

**Chapter Fifteen**

**Environmental Quality**

## 15.1 Environmental Policy

From the survey of the environmental conditions in Jerusalem it can be observed that the developmental processes that the city has gone through has brought about a worsening in its environmental conditions. Congested traffic routes, lack of environmental infrastructure and mutual interactions of land uses cause environmental problems: air and noise pollution that are above the norm, treatment that is inadequate for waste products, excess of landfill and building garbage, pollution of water sources in the city and its surroundings, land that has been polluted by sewage, fuels and industrial waste, and 40 % of the city's waste water that is untreated up to accepted standards or without any treatment whatsoever.

On the basis of these findings, the planning team devised environmental policies that integrate a strategy of sustainable development that will be implemented by means of statutory, regulative, economic and social tools, in order to bring about the upgrading of the environmental conditions in the city.

### 15.1.1 Policy Characteristics

The main points of the environmental policy include planning guidelines for various land use designations that will be used by decision makers to achieve the goals and objectives set out in the outline plan. Also, recommendations are made concerning auxiliary tools to planning, and criteria for evaluation of implementation of the goals and objectives set out in the plan.

The environmental policy of the plan includes the following components:

- The definition of intervention means for coming to grips with the environmental weaknesses that are rooted in the difficult economic and urban functional conditions of Jerusalem.
- Guidelines for creating a system for encouraging and providing incentives for sustainable development, including "green building".
- Guidelines for creating within the Municipality service circles for the all urban solution of all kinds of waste, definition of a treatment system for waste that will minimize volumes for land fills and creating a profitable potential for recycling.
- Setting out policies for minimizing pollutants from industry and transportation.
- Guidelines for including environmental policies in detailed building and development plans.

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- Criteria for evaluating implementation of environmental goals and objectives.

## **15.1.2 Means for Intervention**

The means for intervention include:

- Designation of land uses and infrastructure in the infrastructure and environmental quality appendix.
- Environmental regulations in the plan regulations.
- Definition of detailed policy in the chapter "Sustainable Development".

### **A. Designation of land uses for all-urban infrastructure.**

- Deciding on a preferred location for the transfer station for domestic waste and installations for the separation of waste for recycling.
- Deciding of a preferred location for the setting up of a transfer station and recycling installations for landfill surplus and building waste,
- Designation of areas for the parking of trucks that transport dangerous materials and gas and fuel depots.
- Delineating the noise level contours for noise from the Atarot airfield.
- Defining nature zones for the city.

### **B. Integrating environmental regulations with the Plan regulations.**

- Setting up acoustic barriers on roads and residential areas along major traffic arteries and junctions.
- Regulations for the prevention of radiation and noise nuisance, and visual nuisance from high tension electric lines and installations.
- Zoning land uses and setting out limitations in the interface zones between employment and residential zones and in mixed use zones.
- Prevention of nuisances from mixed uses by classification and/or setting out guidelines for the prevention of nuisance.
- Zoning for employment and industrial areas and precincts for pollution industry within employment and industrial zones.

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- Combination of building methods so as to prevent the penetration of ground gas and radon into buildings.
- Minimizing nuisance from dust and noise from building sites.
- Examination of nuisance from winds and shadows from tall buildings, according to accepted climatological criteria.
- Including environmental topics in the regulations of detailed plans according to land use designations.
- Definition of environmental outline criteria for evaluation of detailed plans and environmental requirements in applications for building permits.
- Definition of land uses for which special measures will be necessary for the prevention of land and underground water pollution.
- Setting out regulations for evaluating plans for the urban nature zones.
- Setting out regulations for ensuring seepage of run-off water.

### **C. Planning Policy**

- Giving preference to public transportation and non-motor traffic.
- Integrating transportation planning with physical planning.
- Recommendations for the transfer to clean fuel.
- Comprehensive urban plan for the treatment of waste water and reuse of domestic water, including the waste in the eastern basin.
- Pooling and seepage of surface run-off.
- Water saving.
- Comprehensive plan for minimizing waste and increasing recycling in the city.
- Setting up of municipal service circle for dealing with surplus landfills and building waste.

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- Legislating urban byelaws for industrial effluent bonds and bonds for capital recovery based on type and quantity of effluent.
- Setting up of industrial managements firms for the management of industrial zones in the city.
- Preservation of nature and ecological values and institutionalizing urban nature zones.
- Increasing the stock and diversity of open spaces.
- Devising criteria for green building.
- Setting up a body of knowledge concerning green building in the municipal managerial department.
- Integrating the subject of environmental quality in the neighborhood management centers and public participation as much as possible through them.

### **15.1.3 Strategy for Sustainable Development.**

#### **A. Sustainable Development**

The topic of environmental quality remains high on the public agenda in different ways ever since the early 70's. The struggle against environmental pollution was characterized, at the beginning of the struggle, by attacking the "end of the pipe" from which emanated the pollution.

The concern with the "end of the pipe" has not produced the expected results. The environmental crisis, that expressed itself in the 70's mainly as local phenomena such as pollution of water sources, air basin pollution and acid rain, has become a global crisis expressed in cross border phenomena such as global warming and destruction of bio-diversity.

The struggle with the environmental crisis is complex because environmental problems are direct outcomes of existing production and consumption systems.

Against this background developed the "sustainable development" concept which is the concept that characterizes the present environmental policies. The sustainable development concept proposes integrative thinking and moving away from development at the expense of the ecological system towards development with a balance between social, economic and environmental priorities, and by recognition of the need to preserve the life support systems of the earth.

The literal meaning of sustainable development is the development that can continue to exist, and to continue to grow with time. This is a supportive development that does not harm the natural and social resource base on which it is

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dependent, utilizes the resources at a pace that allows renewal and does not cause irreversible damage that could cause system failure in the future.

The approach of sustainable development suggests learning to live on the "interest" derived from nature without depleting the "capital", and to find ways to manage the public resources in a just manner between all people and not at the expense of the future.

Thousands of local authorities in the world have begun processes to internalize the principles of sustainable development in the management systems of the city. In the context of the outline plan it is recommended to integrate the principles of sustainable development in the future development of Jerusalem.

## **B. Strategy of Sustainable Development for Jerusalem**

In this section there are a number of suggestions for the treatment of the subject of environmental quality in Jerusalem from the viewpoint of sustainable development.

This document is a general document and makes necessary the going into more depth by preparing detailed development plans for the environment as well as other subjects.

Jerusalem, like other cities in the world, suffers from local environmental problems: The air basin is polluted, quantities of waste that makes disposal and treatment by the urban systems difficult, degradation of water sources, pollution of land and water sources by sewage effluents, neglect of the urban environment and others. Furthermore, the environmental impact of the city extends across borders and affects regional systems.

The environmental problems from which Jerusalem suffers, which have been detailed in Report No.2, "Survey of Present Conditions", cause a deterioration of quality of life and hence also the attractiveness of the city. One of the factors in suburbanization and desertion of Jerusalem by well established population is that the quality of life in the city is lower than that offered in the suburbs. One of the sectors in which the city is inferior to the suburb or the rural areas is in the environmental quality of the city. The environmental quality of the city is responsible for loss of resources, economic costs, social costs and health costs.

The application of the strategy of sustainable development in Jerusalem can change the environmental weaknesses from the city suffers, to a lever for strengthening it and for creating attraction factors for a population in search of quality of life and environment.

The following are details of the proposed policy listed by subjects.

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## 15.2 Transportation

### 15.2.1 Background

The economic and demographic increase in Jerusalem and its expression in the transportation system brought about within the last decade increase in the number of vehicles, car parks and traffic routes in the city.

The number of vehicles in the city increases by about 8 % per annum. The average travel speed from the neighborhoods to the city center stands today at 11-14 KPH only, and the average travel speed within the center is only 2-5 KPH.

A research report of the Israeli Institute for Democracy found that if the present trends continue until 2020, there will be an increase of about 11 % in the trips by private vehicles and a drop of about 30 % in the use of public transportation.

The structure of Jerusalem is characterized by hilly topography, large neighborhoods spread out over a large area and by dispersed centers of activity. This structure created large demand for trips from the neighborhoods to employment centers to which is added trips that come from the suburbs of Jerusalem such as Mevaseret, Givat Zeev, Abu Gosh, Beit Nekufa, Har Adar, Modiin, Bet Shemesh, Betar Ilit and Maale Adumin.

The phenomenon of the suburbs and the lack of alternative transportation intensifies the use of private vehicles at a rate in which the increase in private vehicles in Jerusalem cannot keep up with the rate of road development (sic), and traffic congestion is rising above the urban capacity.

Traffic causes high levels of air pollution and also the exposure of many areas to noise from the roads. These conditions are becoming more serious with the rise in the number of trips (number of trips from origin to destination) by private vehicles.

In addition, the increase of pressure on the roads and conditions of congestion bring about degradation of green areas and the destruction of neighborhood patterns due to the widening of roads and paving of roads within the city that already constitute about 30 % of the urban land.

A transportation system that is based to a large extent on the private vehicle constitutes, besides the creation of environmental nuisances, a source for negative processes that include, besides suburbanization, congestion and traffic jams in the main roads, damage to accessibility to employment and commercial zones, waste of energy, waste of time for drivers, deterioration of vehicles and difficulties for development for many areas due to lack of accessibility.

The paving of new roads has been proven to be only a short term solution, which strengthens, in the long term, these negative processes which have been detailed.

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The intensification of traffic pressure as a result of the use of the private car brings about negative results also in economic terms which are due to the failure to internalize the externalities of the use of the private car. These externalities are the economic costs of using the private vehicle which the user, who benefits from the use of the vehicle, does not pay, such as the costs associated with air pollution, noise, congestion and accidents. The costs in these cases fall on other travelers or on the general public.

From research that was carried out in the European Common Market, it appears that it is possible to estimate the external costs of using private vehicles as one percent of the gross domestic product. In order to put things into scale, the costs in Israel were estimated by using data from this research, by multiplying the Israeli GDP by the percentages calculated by the European research.

**Table 1- Yearly costs of environmental problems from the GDP in percentages and millions of shekels.**

<b>Type of Nuisance</b>	<b>Annual costs (% of GDP)</b>	<b>Annual costs (Million shekels)</b>
<b>Air Pollution</b>	<b>0.4 %</b>	<b>2,001</b>
<b>Noise</b>	<b>0.2 %</b>	<b>1,001</b>
<b>Congestion</b>	<b>2.0 %</b>	<b>10,014</b>
<b>Accidents</b>	<b>1.5 %</b>	<b>7,511</b>
<b>Total</b>	<b>4.1 %</b>	<b>20,530</b>

The social costs include the damage to the quality of life as a result of the nuisances from noise as well as health costs resulting from high levels of illness from air pollution and loss of life from accidents.

Epidemiological research shows a clear connection between the level of air pollution and rates of illness and death, and it has been estimated that the air pollution in Israel adds about an additional 1,500 deaths to the death rate per annum.

The continuation of the existing trend to move from travel by public transportation to use of the private car can cause, without intervention, heavy economic, social, health and environmental costs, and to the drop in urban quality of life.

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## 15.2.2 Goals

- Change in the ratio of use of public transport to the use of private vehicles towards preferring public transport, so that it will be able to achieve an equal ration by means of different means of transportation.
- Disruption of the connection between the development of the city and the growth in the transportation infrastructure based on the private car.
- Preservation of air quality and prevention of noise in the city, according to standards and guidelines in spite of the development and the increase in density planned in the outline plan.
- Placing emphasis on accessibility and not mobility and the moving of people from place to place without cars.
- Returning the use of streets (except for those defined as main or arterial) as public space and pedestrians.
- Minimizing the consumption of fuel for transport vehicles in the city, and improving its quality so as to lessen the emission of pollutants into the air.

## 15.2.3 Means for intervention

Most of the means for intervention whose aim was the encouraging of use of public transport were mentioned in Chapter 14 in connection with transportation, which proposes the promotion of the light railway in the city as a main development goal. The means which are outlined below are additions and supplements to that given in Chapter 14.

### **A. Giving preference to public transportation.**

The main tool for solving the problems outline above, that result from the rise in the number of trips, is the encouragement of the use of public transportation. For comparison, one bus relieves from the road 50 drivers and cars at the peak hour, saves 70,000 liters of fuel and nine tons of air pollutants per annum.

The transportation system functions as a frame for urban building and for dispersal of activities in space. The infrastructure for mass transportation will permit the increase in building densities and activities in the public transportation corridors much more than a transportation system based on the private car.

The mass transportation system that is in the stages of planning and execution in Jerusalem is a project that meets the aim that was placed before the planners of giving preference to the public transportation system over the private.

It is suggested that the Municipality will advance the full operation of the planned mass transportation system and will operate it as **a full system with all its routes,**

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already from the first route. This can be done by operating upgraded buses in public transportation routes that will be laid on next to the additional routes needed to complete the first line as a functioning system, which provides service of accessibility to all the sites in the city, and operation of a necessary support system.

Together with the lines of the light railway, it is necessary to operate a support system of buses/minibuses that feed, with joint tickets and “park and ride” car parks with good accessibility (see details in Chapter 14).

The system will include travel priority for public transportation by means of special lanes for public transportation and lanes for planned mass transportation, giving of automatic right of way to buses traveling in these lanes at traffic junctions and the operation of required means of control.

In addition, it is necessary to act to improve the convenience for the users by means of developing normative standards for public transportation that include, for example, raised parking platforms, unified tickets, providing better information of lines and reliability of travel. This action has great importance for travel but also for psychology and behavior, to change habits and move from private to public transport.

### **B. Integrating Transportation Planning with Physical Planning.**

The urban spatial structure is the most important means for shortening travel distances, for functional efficiency, for savings in energy and reduction of pollutants and noise. Nevertheless, it is impossible to plan the spatial distribution with a “clean slate” in Jerusalem, but it is possible to bring about an increase in transportation efficiency to improve the situation.

Together with transportation development plans, it is possible to bring about maximum efficiency in the mass transportation system by increasing the densities of zones in which mass transportation will operate. This kind of planning intervention can contribute to the intensification of use of land in the paths of mass transport on the one hand, and the prevention of the use of private cars on the other.

In order for the public transportation system to be competitive, it is important to concentrate residences and activities along the traffic axes and to limit private vehicles in “Public Transportation Preferred” zones.

In a coordinated transportation and land use policy, it will be possible to include public transportation services in a statutory plan on the one hand, and on the other, to make the proposed building density conditional upon the supply of public transportation available in the area.

Another essential element in a sustainable system is the development of a fast inter-urban rail link. A fast Jerusalem to Tel Aviv train will allow a quick and convenient access to Ben Gurion airport, place Jerusalem in the accessible space

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of the center of the country and connect the towns of Modiin and Bet Shemesh to Jerusalem as a metropolitan center.

### **C. Lowering the profitability of use of private vehicles.**

This concerns the policy whose aim is to increase the cost of using the private car, parallel to improving alternative means of transportation, especially in dense areas. At the urban level, it is possible, by means of parking policy to influence the choice of transportation means, by increasing parking fees in the city center and by defining areas where private parking is forbidden. Under these conditions, the public will prefer public transportation. The parking policy as proposed in the plan significantly lowers the parking standards in the CBD and in Public Transportation Preferred areas, and conforms with the proposed environmental policy (see subject of parking standards in Chapter 14)

In addition it is proposed to carry out a policy of differential parking rates that will discourage long time parking, and limiting the private vehicle traffic by closing off roads so as to decrease the use of parking for commuters. In parallel, it is proposed to develop park and ride areas adjacent to public transportation routes.

In this connection it should be commented that the national wage policy can also contribute to the discouraging of use of private cars by disallowing the advantage to employers in granting cars to employees or payment for cars in lieu of salaries.

### **D. Giving advantage to non-motorized transportation.**

Walking and bicycling are very vulnerable to the negative effects of transportation. A correct policy of land use can be affected by giving preference to non-motorized transport such as planning bicycle routes and pedestrian ways in the city center and in the neighborhoods, subject to analysis of needs and potentials.

The first step in this direction has been taken in the requisitioning of the Master Plan for Bicycle Paths whose main principles have been incorporated into the outline plan (See chapter 2). It is of great importance to carry out the master plan by means of multi-annual development plans, and among other steps, to allocate funds for the implementation of the master plan.

In addition, it is proposed to carry out a conceptual ordering of the urban streets (as opposed to the road network) as suggested by the Ministry of Transport (Traffic Calming Zones-Guidelines, Ministry of Transport, 2002) according to traffic volume. The ordering will create a hierarchy of urban streets as follows: Central Axes, Arterial roads, Commercial and Neighborhood roads and Pedestrian roads.

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It is proposed to define a street section that is appropriate and friendly to the user at all levels of the hierarchy, by means of traffic variables (traffic volume, speed, necessary means for traffic calming) according to the environmental climate desired (noisy, air pollution, safety, appearance, preferred use), and to decide on means for creating desired traffic variables by means of signs, use of traffic calming methods etc.) . In parallel it is necessary to use additional means to change the road space to a public space.

It is recommended to intensify the use of multi-level planning to separate pedestrian and non-motorized traffic from vehicular traffic and parking, by using the underground for traffic and parking, and by demanding extensive economic analysis that internalizes the external costs of land use. For this purpose, it is necessary to promote the legislation concerning the use of air rights and reserving options in the renting of underground space.

It is recommended to promote the institutionalization of a communications system (Intelligent City) to lower the trips on the roads and to encourage the setting up of employment buildings “close to home”. The first step in the implementation of this idea is the definition of regulations in the outline plan that allow the laying down of a central piped network for cable communications that is not Bezeq communications within the path of roadways.

The proposed means to encourage non-motorized transport, together with the preferential treatment of public transportation, go to serve, besides other goals, the goal of reducing the total consumption of fuel for transportation in the city.

### **E. Use of Clean Fuel**

The analysis of data from traffic monitoring stations indicate that vehicles powered by diesel fuel are mainly responsible for the major part of carbon monoxide and particle emissions which are considered to be the most problematic and dangerous air pollutants. Public transportation in Jerusalem, which is powered by diesel fuel, is one of the contributing agents to these findings.

The light railway, since it is clean and powered by electricity, is forecasted to reduce significantly the level of air pollution in the areas through which it is planned to pass. Therefore the development of this means of transportation should be speeded up also for extra lines. These additional lines, according to the recommendations of the planning team, will also serve other ends (see Chapter 14).

Moreover, it is proposed to insist on the use of “urban fuel”, gas and electricity for public transportation. This task is a national task that requires action from the relevant governmental ministries to encourage the supply of low-sulphur diesel fuel and other clean fuels, and to set proper conditions for tenders for public transportation (the concession for Egged is due to expire in Jerusalem in 2009). A possible action by the Municipality is the legislation of an urban bye-law that insists on the use of low-sulphur diesel fuel, gas and electricity for public transportation in the city

## 15.3 Water and Waste Water.

### 15.3.1 Background

#### A. Lack of clean water

The increase in population and the change in life habits have brought about the increase in the water consumption in the city. On the other hand we are faced with an increasing scarcity of water sources emanating from the series of dry years and lack of an efficient system for managing water resources. The water economy in Israel has been for over 30 years in deep and continuing crisis, this is expressed in the depletion of water sources up to the point of a cumulative deficit of about 2 billion cubic meters in the natural water reservoirs of the country. The amount of water reaching the sweet water reservoirs add up to about 1.8 billion cubic meters per annum. The water consumption on the other hand, reaches 2.05 billion cubic meters. The urban water consumption during the last decade of the 20<sup>th</sup> century is characterized by a constant and sharp upward growth (every year adds 30 -40 million liters per annum) as a result of population growth and increase of per capita water consumption.

In order to find solutions to the problem of water scarcity, the government instituted an investigative commission for the water economy. In May 2002 the commission proposed to announce a national emergency in the water economy. Among the rest of the proposals for solving the problem of water scarcity, a proposal was submitted whereby the Water Commissioner would agree to command the local authorities to encourage wasteful watering of gardens to gardening more appropriate to the conditions of the country.

One of the solutions to the problem of scarcity raised by the water commissioner is to stop water to public gardens. This draconian suggestion that comes up from time to time among those dealing with this problem reinforces the need for planning for the watering of public gardens by water that is not clean water.

While drinking water has to meet strict health standards, it is possible to use for gardening, water of lower quality. Purified waste water is one of the available sources for increasing the potential of water for watering needs. The amount of waste water that is produced daily is almost unvarying and is not dependent on the seasons. Urban sewage contains more than 99.5 % water. Under accepted purification processes that are relatively simple [it is possible] to bring sanitary sewage-on condition that it does not contain acids, heavy metals, residues of pesticides and industrial chemicals-to a level that that is suitable for irrigation. In addition, in waste water there are nutrients that are essential for plants, and its use could lessen the need for fertilizers, on condition that that the soil is monitored for quality and the presence of nitrogen.

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The Jerusalem Municipality uses about a million cubic meters of water for the irrigation of public open spaces. A large quantity is also used for private open spaces such as university campuses and medical centers, zoological gardens and botanical gardens. Every cubic meter of clean water that can be saved without causing harm to the quality of gardens in the city will improve the urban water balance.

It should be noted that the real costs of water have not been converted into present prices for various reasons and are therefore on the low side. With the operation of the water purification systems the cost of clean water and the profitability of water saving, and the operation of purification systems for recycling waste water will become higher.

### **B. Partial treatment of waste water.**

The waste water of the western watershed basin is treated in the western Wastewater Purification plant, the treated wastewater of the plant flows through Nahal Sorek and is used for agriculture down stream. The wastewaters of the eastern watershed basin, on the contrary, are partly untreated and partly treated at an unacceptable level.

The wastewaters of the south-eastern city, that represent about 25 % of the wastewater produced by the city, flow as raw sewage to the Kidron stream. In the area of exit of the stream, this water receives supplementary treatment to the natural treatment that it receives as it flows through the stream and is utilized to a large extent by agriculture. In this watershed there is serious health and environmental nuisance due to the flow of raw sewage in the stream.

The wastewater of the northeastern city constitutes about 15 % of the wastewater produced by the city and receives primary treatment at the Mishor Adumim area (Hazma), partial primary and secondary treatment at north Dead Sea rift, and flow into reservoirs (supplementary treatment) and utilization by agriculture.

Beyond the environmental aspects, the significance of untreated sewage flowing beyond the borders of the city is that a source of water that is an urban resource is lost which could have been used or sold. It should be noted that the plan for a purification plant for wastewater treatment for the Haug basin is in an advanced planning stage.

### **C. Depletion of seepage areas for groundwater.**

Urban activity besides its status as a water consumer, brings about the depletion of the water table in the mountain aquifer area due to the blocking of seepage areas for rainwater runoff.

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Built-up areas of the city decrease to a large extent the replenishing of groundwater by rainwater, because of the decrease in the available seepage area for water, from the surface to deep underground. Urban building causes more and more urban land that used to be available for surface water to seep underground to become covered by buildings, or paved over by concrete, roads and parking lots. As a result water does not seep but collects above ground and is channeled into drainage systems and is lost to the sea. In especially rainy years, this phenomenon can get completely out of hand and besides the loss of the water can cause great damage due to flooding.

The paving of land with impermeable surfaces causes the loss of water that replenishes the aquifer. Research carried out in Jerusalem has found that the ratio of rainfall level to the runoff level is 20 % compared to the acceptable ration of 4 % in open spaces.<sup>1</sup>

The loss of seepage due to paving of land can reach 70,000- 240,000 cubic meters per annum for every square kilometer of built-up urban land.<sup>2</sup> The treatment of runoff water in development areas in the city can alleviate the negative effects of the urban building on the water table. For this purpose it is necessary to ensure collection of rainwater without channeling it to the drainage system. Research in this subject has found that channeling rooftop runoff into courtyards, gardens and open spaces could reduce the water losses by 25,000-75,000 cubic meters per square kilometer of built-up area.

The quality of rooftop water from cement or tiled roofs is very high and is appropriate for inserting into the groundwater. The runoff water from sidewalks and even neighborhood streets is of sufficiently high quality for insertion. Furthermore, the insertion of rainwater and/or its collection reduces the danger and damages from flooding, erosion and destruction of infrastructure systems, and investment in expensive drainage systems.

### 15.3.2 Goals

- Creation of a vital interface between the city and the natural water system.
- Providing an answer for the water needs of all uses in the city without damaging the existence of the natural hydrological cycle.
- Preservation of the water resources- their quality and quantity.
- Treatment of and recycling of all effluents of the city.
- Preservation of public health.

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<sup>1</sup> The Strengthening of Flows in Nahal Sorek as a result of widening Jerusalem, by Ziger Eyal, Water and Irrigation, 396, 1999

<sup>2</sup> Urban Planning sensitive to Water: Preservation of the Israeli Coastal Aquifer, by Naomi Carmon and Uri Shamir. 1997

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## **15.3.3. Means for Intervention**

The municipality must realize that wastewater is a resource that needs to be exploited by means of operative acts in the area of treatment of wastewater and the reuse of treated water.

The release of sewage into the environment damages soil and water resources and constitutes a health hazard. On the other hand, treated sewage water is a water resource that can be used for agriculture, irrigation of urban open spaces or recycled to nature.

In parallel, it must be recognized that urban runoffs are not nuisances that must be gotten rid of as soon as possible, but are a source of quality water for replenishing the underground water or for other purposes. The treatment of runoff water should be the slowing down of the water flow by various measures and not its speeding up.

### **A. Plan for conserving clean water for irrigation.**

A comprehensive urban plan should be prepared for conserving clean water for irrigation. The plan will include:

- A survey of the urban garden areas, including parks and planned gardens and the search for quantities of water needed to irrigate every garden according to its size and flora.
- Search for areas within metropolitan parks for setting up of compact water treatment plants for irrigation.
- Examination of possibilities of water savings and possibilities of use of grey water/ treated water/ runoff extraction for irrigation.
- New gardens, and as far as possible, existing gardens will be planted with flora that is water saving, local flora such as trees and shrubs.

**It is to be noted that at this stage, compact installations for treatment of wastewater and the use of treated wastewater for irrigation of urban gardens is not consistent with the policies of the Ministry of Environmental Quality and the Ministry of Health.**

### **B. Setting Guidelines for seepage of unpolluted runoff water into the ground.**

Every plan for an urban precinct that includes 200 dwelling units or more will be required to submit a plan for the conservation of runoff water and its seepage

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underground, within the precinct, adjacent to it or in the continuation of the watershed, or turning it to other uses. Within this detailed plan will be included a drainage appendix that will be among the documents for deposit. The plan will take into consideration the details that have been published by the Ministry of Housing and Building and will include the following:

- Mention of the catchment and drainage basins, above the plan area, below the plan area and the neighboring catchment basins.
- Guideline for the routing of rainwater runoffs into seepage areas or collection areas and the determination of the size of the area that will remain without impermeable covering for seepage of runoffs.
- Statutory preservation of public areas for the absorption of runoffs from areas above the plan which are not available for absorbing the water.

Guidelines and recommendations for maintaining the area slated for seepage of surface runoff.

### **C. Encouragement of Water Saving.**

- Maintenance of the urban pipes in order to prevent leakages.
- Treatment of industrial wastewater so that it can be recycled.
- Education and Propaganda Plan for encouraging water savings in the public and domestic sectors.
- Examining the possibility of using grey water for irrigation of private gardens.
- Requirement for installation of a water saving device (Devices with a Standards Blue Sign) as a part of the completion license. This requirement shall be an inseparable part of every urban contract including the contracts of subsidiary companies of the municipality.

## **15.4 Waste**

### **15.4.1 Domestic waste.**

The increasing use of consumer products, that become waste products as soon as they are used, cause depletion of natural resources and damage to ecological systems. The strategy of sustainable development on the subject of waste includes the efficient use

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of resources, change of consumer habits, drop in production of waste and change of the waste composition into degradable or recyclable materials.

In the municipal arena, the waste collection and disposal unit deals with the problems of increase in the amount of waste gathered for earth fill, filling of sidewalks with containers for collection, increase in trips to the fill site, congestion of the fill site and consumption of urban economic resources becoming larger and larger.

It should be noted that the waste fill site that services Jerusalem, in Abu Dis, is not built according to environmental standards, and the site is expected to reach its full capacity in the near future.

In Jerusalem and the nearby area, there is today no recycling installation that is capable of handling recyclable waste. The Health department of the municipality disposes of about 1000 tons of waste per day, at a cost of \$10 per ton of waste. In the next two decades a three fold increase in waste quantity is expected.

The major portion of the waste produced in Jerusalem is disposed of in landfill (96.5%) due to lack of recycling infrastructure and also because besides other factors, the cost of waste landfill in Abu Dis is cheaper than setting up treatment and recycling installations. Here also the cost of landfill does not reflect the full costs of treatment of the waste and the damages that are caused. The external costs of the treatment of the waste includes the environmental nuisances that are caused by the disposing system and the landfill such as pollution of the soil and underground water, air pollution, damage to water, air and land resources, from the body of waste and the occupation of the landfill site.

The policy of the Ministry of Environmental Quality is to bring about the minimization of the use of landfill waste management by means of reuse and recycling. The Ministry hopes to achieve this by imposing a tax on the waste for landfill to be collected at the entrance to the site. The tax will increase the cost of landfill waste disposal and make it more profitable to decrease the quantities brought to the site, and therefore should be adopted.

It should be noted that the Jerusalem Municipality carried out an examination of the costs of disposing of waste for recycling and found that the cost of recycling was \$ 18 per ton at the Transfer station of Atarot.

It is still not clear what the costs of disposal per ton of waste at the new landfill site at Mishor Adumim, but there is no doubt that the larger distances of transport, the environmental standards that the site will have to keep and the landfill tax that may be applied, will bring about an increase in the cost of landfill higher than today's.

### **15.4.2 Dirt and building waste.**

The site for dumping of urban dirt is located in the east. The city does not have a special site for the dumping of building waste and this kind of waste is diverted to Abu Dis or Haruvit. The many available and hidden sites for the illegal dumping of building waste and dirt and lack of institutionalized urban inspection system for

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control of building waste and dirt, encourage the uncontrolled dumping of waste and earth in open spaces in all parts of the city. This dumping of waste causes damage to natural resources, destruction of open spaces, visual nuisances, and air and soil pollution. Beyond the environmental and landscape problems, the uncontrolled dumping of dirt and waste cause the depletion of resources that is expressed in waste of land resources. This phenomenon requires the tightening up of the enforcement procedures to catch the offenders of waste dumping, maintenance of inspection vehicles and action to clean up polluted areas.

### 15.4.3 Goals

- Reduction of the quantity of waste that is sent to landfills.
- Use of waste as a resource. Transforming waste into raw material that returns to the economic system.
- Setting up of treatment circles for the treatment of waste in the city, managed by the Municipality with the participation of citizens and the business sector.
- Reduction of the earth, dirt and building waste that is transported to landfills.
- Prevention of uncontrolled dumping of earth, dirt and building waste in the areas of Jerusalem and its surroundings.

### 15.4.4 Means for intervention.

#### **A. Domestic waste.**

First of all, what is needed is the recognition that waste is an urban resource that requires devising a directed plan for transforming it into a desirable product. The setting up of an entire system for the treatment of waste must be considered. The goals of this system are to decrease the quantities of landfill directed waste and creating the profitability of recycling by reduction/ separation/ recycling/ landfill only at sites predetermined by recycling law, and the recycling of 25 % of the urban waste by the year 2007. It should be noted that this goal is a modest goal since in certain cities of the world a figure of 60 % of the waste has been achieved.

#### **B. Plan for the increase of recycling in the city.**

An urban plan shall be prepared, according to the guidelines detailed below. The goal of the plan is to set up a system for reduction/ separation/ recycling/ landfill that will enable the implementation of reduction and recycling. The proposed plan is a comprehensive integrated plan that includes physical planning, setting up of an arrangement for managing and disposing of waste and educating and publicity to encourage separation of waste and its recycling.

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The plan for the treatment of waste which will be defined as a development plan, will define stages for implementing the plans for recycling which are prepared from time to time.

The plan includes the following components:

- **Centers for separation and recycling within commercial and industrial centers-** In these centers areas will be set aside for placing containers for separating the waste and tools for shredding and compacting cartons for recycling. The issue of separation of cartons in businesses will be arranged by means of an urban bye-law.
- **Neighborhood Recycling Centers-** In every neighborhood there will be an integrated separation and recycling center. This center can be integrated into the neighborhood shopping center, community center or to any other convenient place.
- The separation and recycling centers will be modular. The type and quantity of the containers that will be placed in them will vary according to the needs of the market.
- The sizes and locations of the separation and recycling centers will be determined in the master plan that will be prepared for this purpose.
- It is proposed that the separation and recycling centers will be operated by the community management organizations.
- In an area in which there are a lot of offices (city center) there will be an arrangement for the collection of white paper, which can be based on containers for the intra-office collection, or containers for collection at public spaces.
- **Separation and Recycling Centers in schools.-** Space should be allotted for installing separation and recycling centers. The installation of the containers should be coordinated with an education program for recycling. Centers for collecting **unconventional waste** -2-3 containers in which to collect: electronic equipment, domestic appliances and leftovers of small business firms.
- **Recycling Storage Depot.** – A covered structure, a give-and-take (flea) market for reusable items.

### C. Treatment of organic waste.

Organic waste constitutes about 40 % of the urban waste, hence its removal from the waste cycle by means of recycling can lead to appreciable savings in the amount of waste disposed of by landfill.

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The separation of organic waste for recycling will be integrating the following steps:

Separation at origin- separation of the waste flow into wet and dry at the origin. This method requires setting up of garbage rooms whose sizes are large enough to allow entrance of two garbage containers for collection. The separation of garbage flows is in accordance with the new policy of the municipality that demands infrastructure for separation in all new building plans.

Separation at intermediate stations- At intermediate stations provided for in the infrastructure appendix, there will be set up classification centers for separating organic waste for further treatment.

Organic waste can be recycled in a number of ways- composting, which reduces the weight of the waste by about 50 % and transforms it into fertilizer; anaerobic treatment, or EFM (Energy from Waste) installations that create energy from waste by burning. It should be noted that EFM installations are an accepted method of treatment but their setting up is complicated by objections from those living nearby, and by the complexity of treatment necessary to prevent the emanation of poisonous gases that are by-products of combustion in the installations.

The disposal of the residue waste will be to district/ national landfill sites.

### **Collection of garden waste.**

The municipality will operate a system of collecting garden waste and its mulching as part of a composting scheme or for covering of municipal and private gardens.

### **Collection of used tires from garages.**

Guidelines will be set down for the arrangement of collection of old tires from garages in order to send them for recycling.

### **D. Dirt and building waste surpluses.**

It must be recognized that the surplus of dirt and waste earth is a resource that brings many environmental and economical advantages in the wake of its proper treatment.

The prevention of nuisances caused by uncontrolled dumping will be carried out by setting up a circle of service in the municipality for the treatment of dirt and building waste surpluses, with an overall view to a complete separation and recycling treatment as far as possible, without the need for landfill. Nevertheless, a district level site for landfill should be set up that can be used for landfill of dirt

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and building refuse since an appropriate site for this purpose within the municipal limits has not been found.

The plan includes the following components:

- Setting up of a data base of excavation and landfill plans and completing and managing a recycling of regional dirt surplus exchange (bourse) that will include Maale Adumim and the Mateh Yehuda region.
- For all building permits in an area in which the bedrock is found suitable, the possibility of recycling the stone by grinding it for use in building will be investigated, so as to avoid disposing of the waste in unplanned dumping sites and uncontrolled dumping, subject to carrying out measures for the avoidance of nuisances.
- Action should be taken to set up an arrangement for the disposal of waste which will permit close supervision for orderly disposal. It is proposed, among others, to base this arrangement on “Deposit-Refund”, in other words, every initiator will be required to deposit the costs of waste disposal (that is not suitable for recycling), and this deposit will be refunded according to the number of trucks that arrive at the landfill /intermediate site. This method requires an orderly and supervised landfill site and municipal financial management of waste disposal processes.

## **15.5 Industry and Employment.**

### **15.5.1 Background**

Industry harms natural systems by the consumption of fuel and raw material, by the production of goods which at the end of their life are not absorbed into the ecological system, and by the discharge of by-products of production processes into natural systems.

The industrial areas of Jerusalem are potential sources of polluting discharges and salts from industrial processes into the urban sewage system, discharge of air pollutants into the atmosphere due to production processes using fuels, and production of industrial waste and dangerous waste. In addition, the dangerous material that is used in industry can cause, in case of accidents, danger to the adjoining area and to the environment.

The use of natural resources and external infrastructure that is present in industrial areas, including the disposal of problematic waste water into the sewage piped system and discharge of pollutants into the atmosphere are not internalized as part of the production process. Accordingly, the treatment of waste water and its disposal, air

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pollution, creation of noise and environmental hazards are not components that demand urban or national investments.

The degraded quality of the effluents originating in the flows of untreated industrial wastes has caused in the past, disruption in the processes of the purification plant and the spillover of wastes due to their low quality that prevented their proper treatment. This spillover has caused environmental damage. The flows of untreated wastewater can cause damage to the wastewater carrying pipes and to soil and water pollution.

In the system of sewage rates as operated today, polluting industries do not pay the full cost of damages caused by their wastes and are subsidized by other waste producers. The by-product of this situation is the causing of overloading the purification plant, often above its maximum capacity.

The main problem of wastewater is concentrated in the industrial area of Har Hotzvim in which are located factories with characteristics of chemical factories, and in the industrial zone of Atarot where the traditional industries are located.

Another polluting activity is the activity of small business such as garages, paint shops, electronic and coating firms dispersed in different industrial areas also in areas defined as High- Tech, such as the Technological park. These create odor nuisances and pollution, nuisances to other industrial uses and environmental hazards due to discharge of dangerous substances.

The proximity of industrial areas to residential zones and the planned increase of building density of the outline plan raise the necessity of means for the minimization of hazards and decreasing the radii of nuisances and potential environmental damage.

The achievement of the goal of "Living together" of the industrial area that operates close to a residential area and of different types of industries that operate in the same area, is dependent on the ability to prevent and minimize the accidents and potential hazards, and on orderly work for continuous improvements in the field of environment quality.

The subject of "working close to home" that is proposed in the plan, according to which employment in the residential areas is encouraged, necessitates a strict consideration of the prevention of nuisances, accidents and potential hazards from employment activity.

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## 15.5.2 Goals and Objectives

Goals	Objectives
Prevention of environmental danger from use of hazardous materials	Decrease of overall quantity of hazardous material stored in the city Use of alternative non-hazardous materials or of a lower danger level.
Upgrading of the treatment of solid waste	Creating separation and recycling in every firm Organizing separation and recycling as a coordinate effort in every area and industry. Definition of recycling goals in industrial zones as part of the urban recycling goals. Encouraging the use of low refuse technologies and packaging materials that easily disintegrate as waste. Decreasing the use of materials that produce resistant or toxic waste.
Prevention and lowering of air pollution.	Changing to use of clean fuels. Decrease of emissions of air pollutants.
Safeguarding of water as a scarce national resource.	Encouragement of reuse of water. Changing to air cooling in air conditioning systems. Prevention of saltiness of water by among others, the use of environmental technologies for water softening. Reducing the use of chemicals for the treatment of wastewater. Prevention of discharge of heavy metals, brine and materials that do not disintegrate in the purification process of the sewage system.
Upgrading the design and visual quality of industrial, commercial and workshop areas.	Upgrading the design and visual quality of industrial, commercial and workshop areas while emphasizing their integration into space, environment and community.
Minimization of negative environmental impacts as a result of routine activity.	Development of a monitoring and control system. Environmental management of factories and industrial zones. Efficiency of use of energy and raw material. Setting up of environmental infrastructure in industrial zones Management of the interface lines between industrial zones and residential areas.

## 15.5.3 Means for intervention.

### A. Setting criteria, legislation and enforcement.

#### Wastewater

The recommended approach is for the Municipality to act in such a way that the factories will pay the full costs of treatment for the wastewater that they produce.

A bye-law is being prepared in the Ministry of the Interior that deals with an industrial waste tax and a capital returns tax according to quantity of wastewater, and it is recommended that this law be adopted as a municipal bye-law. The bye-law is based on Government decision No.4208 of 12.8.98 concerning implementation of differential rates for industrial sewage.

The rate for industrial wastewater expresses the following principle- every factory will pay the rate for every cubic meter of wastewater from the factory, according to the concentration of pollutants in the wastewater and the complexity of required treatment.

An additional section of the bye-law deals with the capital returns rate according to the following principle- Every factory will pay the capital returns rate for every cubic meter of wastewater of the factory according to the concentration of pollutants in the wastewater. The rate will be paid until the investment in the treatment infrastructure has been recovered.

The adoption of this law will provide incentive for factories to reduce the pollution load by wastewater that is discharged into the drainage system and will permit the management of the wastes economy including the permit or restriction of discharge of wastewater into the drainage system subject to the ability of treatment of the purification plant and to the effects of this discharge as stated.

It is to be noted that in the treatment process for wastewater there are pollutants that cannot be treated and their discharge must be prevented (such as brine or heavy metals, above normal concentrations).

#### Air Pollution

In the subject of discharge of pollutants into the air, the factories are required to employ the best available technology and to remain within the standards of air discharge of the Ministry of Environmental Quality.

Among others, it is possible to demand the use of diesel fuel, gas or electricity.

The municipality should ensure, by means of monitoring and carrying out actions according to need, that the air basin of the city does not deviate from the desired quality according to the environmental standards that were adopted by the Ministry of Environmental Quality.

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## **Classification of Trades**

In order to permit employment “close to home” without creating environmental nuisances and hazards to the residential areas, it is proposed to implement a procedure of classifying trades that may be carried out in a residential neighborhood, while placing environmental restrictions. The classification procedure includes permitted land uses and a procedure for examination so as to prevent nuisances of air pollution, odors, noise, vibrations, hazards from dangerous material and industrial waste. In addition, the classification procedure also relates to the prevention of nuisances that result from transport activity originating from public reception and loading and unloading of raw material and products.

## **Enforcement**

In order to implement the above, an efficient municipal monitoring and inspection system should be set up on the one hand, and on the other to raise the fines for deviations.

## **B. Setting Up Management Frameworks.**

Part of the environmental problems of the industries in Jerusalem emanate from the difficulties that the municipality has in enforcing the conditions of the permit and the law. The setting up of industrial management centers for every industrial area in the city will permit the creation of mechanisms for management, inspection and enforcement that will decrease the environmental impacts of these areas.

The body that is proposed to be responsible for the industrial management centers in Jerusalem is the Jerusalem Development Authority who can aid the Environmental Quality Department in the Municipality in the process of managing the monitoring and control.

The industrial management centers will be responsible for the overall management of the industrial zone, including environmental management as well as implementation of an advanced environmental management system.

The goal of advanced environmental management is the setting up of an environmental management system in order to achieve continual improvements in the overall balance of the environmental aspects in every industrial zone, above and beyond the basic duty of complying with the requirements of the law for the quality of the environment.

The management of the industrial zones will attempt to restructure the factories towards “Clean Production”. Clean Production is an environmental management approach that includes prevention of pollution at source and the reduction of waste of all kinds, as an alternative to the approach of treating the pollution and the waste after they are already produced, the “End of Pipe” approach.

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This approach was developed in the world during the 80's and the 90's in parallel to the environmental self-management systems that were adopted in the business sector, such as the International Standard ISO 14000. Many centers of "clean production" were set up all over the world and operate under the auspices of the UN organizations UNIDO and UNEP or by independent frameworks.

"Clean Production" is implemented in processes, products and services related to the products:

In processes- Efficient utilization of raw materials, energy and water; disposal of toxic raw materials or decreasing their toxicity; decreasing the toxicity of waste.

In products- The goal of Clean Production is decrease and to prevent as much as possible environmental problems along the entire life cycle of the product, beginning with the raw material and the production process, including the use of the product by the consumer and finally in its disposal.

In services- "Clean Production" adopts environmental considerations in the planning and development of services provided to the product.

The industrial management centers will deal with the following issues:

- Control of routine operations of all the factories in the zone in order to prevent environmental disturbances and nuisances.
- Introduction of checks for environmental management (possible within ISO 14000) and the institution of sustainable development policy in the industrial zone with the cooperation of the factories.
- Creation of cooperation between the different businesses operating in the zone, for the achievement of defined environmental goals (separation of waste and recycling, minimizing concentrations and events of hazardous materials etc.).
- Guidelines for the local treatment of industrial factory discharges so as to prevent damage to the municipal system.
- Devising guidelines for minimizing the range of danger from hazardous materials and guidelines for factories and businesses that use and store these materials so as to avoid accidents.
- Devising guidelines for the shift to clean fuel, efficient use of energy and decrease of discharge of pollutants into the air.
- Zoning, classification of land uses and restrictions on the use of hazardous materials in the contact areas with residential and mixed zones.

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- Upgrading and treatment of design and visual appearance of the industrial zone among other, by gardens, cleaning up and preserving a proper appearance of the businesses and factories in the area.
- Encouragement of the use of the “Materials and Waste Table” of the Ministry of Environmental Quality and Industrialists Association, with the aim of promoting the use of the waste of one factory as a raw material for another.

The above table includes two lists: **Demand List**, in which the materials needed by some factories as raw material for its production process or recycling, and a **Supply List**, that includes materials or wastes that can be used as raw materials and which the factory is interested in finding an appropriate environmental solution.

The table includes raw material leftovers, refuse from the production process, empty containers, by-products and so on, including solid waste (plastics, paper, metals, glass, wood etc.,) and hazardous waste (including materials that are disposed of today in the waste treatment plant at Ramat Hovav).

In order to implement this approach, it is necessary to set up the industrial management centers as an independent body in terms of budgeting and having defined management authority.

## 15.6 Open Spaces

### 15.6.1 Background

The supply of open spaces is one of the factors in deciding on the quality of life in the city. Without the existence of proper public open space, the attractiveness of life in the city will diminish. During the last years, the public demand for this in this country has increased. This is expressed, among others, in the craving for living in green areas having good environmental quality, and which causes the demand for attached dwelling units outside the city and the phenomenon of suburbanization at the expense of open spaces.

In the question of open spaces we are witnessing a situation of market failure in the internalization of their economic value. Their value is not accurately expressed in the mechanisms of the market.

If this trend continues, the building in open spaces under conditions of non-interference will reach proportions in which the land reserves will be diminished and the demand will rise to high peaks. Furthermore, the value of open spaces in the land market ignores the social benefits attached to them and their value to flora and fauna systems, their value for recreation in nature and their environmental importance. Urban open spaces, outside the built-up areas and within them, have many functions and they have to be evaluated in a multi-dimensional way. Above their function as generators of character and identity from place to place for recreation, entertainment and rest for the public, the open spaces have great importance for the existence of

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natural ecological systems. Thanks to the ecological services of the open spaces our essential life systems continue to exist.

Different ecological services such as soil creation and prevention of erosion, preservation of water and improving its quality, control of atmospheric gases, promotion of plant life and existence of bio-diversity, are essential for our existence on this planet.

In accepted economics there is a tendency to relate to the various ecological services as free services. However, their economic contribution is tremendous and is experienced when that “free service” stops suddenly for various reasons (for example when there is an urgent need for sea water purification due to pollution of natural water sources).

As the size of population increases, so also increases the demand for quality open spaces that will answer to the physical and spiritual needs of the citizens. The pressures of development and a one-dimensional view of open spaces, bring about the allocation of land low quality land for open space in and outside the city. Accordingly, we are witnessing urban plans that designate areas as open space which cannot serve the public. Steep slopes and deteriorated environmental conditions which bar these areas for residential use also make it difficult to develop these areas as public open spaces.

## **15.6.2 Goals**

- Conceiving of the city as an ecological living space and preservation of open spaces and their ecological value in the city and in its surroundings.
- The creation of a “green skeleton” and “green envelope” for the city, reducing the gradual depletion of open spaces, and developing a range of green spaces at the local and urban levels (see in this connection Chapter 2).
- Joining nature to the urban tissue and improving the nature properties and building properties in the urban environment so that both can continue to exist in a common life space.
- Multi goal utilization of open spaces in the city for everyday activities of recreation, appearance, living spaces for animals and agriculture.
- Recognition of the value of open space as property needed to build the city.

## **15.6.3 Means for intervention**

The preservation of open spaces for landscape needs, views to the city and activities of recreation and leisure have been dealt with in Chapter 2-Open Spaces. In this

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section, additional means are described which deal in particular with the ecological functions of open spaces.

## **A. Preservation of nature and ecological values.**

Definition of open spaces with special nature values that are anchored in “urban nature” sites. In these sites there will be implemented controlled development so as to ensure that the diversity of flora and fauna in them is preserved and the ecological system will be preserved for all time. Areas and sites in the city defined to be “urban nature” sites are mapped in the Open Space appendix.

As part of the planning guidelines in the subject of urban nature there will be a catalog created that shows the stock of these sites, their natural value and their integration into the planning zones.

This method, which is used in various European cities (London, Birmingham, Barcelona...) allows for the preservation of unique values in the city and presents to the public a wide range of activities which otherwise would not be available for them in the city.

One of the ways to protect open spaces, especially the urban nature sites which are often viewed by some of the public as undeveloped areas, is to create a mechanism of communities that adopt open areas in their neighborhood, with the cooperation of the community management centers, for the preservation and guarding of open spaces against harm, illegal development, uncontrolled dumping of refuse, and for keeping up maintenance.

The nature sites will be made accessible to the public.

Passage of animals will be preserved so as to ensure the preservation of the connection between the population groups of different species of animals.

## **B. Increasing the stock of open spaces.**

The use of built-up areas for increasing the quantity of open spaces- gardens on the roofs of engineering installations, upgrading and improvement of marginal and deserted areas, etc.

Designation of underground uses mainly for infrastructure installations and other uses which are not sensitive to daylight, as far as possible, without eliminating the function of the open space as seepage area for runoff and other ecological systems.

Multiple uses of open spaces for different needs including landscape, appearance, leisure and recreation, urban nature, agriculture, urban events that do not need fixed installations, youth activities etc.

Preservation of field crops and orchards in the city and allocating recycled water for urban agriculture.

## **15.7 Green Building**

### **15.7.1 Background**

Green building is directed to the maximum exploitation of energy and adaptation to climatic conditions, prevention of depletion of natural resources, recycling, and use of materials that can be recycled. Hence the negative impact of green building on the environment is lessened. Green building also deals with the convenience of the user and his health, by means of increasing natural lighting, natural ventilation, and the avoidance of use of hazardous materials in the building accessories. In the overall calculations of the costs of building and maintenance, one must take into account the entire range of economic and ecological factors of the building alternatives, such as external costs originating in the depletion of resources, waste of energy in excavation, transportation and production of materials etc. Green planning is planning in which decisions are based on criteria whose purpose is the management of building and maintenance resources so as to achieve environmental, social and economic benefit in the long run.

Green building requires early comprehensive planning that includes the different building elements, from the quality of the exterior space of the buildings to details in the working plans. Solutions that green building calls for can often add to the cost of building. However the economic decisions are based on managing building resources beyond the problem of erecting the building, and there are economic benefits that arise from green building, from routine maintenance costs that are lower for the individual, the local authority and the national economy.

In order to encourage the improvement in the quality of life in the built environment, there is a need for promotion and encouraging quality of dwelling by means of, among others, green components, especially in areas of high density where the profitability is higher.

The attention to the green components of building should be given at the early planning stages of the neighborhood, building site and buildings.

### **15.7.2 Goals**

- Upgrading the quality of the built environment in Jerusalem
- Lowering the consumption of resources and efficiency of use of resources in the production and preservation of the built infrastructure.
- Savings in use of water and energy
- Integration of building into the environment.

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- Promotion of “green” spaces.
- Best use of land in environmental, social and economic aspects.

## 15.7.3 Means for intervention

The municipality will invest in local knowledge in the subject of green building within the urban management system. Plans which are defined as green plans will receive special attention in their statutory promotion.

### A. Principles for the Building of Green Buildings.

Buildings will be defined as green buildings if they comply with regulations Israel Standards 5281- Buildings whose damage to the environment is decreased (green Buildings), which are now at a stage of final approval, or by equivalent standards regulations.

The following elements will we integrated into green buildings:

Variable	Requirement
Energy	Use of local climate for heating, cooling and lighting, and as a result the reduction of the non-renewable energy of the building by: Orientation of the building so as to receive passive heating and cooling and natural lighting, planning of building details (thermal insulation, openings, air circulation, shading, solar heat equipment etc.), planning of natural lighting: planning of heating and cooling system of the building: planning of water heating system and other systems for the use of non-renewable energy sources.
Water and Wastewater	
Water	Installation of means for the reduction of water consumption
Wastewater	Existence of infrastructure for separation of grey water. Existence of equipment for treatment of grey water Existence of final infrastructure for purification of wastewater.
Waste	Area for separate collection of waste for recycling or other means for separation of waste for recycling. Means for reduction of quantities of building waste and dirt and for their recycling.

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Existence of final infrastructure for recycling such as transforming organic waste into compost, use of cuttings for covering gardens etc.

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Air Quality      Infrastructure for natural ventilation

Use of building materials that do not contain toxic material such as paints, glue, resins etc.

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Noise and Acoustics      Means for reduction noise

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Drainage      Use of means for seepage of surface run-off water and harvesting of run-off water for gardens.

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Building Materials      Use of building materials for whom the energy spent in their production, finishing, and transportation is low, and which do not contain materials which cannot return to the environment.

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Building Processes      Recycling of building materials and building waste created in the building process, including the grinding of excavated material for reuse.

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Society and Economy      Planning that enables social integration and savings of resources in everyday life.

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## **B. Principles for building a green space.**

A green space is an urban/neighborhood quality space in which principles of green planning will be applied.

In green spaces the following elements will be integrated:

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Variable	Requirements
Use of water resources	Means for seepage of surface run-off from areas that are not polluted.  Means for reducing the irrigation of public open space by planting water-conservative plants, water saving irrigation systems, use of grey water and recycled water, integration into the watershed basin, utilization of natural drainage, harvesting of run-off.
Recycling of Domestic Waste.	Means for gathering and collecting waste for recycling.

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Infrastructure for composting of organic waste and use of cuttings for gardens in urban building plans.

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Accessibility

Optimal planning of the pedestrian and bicycle path system, and connections to public transportation and to focal points in the green space.

Planning of public transportation routes.

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Thermal comfort in the Streets.

Means for the preservation of thermal comfort in the streets and open spaces by siting of buildings and gardening.

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Acoustics

Means for creating improved acoustic conditions.

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Optimal use of Land

Means for the optimal use of land subject to preservation of a "human scale" and of the character and identity of the space.

Integration of the building into the natural space in terms of character of the building, topography and natural resources.

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Energy

Spatial planning that allows use of solar energy.

Infrastructure for alternative energy.

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Society

Spatial planning that enables social contact.

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Economy

Integration of employment sources and exploitation of green and natural resources so as to raise the value of the built space.

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## 15.8 Environmental Quality Policy – Summary Table

Subject	Goals	Means	Criteria for evaluation of implementation of goals/means.
<b>Transportation</b>	<p>Change of proportion of use between private vehicles and public transportation, towards public transportation.</p> <p>Reduction of air pollution.</p> <p>Prevention of traffic noise</p> <p>Returning to the use of roads as public space for pedestrians.</p> <p>Reduction of the total fuel consumption for transportation in the city.</p>	<p>A. <u>Giving preference to public transportation.</u></p> <p>Encouraging development and planning of public transportation systems.</p> <p>Giving priority of movement to public transportation systems.</p> <p>Improvement of public transportation service.</p> <p>Operating improved arrangements for public transportation until a full system has been installed.</p> <p>Traffic management.</p> <p>Operating a widely dispersed and high service level system, using public transportation lanes and short schedules.</p> <p>B. <u>Integrating transportation planning with physical planning.</u></p> <p>Compacting urban patterns in the inner city integrated with</p>	<p>Modal split between private and public transportation.</p> <p>Pollutant levels in the transportation monitoring stations.</p> <p>Noise levels near transportation routes.</p> <p>Number of plans that include bicycle paths and widening of sidewalks for pedestrians.</p> <p>Total fuel supply to Jerusalem for transportation in relation to the size of the population.</p>

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		<p>operating mass transportation systems.</p> <p>Limiting private vehicle transport in areas of "Public transportation preferred" zones.</p> <p>Integration of public transportation in areas in which it is possible to increase transportation supply.</p> <p>Development of the fast intercity railway.</p> <p><u>C. Lowering profitability of private vehicle use.</u></p> <p>Parking policy- Increasing parking rates in the center of the city, differential parking rates and defining no private parking zones.</p> <p>Setting park and ride areas near public transportation routes.</p> <p><u>D. Giving priority to non-motorized transportation.</u></p> <p>Planning and implementation of bicycle paths and pedestrian streets in the city center and neighborhoods.</p> <p>Creating a pedestrian friendly road section.</p> <p>Intensifying use of</p>	
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## LOCAL OUTLINE PLAN JERUSALEM 2000

		<p>multi-level planning for separating pedestrian and non-motorized transport from vehicular traffic and parking.</p> <p>Encouragement of setting up telecommunications systems.</p> <p>Setting up employment buildings "close to home".</p> <p>E. <u>Use of clean fuel.</u></p> <p>Development of light railway also in additional routes to the first line.</p> <p>Mandatory use of "urban fuel", gas and electricity in public transportation by law.</p>	
<p><b>Water and Wastewater</b></p>	<p>Creating a supportive interface between the city and the natural water system.</p> <p>Providing an answer to the water needs of all the uses in the city.</p> <p>Preservation of the water sources- their qualities and quantities.</p> <p>Treatment and reuse of all urban wastewater.</p> <p>Preservation of public health</p>	<p>Comprehensive urban plan for treatment of wastewater and reuse of treated water for irrigation.</p> <p>Planting of plants amenable to irrigation by reusable water and water-saving plants.</p> <p>Plan for conserving run-off in every built precinct.</p> <p>Plan for education and publicity for water saving in the domestic and industrial sectors.</p> <p>Installation of water saving devices in residential, public and</p>	<p>Quantity of urban treated water for irrigation, in relation to the developed open areas in the city, according to the goal to be stated in plan.</p> <p>The number of approved plans that address the problem of surface run-off.</p> <p>Quantity of per capita water consumption.</p> <p>Percentage of urban wastewater that is not treated.</p>

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		<p>industrial buildings as part of granting of building completion.</p> <p>Treatment of the wastewater of the Eastern basin.</p>	
<b>Waste</b>	<p>Treatment and disposal of waste in a way that does not cause nuisance.</p> <p>Use of waste as resource.</p> <p>Setting up of waste treatment circles in the city.</p> <p>Implementation of the Master Plan for Solid Waste Jerusalem 2010 that was prepared by the Jerusalem Municipality and the Ministry of Environmental Quality.</p> <p>Implementation of the District Master Plan for Building Waste and Dirt that was prepared by the Ministry of Environmental Quality, Ministry of the Interior and Local authorities in the District.</p> <p>Decrease of quantities of surplus dirt and building waste that is sent to landfills.</p> <p>Prevention of uncontrolled</p>	<p>A. <u>Integrated Plan for the reduction of waste and increase of recycling.</u></p> <p>Setting up of separation and recycling centers.</p> <p>Separation and treatment of organic waste.</p> <p>Bye-law for separation of cartons and other waste for recycling.</p> <p>B. <u>Service circle in the Municipality for treatment of treatment of dirt and building waste.</u></p> <p>Database of plans for excavations and filling and management of a recycling regional bourse for surplus dirt.</p> <p>Recycling of stone by grinding and reuse for building.</p> <p>Implementation of method of waste disposal based on "deposit-refund".</p> <p>C. Identification of sites for intermediate</p>	<p>Quantity of urban waste sent for disposal in landfill relative to the number of residents.</p> <p>Quantity of surplus dirt and inert waste from building sites that is returned for reuse.</p>

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	<p>dumping of dirt and building waste.</p> <p>Introduction of waste treatment methods that include the following components: recycling, reuse, reduction at source and return, into urban policies.</p>	<p>stations for domestic waste and identification of sites for intermediate stations for building waste.</p>	
<b>Industry</b>	<p>Rise in level of environmental safety and prevention of environment hazards due to use of hazardous materials.</p> <p>Upgrading of the treatment of urban waste and hazardous waste.</p> <p>Savings of water and treatment of industrial wastewater.</p> <p>Reduction of industrial air pollution.</p> <p>Minimization of negative environmental impacts due to routine activity.</p> <p>Upgrade of design and appearance of industrial, commercial and workshop areas.</p>	<p>Setting up of Industrial Management Centers for every industrial zone in the city.</p> <p>Setting up of an efficient monitoring system and increasing fines for violations.</p> <p>Urban bye-law- Rates for industrial wastewater and rates for capital returns according to quantity and quality of wastewater.</p> <p>Operating advanced environmental management- dedicated to continuous improvements over time in the overall balance of environmental aspects.</p> <p>Management of industrial zones according to the clean production approach and ISO 14000 standards.</p>	<p>Number of hazardous materials events.</p> <p>Decrease in quantity and acute toxicity and permanence of materials used, and the discharge into the environment.</p> <p>Efficiency of water use according to criterion to be fixed.</p> <p>Efficiency of use of energy according to criterion that will decide the number of complaints of industrial nuisances.</p> <p>Compliance with bye-laws.</p> <p>Existence of an active environmental management center for the industrial zone.</p>

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		<p>Upgrading the urban design of industrial, commercial and workshop zones.</p> <p>Preservation of buffer zones between industrial zones and sensitive uses at the planning stage.</p>	<p>Number of ISO 14000 standards for the urban industrial zones.</p> <p>Implementation of urban bye-law for signs.</p> <p>Investments in appearance of buildings.</p> <p>Number of activities of integration of industry into community.</p>
<b>Open Spaces</b>	<p>Seeing the city as an ecological living space and preserving open spaces and their ecological value.</p> <p>Creation of a “green skeleton” and “green envelope” for the city, decreasing the depletion of open spaces, developing a range of green spaces.</p> <p>Connecting nature to the urban tissue and conserving natural property and built property in the urban environment.</p> <p>Multiple goal use of open spaces.</p> <p>Recognition of the open spaces as property that builds the city.</p>	<p><u>A. Preservation of nature and ecology values.</u></p> <p>Designation of open spaces as urban nature sites, increasing their care and utility.</p> <p>Creation of a mechanism of community adoption of nature sites and open spaces, in cooperation with the community management centers.</p> <p>Ensuring passages for animals along roads and building clusters.</p> <p>Catalog of urban nature.</p> <p><u>B. Increasing the stock and diversity of open spaces.</u></p> <p>Use of built-up spaces for widening open</p>	<p>Range of areas defined as “urban nature” that are treated in terms of accessibility and preservation of nature values.</p>

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		<p>spaces- gardens on rooftops, shelters, ponds, parking cellars etc.</p> <p>Designation of underground for uses that are insensitive to daylight and natural ventilation.</p> <p>Multiple uses for open spaces.</p>	
<b>Green Building</b>	<p>Upgrading of the quality of the built environment in Jerusalem</p> <p>Decrease in the consumption of resources and efficiency in use of resources for production and the existence of the built infrastructure, savings in the maintenance of buildings and routine expenses.</p> <p>Promotion of green spaces.</p> <p>Optimal use of land.</p>	<p>Mandatory green building in environmentally sensitive areas.</p> <p>Setting up of a body of knowledge of green building in the city management.</p>	<p>Number of approved plans for green building.</p>