A Green Neighborhood in Yavne, Israel

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A green neighborhood is one that is planned and constructed with an emphasis on a range of environmental components. The need for a planned green neighborhood in Israel is seen in the day-to-day problems caused by high-density development, the intensive use of infrastructure and the desire to raise standards of living while still reducing the cost of homes and maintenance. The solution to environmental problems experienced in residential areas should not be to treat the problems as they arise, but to apply preventative forward thinking of the planning stage.

One of Israel's first green neighborhoods has been planned for the town of Yavne, situated in Israel's southern coastal plain in what is one of the world's most densely populated areas. The local climate is Mediterranean, consisting of two main seasons: a hot dry summer, and a humid temperate winter. As in the rest of the country, this region suffers from a grave lack of freshwater due to low precipitation and high demand.

During the early stages of planning the neighborhood as a green neighborhood, attention was given to elements that required integration into planning, as well as to means of supervision and enforcement that would ensure the smooth integration of these elements into the planning process.

Noise prevention in residential buildings and open spaces

One aim of green residential areas should be to provide a quieter residential environment. This approach will encourage a trend of migration to the city, thereby reducing the need for "dormitory towns" that take up wide areas of open space and encourage commuting. A quiet environment removes the need for noise prevention measures, such as reduced number of windows and window size, and thereby reduces the demand for air ventilation and air conditioning systems that require a lot of energy.

In planning the green neighborhood, attention was given to sources of noise within the area including outdoor play areas, internal roads, mechanical installations and commercial establishments; and sources of noise outside the area, including arterial roads and nearby noise-producing operations.

Preventing noise pollution in noise-sensitive areas can be achieved through:

- acoustic planning of internal lay-out residential units in relation to local sources of noise (such as distancing bedrooms from noisy roads and careful location of mechanical installations such as air-conditioning units etc.);
- functional and acoustic planning of public and open spaces that could potentially produce high levels of noise;
- planning the location of different uses within the grounds of public buildings, and setting a wide buffer of open land around these buildings to reduce noise pollution; and
- the use of acoustic measures in the building envelope, primarily through compliance with the acoustic standards of the Israel Standards Institute.

While planning the neighborhood, it was decided that all acoustic standards, whether obligatory or for guidance only, would be considered obligatory in this case. These standards refer to the acoustic insulation of residential buildings (common walls, ceilings, and floors; entrance halls; noise from elevators); prevention of noise emanating from water supply units, drains and plumbing systems; and the insulation of buildings and their internal areas from airborne noise.

Drainage of runoff from roofs and paths into groundwater

Due to Israel's water deficit, as well as drainage problems caused by urban development, it is vital to use runoff water to the full. This water, which is of high quality, is carried to permeation layers underground in order to replenish groundwater. Due to the nature of the local climate, in which precipitation falls only in winter, there is no reason to store the water for irrigation.

The transfer of runoff underground has a number of advantages, including a significant increase in the amount of rainwater that moves underground, and thus improved replenishment of groundwater; an improvement in the quality of water moving underground as a result of the shorter path taken by the runoff; a reduced risk of flooding due to a significant reduction in the amount of runoff, and a reduction in the cost of repairs to urban drainage systems.

The physical solutions for the transfer of runoff that have been planned for Yavne include the allocation of flood and drainage areas in gardens and open spaces, primarily neighborhood parks; and the use of paving that allows water permeation.

Wastewater recycling for irrigation

The serious deficit of freshwater in Israel also demands the use of alternative water sources where possible. This is primarily achieved through the irrigation of open spaces with "gray" water that today are watered using freshwater.

Following treatment, sewage and turbid water can provide an effective source of water in sufficient quantity for irrigation of open and public spaces in the neighborhood.

In order to recycle water for irrigation, a water treatment facility to purify the water up to the tertiary level is needed. In addition, the irrigation system must be buried or concealed according to Israeli Ministry of Health requirements in order to prevent the water being used for other purposes such as drinking. In addition, treated turbid water can only be used to irrigate vegetation that is not sensitive to the high levels of boron found within it.

Vegetation
Public open spaces in the neighborhood will use local plants that requires little water; are adapted to irrigation using treated water (i.e. water with a high boron content); and are non-allergenic.

The irrigation systems will use water-saving devices such as drip irrigation. Ground cover will be maximized through pruning, or any other method that will reduce evaporation.

Routes for pedestrians and cyclists
The rise in the number of vehicles has led to congestion on urban and neighborhood roads. This causes environmental and safety problems at the urban and neighborhood level for both pedestrians and cyclists. The problem of congestion in Israel is due in part to an inefficient public transport system, an increase in the standard of living and preference for use of private cars, and inappropriate and insufficient planning of routes with regard to pedestrians and cyclists.

The pedestrian and cycling paths in the neighborhood in Yavne will allow access to public institutions, open spaces and adjoining neighborhoods, with an emphasis on creating a user-friendly system. In this regard, the following issues were emphasized:

- the integration of cycling infrastructure into the infrastructure for motorized vehicles (planning bicycle paths as an integral part of planned major routes; connectivity between bicycle paths and transport hubs, including bicycle parking next to bus stops);
- the siting of public and commercial services as a function of bicycle journey distances;
- waiting areas for bicycles at traffic lights in front of vehicles;
- signs, directions and parking for bicycles.
- Separation of bicycle paths from roads, as much as possible.

Optimal land use planning
Optimal utilization of land is an important issue the world over. In Israel it has added importance due to the lack of available land resources in relation to the current and forecasted rates of development. One of the central problems facing the Israeli planning system is the lack of open space, and related building density which is one of the highest in the world. In these circumstances, the optimal use of land, including utilization of underground areas, is a high priority.

This scarce resource can be utilized more efficiently by reducing the area of built-up land. This approach creates improved environmental conditions, such as greater amounts of open space for public use, and larger spaces between buildings.

Land use in the neighborhood plans was optimized primarily through the use of underground areas for functions that do not require daylight or natural ventilation, such as mechanical installations, storage and parking. The land freed up from development as a result was set aside for public open spaces and gardens.

Waste collection and recycling
The most common waste collection system in Israel for residential buildings consists of communal garbage bins that are collected by the municipality. For the green neighborhood in

Yavne there are plans for a pneumatic central waste disposal system. Such a system removes the need for garbage collection vehicles, and their related environmental problems; facilitates compression of garbage near the source, thereby reducing its volume; and encourages the separation of garbage at source through simple sorting methods.

The pneumatic system will be constructed by the developer, in parallel with the rest of the neighborhood-engineering infrastructure.

The system will include sorting mechanisms that allow garbage to be separated at source into both dry and wet waste.

In addition, as Israeli law requires local authorities to recycle 25% of all landfilled waste, means of increasing recycling from commercial establishments have also been included. Commercial areas will contain recycling bins in order to allow separation at source into categories such as paper, cardboard, glass and plastic.

Climate-sensitive construction

During the planning stages, emphasis was put on the need for thermal comfort in sidewalks and buildings.

Thermal comfort in sidewalks is influenced by local wind conditions, shading and the exposure of pavements to sunlight.

Local wind conditions are influenced by the orientation of roads and buildings in relation to prevailing winds, the height and concentration of buildings, and temperature differences produced by the heat-island phenomenon. These factors can lead to a reduction in wind speed in built-up areas, and even to confined areas lacking in ventilation that contribute to air pollution.

On the other hand, the creation of overly strong winds next to high buildings is also a well-known phenomenon, caused by the aerodynamic effect of high-speed winds being forced downwards to street level. This phenomenon produces difficult environmental conditions that prevent regular human activity around such buildings and in adjacent open areas such as parks, paths and roads.

The exposure of pavements to the sun is influenced by the width and orientation of the roads, and by the location and height of nearby buildings.

In order to reduce shading and wind speeds in the winter months, and to allow natural ventilation in the summer, the location of buildings and road orientation in the plan were determined according to local climatic conditions. To this end, a preliminary assessment was made of wind direction and frequency, and of problematic areas of strong winds. This information was then used to determine the orientation of the neighborhood's roads. Given the Israeli climate, shading of open spaces and paths will be needed during the summer months. Means of creating shading include the use of deciduous vegetation that allows maximum exposure to sunlight in the winter and shading of open spaces in the summer.

In order to create thermal comfort in the buildings, all the residential units will be built in accordance with Israeli standards – both obligatory and voluntary – for thermal insulation of buildings and windows.

Use of solar energy
Under the Israeli Planning and Building Law, residential buildings of up to 8 stories must hold solar panels for water heating. In the neighborhood in Yavne, no guidelines beyond the extent of the current law will be set, due to the already high cost of existing solar panel systems.

Prevention of electromagnetic radiation
The rapid increase in the use of cellular phones has caused a growing demand for cellular phone masts or antennae. This rapid rate of development, together with a lack of comprehensive planning, has caused problems such as illegal antennae, little coordination between the different phone companies, and antennae located too close to sensitive land areas. In the neighborhood in Yavne, strict criteria have been set for the location of antennae.

For example, minimum distance has been set between cellular phone masts and residential areas or public institutions. There is also a prohibition on erecting antennae in the grounds of educational institutions or children's play areas.

In order to prevent electromagnetic radiation from electricity supply units, transformers will not be allowed in educational institutions and children's play areas. They may be housed in the basements of buildings, and in underground facilities beneath public open spaces.

THE PLANNING SYSTEM
The multi-disciplinary issues involved in green building in general, and the green neighborhood in particular, are in the early stages of development in Israel, and are being tackled in many different fields. These issues require a complex approach, encompassing professionals working in a range of disciplines.

Green building requires cooperation between planners, architects, engineers, developers, consultants and experts in the relevant fields of construction, as well as in the environmental fields of recycling, pollution prevention, waste conservation, waste management, noise prevention, climatic conditions and general environmental comfort.

The planning of the green neighborhood was carried out in conjunction with the project's architect, the mayor, the municipal engineer, the developers' representatives, and a group of professional consultants dealing with environment, infrastructure, water and waste issues.

During the planning process, the importance of integrating the 'green' elements into the preliminary planning stages became clear, as at these stages it is still possible to influence the basic guidelines of the plan, such as the orientation of roads and buildings, and the allocation of land for neighborhood-wide infrastructure.

It is also important to "anchor" these green elements in the whole process, from draft plans and urban building guidelines, through to the later planning stages and tenders for construction.

The biggest obstacle to planning a green neighborhood comes from the developers involved in the planning process and the plan's implementation. Green building does in part incur greater capital costs due to the use of advanced and more expensive technologies and materials. These costs fall mainly on the project developers and on the local authority of the neighborhood area. Meanwhile, those who benefit most from this method of building are the residents who are fortunate enough to live in a better quality environment, and in a building where the costs of heating and cooling will be lower due to the investment in insulation and adaptation to the local climate.

Green building is considered to be of higher quality, and is in demand in the Israeli market. The perception of green neighborhoods as prestigious areas causes many local authorities to encourage such projects, in the hope of attracting a community with higher socioeconomic standards, who will also be willing to pay more in order to live in such an area. That notwithstanding, the idea of a green neighborhood is still new to Israel, and the integration of new building elements that have not been tried elsewhere is treated with skepticism by authorities and developers.

SUPERVISION OF THE CONSTRUCTION PROCESS

Due to the strict standards applied to every aspect of construction in a green neighborhood, close supervision is required at every stage.

Supervision during construction will be necessary to ensure that every developer involved complies with all the requirements included in the neighborhood's environmental regulations.

It will therefore be necessary to request interim reports and conduct various tests at different stages of construction. The number of reports and extent of testing will be determined by the municipal engineer to ensure that the building and/or project complies with the requirements of the green building license and is consistently assessed during construction.

The green building approval will have to be obtained from the planning authorities before the buildings are occupied. In order to obtain the approval, the applicant or developer must demonstrate that the plans and their implementation have adhered to the environmental regulations. The application will be evaluated on the basis of environmental and construction documentation.