estimated at $2.220 billion.

An additional investment that will be required in the linked infrastructures is measured at $1.332 billion.

The additional direct investments that will be required for stage B of the project, which includes the addition of a runway and other auxiliary facilities, is estimated at $0.7 billion, and the investments for the infrastructure and linked infrastructures are estimated at $0.44 billion.

An analysis of the construction costs in relation to the maximal passenger capacity shows that the construction cost for one million passengers in stage A is estimated at $177 million.
In stage B this estimation is $114 million.

8.4 Economic Model: (see the Appendix attached herein – relating to stage A only – up to 20 million passengers per year).

Based on an estimation of construction cost as detailed above and an analysis of the operational income and expenses, a preliminary economic model was created to test the overall economic viability of the project.
The total cumulative scope of the airport project's activity for a period of 28 years of operation, beginning in the year 2023 and through 2050 is over $50 billion.

9. Planning and Development Staging

9.1 The planning stage of the proposed project including all statutory planning and environmental, transportation and aviation may take approximately three years.

9.2 The detailed planning period will take about two years.

9.3 The performance period through the completion of stage A is estimated about to be five years.

9.4 The total planning and development of the proposed airport may take about ten years, from 2012 through 2022.