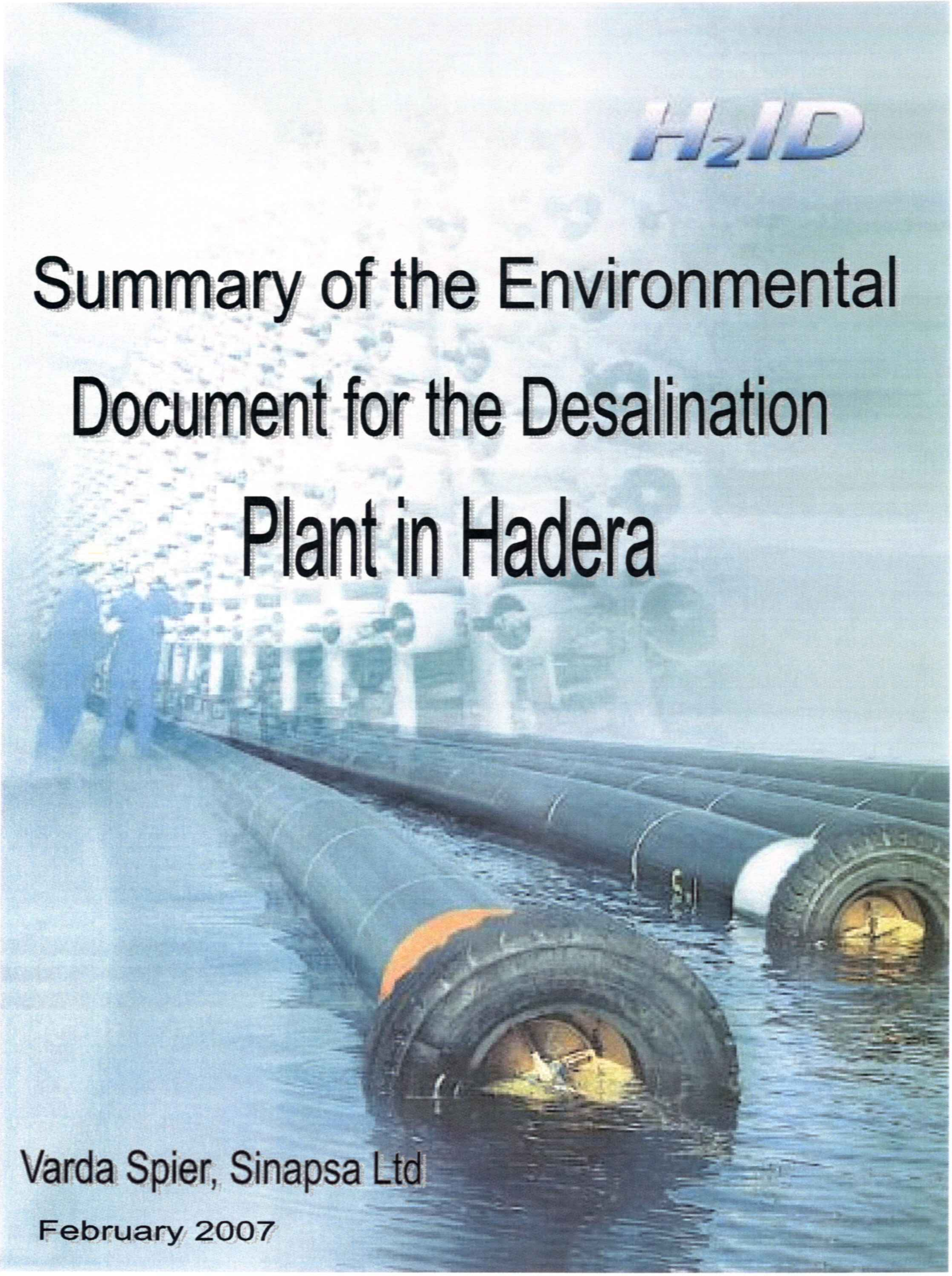

H2ID

Summary of the Environmental Document for the Desalination Plant in Hadera

Varda Spier, Sinapsa Ltd

February 2007

Introduction

H2ID won the BOT tender for planning, building and operating a seawater desalination plant with a 100 m^3 per year output that will be set up at the Orot Rabin power station site in Hadera.
For the purpose of desalinating this amount of water, it will be necessary to pump seawater at a rate of more than 300 million m^3 per year, the currents beyond the output of the plant being returned to the sea as brine (concentrate sea water) that will also contain pre-processing components, rinse water, etc.
The desalination plant will be based on two identical modules of 50 million m^3 per year, using reverse osmosis technology, with a maximum daily output of some 330,000 m^3 per day.
The facility will contain all the components of equipment, accessory facilities and infrastructures required for producing this output, such as: a system for pumping seawater and supplying it to the facility, initial filtration using reverse osmosis, continuing processes of desalination for extracting boron components from the water and final water treatment. The whole process will guarantee that the desalinated water will be of a quality suitable for potable water and agricultural applications. In order to be energetically efficient, an energy reuse facility will be installed so that most of the energy expended in obtaining a high pressure for the reverse osmosis process is maintained and recycled.

The system for bringing seawater to the system will involve sea input system that will reach the sea up to about a kilometer and a quarter from the shoreline, and using "intake heads", it may feed the facility with the required seawater.
The system for returning brine, rinse water and overflows to the sea will be performed using power station coolant outlet ducts to the sea.

The environmental document is submitted to the Haifa district planning and building committee as part of the process of statutory licensing of the project, based on the requirements of national outline plan 34 B2 and detailed instructions of the Haifa district planning and construction committee.
The Ministry of the Environment is part of this committee.
* See simulations plant in the end of the document.

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Chapter A: summary of the background data findings

Seismics

1. An assessment of the seismic situation of the Haifa desalination plant is required.
2. The Hadera desalination plant is located at a site whose horizontal ground acceleration in the hard rock layer, according to the seismic acceleration map for Israeli Standard SI 413, is 0.11.
3. Amplification of seismic waves is expected at the desalination plant.
4. Within the Hadera desalination plant complex there are no shifts that are suspected as active, shifts whose horizontal aspect will cause surface tearing in the case of an earthquake. Suspected active shifts are more than 22 km from the Hadera desalination plant.
5. In the perimeter and in the area around the Hadera desalination plant there is no danger of development of drifts, flow or creeping of land / rock mass.
6. Within the Hadera desalination complex there are no conditions for the development of liquefaction. It may be determined that in the Hadera desalination plant area there is no danger of the development of liquefaction as a result of an earthquake.
7. The Hadera desalination plant will not be affected by a tidal wave (Tsunami) hitting the Israeli coastline.
8. The desalination plant site has no exceptional seismic risk.
9. At the Hadera desalination plant site there is no need to perform comprehensive seismic research and the desalination plant buildings are to be constructed as required by Israeli standard SI 413.

Hydrology

1. In the Hadera desalination plant complex the direction of groundwater flow is from east to west, and the groundwater level varies from 2.0 meters to 0.5 meters.
2. The amount of water pumped on the Hadera coast is approximately 0.24 m^3 per year, all of which is pumped from drill sites that are located north of Orot Rabin power station and south of the Hadera river.
3. In the perimeter of the Hadera desalination plant, the amount of chlorides is relatively low, and reaches 230 mg/l. The level of nitrates is low, at about 35 mg/l.

4. The Hadera desalination plant is located on the section of the aquifer to which the groundwater has penetrated.
5. The Hadera desalination plant drains into the sea through dispersed flow that does not constitute part of the Hadera river basin.

Sensitivity / hydrological opinion

6. Under the circumstances of the hydrological conditions in the Hadera desalination plant complex, there is no risk of damage to the coastal aquifer due to pollution originating from the desalination plant.
7. The hydrological sensitivity of the Hadera desalination plant is large and necessitates specific attention for protecting the groundwater.

Land uses

In the field of the land use survey in the vicinity of the plan, it has been found that there are no nature reserves, no coastal reserves nor national parks. There are archeological declarations and the Hadera river park is located south of the designated desalination plant.

There are no bathing beaches in the immediate vicinity of the plan area, and fishing in the area is prohibited.

The sea facilities and the infrastructures in Hadera port, the vicinity of the plan at sea and the maritime activity in the area have been reviewed.

The flora and fauna in the land vicinity, particularly in the river park, include eucalyptus woods, stabilized sand vegetation that includes carobs and אלת המסטיק mastic trees and coastal vegetation.

The sand vegetation has high value, because together with the Caesarea sands, they constitute the northernmost sands on the Israeli coastal plane on which natural flora has survived. The animals in the area have an affinity for this habitat.

The flora and fauna in the sea vicinity is characterized by a range of species of sandy sea bottom, slightly richer than other sandy areas in the Israeli shallow waters, probably because there are kinds of artificial reefs there (sands, the piles of the jetty at sea, coolant outlet structures, etc.).

The regime of the flows in the area of the facility at sea has been screened.

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Chapter B: Summary description of the proposed plan

The desalination plant plot is in the southern part of the Orot Rabin power station complex.

The plot is a very narrow strip that is to the north of an artificial levee that is made mainly of coal ash.

Owing to convenience considerations, the construction and the future operation, the facility has been divided into two modules – western and eastern – with an output of 50 million m^3 per year each.

The desalination facility includes the following engineering structures:

On land:

- The seawater pump building
- The electricity building of the pump building
- Seawater pre-filtering station (western and eastern)
- First degree reverse osmosis building (western and eastern)
- Second, third and fourth degree reverse osmosis building (western and eastern)
- Reverse osmosis system electricity building (western and eastern)
- Product water final treatment building
- 4000 m^3 container and product pump building
- Electricity and 11 kV high voltage control building
- Substation connecting to high voltage – 161,000 V.
- Product water pools and concrete pools
- Roads and infrastructures

At sea:

Permanent buildings that include three HDPE pipes of 1800 mm diameter each, connecting the inlet facilities, located 15 meters under water, to the pump station on land.

The length of the pipeline is about 1300 meters and it will be laid on an excavated ditch, its earth cover being not less than one meters depth. The level of the pipes is about 8.0 meters to the east and about 18 meters to the west.

The water intake structures are precast reinforced concrete structures with a base of approximately 10 meters diameter and a chimney supported by six ribs that includes a HDPE "knee joint" pipe.

The chimney top has "mushrooms" attached to it through which the water enters at low speed, which prevents the entry of foreign bodies into the system. Another measure is an air bubble screen around the intake top that constitutes a barrier preventing the entry of fish and aquatic life forms into the intake head area. The buildings are based on a stone layer at a level of approximately 20 meters and another stone layer for protection against undermining, until the restoration of the natural water depth.

In the shallow water area it is necessary to build a temporary building that will provide for digging to the required depth, lining the existing shore embankment and ensure the depth of the digging during the time between the conclusion of the digging and the arrival of the pipeline – a cofferdam. The cofferdam structure is composed of two spline walls that are supported by a system of beans and pressure bars.
At the end of the offshore pipeline laying works, the cofferdam is dismantled by taking out the spline walls using the same equipment and method that were used for their insertion and refilling is performed to the sea bottom levels.

Engineering and environmental considerations in plannin

The course of the seawater lines is determined according to the search area defined in national outline plan 34B. 600 meters north of the course there is Israel Electric Corporation's coal jetty. South of the course there is the natural gas line on a course that is horizontal to that of the power lines, 123 meters from the closest point. The course of the line has been chosen to be as perpendicular to the bathymetry lines as possible. In the part near the shore, the line is parallel to the continuation of the southern outlet duct of Israel Electric Corporation at sea for preventing clashing with the Israel Electric Corporation outlet current. The location of the intake has been established 1,250 meters away from the shore.

The speed of the entering current is about 15 cm per second. The measures for preventing the entry of animals and aquatic plants into the inlet pipe are the relatively slow current speed, which allows autonomously swimming animals to move away from the intake; the use of bubble traps for keeping jellyfish and other animals away from the intake area; the intake head structure with smooth mesh covers for preventing the settlements of animals, and a mesh size that prevents large animals from entering the pipe; periodical cleaning of the intake head.

The pipeline is to be buried throughout its length at sea; the sand dug from the bottom of the sea for creating the ditch in which the pipes are to be buried will be stacked by the dredger on the sea bottom in the near area, as inertly as possible, according to the instructions of the sea and shore division of the Ministry of the Environment. This sand will be used after completing the laying of the pipes and their testing for burying the pipes. If there is surplus sand after concluding the burial, the surplus sand is to be dispersed at sea according to the instructions of the Ministry of the Environment.

Principles for the operation of the plant

The seawater is absorbed in the three intake heads that are set about four meters above the bottom, some 1250 meters from the shore. The seawater flows at a rate of 35000 m^3/hour into the pumping station on the shore through three 1800 mm diameter HDPE pipes that are buried in the bottom of the sea. The puping station concurrently draws the water into two gravitational sand filters. Coagulants and flocculants are added to the water to expedite the nucleation of the particles suspended in the water. At the end of the filtration process, water is collected into an underground filtered water pool. The rinsing water is gathered into a holding tank of 1,600 m^3 volume and is returned at a constant rate to the coolant water outlet duct of Israel Electric Corporation. The filtered seawater is drawn to the first degree reverse osmosis system for creating salt-free water, the brine in the reverse osmosis system flows with gravity to the brine system until its dispersal in the Israel Electric Corporation outlet ducts.

The total current of the brine during regular operation is 19,000 m^3/hour, plus an operating current of about 1500 m^3/ hour, which is added during the rinsing of the filters. These two currents mix with the southern Israel Electric Corporation outlet current whose flow rate is 160,000 m^3/ hour before reaching the sea.

The reverse osmosis water is separated at the outlet from the first degree system, the good quality water is diverted directly to the final treatment system for adding hardness and pH correction. The water with the lower quality continues to the second, third and fourth degree osmosis systems whose purpose is to separate the boron to a level of less than 0.3 ppm. Some of the first degree osmosis water supply is returned to a mixing tank at the entrance to the hardening pools that are built upon on calcite rich limestone. Before entering the hardening pools, CO_2 gas is injected for reducing the pH. The water leaves the hardening pools and is pumped into an additional mixing tank. The remainder of the water from the second, third and fourth degree osmosis water is added to this tank. In addition, a calcium hydroxide $Ca(OH)_2$ solution is injected for correcting the pH and hardening the water. This treatment is necessary for reaching a final water product with hardness at a level of 80 to 120 ppm of $CaCO_3$ as required.

At the outlet from the mixing chamber, the product water flows to a 4000 m^3 storage and holding tank, from which it is pumped by product pumps to the national water system.

The energy source is from the national electricity network.

Breakdown of the additives in the process

The membrane rinsing water from cleaning with salt acid (HCl) is added to the outlet water (the brine), along with rinsing water for the pre-treatment, rinsing of chalk filters and brines of the third and fourth desalination processes. The outlet water contains the following substances:

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Expected concentration at the outlet of the cooling water ducts	Expected concentration in the brine	Purpose of use	Amount in injection points	Substance	Purpose
1.3 ppm as CO_2	12 ppm as CO_2	Change of seawater pH from 8.1 to 7	Continuous – 20-40 ppm as H_2SO_4	96% sulfuric acid	Pre-treatment for water
0.2-0.6 ppm	1.8-5.5 ppm	For filtering suspended matter	1-3 ppm as Fe Continuous	Ferric Sulphate	Pre-treatment for seawater
0.02 ppm	0.2 ppm	For filtering suspended matter	0.1 ppm	Flocculent	Pre-treatment for seawater
0.28 ppm Commercial material 0.03 ppm Active agent	2.46 ppm Commercial material 0.25 ppm Active agent	Preventing precipitation of limescale on membranes	2.5 ppm Commercial material 0.25 ppm Active agent Continuous	Antiscalant for preventing limescale precipitation 10% active agent	In reverse osmosis desalination process
0.01 ppm as CO_2	0.1 ppm as CO_2	Preventing precipitation of limescale on membranes	40-50 ppm Continuous	96% sulfuric acid	In reverse osmosis desalination process
	min.2 -max.4 ppm Quantity of NaCl	As needed A few days a year	0.2% increment solution	Salt acid	Periodical treatment for RO membranes

Current ratio 1:200	Current relative to brine 1:22 Contains chalkstone dust Low level of turbidity	For rinsing chalkstone after filling product water hardening reactor	600-800 m^3 per day Incremental	Fourth stage brine ppm -TDS 1200 Boron – 70 ppm	Product treatment Chalk filter rinsing

Quality of characteristic brine that is expected to be pumped from the facility to the coolant ducts (national average) and final quality after running:

Parameter	Average Concentration in Brine, ppm	Concentraion in IEC channels, min flow, ppm	Concentraion in IEC channels, max flow, ppm
NH_4	0	0	0
K	952	558	488
Na	24,719	14,221	12,344
Mg	3,084	1,808	1,579
Ca	956	561	490
Sr	17	10	8
Ba	0	0	0
CO_3	16	22	23
HCO_3	350	194	166
NO_3	0.2	0	0
Cl	44,751	26,235	22,925
F	0	0	0
SO_4	6,366	3,708	3,233
Boron	10	6	5
SiO_2	3.4	2	2
CO_2	8	2	1
TDS	81,273	47,353	41,288

As a rule, it may be said that all the contaminants above are transferred in full to the brine (do not pass the RO membrane at a rejection level of > 99.5%) and are pumped to the coolant duct of Israel Electric Corporation at a concentration that is 1.9 times that of their concentration in the seawater.

Due to the high dilution ratios in the ducts (4.5-9 times), the general flow that returns to the sea contains a concentration of contaminants that is 10-15% higher than their natural concentration in the seawater that is pumped to the plant.

Earthworks, burial of piping at sea and organization areas

The great majority of the facility will be built on the filling of 60-200 cm thick beds.

Most beds will arrive from an appropriate excavated material from outside the site, but use will also be made of some of the excavated material at the site for filling beds. Dug material that is not fit for use as a filling for beds will be removed only to approved dumping sites.

The burying of the pipeline will usually be performed within the full thickness of the beds without deep excavations on existing surfaces.

The organization grounds of the project are grounds that the state has allocated to the north of the project.

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Chapter C: the environmental impacts of the desalination plant

Impact on the marine environment during the construction

During the construction period of the sea facilities, when there is offshore digging, there is sometimes sand suspension that causes turbidity in the water and reduces light penetration, which disrupts some aquatic animal species. Usually, autonomously motile animals move away from the area as soon as the disruption starts. The cloudiness decreases a short time after the works end. The sea area is restored a short time after the water becomes clear again.

During the construction term, there may be a local change in the coastal sand drift regime as a result of the offshore pipe burial works.

After burying the pipes, the conclusion of the seabed works and restoring the bottom to its previous state, the seascape should recover in a short time.

Sea pollution due to works at sea (leaks of oil fuel and waste, etc. into the water) will be prevented by observing all laws and regulations in effect.

Impact on the marine environment during operation

In the desalination facility in Hadera, the brine and rinsing water are discharged back into the sea through the coolant ducts of the power station. The brine is diluted with coolant to a high degree, meaning that the salt concentration in the combined current of brine + coolant water pumped into the sea is still higher than the concentration of the seascape, but much lower than the net concentration of the salt in the brine . The temperature of the brine + coolant water current will be slightly higher than that of the seawater.

In the seascape near the shore (the brine + coolant water dispersal area), there is a profile of a seascape with its fauna being similar to that of other areas, despite regular pumping of coolant water over time. This fact indicates that the survival / regeneration ability of the ecosystems in the area is high, and it appears that after the initial operation of the facility, the ecosystem in the region will stabilize, possibly with a slightly different composition.

The buried offshore pipes do not affect the environment.

All the chemicals used throughout the stages of the desalination process, some of which are eventually dumped into the sea, are highly environment friendly and all are approved by the Ministry of Health and the Ministry of the Environment.

The pollution of water as a result of pumping into the sea will be prevented by observing all relevant laws and regulations.

Laying the pipeline of the desalination plant at sea will not affect sand movements because the entire length of the pipeline will be buried.

It is known that sand movement occurs mainly in the breaking waves area . This area reaches a water depth of 6-8 meters. In this strip, the offshore pipeline is covered by a 1.5 to 5 meter thick layer, meaning that it cannot disturb sand movement.

No restoration works will be necessary on the sea bottom because natural shifts of sand resulting from shallow sea currents will stabilize the area where the works occurred and bring its state similar to an area in which no works have been performed in its natural environment.

Water intake impacts

The planned flow speed around the intake head is about 15 cm per second. This flow is stable throughout the operation of the project in the water, at depths ranging from 6 to 10 meters. Aquatic animals learn to live in this environment – benefiting from the plankton that such a flow brings, and take care not to be carried by the current.

Evidence during a year of operation at Ashkelon desalination plant indicates that the water suction has no impact on the bottom of the sea, and that the current does not affect the biota in the water near the intake head; it is possible that the opposite is true – that there is significant development of aquatic fauna on the stones supporting the intake head at the bottom and on the nets that protect the intake heads.

As far as it is known, this flow does not impair the shore current running from south to west.

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Impact of brine emission

The impacts of the brine over the marine environment are expected to be slight.

The presence of the breakwater of Hadera port near the outlet of the coolant ducts and the directions of flow from the ducts route the brine southwestward, where the brine also mixes with the Hadera river water that flows into the sea.

The iron containing brine is pumped at a controlled rate into the southern duct of Israel Electric Corporation before reaching the sea. This reduces its impact.

Environmental impact of hazardous substances over land and marine environments

Some of the materials used in the desalination process are defined as hazardous substances (acids, etc). There are laws and procedures that regulate their transport, storage and use, some of which are business license conditions. The plant will be required to fulfill all requirements for safe process operation.

Pollution of the sea, land and river due to these substances will be prevented by fulfilling all the conditions required by law.

Impacts of noise over sensitive land uses

The closest residential area to the plant is the Heftziba neighborhood in Hadera, which is about 1.5 km southeast of the facility. Between the neighborhood, including its vicinity, and the power station, the busy highway number 2 passes, which undoubtedly constitutes the dominant source of noise in the neighborhood.

The noise from the power station in general and from the planned desalination plant in particular cannot be heard from the Heftziba residential neighborhood.

Impact on ecosystems in the land environment

The desalination plant does not affect the ecosystems described south of the facility, or the Hadera river or its estuary. The brine or other water surpluses from the desalination process do not reach the river or the area south of the river.

Potential impact on groundwater

Improper infrastructures of the desalination plant may cause permeation of seawater, brine and various chemicals into the groundwater and may contaminate it.

In view of the sensitivity of the aquifer to pollution, the desalination plant infrastructure is being built using the best possible measures for preventing leaks and overflows, such as: watertight surfaces, double walled containers and piping, landfills, pooling systems and treatment of floodwater and leak monitoring devices as required by law.

Visibility

The facades of the project cannot be seen from most directions.

The only place where the public has access and may see the project is the Hadera river estuary. At this point, a northward view includes the existing port buildings, mainly the coal jetty that runs a great distance into the water, and reveals the pumping station, which is handled minimally vis-à-vis(?) the visual disturbance.

Non-ionizing radiation

Israel Electric Corporation has prepared a report that presents the issue of the electrical and magnetic fields in the desalination plant area in the power station complex. The report determines that the area of the plant has a measured electrical field that is at least 2.6 times lower than the health threshold value; the values measured are lower than the threshold of sensitivity to electrical discharges through the human body; the values are expected to change after changing the topography features.

Regarding the magnetic fields, the values measured at the site are at least 7.6 times lower than the health threshold value; values higher than the sensitivity threshold of computer screen jitter have been measured up to 44 meters south of the yellow circle. It is recommended to install computer screens beyond this distance.

After completing the detailed planning of the facility, it is advisable to perform an evaluation of magnetic induction strength in order to determine measures for preventing worker exposure to any strength higher than permitted and for preventing electrical discharges.

Land uses

The desalination plant has no impact on land uses that result from the construction of the plants near the shore – the desalination plant is being constructed within an existing engineering facility.

Air quality

The desalination plant in Hadera is not planned to generate energy but to receive the energy it requires from the national grid of Israel Electric Corporation, meaning that the contribution to air pollution from water desalination is minor, if any.

Maritime activity

Maritime activity (fishing, sailing, diving, etc.) – the seascape near the shore in the vicinity of the facility is defined as a port and is operated as such, so fishing and diving activity is prohibited there in any case. Navigation is regulated like in any port area; the intake heads at sea will be marked by appropriate buoys/ lighting according to the instructions of the Ministry of Transport's Shipping and Ports Administration.

Maritime facilities

The desalination plant does not affect other maritime facilities; the integration of utilities between the desalination plant, the power station, Hadera port and the coal jetty and natural gas pipeline in one area cell are an example of effective utilization of land, energy and sea resources.

Widespread environmental impacts

Beyond the local impacts reviewed below, there are widespread positive impacts that are related to environmental and economic aspects of the state and the region:

Maximum utilization of existing infrastructures

The desalination facility saves land resources by its proximity to the shore, to an existing industrial facility in the same fenced area cell and a shared utility corridor of piping for dumping brine into the sea.

Reduction of salination of water sources

The ongoing salination of the shore aquifer and others is caused, *inter alia*, by overpumping. Desalination will reduce / prevent the salination of the shore aquifer as a result of decreased pumping to it.

Agreements with neighboring countries

According to international agreements, Israel must allot 185 million m^3 a year to its neighbors, 35 million m^3 to the Palestinian Authority and 150 million m^3 to Jordan. This quantity constitutes about 10% of the quantity of natural water that Israel had.

The water thus disposed of will be supplied, *inter alia*, by desalination plants.

Natural needs

The government of Israel decided, in August 2000, to furnish some 50 million m^3 per year for natural purposes, restoring rivers and water pools, in addition to the quantity that naturally flows at present. Water desalination will help deliver the volumes of water required for these purposes, which will improve the state of the nature reserves and water pools in Israel.

Improvement of the quality of the water supplied to different consumers

Desalination of major scopes will lead to an improvement in the quality of drinking water, a decrease in the level of salinity, nitrates and other pollutants that are in the water sources. Low nitrate desalinated water will provide for dilution with well water containing a high nitrate level. This dilution will provide for a saving in the construction of well water treatment plants and will allow for more simple utilization of wells.

Production of "soft" water

The hardness level of desalination water is very low, and it is defined as "soft" water. The meanings of the entry of "soft" water into the system are: A. Reduced accumulation of limescale and extended lifetimes of electrical and solar heaters and the domestic water piping; B. Saving in energy for heating due to reduced limescale precipitation on heating elements; C. Reduced use of soaps (detergents) and emollients (salts) for laundering and dishwashers and industrial processes.

Saving in water conduction from distant water sources

The supply of desalinated water in consumption areas will reduce the need for supplying water from distant water sources, such as the pumping of water from the Sea of Galilee to Ashkelon or Beer Sheva, which involves great investment in energy and infrastructures.

Constructing the facility near the shore yields an economic advantage due to the high cost of pumping water to an inland facility and pumping the brine back to sea at the end of the process

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Chapter D: measures for preventing environmental and health hazards

Marine environment measures

The measures that are to be taken are performing visual scans by divers equipped with underwater video systems for monitoring the water intake facility area. Concerning the course of the pipeline, bathymetric mapping will be performed on an annual basis during the first five years. The frequency of the mapping thereafter will be determined based on the conclusions of the analysis of the mapping results.

Air quality

During the facility construction works, dust will rise in and around the work area. The dust abatement measures include proper wetting of the area, covering of trucks and prudent heaping of excavation and filling materials. These measures will be performed on site as part of the fulfillment of the permit conditions.

Prevention of chemical pollution

For the purpose of routine operation of the desalination plant, continuous use has been made of chemicals such as sulfuric acid, sodium hydroxide and flocculent (polymer) and perichlorate type coagulant. Each dosing system will be placed in an epoxy lined reservoir that will prevent the seepage of these substances on the floor. The filling of the storage tank with acids and bases will be performed through a controlled connection system.

During the cleaning of the membranes, sodium hydroxide, will be used; remains of the solution following the conclusion of the cleaning will be counteracted with sulfuric acid in the cleaning tank and disposed of to a dedicated waste disposal site.

Minimizing of marine environment disturbances

The substances in the brine that is pumped into the sea are the most environment friendly possible in the desalination process, approved by the Ministry of the Environment, and as such they minimize the disturbance to the marine environment.

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The dispersal of the brine at sea through the coolant ducts of the power station dilutes the brine several hundredfold or thousandfold immediately. At the Hadera plant, the southern coolant outlet is adjacent to a more northern outlet, which runs coolant at enormous flow rates to almost the same point at sea; the actual dilution is much greater and the impact of the brine alone over the area is minimal.

To prevent the pollution of seawater by remains of iron oxides in the counterflowing rinse water of the filters, the counterflowing rinse water from the two filters will be collected into a 1600 m^3 underground collection tank. The rinse water collected will be removed in a controlled manner to the Israel Electric Corporation outlet duct and will be diluted with the clean brine current and with a current of 160,000 m^3/ hour that leaves the Israel Electric Corporation condensers. Along with this, at the request of the Ministry of the Environment, an area has been reserved for solid reduction treatment.

Prevention of ground pollution with seawater or brine

The brine and seawater drainage system is separated from the surface rainwater system of the plant and is drained separately to the southern outlet duct of the power station. The rainwater will drain to an existing drainage duct south of the desalination plant. The duct will be elevated and appropriate slopes will be planned for draining the rainwater to this duct.

Functioning of the plant during sea contamination

The level of the water entrance is -8.0 meters, meaning that sea contamination resulting from substances whose specific gravity is less than that of seawater will not sink to the depth of the entrance. In addition, another possible source of pollution due to a significant fault is the coal discharge terminal. This facility is located north of the water entrance facilities, and considering the depth of the water and the northward flow of direction, the probability of such a case occurring is low.

In addition, it must be remembered that the speed of the water flow into the facilities is low, at a rate of only 0.15 meters per second or so.

Notwithstanding the foregoing, the maintenance array of the desalination plant must include suitable equipment for combating sea contamination.

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During sea contamination events, the sea contamination reporting and treatment system is deployed, including the teams of the power station, the port, the Ministry of the Environment and other entities, depending on the severity of the event.

The desalination plant will be incorporated into the guidelines of this system in order to operate the facility with a minimum of damage to the process, its equipment, products and the environment.

The Orot Rabin power station has an orderly procedure on the issue of sea contamination that is approved by the Ministry of the Environment.

Drainage of the facility during faults

In order to provide for drainage of the site, two drainage systems have been planned: a process drainage system whose aim is to drain the brine and filter rinse water to the Israel Electric Corporation duct and a surface rainwater drainage system for draining rainwater and states of overproduction of product water.

Process drainage system

This system is separated into two subsystems: An eastern system, which drains the two filters and the eastern reverse osmosis facility, and a western drainage system that brines the entire western area that is north of the Israel Electric Corporation outlet duct.

Brine cleaning

The brine water from the western facility is drained by a pipe to the Israel Electric Corporation duct. In addition, this system drains the production surpluses from the western facility.

The brine water and floods from the eastern facility are drained by a drainage system from the eastern part of the facility, which drains some of the seawater floods that are caused by faults, the brine and the reactor rinsing water from final treatment. The rest of the seawater currents in case of flooding are drained through an internal duct in filters to a filter rinse water storage pool.

Note: During faults, the water pumping is shut down; seawater that is still in the process is pumped back to sea through the coolant outlet duct.

All the tanks, ducts, pools and reservoirs are watertight to prevent leakage of seawater, product water or chemicals into the environment.

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Monitoring plan for the sea and land environment, including a mechanism for reporting to the Ministry of Health

A background monitoring was performed before the construction of the Hadera desalination plant in 2004-2005, which included six samplings in the Hadera power station sea area. The monitoring plan for the operation period will be submitted for the approval of the Ministry of the Environment before the approval of the request for a construction permit for the plant.

The mechanism for reporting to the Ministry of Health is attached to the document as an appendix.