

## Executive Summary

For the past two decades, the West Bank and Gaza Strip are de-facto territorially disconnected, with the result of a significant harm to the Palestinian economy, society, politics and identity. As agreed upon in past interim agreements, a final agreement between Israel and Palestine will include a territorial link, connecting the two Palestinian territories. Such a link will contribute significantly to the Palestinian economy, allowing improved international and intra-Palestinian trade and economies of scale. We urge the professional and political authorities to initiate a detailed plan of this link, as the possibilities for a new route in the relevant area are already limited, and the process will last several years. As both parties' interest regarding the route of the link and its nature are not dissimilar, there should be no refrain from beginning the planning and construction of the link as soon as possible, even if the future agreement will be finalized at a later time.

In the following working paper we suggest that the link should be constructed as an overland car road and railway, between the Karni Crossing and El Majed Crossing. The construction of a tunnel or a bridge is not feasible, and the use of a monorail or a train alone will not satisfy the core interests of the Palestinians. Three routes were examined in detail, as we analyzed their statutory, engineering, financial, environmental and security implications. All three routes should be presented to the planning authorities, with the proposed Road 33 Route as the preferred alternative. The construction of the route is expected to cost about 700 Million USD, with additional 180 Million USD for the expected security measures. We recommend that the territorial link will be financed by the World Bank as a long term loan to Palestine.

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## **Introduction**

The Palestinian Territories of the West Bank and the Gaza Strip has been separated geographically since 1949, when Jordan gained control over the West Bank, and Egypt over the Gaza Strip. Both areas were ruled by the British from WWI to 1948. Following the Israeli occupation of the Territories in the 1967 War, from 1967-91 Palestinians enjoyed fairly free mobility between the two regions. But since 1991 mobility restrictions increased, and since the disengagement from Gaza in 2005 and later developments, the two regions have been completely cut off from one another. The lack of mobility and transport between the West Bank and Gaza is problematic in the present, as it violates the 1993 Oslo Agreement that recognizes the West Bank and Gaza as a single territorial unit, but it is especially problematic for a future final agreement. It is clear that a territorial link is necessary for the independence and contiguity of a future Palestinian state. This territorial link should pass through Israel in an approximately 50-km-long corridor. Because of its importance to the future of a Palestinian state, this link is a principal topic on the negotiation agenda for the final status agreement.

This document puts forth a bold suggestion that follows our general approach of starting today what is required by a viable, future agreement. We believe that rather than waiting for the signing of a final status agreement, now is the time to begin constructing a territorial link, as it is integral to a future two-state solution, and construction time will be long (seven to ten years). We do not believe that extensive negotiations with the Palestinians are needed for Israel to begin building this link. In this document we will detail the reasons for this stance, which we present here briefly. First, the *location* of the link should be left to Israel's preferences, being that it cuts through Israeli territory and has implications for Israel's contiguity, and because it is in the interest of both sides for the link to be as short as possible. Second, the *type* of link should mainly reflect the preferences and needs of the Palestinians, since they will be the ones using it and since in the future it should be completely under their jurisdiction. Third, as we show below, potential differences between the sides can be overcome if we take into consideration various criteria such as cost and timeframe of construction, security, and mobility of commerce and passengers, among others. The issues of sovereignty, maintenance, and other technical matters could be agreed upon in the final agreement. In Section A of this

paper we discuss these aspects, as we briefly present the historical background of the issue, and its legal and security aspects. The last part of Section A deals with potential socio-economic benefits of a direct link between the two territories.

Section B presents an engineering analysis of workable options for a territorial link. After detailing the underlying assumptions of the analysis and planning principles, alternative means of transport and construction methods are discussed. Of these, it seems that an overland motorable road combined with a rail route is the best option. Full-length tunnels or bridges are not feasible, and rail alone is unsatisfactory. We then offer a detailed description of suggested routes, each analyzed from a statutory, engineering, security, environmental, and financial perspective. We complete the paper with a summary of three possible routes and a recommendation to present these options, with a preference for Road 33, to planning authorities. The cost of construction of this route is estimated at US\$700 Million, and it is suggested that the construction will be financed by the World Bank as a long term loan to Palestine.

## **Section A: Political, Legal, Security and Socio-Economic Aspects of the Link**

### **1. A Short History**

The West Bank and the Gaza Strip were completely disconnected during the period of 1949-1967. After 1967, mobility and transportation became quite free, but with the closures of the territories that began with the Gulf War in 1991, mobility became progressively limited. Since the disengagement from Gaza in 2005 and the rise of Hamas to power in Gaza, the West Bank and Gaza have become completely disconnected.

This state of affairs violates agreements made during the peace process. In both the Camp David Accords (September 1978) and the Declaration of Principles (September 1993), Israel accepted the principle that Gaza and the West Bank together form a *single territorial unit*.<sup>1</sup> The practical significance of this principle was embodied in arrangements regarding overland *safe passage* between Gaza and the West Bank within the framework of the Interim Agreement (September 1995). The concept of safe passage refers to a physical connection between the West Bank and Gaza Strip facilitating the movement of goods, services, and people between the two areas. Safe passage was repeatedly demanded by the Palestinians during the Oslo Process, but was only implemented for a brief period.

The Protocol Concerning Safe Passage between the West Bank and the Gaza Strip, signed in October 1999, was intended to create temporary arrangements for passage between Gaza and the West Bank. This protocol included the following:

- a. Israel will ensure safe passage for persons and merchandise during daylight hours (from sunrise to sunset) or as otherwise agreed, but in any event not less than ten hours a day.

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<sup>1</sup> The phrase Single Territorial Unit first appeared in the Declaration of Principles (9/93) (Article IV – Jurisdiction), and was reaffirmed in the Gaza-Jericho Agreement (5/94) (Article XI – “...arrangements for safe passage of persons and transportation between the Gaza Strip and Jericho Area...”) and the Interim Agreement (9/95) (Annex 1, Article I – “...movement of people, vehicles, and goods between the West Bank and Gaza Strip..”).

- b. Israel shall signpost safe passage routes clearly and shall take all necessary measures to ensure ease of movement while preserving safety and security on the route or routes in use on any specific day.
- c. Israel may for security or safety reasons temporarily halt the operation of a safe passage route or modify passage arrangements while ensuring that at least one of the routes is kept open for safe passage.
- d. Nothing in the protocol will be construed as derogating from Israel's right to apply inspection measures necessary for ensuring security and safety at crossing points.

A similar protocol was signed in 2005, but these agreements were implemented for very short periods of time, if at all; the majority of time Israel has not allowed safe passage for security reasons. Along with the issue of currently providing safe passage, Israeli-Palestinian negotiations raised the issue of a territorial link, namely a passage that would cross Israeli territory but be under Palestinian jurisdiction. The extent of that jurisdiction was negotiated as well. This territorial link would not be controlled, opened, or closed by Israel, but would be a linkage through which Palestinians could move freely 24 hours a day, as well as an established infrastructure corridor allowing the free passage of resources.

## **2. Legal Aspects of the Territorial Link**

There are three possible solutions to the issue of the legal status of a future territorial link:

- a. Israeli sovereignty over the territorial link with Israeli jurisdiction.
- b. Israeli sovereignty with Palestinian jurisdiction.
- c. Palestinian sovereignty with Palestinian jurisdiction.

As the link cuts across Israel from east to west and therefore endangers the country's contiguity, we assume that Israel will wish to keep its sovereignty over the area used for the link. Therefore Option C, Palestinian sovereignty over the territorial link, is not likely to be agreed upon by Israel within the framework of a final status agreement. Imposing Israeli jurisdiction over the territorial link will require continuous Israeli involvement in

the link and, accordingly, ongoing enforcement of Israeli law and transport regulations. This would be problematic and undesirable for both parties.

Thus, the option most likely to be implemented is Option B, in which sovereignty and jurisdiction are divided between Israel and Palestine respectively. Note that a split between sovereignty and jurisdiction is the general principle, but such an arrangement requires careful attention to a number of important details and potential scenarios that must be settled as well.<sup>2</sup>

Interestingly, this solution has historical precedent. Such a solution was successfully implemented in the case of the Berlin Road, which linked West Germany to West Berlin in the 1950s, and in the case of the Alaska Highway, which links the United States with the state of Alaska, passing through Canada.

The option of a split between sovereignty and jurisdiction seems optimal, but requires settling a number of smaller legal issues, among them the following:

- a. Deciding upon physical barriers separating a territorial link under Palestinian jurisdiction from Israeli infrastructure and population.
- b. Does the source of funding for the territorial link, be it international, Palestinian or Israeli, hold legal significance?
- c. Does the identity of the operator of the territorial link (whether international or Palestinian) affect legal considerations?
- d. Under what circumstances does the principle of servitude apply: by lease or by evident practice of long-term use of the territorial link?

### **3. Security and Safety Aspects Regarding the Link**

The establishment of a politically and technically complex link raises security and safety issues for both sides. From the Palestinian point of view, the link must be secure from possible disruption of traffic by Israel. The link should also be as secure as possible from

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<sup>2</sup> An example of such a scenario is the case of a large accident in the link that would require Israeli rescue vehicles to enter through designated access points.

potential attack. In addition, the link should be constructed in a way that answers safety concerns as much as possible, despite the fact that at times safety and security concerns may contradict each other. For example, maintaining motor safety requires points of access to Israel, in case of emergencies like large accidents or problems with hazardous materials. Yet points of access from Israel may leave the road exposed to closure by Israel. Required safety measures might add to the security cost of guarding the link.

From the Israeli point of view, a territorial link built on Israeli land and crossing Israel from east to west raises concerns as well. First, there is the possibility of illegal entrance to Israel. Second, there is the possible use of the link itself as a platform for carrying out hostile activities against Israel, like opening fire or blocking Israeli roads in the area of the link. These concerns are relevant for the entire length of the link, and especially at the designated access points required for safety reasons.

We believe that the best way to deal with the security concerns of both sides is by constructing a solid system of isolation using fences and a military presence both inside the territorial link (Palestinian) and outside it (Israeli). We strongly believe that any type of link, even a tunnel, will have to be well-guarded until relations become more peaceful.

Security requirements are similar for the various options for linkage. It is important to remember that security has a long-term aspect: A well-functioning territorial link that significantly improves the Palestinian quality of life, sense of independence, and economic well-being will contribute to Israel's long-term security in a way that greatly outweighs the short-term risk of infiltration from the link.

## **4. Socio-Economic Benefits of the Link**

### **4a. Current Hardships Stemming from Territorial Separation**

Israeli and international recognition of the territorial integrity of the Palestinian Territory is incompatible with the current, ongoing economic isolation and division of the West Bank and Gaza. The impediments imposed by Israel on the movement of goods and people between the West Bank and Gaza not only prevent linking both territories but also prevent economic recovery within them, causing the fragmentation of both the land and

the economy, and by doing so compromising future statehood. The economic situation is dire, with Gaza having been transformed from a potential trade route to an insular hub dependent upon humanitarian aid. Palestinian businesses cannot grow economies of scale, with over 95% of businesses numbering ten employees or less.

Any sense of normalcy in Palestinian life has been disrupted: Gazans do not have access to sufficient medical and health services, as the transfer of medical equipment to Gaza is hampered and for a Gazan to travel to a West Bank hospital for treatment is nearly impossible; the delivery of food and basic necessities to Gaza is severely restricted; Gazan students cannot reach West Bank universities and vice versa; laborers cannot move from one territory to another; and families, often divided between the two sides, are unable to see one another.

As long as a direct territorial link does not exist, it is important to strive for safe passage in the way of a fully normalized interim transit system between the West Bank and Gaza utilizing existing Israeli road and rail infrastructure. It is in Palestinian interest that the cumbersome system of loading and unloading Israeli trucks with Palestinian goods not be used, as the consequence of these measures is an increase in costs and delays that affects both competitiveness and predictability.

#### **4b. Key Socio-Economic Benefits of a Direct Link**

Safe passage of people and goods between Gaza and the West Bank will advance the development of a viable Palestinian state, whose citizens can identify with a single nation, a central government, and effective institutions of government. Safe passage, with proper security measures in place, will also help the Palestinian economy to recover and grow without endangering the security of Israel. The territorial link will facilitate trade between the West Bank and Gaza Strip, influencing the Palestinian market and its ties with neighboring countries. Among others, a dedicated link could create a larger effective internal market, increase opportunities for labor and production, provide a pathway between the economy of the West Bank and future sea- and airports in Gaza, and reduce transaction costs. The free flow of goods in Palestinian territory could also lessen dependence on Israeli companies for raw materials and industry inputs.

It is true that a scenario of free passage of people and goods requires marked improvement in the political and economic relations between Israel and Palestine. However, using such a passage would cut transaction and distribution costs significantly. Currently, Israeli regulations require Palestinian haulers to completely unload their cargo and reload it onto Israeli trucks at each border crossing for passage through Israeli territory. This policy adds significant transaction costs to Palestinian commerce due to delays and additional shipping expenses, as waiting times can be up to 24 hours, leading to the spoilage of fresh produce and flowers. In the case of merchandise traveling from Gaza Strip to the West Bank, it is estimated that the transit policy adds 50%-100% to transit costs.

A territorial link would open a new market for products of both the West Bank and Gaza, and could enable West Bank industries easier access to Egypt and through it (via Port Said) to Africa and the Mediterranean. Similarly, Gazan producers would enjoy improved access to desirable local markets of east Jerusalem and Ramallah, with export opportunities to Jordan and the Gulf. Access to new markets could improve even more with the possible establishment of an airport or a seaport in Gaza. Any widening of trading possibilities is critical for the Palestinian economy, which due to its small size and limited resources is highly dependent on trade: the total value of traded goods and services (both imports and exports) is equal to its GDP. Exports to Israel account for about 90% of Palestinian exports, while only 6% of Palestinian exports reached neighboring Arab countries, and only 4% reached the EU. Expansion of trade, as well as tilting the trade balance away from Israel could reduce dependence on Israel and lessen vulnerability to political and security shocks.

A better intra-Palestinian economic connection could reduce the price that Gazan consumers pay for West Bank exports of olives, fruits, vegetables and limestone and increase profit margins that Gazan producers receive for their principal exports of citrus, flowers, and textiles. Extensive trade between the two regions can lead to greater specialization, increasing the net effect to a greater total value of goods. Two strategic resources that could be transferred from Gaza to the West Bank are gas and water. There are signs of large deposits of natural gas near the Gaza shore, which could be provided to the West Bank for private and industrial uses, and for generating cheaper and cleaner



electricity. In addition, the sea of Gaza could be an important source for desalinated water, transferred through an infrastructure corridor to the much drier West Bank. In addition to the above resources, Gaza could become the principal provider of perishable products such as vegetables and fish, requiring fast transit to the West Bank, thus eliminating the need for Israeli products. Moreover, the Gaza Strip could become the main supplier of sand to the Palestinian construction sector, again cutting costs and dependence upon Israel. Gazan laborers, both skilled and unskilled could travel easily to the West Bank, helping local industries develop and boost production rates. Increased trade could ultimately generate more employment opportunities and increase wages, contributing to a positive business atmosphere. Currently across Palestinian industry there is difficulty in accessing capital, a lack of transportation and distribution channels, and complete dependence on Israel for import and export. The economic infrastructure is in poor shape, and there are no research and development activities taking place. Specifically in Gaza, the measures taken by Israel as of 2006 are extremely restrictive and make any real economic development impossible.

We now turn to a short review of some of the main Palestinian industries, noting possible implications of a territorial link<sup>3</sup>. The cut flower industry, one of the major industries in Gaza, relies heavily on export. Today it is fully dependent on Israel for export, as well as import of all key inputs. Independent export could make this industry flourish. The same is said for the stone industry, located mainly in the West Bank. The food and furniture industries are examples of locally oriented industries, as the products are not export quality. Such industries could benefit from an expanded market. The Gazan furniture industry today depends on Israel as its only source for wood. This could change with the link, as is the case in other sectors. Another mainly local industry is olive oil production. Olive oil is a typical regional product with a large potential in the arid Palestinian land. Today most oil is sold locally, as products are not yet export-quality. The Gazan market could be a first step, followed by export-oriented production. Another industry that could benefit greatly from access to the Gazan market is the active West Bank pharmaceutical sector. The largest industry in the Palestinian Authority today is the textile industry. The

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<sup>3</sup> Some of the data is based on a study that was done during the 1990's by the Palestinian Ministry of Planning and International Cooperation (MOPIC).

majority of the textile manufacturers are subcontractors for Israeli or foreign firms, and greater mobility of people and goods could incorporate a new labor force into this industry.

Though the vast majority of tourist attractions are in the West Bank (in East Jerusalem, Bethlehem, and Jericho) direct passage to Gaza, with its Mediterranean beaches, could help the city enjoy its share of tourists and foreign exchange income. Moreover, tourists would be able to come from Egypt and travel directly to sites in Palestine without entering or exiting Israel. This could increase the number of tourists in Palestine, as movement restrictions between Israel and Palestine are and always will be sensitive to political climate. Internal tourism could be a growth-motivating factor as well.

In addition to reducing transaction costs and catalyzing productivity and trade, the link could also reduce the risk and uncertainty faced by Palestinian suppliers and consumers. Drastically shorter waiting times will allow for an increased volume of movement between the two territories. This new efficiency can also create a more reliable transportation schedule that will benefit Palestinians planning to make the journey themselves. A more efficient and reliable schedule will save Palestinians time that can be used for other income-generating activities, while encouraging those who previously found the difficulty insurmountable to make the trip.

With a territorial link, Palestinians could freely visit family and friends in the discontinuous territories, a significant emotional benefit that would help ease current hardship. Yet if the cost of passage were too high, the poor would not be able to take advantage of the link. The free movement of people between the two territories would also allow Palestinians to engage in basic democratic activities such as campaigning within the Palestinian area. Increased movement would grant Gazans better access to the higher-quality West Bank schools and hospitals, helping to reduce vulnerability.

Finally, it is worth mentioning that Israeli security measures may potentially exclude certain Palestinians from using the link, as was the case in the Rafah crossing deal. In this context it is important to note that increases in Palestinian living standards may translate to a reduction of support for violence; thus, the link may actually have spillover effects beneficial to Israeli security.

#### **4c. Short-Term Benefits of Establishing the Link**

The construction of an infrastructural and transportation link will generate new Palestinian employment opportunities by introducing a labor-intensive project that will attract poor workers. Estimates place the total number of jobs created to be in the hundreds over a five-year construction period. About half of the Palestinian poor live in localities in close proximity to the project—Khan Yunis and Gaza City in the Gaza Strip, and Hebron in the West Bank—making it reasonable to surmise that many of the workers will hail from these poor communities.

If this project were contracted in full or even in part to the domestic private sector, an additional benefit would be the development of private Palestinian construction firms. Mixed foreign and domestic management of construction could facilitate the transfer of project management skills and construction technologies, augmenting the domestic construction industry.

#### **4d. Increased Palestinian Trade in the Regional Perspective**

The low volume and weakness of Palestinian exports is in marked contrast with the fast growth of trade throughout the Middle East. This weakness is apparent when compared with the fast growth of Jordanian trade volumes, as Jordan and the Palestinian Authority have a similar basic resource base. As the P.A. is a member of the Arab Free Trade Area, and has free trade agreements with both the E.U. and the U.S.A, it could capitalize greatly on improving its trade abilities. In recent years there has been a rapid build-up of inter-Arab trade based on the Arab Free Trade Area, integrating all major Arab economies into the global economy. As a member of this community the P.A. enjoys free access to this trade bloc and this potential trade capacity should be fully realized.

Moreover, in light of the close ties of the Palestinian economy to Israel, substantial Palestinian exports to Arab markets would involve a large volume of Israeli-made inputs, machinery, etc. Thus, Arab market-oriented export growth would actually open a potentially large indirect export channel for Israel. Furthermore, under a stable Israeli-Palestinian political arrangement, these markets will open to the direct export of joint Israeli-Palestinian products as well.

#### **4e. The Cut Flower Industry: An Example of The Growth Potential for Palestinian Trade**

The Palestinian flower industry began in Gaza in the second half of the 1990s and was based on Israeli know-how and marketing. Palestinian flower growers specialize in labor-intensive types of flowers, earning yearly revenues of about US\$10 million from a flower growing area of some 1,000 *dunams* (approximately 247 acres). Palestinian flower export continued during 2000-2005, in spite of the conflict, though at lesser volumes. Palestinian potential in this field is considerable, as immediate access to Israeli know-how, logistics, and marketing places Palestinian growers in an advantageous position compared with African competitors. From the standpoint of Israeli growers and marketers, the movement of labor-intensive flower growing (i.e. roses, carnations, etc.) from Israel to the P.A. is a much better alternative than to distant countries, such as Kenya or Ethiopia. Moreover, Palestinian growers have better access to the fast-growing Gulf market. With political stability and Israeli-Palestinian cooperation, the Palestinian labor-intensive flower growing area can reach close to 10,000 *dunams* within a few years. A *dunam* of these types of flowers generates an annual income of about US\$10,000. However, these flowers require swift transit and delicate maintenance. Thus, with proper transport, export capabilities, and infrastructure, this industry has the potential of generating US\$100 million annually. A *dunam* with these kinds of flowers demands hundreds of working days per year. Hence, a Palestinian flower growing industry of this scale would create about 20,000 new jobs. Similar calculations could be made with the vegetable and fruit industries. In order for all of these industries to fulfill their potential, quick and stable passage from Gaza to the West Bank and on to other countries is necessary.

## **Section B: An Engineering Analysis of Possible Territorial Links**

In this section a physical and statutory analysis of possible links is presented. After a brief review of the principles of analysis means of transport and roads are examined, followed by a detailed analysis of possible routes.

### **1. Underlying Assumptions of Analysis and Planning Principles**

#### **1a. Underlying Assumptions**

The assumptions for the engineering analysis are as follows:

1. Operating the connection will be possible only after a political agreement between Israel and the Palestinian state.
2. A central Palestinian entity will govern both the West Bank and Gaza.
3. In the framework of the agreement, procedures regarding control and use of the link will be settled, including among others: the issue of sovereignty and civil powers; the system of laws and regulations; the right of free movement, interference procedures, and criminal and traffic law enforcement; the handling of casualties, security incidents, and hazardous material leaks; procedures for passage of goods, and for transferring firearms, weapons, and troops; and procedures for infrastructure establishment and maintenance.
4. The territorial link will be established as a separate road system between the WB & GS and will not allow connection to Israel.
5. The territorial link will allow a continuous flow of goods and passengers according to Palestinian demand, and will also handle the transit of goods and passengers between Egypt and the Arab East.
6. The territorial link will not interfere with Israeli territorial contiguity and will not disrupt the traffic system within Israel.
7. Planning will include an infrastructure corridor for transportation, railway, electricity, water, natural gas, etc.
8. The approval of the route will require a statutory process within Israel.
9. Donor countries and institutions will fund the planning, establishment, and operation of the passage.

10. Full, continuous, and free movement will exist within the West Bank, allowing easy access from Palestinian cities and economic centers to the passage. This includes a convenient connection to Jordan bridges and to Jordan, and continuous movement in the Gaza Strip toward the terminal to Egypt and to the seaport, if established.

### **1b. Planning Principles**

1. There will be only one link from the West Bank to the Gaza Strip assigned for Palestinian traffic.
2. The passage will be part of the Palestinian State transportation system between different areas of the country and between Palestine and neighboring countries.
3. The link route will adhere to civil planning principles, such as safety, security, environmental concerns and protected areas, land use, future plans, existing and planned infrastructure, and other considerations.
4. The passage through Israel will be as short as possible.
5. The infrastructure will be flexible enough to endure various political and security scenarios:
  - Significant improvement in relations with Israel.
  - An improved Palestinian economic situation, resulting in greater transport needs.
  - Deterioration of the security situation.
  - Governmental split between the West Bank and Gaza.
6. The planned route should be coordinated with the national, regional, and local statutory plans in Israel, even if a special law is legislated for that matter. The route and the process will be subject to public objections.
7. Palestinian usage forecast for 2020:
  - Data will be based on a forecast of growth in the socio-economic level and growth of Palestinian transportation, under the assumption of an agreement and a centralized Palestinian government.
  - A response to traffic demands of at least 50,000 journeys a day, 15% of which by heavy commercial vehicles and another 15% by public transport.
  - Taking into account peak and off-peak travel times.

8. In order to meet service level C, the road must be planned with three lanes in each direction, with two lanes being built in the first stage.
9. The link should meet the demand for international traffic from Egypt to the Arab East (not taken into account in calculating transportation forecasts).
10. Planning should allow for an infrastructure corridor for rail, electricity, water, and natural gas.
11. The highway should be planned with the service level of a national road.

## **2. Alternate Means of Transportation and Construction Methods**

### **2a. Alternate Means of Transportation**

**1. Highway.** A highway offers unlimited movement of all types of vehicles, in all weather conditions, in the original vehicle without having to transport goods and passengers from one vehicle to another. Although the speed limit is 110 km/h, it saves waiting and loading/unloading time. The separate passage of each vehicle allows continuous movement in case of technical problems. On the other hand, autonomous vehicular traffic does not allow control of each vehicle. In addition, infrastructure is required to prevent the flow of vehicles and passengers from the main route to the surrounding area. Due to the length of the passage, gas stations and rest stops should be integrated along the route.

**2. Train.** A train is characterized by one route of journey, with no option of changing directions or routes. It allows the transit of a large number of passengers and cargo and travels at a speed of up to 145 km/h. The railway infrastructure requires a limited right of way from the road. Train monitoring is easily carried out, and could prevent passengers and cargo flowing from the train to its surroundings. Additionally, it is easy to control a train's location and to monitor deviations. The infrastructure and actual trains should be under the ownership and operation of a central responsible body, which is an advantage control-wise but can be a disadvantage due to high operating costs. The use of one track is limited to one train in any given section so there is a limit to the amount of trains and to schedules. The major disadvantage of a train is that it requires the loading/unloading of

people and goods, from vehicles to train and train to vehicles. It also requires an appropriate infrastructure for stations, parking lots, and storage on both sides. It requires means of protection to prevent direct or indirect shooting from the train to the surroundings and vice versa. The railway is sensitive to sabotage that could stop traffic and cause damage to passengers and cargo.

**3. Monorail.** This rapid transit system is based on a single rail-track that employs powerful electromagnets. The idea has been tested in many places in the world and found to be less effective for commercial use. Today monorail systems are mainly used on limited routes at tourist sites and airports. The advantages of the monorail system are very high speed (up to 250 km/h) and an elevated system that reduces topographical impact and shortens routes significantly. Another important advantage is the lack of air pollution. The main disadvantage of the system is the limited weight the system can bear. The monorail emits a very strong magnetic field that can affect both the use of electronic devices in its area and the health of users.

## **2b. Alternate Construction Methods**

**1. Surface.** This is the conventional method for roads and railways. Its advantage is in the optimal geometry of the transport system and how it integrates with the environment in which it passes in terms of other roads, geology, and drainage. In this method, the road can be tailored to fit topographical needs with a local bridge or tunnel. The transport system is separated from the area by physical means unrelated to the road's geometry.

**2. Underground.** Locating the transport system in a tunnel is advantageous in that it is not visible on the surface and traffic is not affected by aboveground events. The tunnel has a number of prominent disadvantages: very high cost and timeframe for establishment; high ongoing maintenance costs; negative psychological impact on drivers (which is why long tunnels are generally for rail transit); need for ventilation and escape shafts; danger in the event of accidents or fires; in the event of an accident a tunnel is easily blocked; restrictions on traffic volume and size of overload. The tunnel has advantages from a security perspective as it is difficult for people traveling in it to get out, but a tunnel is very sensitive to bombings as it creates a thrust effect that amplifies damage.



**3. Bridge.** Establishment of roads and railways on bridges is acceptable worldwide for short distances, but can be applied for long distances as well. The advantage of the system is that it allows life and movement under the bridge to go on relatively normally. However for the establishment of the system, the surface land must be expropriated, and the temporary damage is similar to that of paved roads. Vehicles and people can easily be prevented from exiting the bridge to the surrounding area, however emergency exits are required. The most obvious disadvantage of a bridge system is that it has very limited options for future development. If the demand for traffic increases significantly, another bridge is required. The bridge traffic system is extremely sensitive to certain attacks, and damages during such attacks may be extensive. Another disadvantage of a bridge is damage to the landscape, as a system so large and visible passes through open agricultural landscape.

**4. Submerged Highway.** This concept was developed by engineer Giora Shilony with the intention of hiding the transportation system from the ground. According to this concept, the road would pass through an artificial channel based on existing stream beds coming down from Mount Hebron to the Gaza Strip (Adoraim Stream followed by Besor Stream). The separation between traffic and environment is achieved by lowering the level of the road by six to ten meters. At points where the system crosses other roads, local interchanges or tunnels would be built. The advantage of this method is the reduction of visibility and the vertical geometry of the construction. A disadvantage is the damage done to ecological systems around the road, including drainage systems, which require drainage solutions both lengthwise and crosswise. The lengthwise solution is conceivable by a concrete channel along the route. An additional disadvantage is associated with the high cost of establishment and the need to transport large quantities of dirt from the channel. This system requires surface emergency traffic connections.

**Table 1: Comparison of Transport Systems and Construction Methods**

Good  Medium  Barrier

Criterion	Road			Train			Monorail
	Surface	Tunnel	Bridge	Surface	Tunnel	Bridge	Bridge
Response to Predicted Traffic Needs	Good	Good	Good	Barrier	Barrier	Barrier	Barrier
Transport Autonomy in Passage	Barrier	Good	Good	Good	Good	Good	Good
Surface Texture Disturbance	Good	Good	Good	Good	Good	Good	Good
Palestinian Security Preferences	Barrier	Good	Barrier	Barrier	Good	Barrier	Barrier
Israeli Security Preferences	Barrier	Barrier	Barrier	Good	Barrier	Barrier	Barrier
Safety	Good	Barrier	Barrier	Good	Barrier	Barrier	Good
Ecology	Barrier	Good	Barrier	Barrier	Good	Barrier	Barrier
Flexibility for Changes in Situations	Good	Barrier	Barrier	Good	Barrier	Barrier	Barrier
Land Expropriation	Barrier	Good	Barrier	Barrier	Good	Barrier	Barrier
Construction Costs	Good	Barrier	Barrier	Good	Barrier	Barrier	Barrier
Operation and Maintenance Costs	Good	Barrier	Good	Good	Barrier	Good	Barrier
Execution Time	Good	Barrier	Barrier	Good	Barrier	Barrier	Barrier

## **2c. Transportation Method Conclusions**

1. The monorail will not answer the Palestinian need for transfer of goods and cargo, and thus is not being considered.
2. The use of train alone has multiple advantages. However, the need for the loading/unloading of goods and passengers from vehicles to train creates long delays and high costs, and requires parking lots and transportation terminals on both sides. As there is currently no internal railroad system in the West Bank and Gaza, the train would operate solely between the two points. A train will not completely satisfy anticipated traffic demand, and therefore we recommend integrating rail into the infrastructure corridor.
3. The tunnel and bridge alternatives were found to be problematic and expensive, especially in the flexibility parameter allowing for greater development and changing use of infrastructure in different political situations.
4. A 50-kilometer-long tunnel could lead to serious safety issues, and therefore it is acceptable worldwide that in long tunnels vehicles are transported on trains. It is also the norm to build an aboveground bypass road in case the tunnel is blocked for reasons of maintenance, safety, or security. In our case, such a road cannot be established. Despite the many advantages of a train or vehicle tunnel, the limitations are too great to ignore, and thus prevent the use of this method along the route.
5. Utilizing a bridge overcomes the limitations of the tunnel but has its own set of difficulties and limitations in the way of landscape and environment, implementation and operation costs, and flexibility.
6. The best alternative, according to the criteria we set, is a surface road, combined with a railroad throughout, because of the combination of positive parameters without major constraints.
7. For the conventional planning of the territorial link, unique characteristics should be added: physical isolation, different heights when meeting existing and planned roads, emergency entrance and exit ramps, and a central control and command system. In specific places where required due to abovementioned conditions, or where friction

with Israeli needs occurs, a bridge or tunnel bypass of limited length may be implemented.

### **3. Possible Connection Points of the Territorial Link**

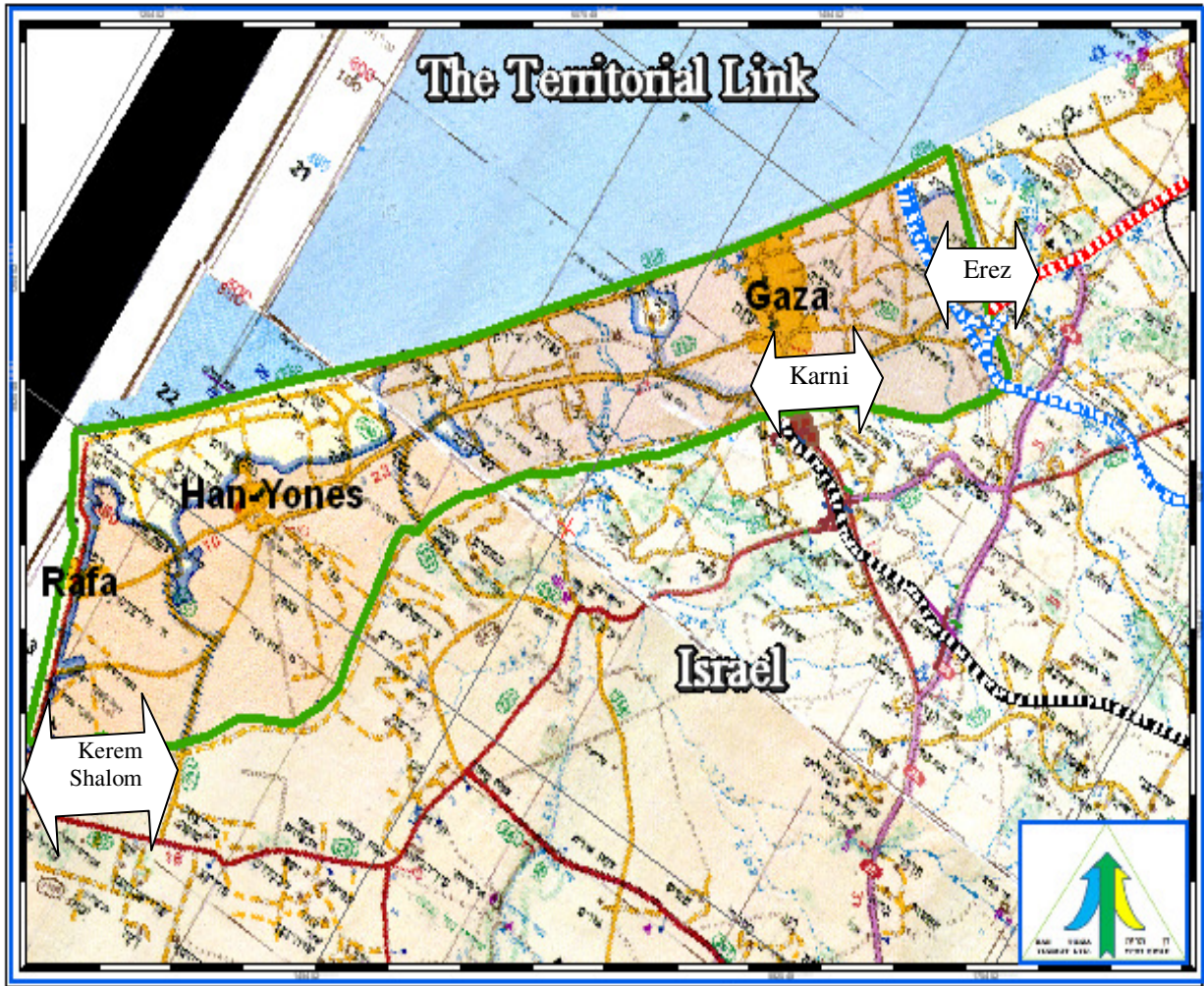
#### **3a. Possible Connection Points in the Gaza Strip**

**1. Erez.** Located in northern Gaza Strip, with convenient access from Israel (National Highway 4) and from the Palestinian side (main road), Erez is a busy crossing for pedestrians and goods. For operational and security reasons, it is best to separate the territorial link from the connection point with Israel. The proximity to Highway 4 is an advantage when considering the traffic towards the land crossing with Egypt.

**2. Karni.** Found in northeast Gaza, Karni has a large terminal for transferring goods between Israel and Gaza. Its advantage is its easy access to Gaza City and its nearby open areas that can be enlisted for future development.

**3. Kerem Shalom.** The site is located in southwest Gaza and serves as a main transit terminal between Gaza, Egypt, and Israel. Its advantage is in the possible connection to Egypt; its disadvantage is in multiple functions already located onsite, and in its relative distance from Gaza City and the West Bank.

**Map 1** below presents the possible connection points in the Gaza Strip.



### 3b. Possible Connection Points in the West Bank

**1. Tarkumiya.** The site is located in the eastern part of Hebron District in the southern West Bank on Route 35, which is the only good road in the area due to the steep topography of the Hebron Mountains. Onsite is a large passage terminal to Israel, yet the space would allow separating the terminal to Israel and the territorial link to Gaza.

**2. El Majed.** El Majed is located southwest of Hebron District, between Shekef and Shomria, at the closest point to the Gaza Strip. Its advantage is in its minimal passage through Israeli territory, and in the relative isolation from other functions. Its disadvantage is the need to pave a new road that would connect it to the central Mountain Road (Highway 60). Such a road is already planned and has passed statutory procedures

for its approval, but has not yet been paved. This section is currently under the security and civil responsibility of the Palestinian Authority, a fact that may make the land expropriation proceedings more difficult. A significant advantage of the site is the possibility to continue the railroad into the West Bank at a reasonable gradient, connecting to the mountain ridge or continuing down through the desert to Jericho and from there to Jordan.

**3. Kramim Crossings.** The site is located south of Hebron District and serves as a major crossing point from the southern West Bank to Beer Sheva and the Negev. Its advantage is its connection to the Mountain Road and the open spaces around it. Its disadvantage is in the road's proximity to the Israeli villages of Meitar and Kramim, and in the proximity between the passage to Israel and the overland link.

**4. Latroon area** (Beit Sira). Located in the west of Ramallah District, its foremost advantage is in its convenient access to the northern and central West Bank using convenient transportation routes, as well as its relative isolation from the passage system to Israel. The main disadvantages are the length of the route required within Israel and the crossing of essential Israeli infrastructure.

**E. Tul Karem** (Kaduri site or Sha'ar Ephraim). These sites are located near the city of Tul Karem in the northern West Bank. The sites allow very easy access to this area (Nablus, Jenin, Tul Karem). The prominent disadvantage is the long journey inside Israel, which goes through sensitive areas.

**Map 2** below presents the possible connection points in the West Bank.





## **4. The Analyzed Routes**

### **4a. General Presentation of the Routes**

**1. The Safe Passage Route.** This route is based on the expansion of the existing road system in Israel: Route 4 from Erez crossing to Berekhya intersection, and Route 35 from north of Kiryat Gat to Tarkomiya.

**2. The Shiloni Route (Submerged).** This proposed new route is based on stream channels, from Karni crossing through Besor Stream and Adoraim Stream to El Majed. Another alternative is to go to Beit 'Awa, south of Tarkomiya.

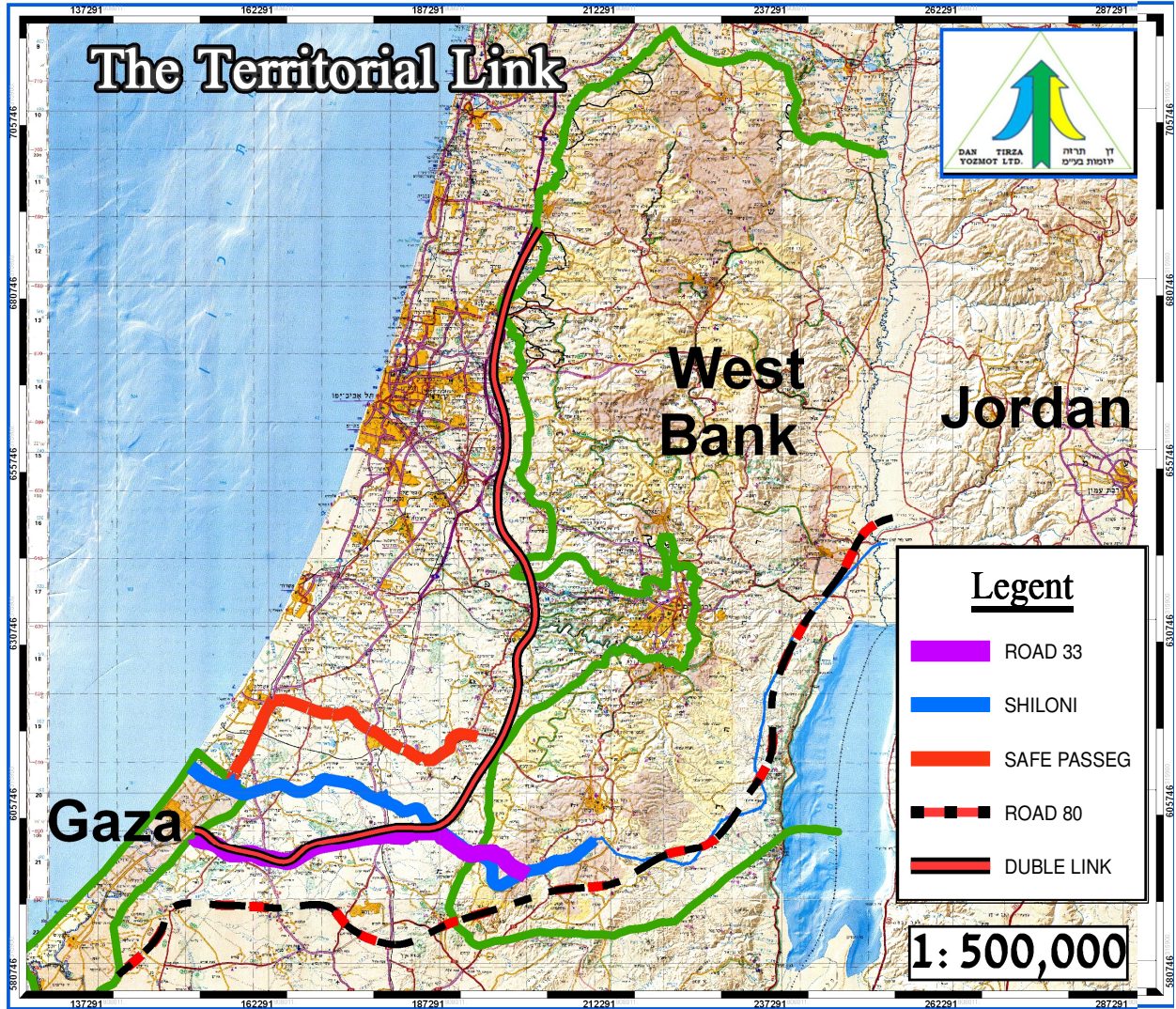
**3. Road 33 Route.** A proposed new route connecting Karni Crossing to El Majed, cutting north of the Israeli town of Netivot.

**4. Road 80 Route.** A proposed southern arc from Kerem Shalom through Kramim crossing, and from there through Horkaniya Valley to the Allenby Bridge.

**5. The Double Link.** A proposed road from Karni Crossing to Tarkomiya, and from there through the Israeli lowland to Tulkarm Crossing, parallel to the Trans-Israel Highway.

**Map 3** below presents the different discussed routes.





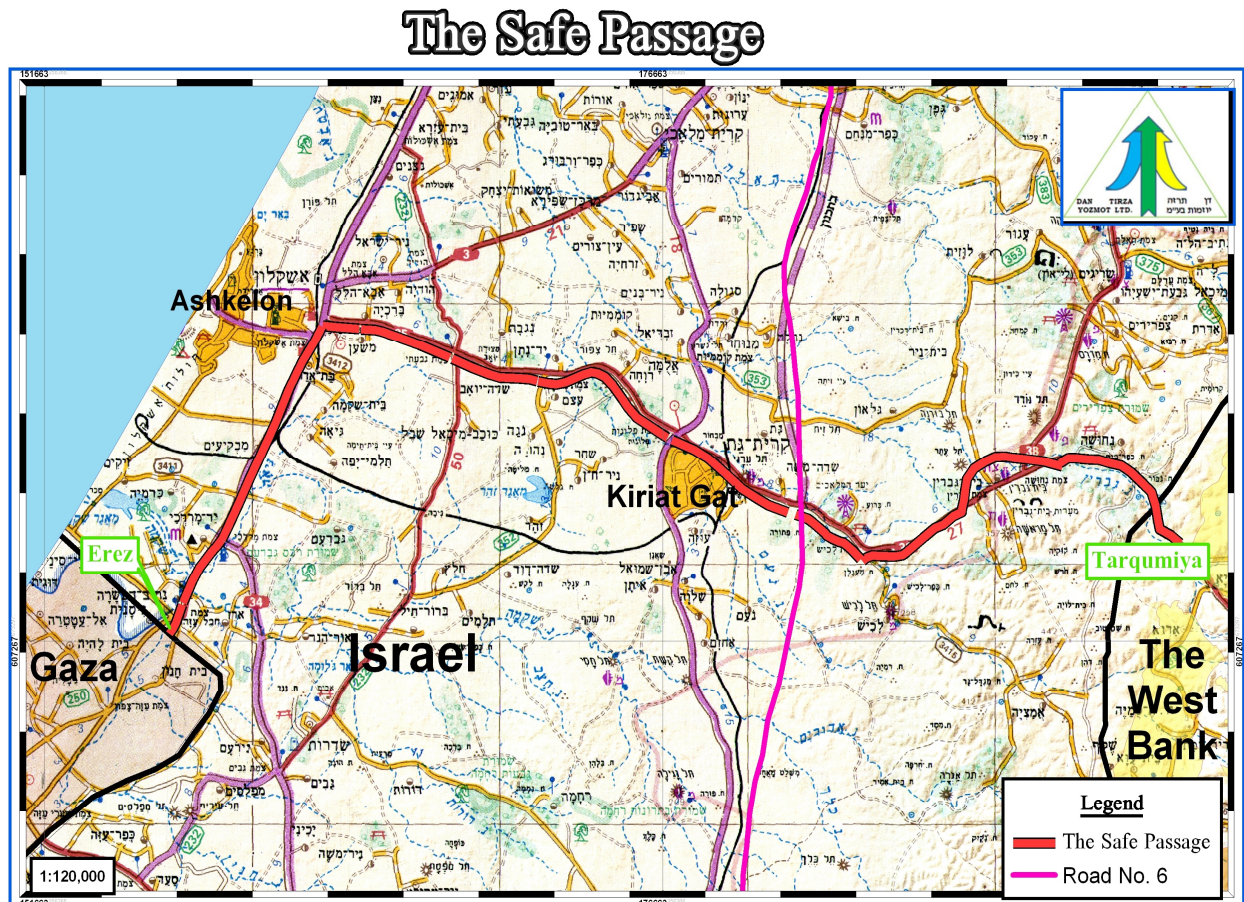


#### 4b. Detailed Route Description

**1. The Safe Passage Route.** The origin of this route is in the Interim Agreement and it served as one of two connections between the West Bank and Gaza until the outbreak of violence in 2000. The central idea of the route is the Palestinian use of the Israeli road system in a joint journey. This meant concentrating the bulk of traffic on public vehicles, performing security checks and accompanying and monitoring convoys so as to prevent them from entering Israel. This method prevents Palestinian transportation autonomy and contradicts the principles of the current work. However, we examined the possibility of paving the overland connection adjacent to the existing road. This route is based on the expansion of the existing road system in Israel so that it could contain the expected Palestinian traffic.

**Route Description:** from Tarkomiya via Route 35 north of Kiryat Gat, Berekhya intersection, Route 4 through Erez crossing (see map below).

Map 4 below presents this route in detail.

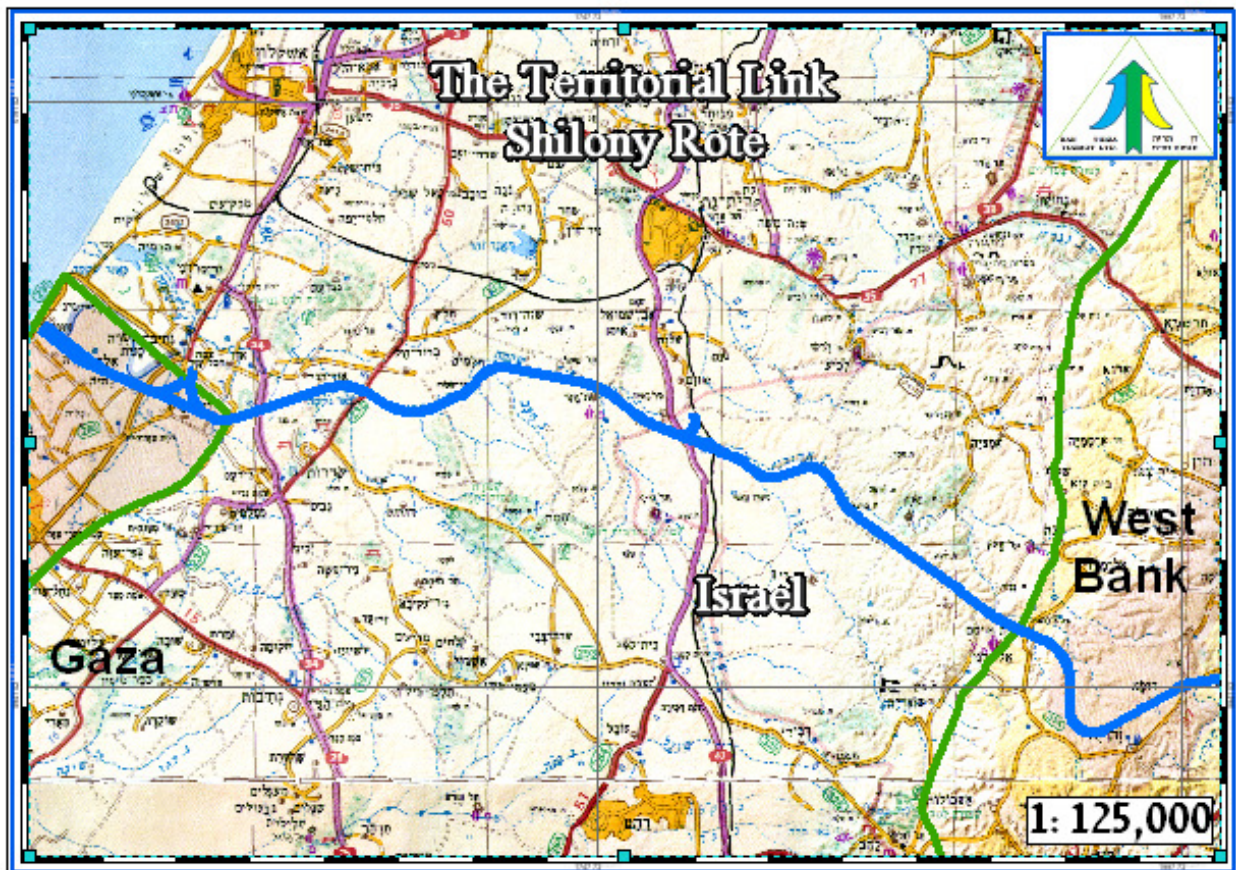




**2. The Shiloni Route (Submerged Highway).** A new route based on the streams channels, from Karni Crossing along the Besor Stream and Adoraim Stream, to El Majed. Another alternative is to connect to Bet 'Awa, south of Tarkomiya. The route was originally proposed by the engineer Giora Shiloni, and is planned for road and railway. The central idea is to pave a new separate road for the exclusive use of the Palestinians, based on stream bed channels, so that it is hidden from its surroundings.

From El Majed, there is an option to pass Daharia from south, connecting to the mountain ridge on the central road, and to Jericho Valley via the Judean Desert step.

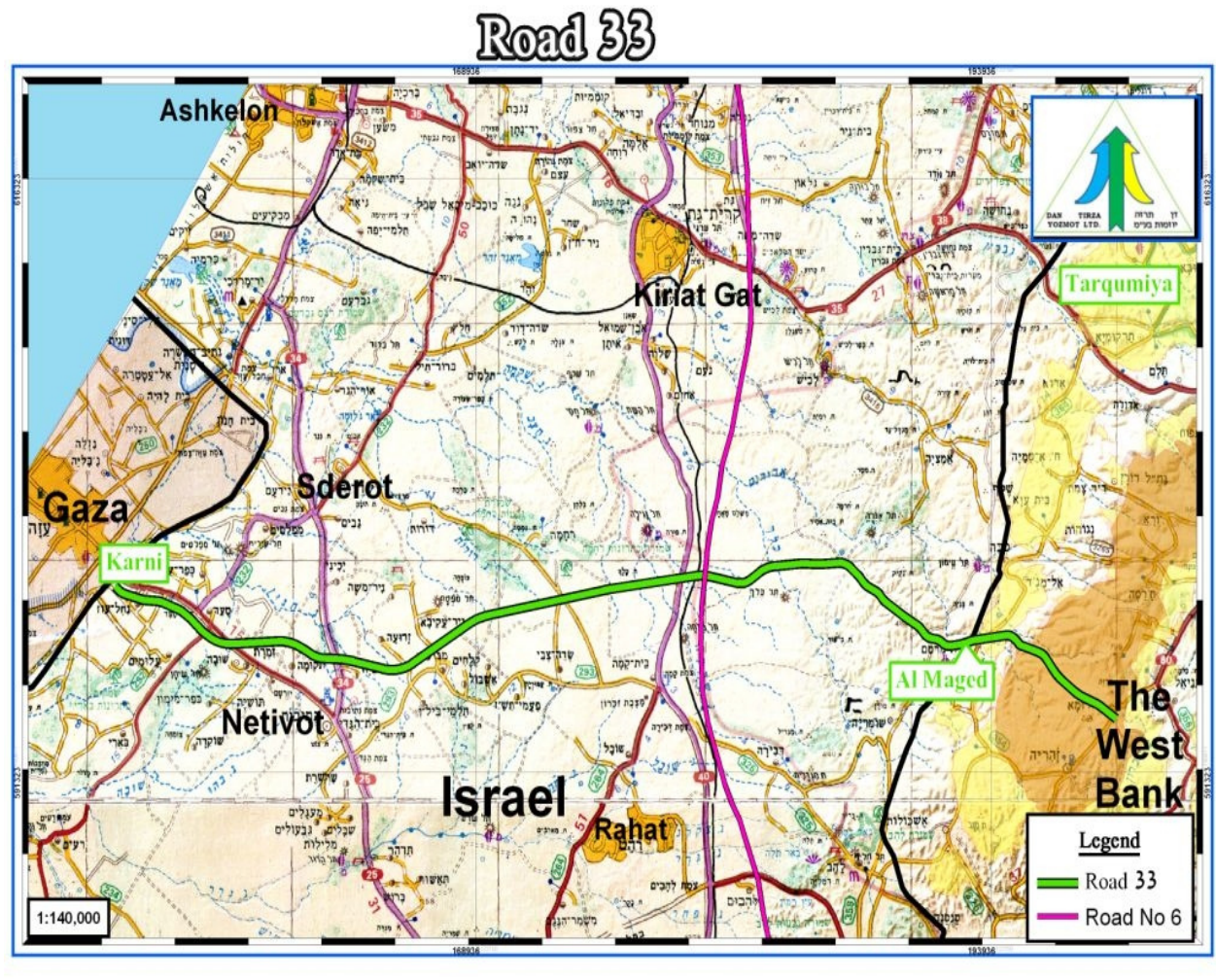
Map 5 below presents this route in detail.





**3. The Road 33 Route.** This is a proposed new route, going from Karni Crossing, north of Netivot to El Majed. The route was proposed by Mr. Shimon Farhang of Landuse, and is planned for road and railway. The central idea is to pave a new road for the exclusive use of the Palestinians, based on the most convenient engineering connection, while separating the road levels from Israeli roads and maintaining secure physical isolation from its environment. From El Majed, a connection is planned to the main Mountain Road (no. 60), north of Daharia, allowing continued traffic to the West Bank.

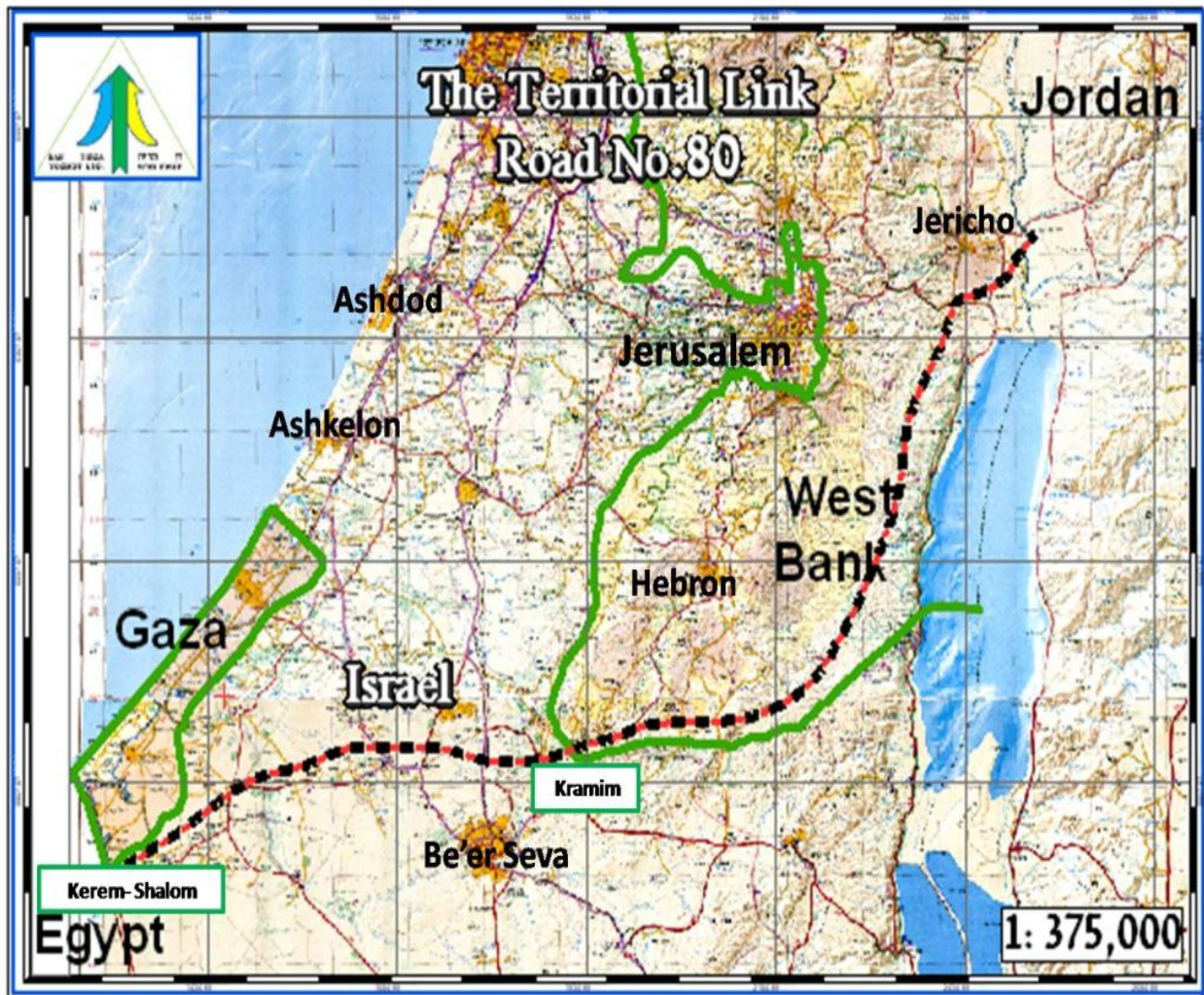
Map 6 below presents this route in detail.





**4. The Arc Route (Road 80).** A new proposed international route, connecting Kerem Shalom Crossing, cutting north of the city of Be'er Sheva, and entering the West Bank at Kramim Crossing. From there it bypasses the mountain ridge from the east, and connects to Jordan through the Allenby Bridge. This route was not fully planned but was presented as an idea by the Rand Institute, for the use of road and railway. The central idea is to pave a new separate road, exclusively controlled by the Palestinians and connecting Egypt, Gaza, the West Bank, and Jordan. In the area of Mishor Adumim, a split is planned, as the central route will turn to Jericho and the secondary route continues north to Qabatiya, south of Jenin. The road will replace the Mountain Road as the central road for Palestinians in the West Bank.

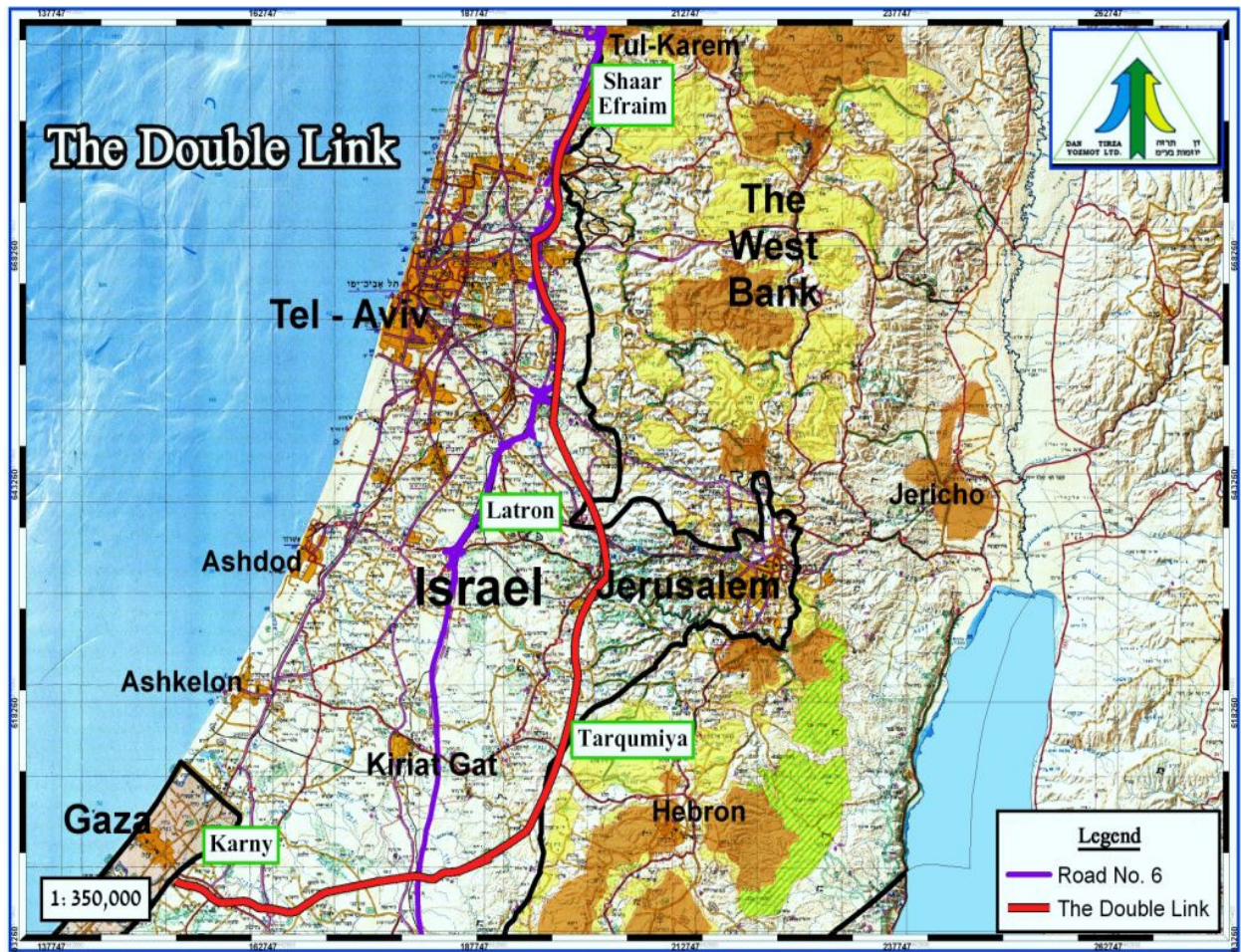
Map 7 below presents this route in detail.





**5. The Double Link Route.** The route was presented in some Palestinian proposals. It goes from Karni Crossing, south of Sderot to a connection in Tarkomiya on Road 35. From there it continues north, as it passes east to Beit Shemesh and east of Latroun. The road connects to Ramallah via road no. 443 and continues in parallel the Trans-Israel Highway (no. 6), connecting to Qalqilya and later to Tul Karm. The central idea is to allow a connection of the Gaza Strip to the southern and northern West Bank, using a Palestinian corridor that will include a road and railway. The route will allow rapid movement by utilizing the convenient topography of the eastern lowland. The route was presented as a conceptual line without an engineering plan and without examining its implications.

Map 8 below presents this route in detail.



#### **4c. Interim Conclusions**

1. The Arc Route does not enter the Gaza Strip and only meets it in Kerem Shalom Crossing. The arc does not meet the minimum requirements and needs of the Palestinians and mainly serves the international context with a long passage in Israel, without regard toward Israeli internal texture. The arc does not connect to the existing road system in the West Bank but offers to change the internal system from the Mountain Road to an Eastern Road, and to link all the Palestinian cities to this new road. For these reasons, we decided not to examine this idea.
2. The Double Link considers only Palestinian needs, disregarding Israeli considerations. This route was not planned in detail but was outlined as an idea. This route crosses Israel horizontally and vertically, traveling through its most sensitive areas. The main gist of this alternative is to transfer traffic between the northern and southern West Bank from the mountain ridge to the eastern Lowland within Israel. A railway alone is possible in this route, but it is not reasonable for rail and road. Due to the length of the road in Israel, we have decided not to advance to a detailed examination of this route.
3. The three remaining routes are feasible and therefore we examined each one.

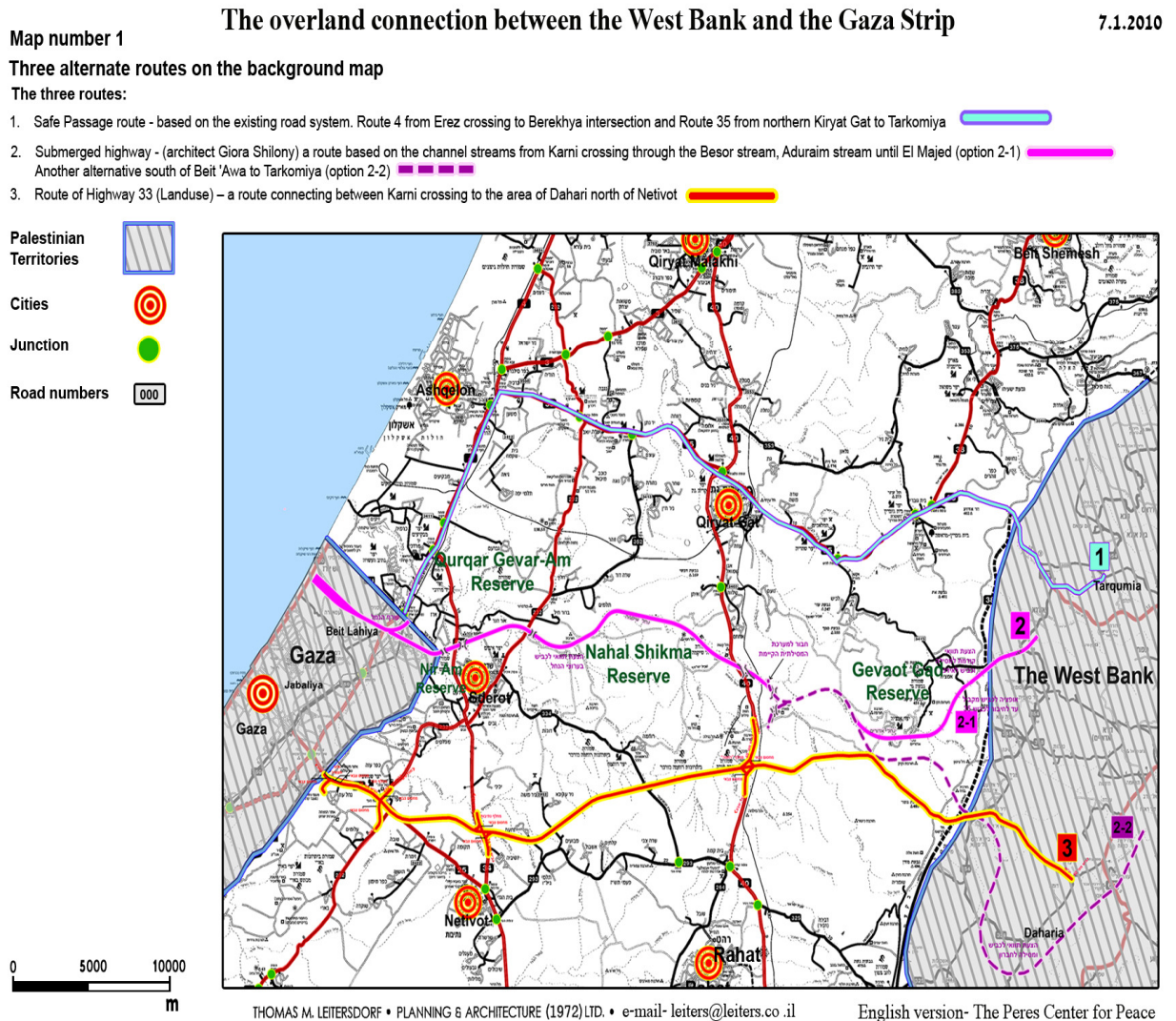
#### **5. A Statutory Review of Territorial Link Options**

This chapter presents the planned and approved statutory layout of expanding towns, new settlements, and nature reserves in various hierarchical levels in order to show potential conflicts that each route entails. Over the past decade, towns and road networks have developed, areas have been declared environmentally sensitivity, and different limitations were added. Possible alternatives for the link's route are narrowing. The alternatives were examined according to several criteria:

- a. Suitability for existing approved statutory layout.
- b. Suitability of planned programs (a preliminary examination of main planned projects).
- c. Environmental sensitivity.
- d. Suitability for the existing transportation and infrastructure layout.

Below are a few maps of the proposed routes, with the relevant statutory data. Additional maps are attached in Annex A. Map 9 presents the three routes on the background of an orientation map. Map 10 presents the three routes with the environmental guidelines of national master plan #35. Map 11 presents the three routes with the roads in the region, as outlined in national master plan #3. Map 12 presents the three routes and their potential conflicts with the district planning map #14/4.

**Map 9:** The three routes on the background of an orientation map





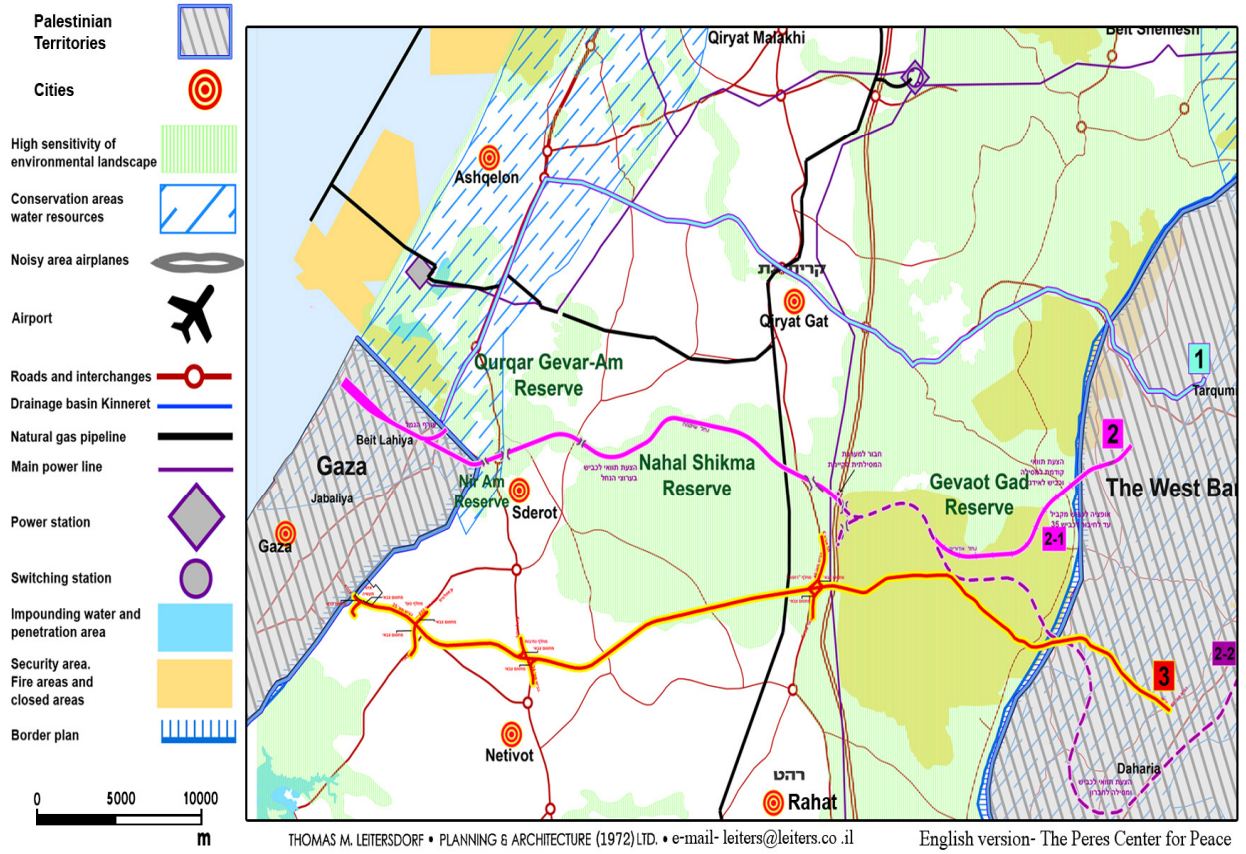
**Map 10:** The three routes with the environmental guidelines of national master plan #35

**Map number 3** **The overland connection between the West Bank and the Gaza Strip** 7.1.2010

**Three alternate routes on the national master plan 35 background - environmental guidelines**

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya █
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1) █  
Another alternative south of Beit 'Awa to Tarkomiya (option 2-2) █
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot █



# Map 11: The three routes with the roads in the region, as outlined in national master plan

#3





## The overland connection between the West Bank and the Gaza Strip

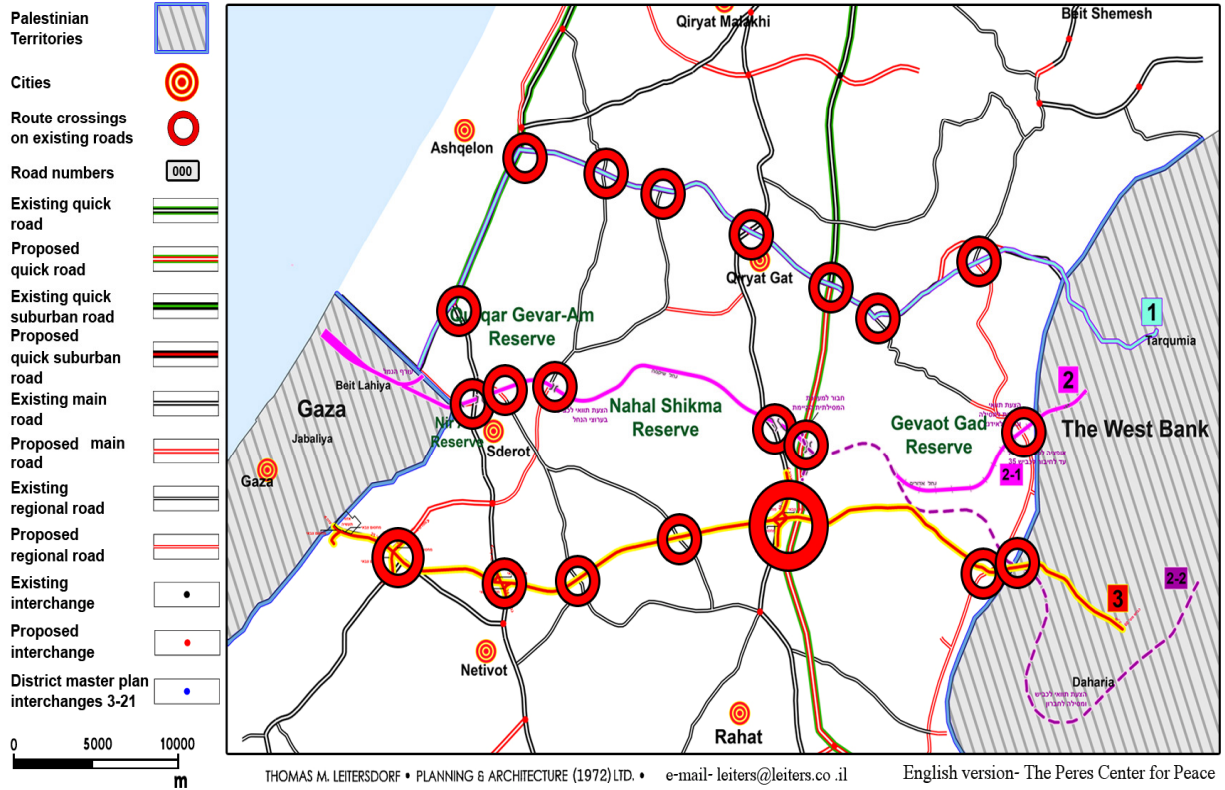
7.1.2010

Map number 4

Three alternate routes on the national master plan 3 background – access

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya 
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1)  Another alternative south of Beit 'Awa to Tarkomiya (option 2-2) 
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot 



# Map 12: The three routes and their potential conflicts with the district planning map

#14/4

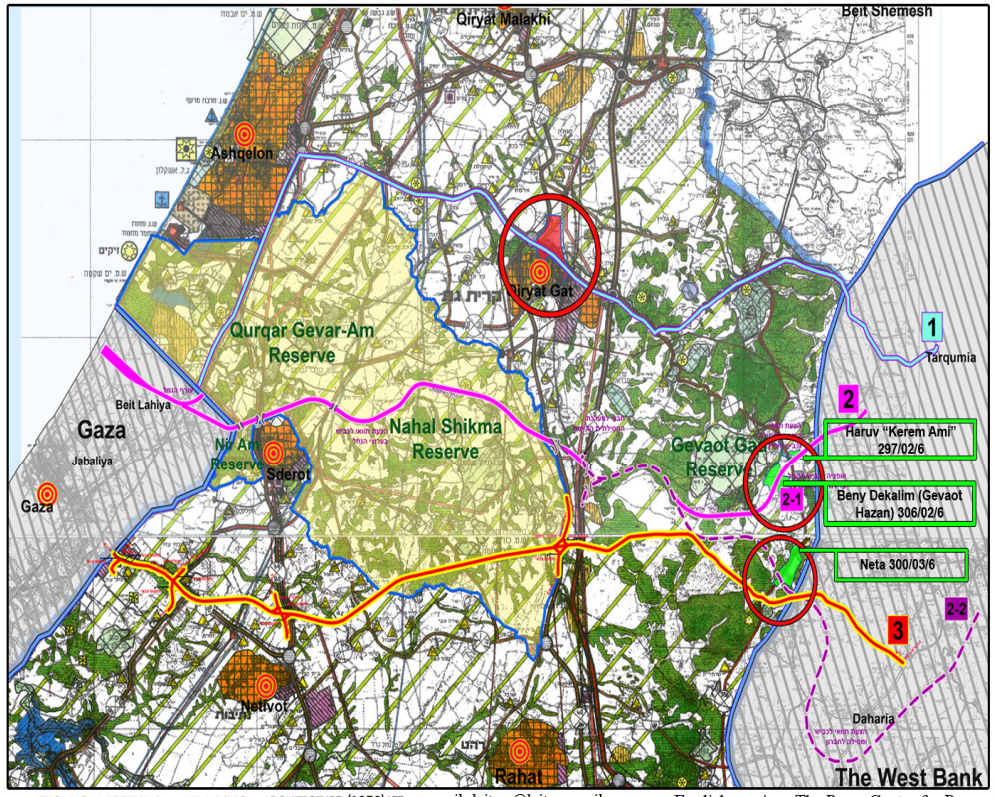
Map number 10 **The overland connection between the West Bank and the Gaza Strip** 7.1.2010

Three alternate routes on the national master plan 14/4 background - potential conflicts

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya ▬
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1) ▬  
Another alternative south of Beit 'Awa to Tarkomiya (option 2-2) ▬
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot ▬

- Palestinian Territories
- Cities
- Blue line borders Expansion plan of Kiryat Gat across road 35 Lerman Architects Plan in proceedings
- Blue line area of east Lachish settlements development program Plan in proceedings
- Blue line border Sycamore Creek Plan 4/14/43 Architect Eii Eisen Plan in proceedings
- Potential conflicts





## 5a. Summary tables of statutory implications of routes.

**Table 2: Statutory Implications of Safe Passage Route**

<b>Statutory anchoring</b>	<b>Urban development, approved statutory status</b>	<b>Plans in preparations</b>	<b>Environmental sensitivity</b>	<b>Intersection with existing transport routes</b>	<b>Infrastructure lines</b>	<b>Other barriers</b>
Widening the route in the existing road layout based on highway 35 and highway 4.	The route is tangent to two urban centers: Kiryat Gat and Ashkelon. It also passes near 14 moshavim and kibbutzim in the Lachish Regional Council.	An outlined plan to expand Kiryat Gat to the north is about to be submitted to the District Planning Committee. The approval of the plan will make the route in this area irrelevant.	Near the nature reserve of Beit Guvrin. But establishing the route on an existing road layout is less problematic environmentally.	Route 4 Route 6 Route 38 Route 40 Route 352 Route 323  Crosses the railroad to Be'er Sheva and the Kiryat Gat – Ashkelon railway.	The route crosses a power line corridor near Ashkelon at two points and also crosses an infrastructure corridor along Route 6. Tangent to the Eilat - Ashkelon pipeline (continuous along Route 4 and crosses it).  Crosses twice the natural gas pipeline route.	

**Table 3: Statutory Implications of Shiloni Route**

<b>Statutory anchoring</b>	<b>Urban development, an approved statutory status</b>	<b>Plans in preparations</b>	<b>Environmental sensitivity</b>	<b>Intersection with existing transport routes</b>	<b>Infra-structure lines</b>	<b>Other barriers</b>
A new road on the basis of the Besor and Adoraim channels.	<p>The route passes an open space of agricultural areas and forestland (two preserved forest polygons and three planting areas on banks of streams).</p> <p>The route is tangent to Sderot from the north and passes near several kibbutzim in the Shaar Hanegev area.</p>	<p>1. As part of the planned settlement of eastern Lachish, two new villages are planned on the proposed route.</p> <p>2. The route crosses the Shikma Park, a unique area of consecutive and high quality open lands.</p> <p>3. Another alternative for the eastern part of the route distances it from the new villages but places it next to another planned village.</p>	<p>1. The route is based on Besor and Adoraim channels. Crosses large open areas that are defined in the National Master Plan #35 as a “combined preserved texture” and as “environmentally highly sensitive area.” This texture is a statutory anchor of the biosphere space of Judea lowland.</p> <p>2. The route enters the core areas of Hashikma Park, the most valuable natural areas in which the level of conservation is maximal.</p> <p>3. Another alternative for the eastern part of the route crosses areas with high environmental values in the biospheric area of Ruhama Gorges.</p>	<p>Route 6 Route 40 Route 34 Route 38 (being paved) Route 323</p> <p>Crosses the railroad to Be'er Sheva.</p>	<p>The route crosses an infrastructure corridor along Route 6 and a power line near Sderot.</p> <p>The route crosses several power lines near the village of Ahuzam.</p> <p>The route crosses the natural gas pipeline route.</p>	<p>The route enters the northern part of an active firing range.</p> <p>The other alternative for the eastern part of the route penetrates even deeper into the firing zone.</p>

**Table 4: Statutory Implications of Road 33**

Statutory anchoring	Urban development, an approved statutory status	Plans in preparations	Environmental sensitivity	Intersection with existing transport routes	Infra-structure lines	Other barriers
A new road, except for the connection to the Gaza Strip, which is based on road 25.	<p>The route passes on agricultural land and forest areas (11 existing forest polygons and 2 proposed forest polygons – National Master plan 22).</p> <p>The route does not meet urban centers (approaches to 6.1 km away from Netivot) but crosses a rural area with many kibbutzim and moshavim in the Sha’ar HaNegev area.</p>	<p>1. The route passes near the planned village of Neta.</p> <p>2. The route enters Shikma Park, a unique area of contiguous, high quality open lands.</p>	<p>1. The route crosses the biospheric area of the Judean lowland.</p> <p>2. The route penetrates two non-violated open spaces of high environmental and landscape sensitivity: the Gad – Lachish Hills (the eastern section of the route) and part of the core area of the Shikma Park.</p>	<p>Route 4 Route 6 Route 38 (paving) Route 40 Route 34 Route 25 Route 334 Route 323</p> <p>Crosses the railroad to Be’er Sheva.</p>	<p>Six crossings of power lines.</p> <p>The route crosses the natural gas pipeline route.</p>	The route passes through the heart of an active firing zone.

**5b. Conclusions from the comparison of spatial impact**

**1. The Safe Passage Route** is based on the expansion of the existing road system and hence its advantages and disadvantages. This alternative is close to the greatest number of communities, including two major cities, but it passes through an already violated area and therefore has the lowest sensitivity. The planned expansion of Kiryat Gat will require substantial changes to this alternative.

**2. The Submerged Shiloni Route** is tangent to Sderot and crosses two planned new villages along the Judean lowlands. The proposed route crosses a sequence of open, non-violated lands, which are statutorily protected and therefore a strong opposition of green organizations is expected. In addition, constructing the route in streambed channels is expected to cause severe engineering difficulties concerning drainage.

**3. Route 33** crosses through the heart of a rural area and is not attached to any existing communities. The eastern part of the route crosses non-violated areas of high environmental value and therefore it is expected to stimulate the opposition of green organizations. This alternative crosses an active firing zone. In the past, this route was included in the District Master Plan for the Southern District, but eventually it was removed due to pressure from the security establishment.

## **6. Security Considerations: Implementation and Cost**

This section focuses only on planning and engineering considerations, and therefore does not include a reference to the complex political and military implications involved in the actual establishment of an overland connection between Gaza and the West Bank. We focus on security means and arrangements to be taken directly, assuming that a decision was made to establish the territorial link. The section was written from the Israeli perspective, which seeks to allow the territorial connection while minimizing damage to Israel.

The main security threats are attacks on Israel from the link; the use of the link for transferring troops, weapons and arms inside Palestinian territory as opposed to an agreement or into Israel; and attacks on the link's infrastructure and passengers from Israel or transfer of weapons to the link from Israel. The relevant attacks are done by different groups who seek to sabotage any agreement between the parties and to harm civilians while using small groups of attackers; or military actions by official and authorized forces, Palestinian or Israelis. These forces are characterized by standard weaponry and corps designated to protect borders and territory of the country by way of defense or attack.

There is no real difference between the various routes as far as troop transfer is concerned. The main response to this threat is in the political agreement and in the verification and monitoring systems agreed upon between the parties. We assume there will be attempts to damage the link and those crossing through it. These attacks can be both from Israelis and Palestinians. There will be attempts to exploit the link to exit into Israeli territory, to smuggle weapons, and to attack from the link into Israel and from Israel into the link area.

The principles for an optimal response to these threats are maximum reference to the threats in the agreement between the parties; coordination and focused intelligence cooperation; operational coordination and liaison with the Palestinian Police and other relevant authorities to ensure the fulfillment of the final agreement; physical isolation of the route from its surroundings during construction and protection from possible attacks. Below is a list of major components of the required security response. In any overland or submerged road, all of the components should be used.

**Table 5: Major Components of Security Response**

Action Components	Cooperation and Coordination Components	Infrastructure Components
<ul style="list-style-type: none"> <li>• Intelligence and observation forces.</li> <li>• Patrol and response forces.</li> <li>• Command and control forces.</li> <li>• Headquarters</li> <li>• Logistics and assistance</li> </ul>	<ul style="list-style-type: none"> <li>• Maximal reference to security in the agreement</li> <li>• Sharing intelligence information</li> <li>• Operational coordination and cooperation</li> <li>• Police forces within the link</li> <li>• Palestinian control</li> </ul>	<ul style="list-style-type: none"> <li>• Palestinian monitoring points before entering the link</li> <li>• Indicative fence along the connection, on both sides</li> <li>• A physical shield against gunfire in sensitive places</li> <li>• Array of measures and sensors in water pipelines and drainage infrastructure</li> <li>• A sensoric system.</li> <li>• An open space and deep paths for forces</li> <li>• Barriers in rescue points, with Israeli infrastructure interface</li> <li>• Security in sensitive</li> </ul>



		points.
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## 6a. Implications for the Different Routes

**1. The safe passage route** will require a physical wall along its length to prevent firing on nearby Israeli roads. In certain points, additional barriers will be required to prevent firing at Israeli towns and infrastructure. The proximity to Israeli communities will require placing manned forces in immobile positions to prevent direct fire or “leakage” to Israel.

**2. A submerged route** requires placing an electronic fence along both sides of the overland connection; placing electronic sensors for control and supervision; physical security positions in the emergency connections to Israel; and the deployment of response forces in the link and outside.

**3. A surface road** requires an array such as the one needed in the case of a submerged highway, with additional protective walls or dirt mounds in sensitive locations.

**Table 6: Estimated Costs of Security Measures**

Means	Calculation Unit	Unit Cost in Millions of USD	Safe Passage Route Cost in Millions of USD	Submerged Route Cost in Millions of USD	Route 33 Cost in Millions of USD
Control Point	Terminal	1	2	2	2
Electronic Fence	km	0.4	15	25	25
Patrol Roads	km	0.3	30	30	30
Defensive Wall	km	1.5	75	20	22.5
Rampart Shield	km	1	20	40	70
Intelligence Network	Position	0.75	10	10	10
Command and Control Centers: 2 Israeli & 1 Palestinian	Facility	3	9	9	9
Security Forces	Squadron	2.4	7.2	7.2	7.2
Barriers in Rescue Points	Checkpoint	1	8	4	4
Security Towers in Sensitive Locations	Position	0.2	20	6	6
<b>Total</b>			<b>196.2</b>	<b>153.2</b>	<b>185.7</b>

Notes:

1. 15% to 25% should be added to this amount to estimate annual maintenance cost.
2. These sums are a rough estimation.
3. Infrastructure for army camps and regional logistics were not taken into account.

## **7. Engineering and Construction Costs and Estimated Timeline**

This section deals with a rough estimate of the costs and timeline for the different routes. Pricing data and time evaluation are general and based on cost and timeframes of similar projects, such as the Trans-Israel Highway. Annex B outlines the special criteria used to evaluate construction costs.

### **7a. Estimated Costs**

Based on the Trans-Israel Highway experience and the National Roads Company experience, *the basic price for all routes is US\$8 million per km (NIS32 million)*. This price is in 2009 terms, and it covers a two-way road with two lanes on each side and an option to expand the road with an additional lane. To this price, one should add the cost of expropriations, planning, administration and supervision, unpredictable expanses (20%), and VAT (16%). For the submerged highway section, an addition of about 20% for water carriers should be taken into consideration. Expanding existing roads, which requires more agricultural paths and interchanges could add 10%.

For the railways, a price of about US\$6 million per km (NIS25 million) should be calculated. This price includes double railways and infrastructure, routing means, supporting walls, expropriation, planning, administration and supervision, and VAT. It does not include the construction of stations and a maintenance depot, infrastructure for an electrical train, and the train itself.

Integrating the cross-section and construction of the road and railway could set the cost at US\$13 million per km (NIS50 million).

**Table 7: Estimated Costs of the Different Routes**

Prices in M\$	Safe Passage Route	Submerged Highway	Route 33
Basic Cost per km	<b>14.3</b>	<b>15.6</b>	<b>13</b>
Length of Route	<b>52 km</b>	<b>65 km</b>	<b>53 km</b>
Estimated Construction Costs	<b>743</b>	<b>1,014</b>	<b>689</b>
Estimated Combined Construction and Security Costs	<b>939</b>	<b>1167</b>	<b>874</b>

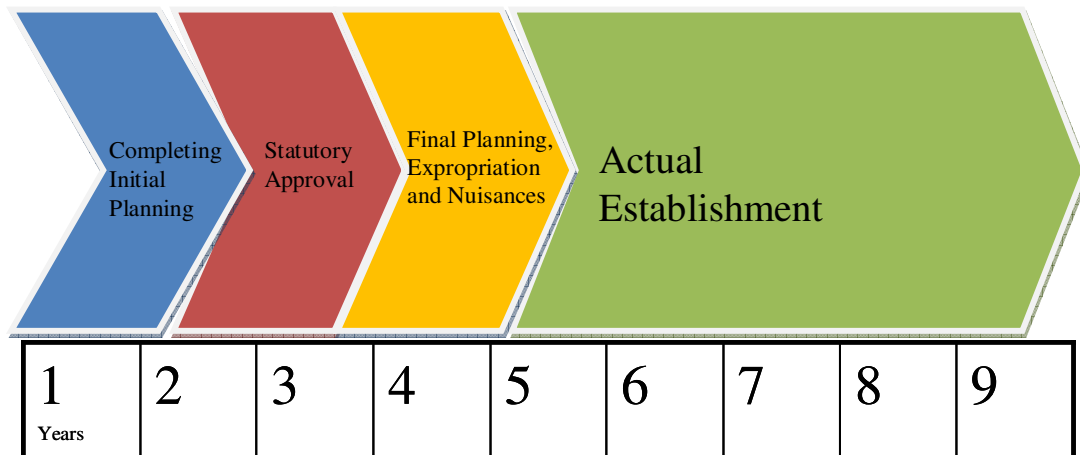
Note on land expropriation:

In order to calculate exact cost of land expropriations, a survey and assessment must be performed. These amounts should be added to the above totals. Special legislation should be enacted in order to promote the issue of expropriations, similar to the one made with the Trans-Israel Highway. Such legislation has two key advantages: reducing the cost of land and shortening the duration of the expropriation proceedings and negotiations.

### **7b. Estimated Timeline**

1. Completion of initial planning of the three alternatives and statutory process (under the assumption of an accelerated process): approximately three years.
2. Detailed planning: one year
3. Expropriation, under the assumption of a special law: at least one year
4. Construction by six contractors (approximately 8 km per contractor). Each contractor performs about US\$1.5 per month, total of about US\$9 million per month = 5 to 6 years.

This timeline does not include unexpected interruptions.



**Table 8: Statutory and Engineering Route Comparison**

Good  Medium  Barrier

The criteria	The Safe Passage	Submerged Highway	Route 33
Response for the Palestinian Needs			
Length in Israel			
Length in Palestinian Area			
Compliance with Engineering Criteria			
Proximity to Israeli Communities			
Engineering Feasibility			
Conflicts with Existing Planning			
Environmental Conflicts			

Estimated Cost without the Security Costs, in Millions of US\$	<b>743</b>	<b>1014</b>	<b>689</b>
Security Response			
<b>Final rank</b>			

**Implications:**

1. All three alternatives are possible, as each one of them has advantages and limitations.
2. The Route 33 alternative has many advantages but also some limitations that should be addressed and improved.
3. We recommend presenting the three alternatives to the statutory authorities while indicating the benefits and limitations of each alternative.

**8. Final Conclusions and Recommendations for Further Procedures**

- a) All three route alternatives outlined have no statutory status.
- b) Changes in the Master Plan of the Southern District make it nearly impossible to construct significant sections of the three routes.
- c) The competition on the land will only get worse with the approval of proposed programs and with new development initiatives in the district.
- d) From professional and engineering standpoints, it is recommended to abandon the monorail, tunnel, and bridge options, and to focus on an aboveground transportation system that will include a road and a railway.
- e) From an engineering point of view all three alternatives are possible, although Road 33 possesses distinct advantages over the other options.
- f) It is recommended to immediately promote a statutory planning process, supported by an early engineering plan to determine and ensure the route, including examination of the route.
- g) The plan requires a government resolution, therefore:

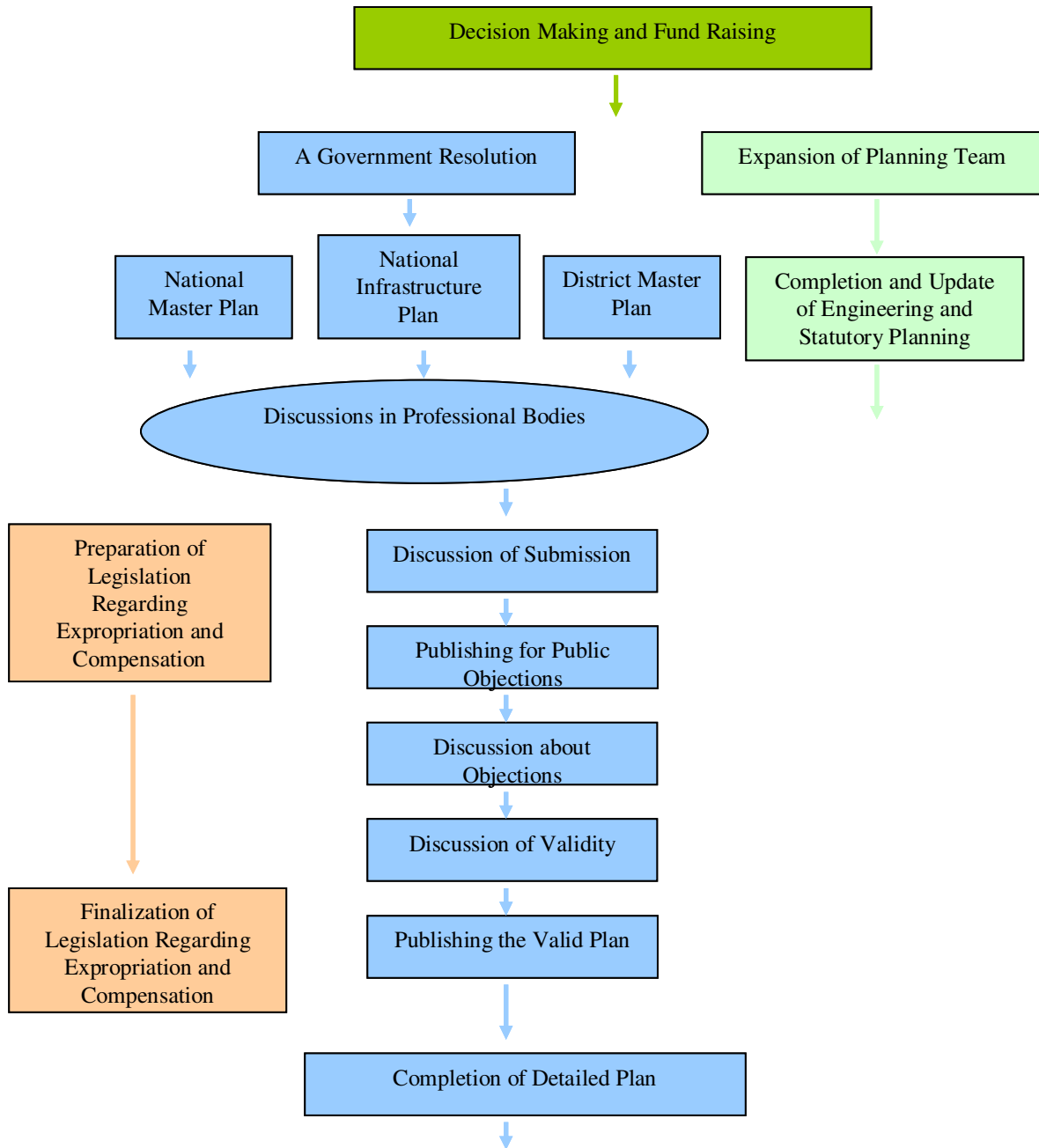
- A draft resolution should be prepared, accompanied by suitable planning and political background, while consulting with the Planning Administration Manager.
- Until the government's resolution, it is possible to shorten schedules through continued promotion of the planning.
- This work requires recruiting human and capital resources, including a significant team of consultants.

H. It is recommended to promote a collaborative planning effort with professional Palestinian representatives and a donor organization representative as soon as possible.

I. Immediately upon receiving governmental approval and after receiving approval from the suitable minister, proper plans should be prepared: national, district or national infrastructure plan.

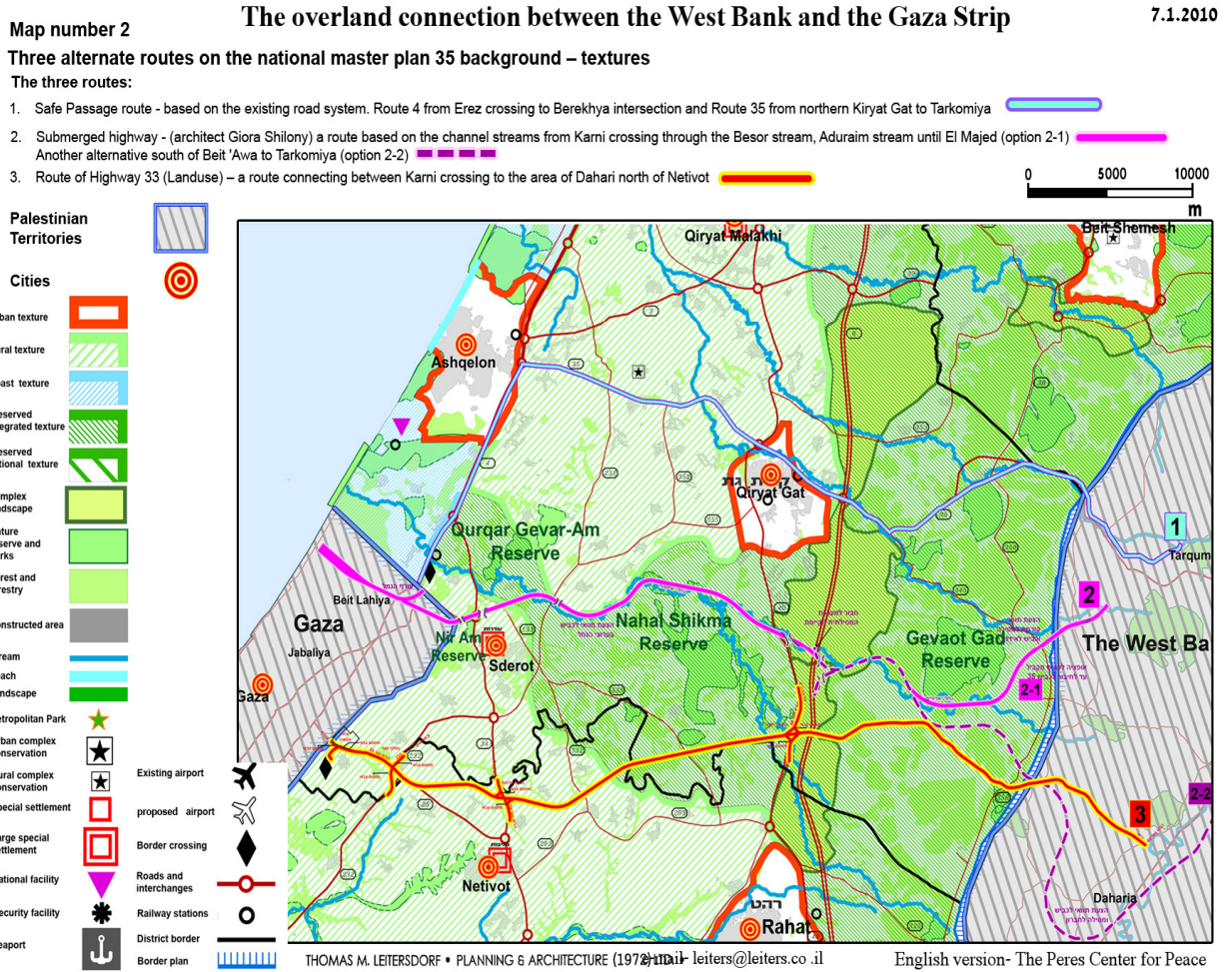
J. The long preliminary processes and duration of construction require early recruiting and impulsion of the project in order to enjoy its benefits as soon as a permanent agreement between the parties is realized.

### 8a. Flowchart of Recommendations for Administrative Procedures



# Appendix A: Additional Statutory Maps of the Proposed Routes

Map 13: Routes with national master plan #35- textures.





Map 14: Routes with national master plan #23- railroads.

Map number 5 **The overland connection between the West Bank and the Gaza Strip** 7.1.2010

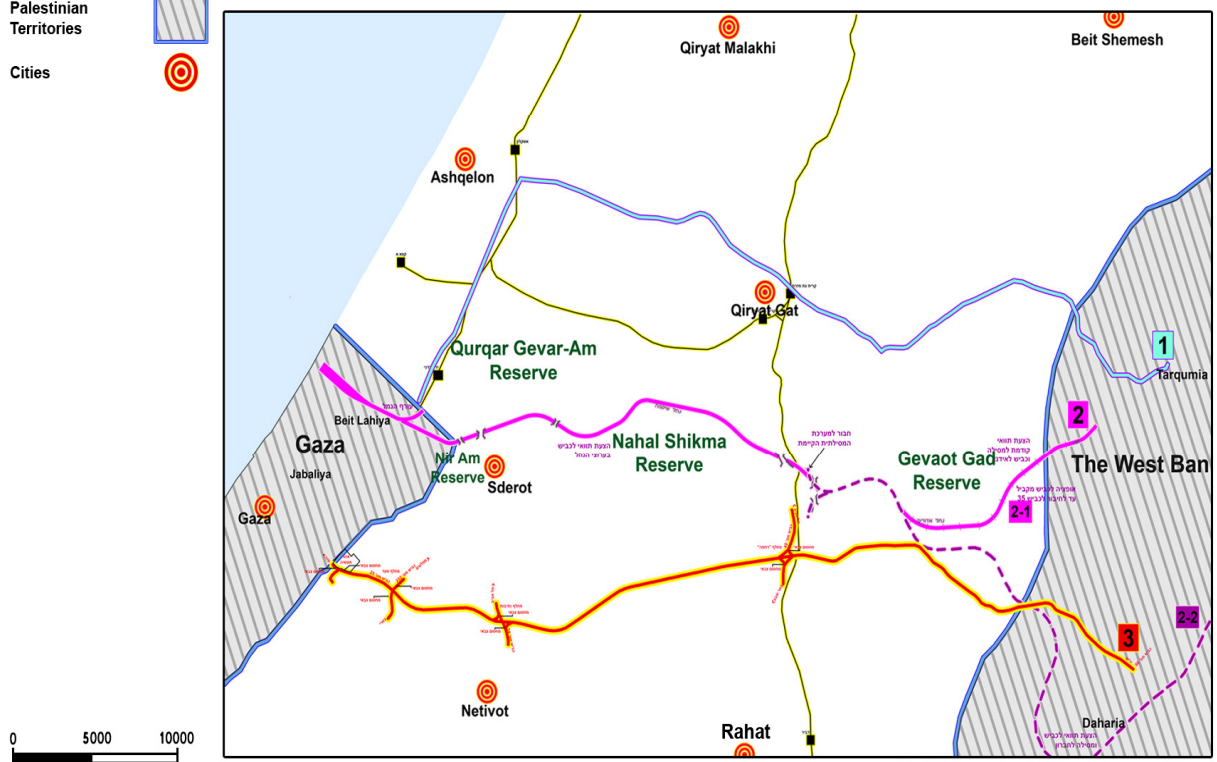
Three alternate routes on the national master plan 23 background - trains / railroads

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya █
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1) █  
Another alternative south of Beit 'Awa to Tarkomiya (option 2-2) █
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot █

Palestinian Territories ▨

Cities ◎



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Map 15: Routes with national master plan #22- forestry.

The overland connection between the West Bank and the Gaza Strip

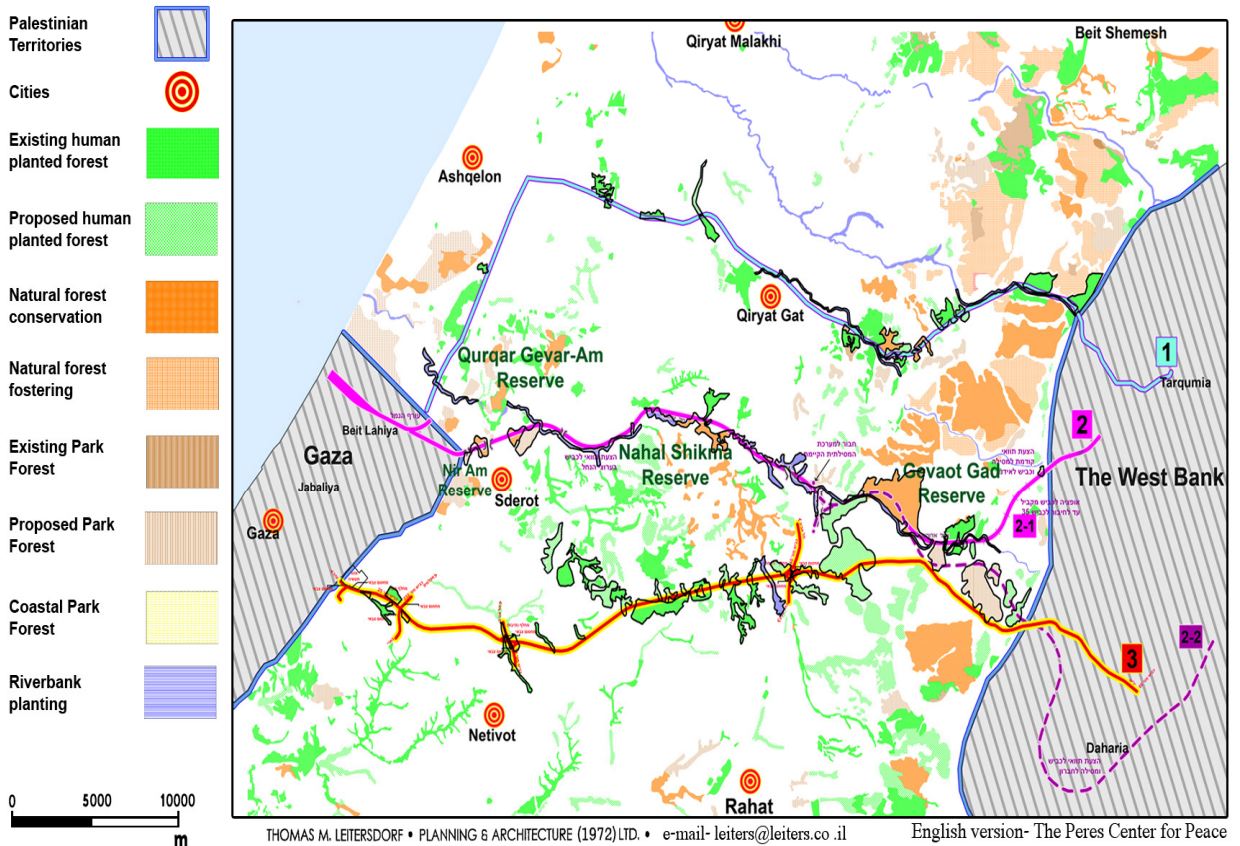
7.1.2010

Map number 6

Three alternate routes on the national master plan 22 background - Forest and forestry

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1)  
Another alternative south of Beit 'Awa to Tarkomiya (option 2-2)
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot



Map 16: Routes with national master plan #37- natural gas.

**Map number 7 The overland connection between the West Bank and the Gaza Strip** 7.1.2010

Three alternate routes on the national master plan 37 background - natural gas

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1)   
Another alternative south of Beit 'Awa to Tarkomiya (option 2-2)
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot



**Palestinian Territories**

**Cities**

National master plan 1/a/37 route

National master plan 2/1a/37 route Be'er Sheva bypass

National master plan 4/1/a/37 route Ramat Hovav and Rotem Plain

National master plan 2/a/37 route

National master plan 1/a/37 route

National master plan +1/2/a/37 route +2/2/a/37 +d/37 e/37

National master plan 5/2/a/37 route

National master plan b/37 route

National master plan 3/b/37 route volcano

National master plan 4/b/37 route Hakishon Gap

National master plan c/37 route

Route of completion of planning

**Power station**

Natural gas station

Natural gas receiving station

**Key of distribution area**

Haifa

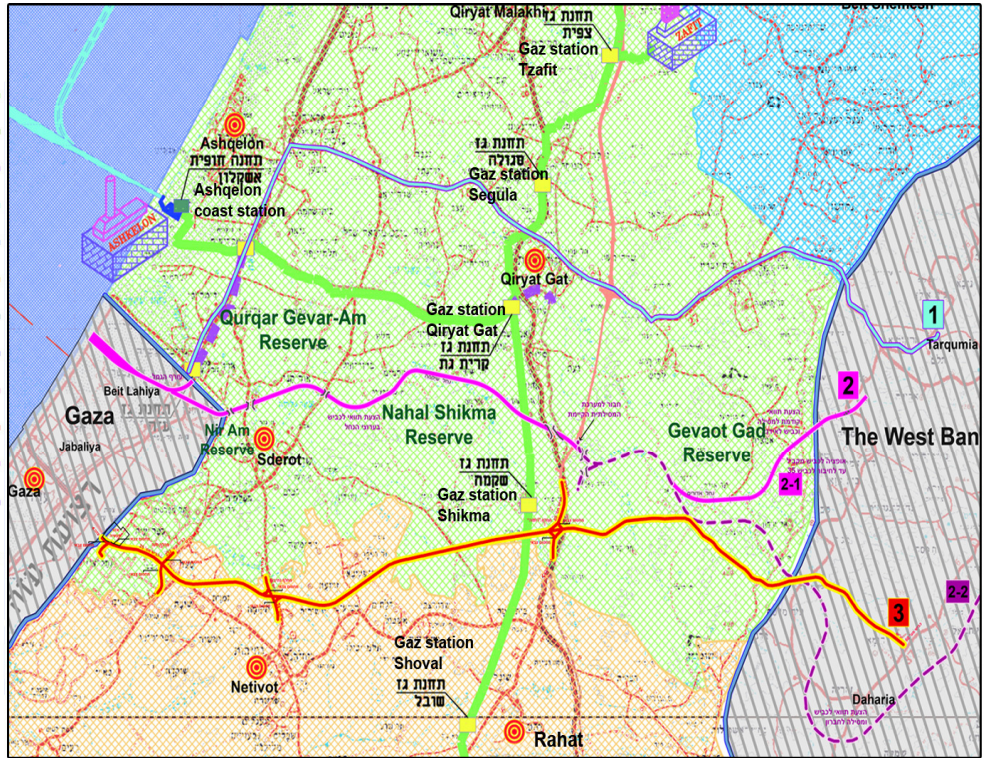
The Valleys

Center

Jerusalem

South

Negev









Map 17: Routes with district master plan #14/4 in the background + key.

Map number 8 **The overland connection between the West Bank and the Gaza Strip** 7.1.2010

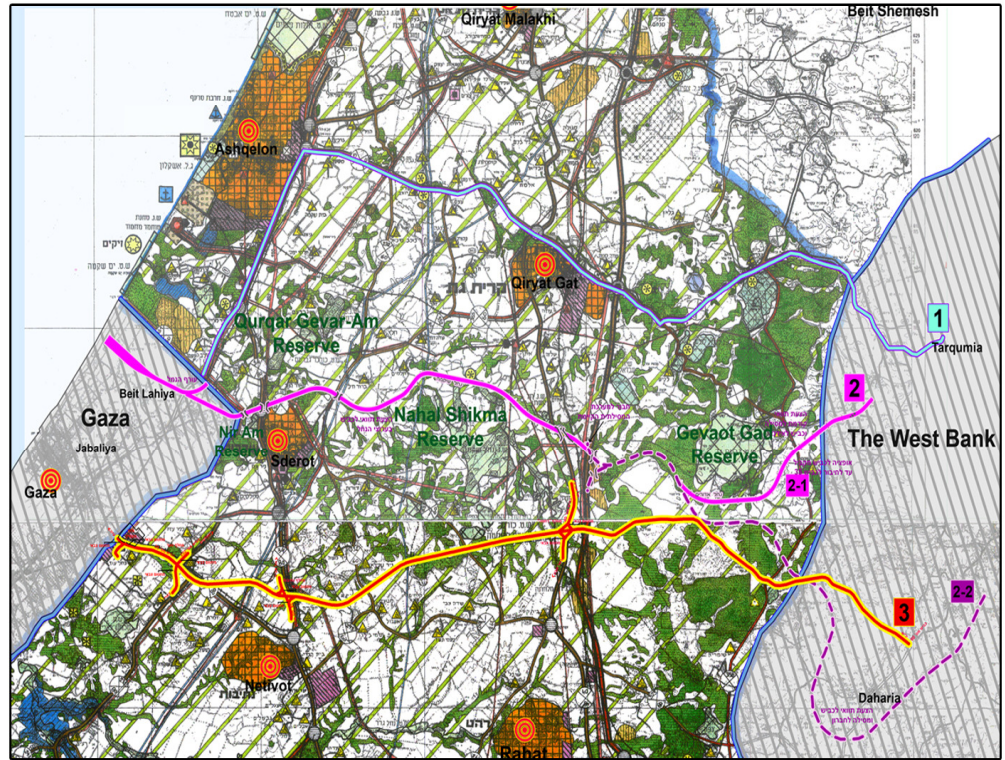
**Three alternate routes on the national master plan 14/4 background**

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya 
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1)  Another alternative south of Beit 'Awa to Tarkomiya (option 2-2) 
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot 

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**Cities** 



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# The overland connection between the West Bank and the Gaza Strip

7.1.2010

Map number 9

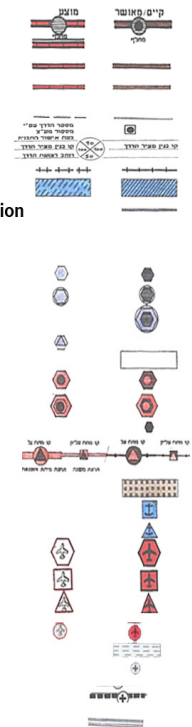
Key:

Southern District  
National master plan number/4  
change number 14  
4.2 Designated land  
scale 1:100,000

Program border  
Province border  
Local authority border  
Existing rural settlement  
Proposed rural settlement  
Regional enterprises  
Urban construction area  
Suburbs construction area  
Metropolitan area of importance  
Space for future planning

Tourism Planning Area boundary  
Urban tourist attraction  
Specialized tourist attraction  
Rural Tourism Center  
Tourism Site  
Area Hotels & Leisure  
Local Industry Zone  
National Industrial Zone  
Polluting industrial area  
Special Industrial Zone  
Industrial Zone related to raw materials  
Mining and quarrying area  
Mining and quarrying area within the Urban Construction area  
Search and determining site area for mining and quarrying  
Mining and quarrying area in large craters and Ramon  
Evaporation scratch area  
Forest  
Forest on other forestry  
Forest in mining and quarrying area  
Forestry and open areas  
Nature reserve  
National park  
Landscape reserve  
National site and Memorialization suite  
Beach  
Agricultural land  
Open spaces  
Central Hospital  
Institution for higher education  
Cemetery  
Prison

Franchise border Area  
Fire, and security facilities border area  
border area of land groups in the Dead Sea concession  
Border area of land reserved in the Dead Sea concession  
Rapid road  
Rapid suburban road  
Main road  
Regional road  
Local road  
Terminal border  
Railroad  
water impound and penetration area  
National water line and sewage purification institute national water line  
Local waste disposal site  
Central waste disposal site  
Toxic waste disposal site  
Garbage treatment site  
Power site are  
Site Power  
Nuclear site  
Gas turbines site and others  
Power lines crossing area  
Gas facilities  
Seaport  
Sport and fishing port  
International airport  
Regional airport for international flights  
Airport for domestic flights  
Airport for light aircraft and agricultural  
Airport Area  
Aircraft navigation aids  
Seawater channels  
Channel strip





Map 18: Routes with district master plan #14/4- electricity lines.

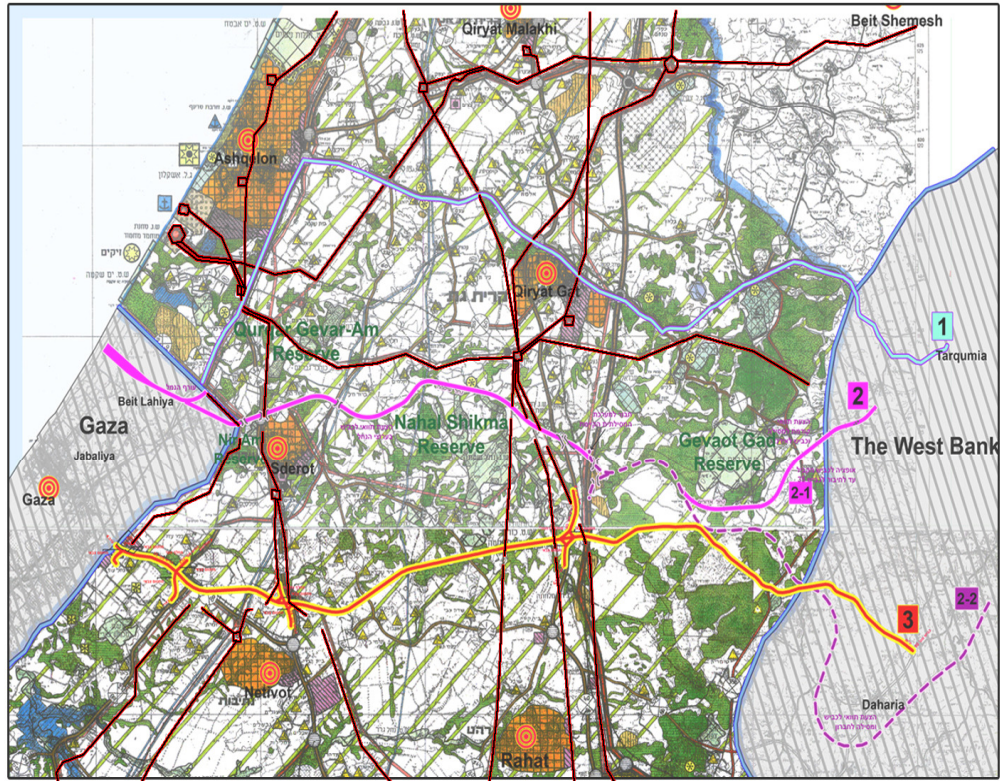
**Map number 11** **The overland connection between the West Bank and the Gaza Strip** 7.1.2010

Three alternate routes on the national master plan 14/4 background – electrical lines for land crossing

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1) Another alternative south of Beit 'Awa to Tarkomiya (option 2-2)
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot

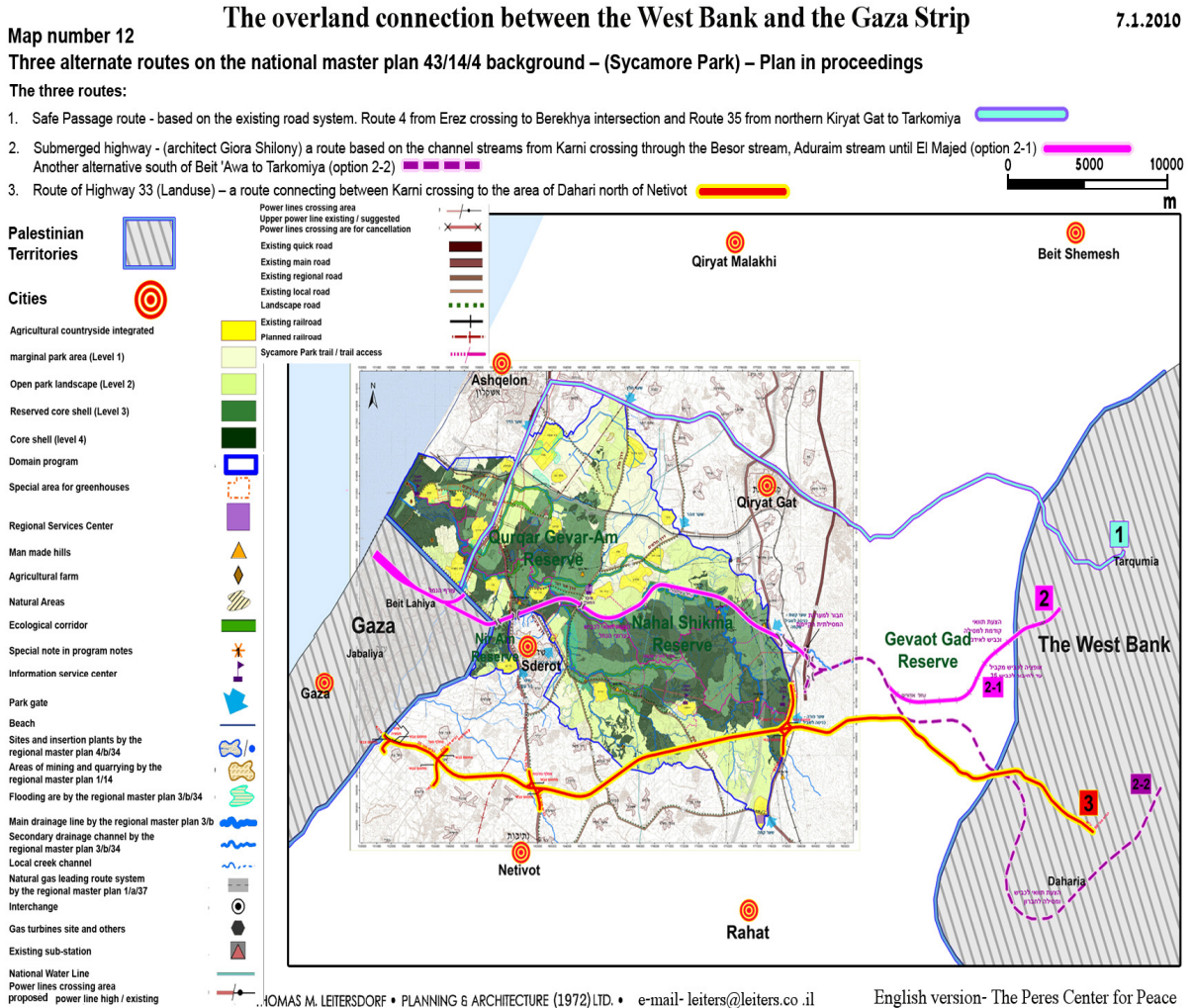
- Palestinian Territories
- Cities
- Power lines area crossings



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Map 19: Routes with district master plan #43/14/4- Hashikma Park in the background.





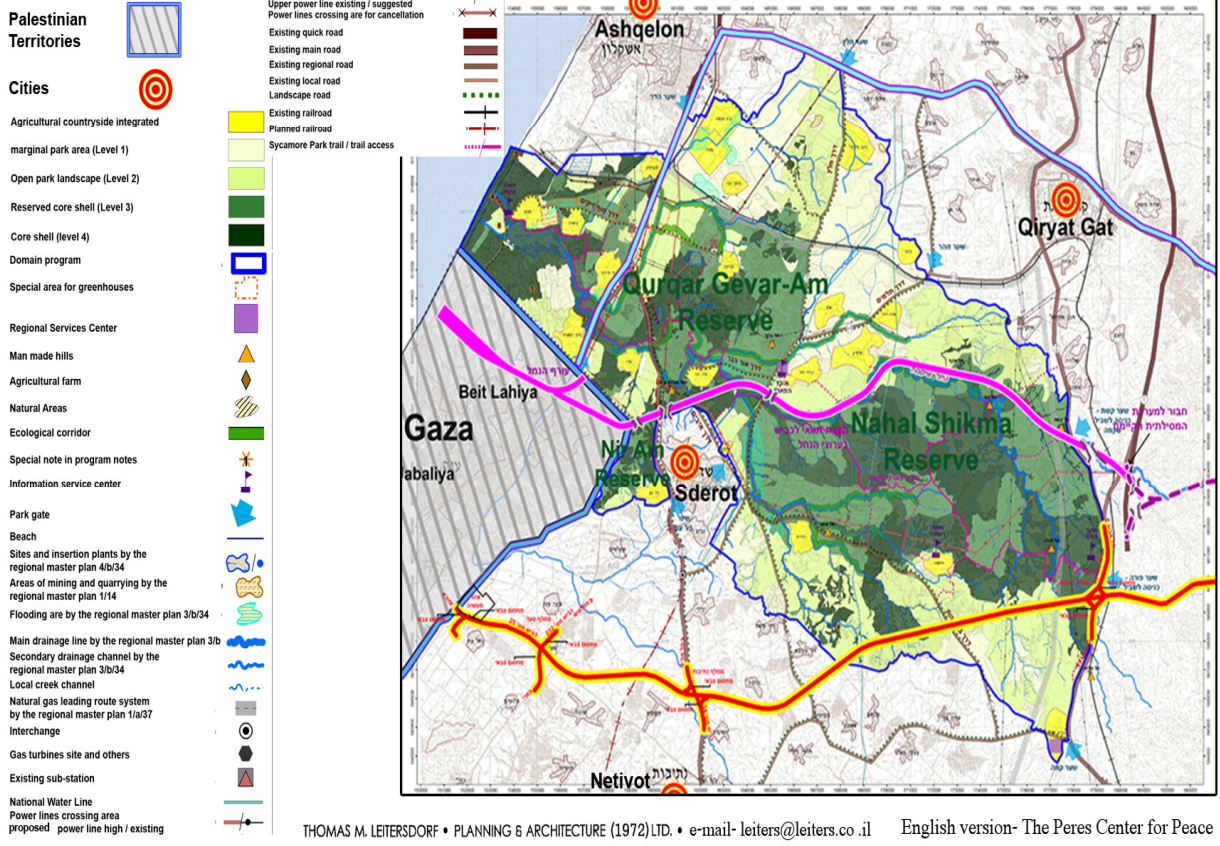
Map 20: Routes with district master plan #43/14/4- Hashikma Park, focus.

**Map number 13** 7.1.2010  
**The overland connection between the West Bank and the Gaza Strip**

Three alternate routes on the national master plan 43/14/4 background – (Sycamore Park) – Plan in proceedings

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya █
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-2) █  
 Another alternative south of Beit 'Awa to Tarkomiya (option 2-2) █
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot █





Map 21: Alternative fourth route for review on the background of an orientation map.

**Map number 14** **The overland connection between the West Bank and the Gaza Strip** 7.1.2010

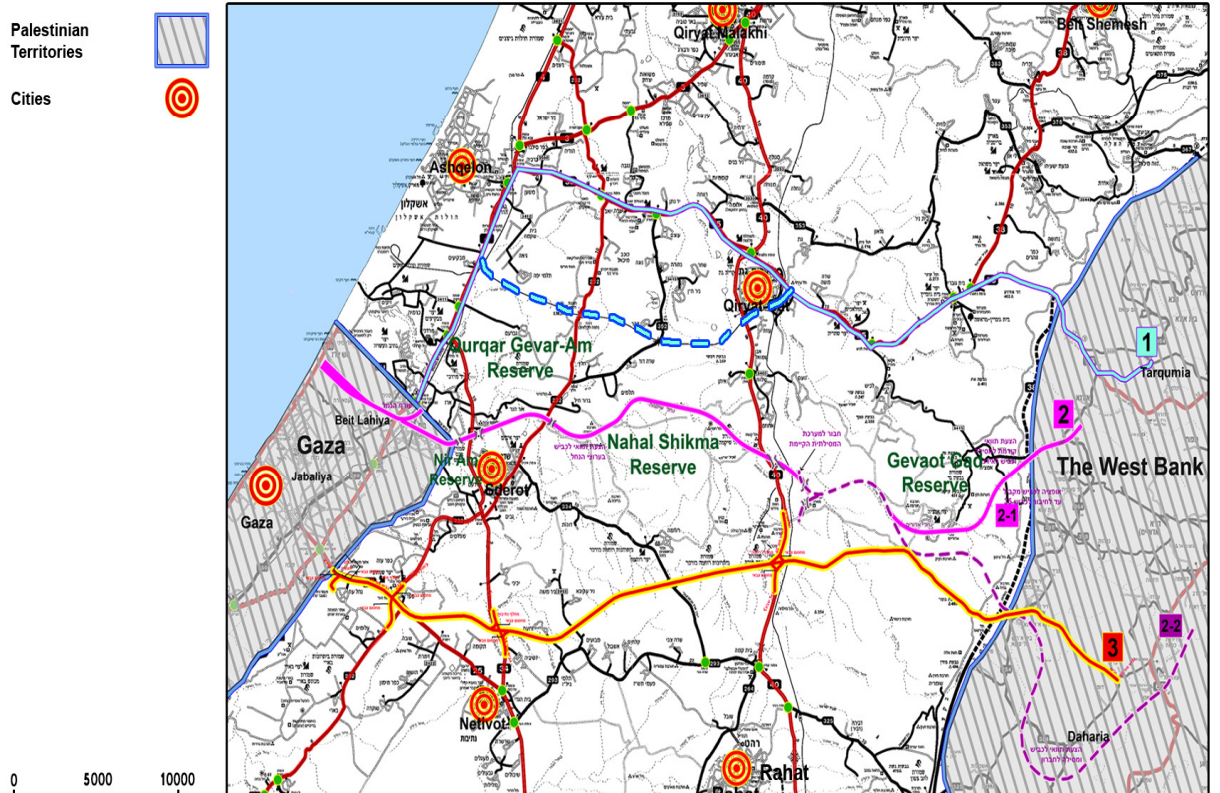
Four alternate routes on the background map

The three routes:

1. Safe Passage route - based on the existing road system. Route 4 from Erez crossing to Berekhya intersection and Route 35 from northern Kiryat Gat to Tarkomiya ▬▬▬▬
- 1-1. fourth route to examination- based on the existing road system. Route 4 from Erez crossing to Mavkeem, from Mavkeem on a existent rail route to Kiryat Gat crossing route 35 from north of Kiryat Gat to Tarqumia ▬▬▬▬
2. Submerged highway - (architect Giora Shilony) a route based on the channel streams from Karni crossing through the Besor stream, Aduraim stream until El Majed (option 2-1) ▬▬▬▬  
Another alternative south of Beit 'Awa to Tarkomiya (option 2-2) ▬▬▬▬
3. Route of Highway 33 (Landuse) – a route connecting between Karni crossing to the area of Dahari north of Netivot ▬▬▬▬

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## **Appendix B: Engineering Criteria for the Costs Estimation**

1. Designated speed: 110 km/h.
2. Typical cross-section for a two-way road with two lanes on each side. The road has a 15-meter divider, three-meters margins, and security fences as standards require, with the possibility for future expansion.
3. Correct integration of horizontal and vertical cross sections.
4. Suitable structure for traffic load of 50 thousand movements per day, 15% of which are trucks and heavy vehicles.
5. Minimum interface with road and interchange systems.
6. Minimum crossing of existing and planned roads and infrastructure.
7. Crossing of routes and agricultural roads with flyovers.
8. Maximum suitability for drainage system, and bridges and flood culverts of 1:50 years.
9. Isolation from surroundings by digging the route in suitable locations in terms of drainage and establishment of mounds in the filling areas.
10. Integration of the railway route in the cross section (examining the possibility for a track in the middle of the road).
11. Emergency exits in areas adjacent to crossings of existing roads.
12. Minimum damage to nature and landscape values.
13. Minimum damage to existing and planned infrastructure.
14. Minimum pavement assessment.
15. Creating an infrastructure corridor along the road.
16. Maximum distance from built areas.
17. Employing means of noise mitigation if necessary.

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