ISLAMIC REPUBLIC OF IRAN

MINISTRY OF ENERGY

NORTHERN CITIES WATER SUPPLY AND SANITATION PROJECT

CONSOLIDATED
ENVIRONMENTAL AND SOCIAL ASSESSMENT

EXECUTIVE SUMMARY
(FINAL DRAFT)

MARCH 2005
ISLAMIC REPUBLIC OF IRAN  
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TABLE OF CONTENTS  

INTRODUCTION .................................................................................................................................. 4  
PROJECT DESCRIPTION ................................................................................................................ 8  
POLICY, LEGAL AND REGULATORY FRAMEWORK ............................................................... 16  
INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENT MANAGEMENT ............................... 18  
BASELINE INFORMATION ........................................................................................................... 19  
IMPACTS OF THE PROJECT ........................................................................................................ 24  
ANALYSIS OF ALTERNATIVES ................................................................................................... 26  
ENVIRONMENTAL MANAGEMENT PLAN (EMP) ........................................................................ 27  
LAND ACQUISITION AND RESETTLEMENT ............................................................................. 37  
PUBLIC INVOLVEMENT ............................................................................................................... 39  

ANNEXES  
ANNEX 1: DATA TABLES AND EMP FOR THE GUILAN AND MAZANDARAN PROVINCES ......................................................................................................................... 41  
ANNEX 2: RESETTLEMENT POLICY FRAMEWORK .................................................................. 49  
ANNEX 3: MAPS ........................................................................................................................... 64
LIST OF ABBREVIATIONS

BOD Biochemical Oxygen Demand
C&EGWSS Central & East Gilan Water Supply Scheme
CC Construction Contractor
DoEG Department of Environment Guilan
DC Design Consultants
DOE Department of Environment
EA Environmental Assessment
EHC Environmental High Council
EIA Environmental Impact Assessment
EMP Environmental Management Plan
ESO Environmental and Safety Officer
EU European Union
FAO Food and Agriculture Organization
GRWA Gilan Regional Water Authority
GWWC Gilan Water and Wastewater Company
JEK Jihad-e-Keshavarzi
LAP Land Acquisition Plan
MOAJP Ministry of Agriculture Jihad
MOE Ministry of Energy
MOHME Ministry of health and Medical Education
MoRA Municipalities of Rasht and Anzali
MWWC Mazandaran Water and Wastewater Company
NGO Non-Governmental Organization
OP Operational Policy
PMU Project Management Unit
RAP Resettlement Action Plan
RPF Resettlement Policy Framework
TSU Technical Support Unit
QA/QC Quality Assurance and Quality Control
RWB Regional Water Board
SA Social Assessment
TOR Terms of Reference
UFW Unaccounted for Water
US EPA United States Environmental Protection Agency
WB World Bank
WHO World Health Organization
WTP Water Treatment Plant
WTPO Water Treatment Plant Operator
WWTO Wastewater Treatment Operator
WWTP Wastewater Treatment Plant
INTRODUCTION

1. The deficiencies in the water supply system, the inconsistent quality of drinking water, the lack of a proper wastewater collection system and poor water and wastewater management, coupled with rapid growth of population have prompted the Government of Iran to consider the water supply and sanitation sector as one of its top priorities in its current five-year development plan. Within this context, the proposed Northern Cities Water Supply and Sanitation Project is being prepared by the Iranian Ministry of Energy – with the assistance of the World Bank - to improve the provision of water supply and sewerage services of 4 cities in the North of Iran: Rasht and Anzali (located in the Gilan Province), Sari and Babol (located in the Mazandaran Province).

2. This executive summary presents the main findings of the environmental and social impact assessment studies conducted in each of the four cities covered under the proposed project.

3. The objective of the impact assessment is to examine the environmental, economic, physical, biological and social impacts in the areas which may be affected by the proposed project, and propose mitigation measures, as well as construction and operation environmental management and monitoring plans.

4. This executive summary is intended to be a self-contained, stand-alone document that can be relied upon to provide major information necessary to understand the environmental and social sensitivities, potentially significant impacts, and mitigation and measures to be undertaken under the proposed project. For specific information or further details not presented in depth in this summary, the reader is referred to the main body of: a) the Environmental Impact Assessment (EIA) report for the cities of Rasht and Anzali (Gilan Province); b) the EIA report for the cities of Sari and Babol (Mazandaran Province) and c) the Social Assessment (SA) reports for each of the four cities. The full reports present description of the existing social and ecological environment as well as all the relevant baseline data. The EIA and SA reports were prepared by an Iranian Consulting Firm (Pars Ab Tadbir Consulting, in association with National Engineering Services of Pakistan). The Project is partly financed by the World Bank and as such will have to comply with World Bank guidelines relative to environmental and social safeguard policies.

5. Rasht is the capital of Gilan Province and is located 320 km north of Tehran, while Anzali is the second largest city of Gilan Province and is located at the coast of the Caspian Sea 40 km northwest of Rasht. The present population of Rasht is about 500,000 inhabitants and is projected to reach about 956,600 inhabitants by year 2027. The present population of Anzali is around 118,000 inhabitants and reaches 143,000 inhabitants in the summer because of tourism. Anzali’s population is projected to reach about 252,000 inhabitants, including tourists, by the year 2027.
6. The Zarojob and Goharood rivers are the main rivers flowing through Rasht while Anzali is located around Anzali Lagoon (on the Caspian Sea), a wetland of international ecological importance and recognized under the Ramsar Convention (1971). These two rivers and the Anzali Lagoon eventually flow into the Caspian Sea.

7. It is estimated that around 85% of the population of Rasht and about 75% of Anzali are currently connected to the cities’ water supply system. Water quality monitoring indicates that the water supply is of acceptable quality and in compliance with national and WHO standards. Chemical, physical and bacteriological analyses are conducted on a daily basis at various points including water sources, storage reservoirs and distribution network. The major problem raised by the Gilan Water and Wastewater Company is the high percentage of unaccounted for water (UFW), particularly for Rasht due to the old age of the system. The UFW in Rasht is estimated at 36%, whereas at Anzali it is estimated at 26%. Rehabilitation of the network has been initiated, but is proceeding at a very slow rate due to limited financial resources.

8. Similar to other cities in Iran, wastewater collection, treatment and disposal are the main environmental concerns in Rasht and Anzali. The major problem in both cities is the discharge of raw wastewater into the natural water bodies running through these cities. In Rasht raw wastewater is discharged to Zarojob and Goharood River, whereas in Anzali the wastewater is discharged to the Caspian Sea and to the Anzali lagoon where pollution levels are increasing and seriously affecting its environmental conditions. Currently a wastewater treatment plant is being constructed in each of Anzali and Rasht. At this time, the construction of these plants is about two thirds completed.

9. Moreover, due to the high ground water level in both cities, the indiscriminate discharge of sewage is leading to the contamination of ground water and causing the spread of infectious diseases. In view of these conditions and the serious repercussions on the cities’ development, the implementation of wastewater collection and treatment has become a high priority for both cities.

10. Sari is the capital of Mazandaran province while Babol is its second largest city. Both cities are located north of Tehran, about 20 to 25 km south of the Caspian Sea. The present population of Sari is about 241,000 inhabitants and is projected to increase to about 423,000 by year 2029, whereas the population of Babol is about 195,000 inhabitants and is projected to increase to 342,000 inhabitants by the year 2029. Both cities include one major river that passes through them: Tajan in Sari and Babolroud in Babol.

11. In Sari, studies indicate that the water supply system is in satisfactory condition, with more than 80% of the population connected to the water network. However, it is projected that the city will need to start planning its future expansion, as a number of groundwater wells begin to show deterioration in water quality and their production capacity begin to diminish. The studies also show that the drinking water is safe in terms of biological quality due to continuous chlorination.
12. In Babol, the water supply situation is also satisfactory and about 80% of the population is connected to the water supply network. The quality of groundwater aquifer complies with the Iranian standards and international standards (World Health Organization) for drinking water. However, it is projected that in the near future, the yield of the existing wells will not meet the projected increased water demand and additional new wells may need to be developed\(^1\). Recent surveys show the need to rehabilitate a considerable portion of the network, which will reduce the unaccounted for water and provide additional supply to meet the immediate demand.

13. Similar to other cities, wastewater collection, treatment, and disposal are the main environmental concerns in Sari and Babol. At present, there is no wastewater collection and disposal system in Sari. Most of the inhabitants rely on the traditional percolation pits. Part of the generated wastewater is discharged to the Tajan River, and to the irrigation channels of the city.

14. On the other hand, the wastewater collection system (including a wastewater treatment plant) in Babol is under construction. A part of the wastewater in Babol is discharged to Babolroud River or in open drainage channels that run along the roads adjacent to residential areas. Due to the high water table and low soil permeability, the use of existing percolation pits in Babol and Sari has been unsatisfactory and causing groundwater and surface water contamination.

**Social Assessment**

15. During project identification, a social assessment in each of the four cities was commissioned by the National Water & Wastewater Engineering Company of Iran on terms of reference and using consultants\(^2\) approved by the Bank. The social assessment in the four cities analyzed the social aspects of water and wastewater problems in the target cities using a consistent reporting format and methods of investigation: review of the secondary data, questionnaire social survey of representative households, and interviews with key informants, and focus group discussions with the residents and stakeholders, officials of the Regional and Local Water & Wastewater Companies and other private sector operators for sludge disposal. The studies analyzed the existing water and wastewater disposal strategies that the residents adopt with regard to water collection, wastewater disposal and sanitation. It also assessed the capacity of the WWCs to deliver improved services. The key focus of the field investigation was on the attitudes of the residents to the project and their willingness and ability to pay their share of the costs, both the capital cost of the investment (through a connection fee), as well as the Operation and Maintenance costs (through tariff increases).

\(^1\) Under the new Alborz Integrated Land and Water Management Project (financed by the World Bank), a Water Basin Council is proposed to be created in this basin (which includes Babol) to study, plan and coordinate the use of water for the various purposes. It is projected that any increase use of water supply in Babol will be decided by this Council. All users of water in the basin are expected to participate in the deliberations of the Council.

\(^2\) The work was a joint venture between a national and an international firm of environmental and social consultants Pars Ab Tadbir of Iran and NESPAK of Pakistan.
16. The region’s economy has always had an important sector of high-end tourism and vacation homes, but in other sectors the emphasis is gradually changing from fishing, mixed low-input farming and lower value crops (e.g., paddy rice), toward light manufacturing, transportation, and modern farming systems with higher value crops under irrigation and aquaculture. Table 1 below shows the key characteristics of the cities, which, despite local specificities, display broad similarities. The four cities are quite well covered with potable water supply but sewerage coverage is very low for current populations. Future demographic growth is likely to be accompanied by some vertical expansion (construction of apartment blocks), thus increasing the population density and also the proportion of rental properties. This fact alone brings urgency in the provision of a new sanitation system to replace absorption wells, a system that suits only individual households and lower population densities.

17. **Key social/poverty alleviation benefit.** With low natural gradients, rapid urban growth, and a predominant system of sewage disposal through domestic absorption wells, sewage infiltration into the water table and seepage into surface water and standing pools is common. This situation causes significant environmental health risks and quality of life problems, particularly for the extensive neighbourhoods of the four cities where the poorer sections of the population generally inhabit lower-lying and less well drained lands. Conditions in these areas, particularly in hot weather or during heavy rains, can be flagrantly unsanitary and unhealthy. For example, along the Anzali waterfront, shops and residences typically discharge untreated effluent visibly and directly into the lagoon. In Babol, sewage sometimes flows freely in streets where children play and pedestrians pass, causing severe health hazard. This project therefore will bring a direct, tangible, inclusionary and sustainable benefit for all, but particularly for the poor by improving dramatically the unacceptable conditions of environmental health and safety.

**Table 1. Some key characteristics of 4 northern cities**

<table>
<thead>
<tr>
<th>City</th>
<th>Province</th>
<th>Economic base</th>
<th>Urban area (kha)</th>
<th>Housing coverage</th>
<th>Literacy (%)</th>
<th>Lower category (%)</th>
<th>At least low income (%)</th>
<th>At least low income or services (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anzali</td>
<td>Gilan</td>
<td>seasonal tourism, fishery</td>
<td>143</td>
<td>75%</td>
<td>2.8%</td>
<td>93%</td>
<td>4.5%</td>
<td>16-20</td>
</tr>
<tr>
<td>Babol</td>
<td>Mazandaran</td>
<td>commercial and transport service center</td>
<td>202</td>
<td>80%</td>
<td>2.8%</td>
<td>95%</td>
<td>4.5%</td>
<td>36% 16-20</td>
</tr>
<tr>
<td>Rasht</td>
<td>Gilan</td>
<td>provincial center</td>
<td>480</td>
<td>85%</td>
<td>3.0%</td>
<td>96%</td>
<td>4.5%</td>
<td>32% 18-22</td>
</tr>
<tr>
<td>Sarı</td>
<td>Mazandaran</td>
<td>provincial center</td>
<td>203</td>
<td>80%</td>
<td>2.9%</td>
<td>96%</td>
<td>4.5%</td>
<td>35% 16-20</td>
</tr>
</tbody>
</table>

* Source: City populations based on data from Feasibility Studies, other data from social Assessments
Executive Summary

The objectives of this proposed Northern Cities Water Supply and Sewerage Project are:

- The improvement of the provision of water supply through the rehabilitation of the existing networks, reducing the unaccounted-for-water and limited extension of the network to unserved areas
- The provision of a wastewater collection service (all four cities) and wastewater treatment facilities (in Sari and Ghazian – which is the eastern half of Anzali) for the improvement of the health conditions of the population in the four cities and the environmental conditions within the project area
- The strengthening of the capacity of the Gilan and Mazandaran Water and Wastewater Companies (WWCs) to operate as an autonomous entity on a commercial basis.

The execution of the project will have positive impacts in terms of reducing pollution of natural resources, generation of significant economical, social and public health benefits, and will facilitate the enforcement of existing environmental regulations and standards by the government.

Potential negative impacts from the proposed project are mainly related to the construction phase of the project, and are thus of temporary nature. Other negative impacts that might arise from the project will be mitigated through appropriate measures. The present report summarizes the findings of the environmental assessment study that was conducted and the environmental management plan that will be adopted for the project.

PROJECT DESCRIPTION

The proposed project is based on feasibility studies carried out during 2002-2004. The proposed project cover the first phase (2005-2009) investment program identified in the feasibility studies which covered the long-term need projections for the study area. The total project costs are estimated at US$330 million (including all contingencies and costs of parallel activities undertaken by the WWCs). The Bank financing is estimated at US$230 million.

Water supply in the Gilan Province:

The cities of Rasht and Anzali are provided from the Central & Eastern Gilan Water Supply Scheme (C&EGWSS), which provides water also many other cities in east and central areas of Gilan. The C&EGWSS depends on the surface water of Sefidrood River, and the groundwater of Emanzadeh Hashem deep wells. Sefidrood River water is treated at Sangar Water Treatment Plant (WTP) and the Emergency WTP using conventional treatment processes comprising of flocculation, sedimentation, filtration and chlorination. Sangar WTP presently provides 259,200 m³/day, which
accounts for 74% of the total supply quantity, whereas Emamzadeh Hashem wells provide 64,800 m$^3$/day. The Gilan Regional Water Authority (GRWA) is responsible for the bulk supply in the province.

23. As part of the proposed project, the following water works will be executed, for a total of US$50.7 million in Rasht and US$9.6 million in Anzali. The proposed first phase components (2005 to 2009) of the water supply system in Gilan include:

**Rasht:**
- 261 km extension of distribution piping and mains
- Rehabilitation of 440 km of distribution piping
- Construction of 30,000 m$^3$ reservoir at Lakan
- Transmission line Saravan Lakan (financed by the GRWB)
- Rehabilitation of two existing 2,500 m$^3$ capacity elevated storage tank (financed by the WWC).
- Construction of two 40,000 m$^3$ ground reservoirs and related facilities (financed by the WWC)
- Provision of control and instrumentation system
- Reduction of unaccounted for water (studies and purchase of equipment)

**Anzali**
- Replacement of 39 km of distribution mains
- 59 km extension of distribution piping and mains
- 57 km extension of laterals (financed by the WWC)
- Reservoir and pump station (financed by the GRWB)
- Provision of control and instrumentation system
- Reduction of unaccounted for water (studies and purchase of equipment)

**Water Supply in the Mazandaran Province**

**Sari**
24. The water supply network, presently serves nearly 100% of Sari’s population. The total water demand of the city is 51,800 m$^3$/d and is supplied from 19 wells, which are scattered inside and around the city, tapping the Tajan river aquifer and Tajan alluvial cone. The total water production of these wells is 1,060 l/s (91,584 m$^3$/d). The water quality test results show that the water quality is safe and complies with WHO standards. As part of the proposed project, the following water works will be executed in the first phase, for a total of about US$4.8 million:

- Rehabilitation of some 50 km of pipelines (100 to 400mm)
- Extension of the network (65 km)
- New branches (85 km) in 50 to 90 mm Dia pipelines (financed by the WWC)
Executive Summary

Iran - Environmental and Social Assessment for the Northern Cities Water Supply and Sanitation Project

- Installation of 5,500 consumer water meters
- Reduction of Unaccounted for Water

Babol
25. The total water demand of the city is 41,796 m³/d and is supplied from a well field located 38 km toward south west of Babol, near Amol town. The well field, called Amol well field, taps the aquifer of the Haraz River basin, wherein 12 wells provide a total water supply capacity of 1,080 l/s (93,000 m³/d). The well field also supplies three urban centers adjacent to Babol, which include Babolsar, Amir-Kula, and Freyedounkenar. The water quality of these wells is in compliance with national standards, except for Selenium levels which exceed the national standards of 0.01 mg/l. However, all measurements for Selenium are less than the maximum contaminant limits of 0.05 mg/l specified by the US EPA by a very wide margin. Thus, there is no imminent health concern from using this water source as demonstrated by years of use in the region without records of related health cases. The water of Amol wells is continuously chlorinated to disinfect it, prior to being distributed in the supply network.

26. Within the proposed project the following water works shall be implemented, for a total amount of about US$7.1 million:
   - Equipment and collection network for five existing wells (to be financed by the Mazandaran Regional Water Board).
   - Construction of a 20000 m³ reservoir and a pump station (to be financed by the MRWB)
   - Rehabilitation of water supply network by replacing 40 km of pipelines having 100 to 400 mm diameters
   - Extension of water supply network mains by execution of 32 km of pipelines
   - Extension of water supply network branches (125 km of pipes 50 to 90 mm)
   - Installation of 4,500 consumer water meters.
   - Study and equipment for the reduction of UFW

Wastewater in the Gilan Province

Rasht
27. Rasht city is divided into western, eastern, and central drainage zones. Currently, 85% of its population is connected to a combined wastewater and storm drainage collection network, which discharges into Zarjoub and Goharood rivers. The rivers are severely polluted and during the summer season, when their flows are minimal, they are transformed to open sewers. The wastewater management plan in Rasht city is to collect the wastewater generated in the three drainage zones of
the city and convey them by gravity and pumping to a single wastewater treatment plant (under construction) located some 4 km to the northeast of the city. These flows will be treated to secondary treatment level with additional nutrient removal for control of nitrogen and phosphorus levels. The treated effluent of Rasht WWTP will be discharged to Zarjoub River, ultimately discharging to Anzali lagoon, which in turn discharges to the Caspian Sea.

28. At present, parts of the wastewater collection system in Rasht are under construction, with priority given to the central drainage area as it has the highest population density. Land for effluent outfalls, and land for collection network pumping stations has been acquired by GWWC. Pipelines will be laid within the right of way of public streets. The land for phase 1 of the Rasht WWTP was acquired, and construction of the phase 1 facilities with capacity of 80,000 m$^3$/day is currently in progress. A full EA was not performed for the under construction WWTP. Consequently and as part of the EA study of the proposed Rasht and Anzali project, a post environmental review was undertaken with respect to siting, engineering design, technical and environmental performance as well as any potential risks related to the operation of the WWTP. The costs of the proposed components (for the phase 2005 to 2009) of the wastewater collection and treatment system in Rasht are estimated at US$86.7 million and include:

- Construction of about 70,400 house connections
- Construction of some 560 km of network
- 16 lift stations
- Upgrading of the Rasht WWTP by including Biological Nutrient Removal (BNR)
- Provision of emergency raw wastewater storage tank with 24 hour capacity for phase 1.
- The provision of septage management works

**Anzali**

29. Anzali city is divided by Anzali lagoon into two drainage zones; called Anzali and Ghazian. Currently, 70% of its population is connected to a combined wastewater and storm drainage collection network, which discharges into either Anzali lagoon, which is currently classified as eutrophic in many of its parts, or into the Caspian Sea, through eight existing sewer outfalls. The wastewater management plan in Anzali city is to collect the wastewater generated in each drainage zone and convey it by gravity and pumping to a central WWTP serving that zone. Thus, there will be two WWTPs: one in Western Anzali (under construction) and one in Ghazian. It is forecasted that by end of phase 1, 65% of the population will be connected to the collection system, generating 19,710 m$^3$ of effluents per day. These flows will be treated to secondary treatment level with additional nutrient removal for control of nitrogen and phosphorus levels. The treated effluent of West Anzali WWTP will be discharged to Anzali Lagoon, which in turn discharges to the Caspian Sea. The treated effluent of East Anzali WWTP will be discharged to Talebabad River, which discharges to the Caspian Sea. The target for year 2027 is to serve 252,000 people with a total generated flow of 51,160 m$^3$/day.
30. As indicated above, the wastewater collection system in Anzali (West) is under construction. The land for treatment plants, effluent outfalls, and collection network pumping stations has been acquired by GWWC. Pipelines will be laid within the right of way of public streets. A full EA was not performed for the construction of the WWTP. Consequently a post review was undertaken.

31. As part of the proposed project, the following wastewater works will be executed in Anzali for a total amount of about US$46.1 million:

- Construction of 27,000 house connections
- A total of 253 km of collection network
- 14 lift stations
- Upgrading of the Anzali West WWTP by including biological nutrient removal.
- Provision of emergency raw wastewater storage tank with 24 hour capacity at Anzali WWTP.
- The provision of septage management works at Anzali West WWTP.
- Construction of the first module at East Anzali WWTP

32. The process design of the treatment plants was developed based on influent loads that were estimated from the long term data acquired at Esfahan and Tehran treatment plants and on guidelines issued by the Management and Planning Organization. The design treated effluent quality is in accordance with Iranian standards for discharge to surface water bodies. These effluent standards include among others, concentration limits for BOD, COD, suspended solids, nitrogen, phosphorus, and fecal coliform. It should be noted that since the discharge of all treatment plants is eventually reaching the sensitive water body of Anzali lagoon, additional features have been incorporated in the design of the Rasht and Anzali WWTPs to increase their performance and reliability. These features include: (1) the provision of biological nutrient Removal (BNR) for controlling nitrogen and phosphorus to minimum levels achieved by biological treatment systems, (2) the provision of 24 hour emergency storage tank for raw sewage in case of upset in plant performance (3) the provision of UV disinfection in lieu of chlorine to eliminate the possibility of harmful chlorination by-products.

33. Sludge treatment for Rasht WWTP is achieved through blending, thickening, and anaerobic digestion, and dewatering by belt filter presses to 30% dry solids content. Sludge treatment for Anzali West and East WWTPs is achieved through thickening and dewatering to 30% dry solids content. The projected sludge quantity from Rasht WWTP is 26 m³/day at year 2009, (reaching 111 m³/day at year by 2027). The projected sludge quantity from both West and East Anzali WWTP is 28 m³/day for year 2027. The initial sludge disposal scheme proposed was incineration since sludge disposal by re-use in agriculture within Gilan province was rejected due at a) public opposition in application to agricultural fields (predominantly cultivated by rice), b) unfavorable weather conditions (high humidity and rain for most of the year which prevents sludge drying in open beds), and c) the higher cost of landfilling when compared to cost of incineration. However - and as concluded by the post environmental review - the proposed incineration system did not meet international accepted
guidelines in terms of emission levels and other environmental criteria. Therefore after a re-analysis of the feasible options, it was decided to opt for the re-use of sludge from Rasht and Anzali in agriculture at the borders of the Gilan province with Qazwin province (after storage for up to one year to control for all infectious microorganisms); initial contacts were made with the authorities in Qazwin and the details of the site location are yet to be finalized. The agricultural and climatic conditions in the proposed zone have been identified as the more appropriate method for this project. The costs of the site purchase and preparation will be covered by the WWC (in lieu of the incinerator). Given that the Rasht WWTP falls within the area of influence of the project, on site analyses and an environmental assessment will be conducted during project implementation for the proper handling and disposal of the sludge. The EA will also cover the sludge from the Ghazian WWTP to be financed under the project.

**Wastewater in the Mazandaran Province**

**Sari**

34. There are no wastewater collection, treatment and disposal system in Sari. The common practice for wastewater disposal is through percolation pits. These wells have 1 to 1.2 m diameter and 8 to 10 m depth and normally require one time cleaning in about 1-to 2 year period.

35. The wastewater is almost entirely of domestic origin. Only two industries that produce an effluent are located in the project area: a dairy factory and a soft drink factory. Both factories have activated sludge wastewater pre-treatment plants, which produce effluent compliant with Iranian standards for industrial effluent discharge to the sewer network.

36. It is projected that by end of first phase of the project, 30% of the population will be connected, generating flows of 15,595 m$^3$/day. At year 2029, 100% of the population of Sari will be connected, generating 92,840 m$^3$/day. The Sari WWTP will employ the activated sludge treatment process and shall include processes for nitrogen control and effluent disinfection by chlorination. The proposed WWTP is comprised of four modules, with a capacity of 23,240 m$^3$/d per module. Treated effluent will be discharged to the Tajan River; whereas the generated sludge of the plant will be re-used as a fertilizer and soil conditioner after composting and storage for one year (land is made available on the site of the WWTP). While the use of sludge compost is not yet commonly known, the project will help promote its use among farmers. As a back-up option, the WWC has entered into consultation with the Department of Forestry in Mazandaran which has indicated its interest in use over forested land.

37. Under the proposed project, the following wastewater works will be executed in Sari for a total amount of about US$40 million:

- Installation of 16,000 house connection using 120 km PVC pipes, dia. 150 mm. (financed by the WWC)
- Installation of 125 km laterals using polyethylene pipes with 200 mm diameter;
- Installation of 108 km of main pipes and interceptors;
- Installation of 4 km trunk mains using polyethylene pipes with 1200 mm diameter;
- Installation of two pumping stations with capacity;
- Construction of the first module of WWTP;
- Provision of septage receiving facility at Sari WWTP;
- Construction of 1.2 km outfall main with pipe diameter 1400 mm for discharging of treated effluent from the WWTP to Tajan River.

38. The total land requirements for the development of the wastewater treatment plant for the target year of the project are 13 ha. This land and the right of way for the outfall main have been acquired by Mazandaran WWC. Pipelines will be laid within the right of way of public streets, and there is no need for land acquisition.

39. The 1400 mm treated effluent outfall will run parallel to an exiting irrigation canal and shall discharge to the Tajan River at a point 30 km south of the Caspian Sea. The Tajan River water is restricted to irrigation use downstream of the effluent discharge point.

40. Sludge treatment is achieved through blending, thickening, aerobic digestion, mechanical dewatering, and composting. Following composting, the sludge will be stored so that the total curing and storage period is one year. Sludge compost produced from the treatment plant at the end of the first phase is estimated at 700 tons/yr and will reach 4,600 tons/yr by year 2029. An area of 1.7 hectares has been allocated in the treatment plant for sludge composting. The sludge will be treated to achieve WHO guidelines of less than one nematode egg per 100 grams dry solids. The sludge compost will be transported to agricultural areas, where it will be used as a fertilizer and soil conditioner.

41. In order to mitigate the effects of disposing non-compliant effluent (in case of plant breakdown), the treatment plant design includes for the provision of four emergency storage lagoons, which in total provide a volume of 93,000 m³. This volume is sufficient to store the treated effluent for one day at year 2029 flow.

Babol

42. The wastewater collection, treatment and disposal systems in Babol city is currently under construction. The common practice for wastewater disposal for the whole city is to utilize percolation pits, which are identical in size and operating method as those described for Sari.
43. As there is no industry in the project area of Babol, the sewage is entirely of domestic origin. It is projected that by end of first phase of the project, 33% of the population will be connected, generating 18,913 m³/day.

44. The Babol WWTP will employ the activated sludge process and shall include processes for nitrification with effluent disinfection by chlorination. The final effluent discharge to Babolroud River has been discarded in view of major difficulties faced in acquisition of the properties required for routing the outfall to this river. Therefore the treated effluent will be discharged to Shazedroud River. The sludge generated from the Babol plant will be re-used as a fertilizer and soil conditioner after composting.

45. Under the proposed project, the following wastewater works will be executed in first phase, for a total amount of about US$27.6 million:

- Installation 16,300 house connections (financed by the WWC);
- Installation of 90 km laterals using polyethylene pipes;
- Installation of 38 km main pipes and interceptors including 1.2 km by pipe jacking using polyethylene pipes with 250 to 1000 mm diameter;
- Installation of six lift stations;
- Completion of the first stream of module one of Babol WWTP;
- Provision of septage receiving facility at the Babol WWTP;
- Construction of 4 km outfall main with 1400 mm diameter for discharging treated effluent from the WWTP to Shazedroud River.

46. The trunk main which conveys all the wastewater to the WWTP has already been constructed. The total land requirements for the development of the wastewater treatment plant for target year of the project are 10 ha. This land and the right of way for the outfall main have been acquired by the MWWC. Pipelines will be laid within the right of way of public streets, and there is no need for land acquisition.

47. At present, trunk lines and part of mains and laterals are being laid in the city and the first stream of the wastewater treatment plant is under construction. A full EA was not performed prior to the construction of the wastewater treatment plant. Consequently and as part of the EA study of the proposed Sari and Babol water and sanitation project, a post environmental review was undertaken with respect to the engineering design, technical and environmental performance as well as any potential risks related to the operation of the WWTP.

48. Shazedroud is a relatively small river, which runs dry in its upper reaches during the summer season. The river is strictly used for irrigation during the summer months and during the wet season it...
discharges to the Caspian Sea. During the summer, the effluent will be used for irrigation of the orange orchards surrounding the course of the river, and during the winter season the effluent will be used for augmenting the river’s flows.

49. Sludge treatment is achieved through blending, thickening, and anaerobic digestion, mechanical dewatering, composting followed by compost storage for one year. Sludge compost produced from the treatment plant in the first phase is estimated at 410 tons/yr and will reach 3,550 tons/yr by year 2029. For composting the sludge, an area of 1.3 hectares has been allocated in the treatment plant. The sludge will be treated to achieve WHO guidelines of less than one nematode egg per 100 grams dry solids. The sludge compost will be transported to agricultural areas where it will be used as a fertilizer and soil conditioner. Similar to Sari, four emergency storage lagoons are provided to mitigate the effects of discharging non-compliant effluent.

POLICY, LEGAL AND REGULATORY FRAMEWORK

50. The Environmental Impact Assessment for the Project must meet a number of policy and legal requirements. The World Bank policies and the Iranian Decree 138 have been complied with during the course of project preparation and will be complied with during project implementation.

51. The competent body for EA as defined in Decree 138 of 12/04/1994 is the Iranian Department of Environment (DOE), under the authority of the Environmental High Council (EHC) which is composed of senior representatives of government ministries, senior academics and advisers to the Iranian government. Environmental Assessment (EA) in Iran was enabled by Note 82 of the Law for the Second State Economical, Social and Cultural Development Plan of 1994, amended by Note 105 of the Third Development Plan. EA was approved by the EHC through Decree 138 and detailed requirements for conducting EA were defined in the Code of Practice of 23/12/1997. In addition to the defined project types that are subject to EA, the EHC may also require an EA for any other large project.

52. In addition to Environmental Assessment, there are a wide range of regulations regarding environmental protection including the Environmental Protection Act of 1974 and its executive by-law dated 1975, the Clean Water Act of 1982 that was amended in 1994, the executive by-law on the prevention of water pollution (1994), the Air Pollution Abatement Act of 1995 and its executive by-law dated 1997, the Game and Fish law of 1957 with subsequent amendments made in 1975 and 1996. Also, there are standards for drinking water, effluent discharges, noise levels and ambient air quality. The project will adhere to the aforementioned laws and standards. With respect to industries, existing national legislation provides for control of industrial discharges. DOE is mandated with the enforcement of the limits for industrial discharges and has shown willingness in terms of enforcement of the laws and regulations against polluters by issuing warnings, imposing fines and eventually
Executive Summary

Iran - Environmental and Social Assessment for the Northern Cities Water Supply and Sanitation Project

brining them to courts. Moreover, the project will only provide connections to industries that are inside the cities of Rasht and Anzali. Industrial complexes outside Rasht and Anzali will have to treat their effluents separately and DOE will be responsible for the industrial effluents discharging into the receiving water bodies.

53. The Law dated February 6, 1980 governing the Expropriation of Land for Public Projects, Military Usage & Infrastructure Improvements, applies to activities involving land acquisition and resettlement.

Applicable World Bank Policies

Operational Policy 4.01 on Environmental Assessment

54. The World Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of EA. The World Bank classifies any project into one of the four categories (A,B,C,FI), depending on the type, location, sensitivity and scale of the project and the nature and magnitude of its potential environmental impacts. A category ‘A” project is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

55. The project is considered a Category A project as the rehabilitation, improvement and expansion of water and wastewater services will produce impacts from noise, dust and water quality during construction, wastewater effluent quality, sludge and solid waste during operation that could be significant for a number of people living in the residential areas. These populations may also be affected by induced impacts such as increase in traffic congestion. It should be noted that there will be also a number of significant benefits resulting from this project including improved water quality, improved waste management, increased access to clean water supply and sanitation, and most importantly improvement of public health. An Environmental Assessment (EA) and an Environmental and Social Management Plan that provides mitigation measures to project impacts as well as monitoring arrangements have been prepared. In the following table, other World Bank Safeguard policies are listed with the actions taken:

<table>
<thead>
<tr>
<th>Safeguard Policy</th>
<th>Relevance and Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment (OP 4.01)</td>
<td>An environmental and Social Assessment have been prepared that include environmental and social management plan as well as an environmental monitoring plan.</td>
</tr>
<tr>
<td>Cultural Property (OPN 11.03 being)</td>
<td>The Cultural Heritage Office in both Gilan and Mazandaran has confirmed that there are no valuable cultural and</td>
</tr>
</tbody>
</table>
Executive Summary

revised as OP4.11) religious properties in the project cities. Chance find procedures will be in place during construction in compliance with the Government’s and the World Bank’s safeguard policies.

Involuntary Resettlement (OP 4.12) A Resettlement Policy Framework has been prepared along with a Land Acquisition Plan and an abbreviated Resettlement Action Plan. These are attached to this Executive Summary

International Waterways (OP 7.50) Rivers and the Anzali Lagoon (a recipient of the rivers in the Rasht/Anzali area) discharge in the Caspian Sea thus triggering this Policy. The impacts of the project components have been assessed and found to be positive in terms of recipient water quality. To comply with the policy, project notification letters have been issued to the riparian countries of the Caspian Sea, namely, Azerbaijan, Russia, Kazakhstan and Turkmenistan, providing them with a 30-day period for response.

Natural Habitats (OP 4.04) The Anzali Lagoon is on the list of Ramsar Montreux Record (Ramsar Convention 1971) and as such is considered a site of international ecological significance. A notification letter will be sent by the Government to the Ramsar Convention Secretariat in Montreux. Under the project, the wastewater of Rasht and Anzali will be treated to tertiary level (removal of nitrogen and phosphorus) before discharge. An emergency reservoir for storing incoming sewage for 24 hours has been included in the project to avoid discharges in cases of plant failure. No degradation of the lagoon is to be expected. It is expected that the overall environmental conditions of the Lagoon will be improved as a major source of pollution will be removed.
INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENT MANAGEMENT

56. A number of governmental organizations have responsibilities for managing and monitoring environmental impacts. The Guilan Water and Wastewater Company (GWWC) which is in charge of water supply as well as wastewater collection and treatment will be in charge of managing, operating and maintaining the project. Among its duties, the GWWC will have responsibility for ensuring the supply of adequate water quality and quantity. GWWC will also be responsible for controlling discharges into the wastewater collection system and as such will be responsible for ensuring that industries pre-treat their wastewater before discharging it into the collection network.

57. The DOE will have the responsibility for monitoring the environmental impacts. It will monitor construction activities, will check water quality in the rivers and in Anzali Lagoon and will ensure compliance with effluent standards for industries and wastewater treatment plants. The DOE will also monitor the quality of sludge to be used for soil conditioning, if this application is adopted by the projected.

58. The Ministry of Agriculture Jihad has responsibility to supervise and regulate the reuse of treated sludge, if reuse in agriculture is adopted, while the Ministry of Health and Medical Education will be responsible for monitoring water quality and the occurrence of water borne diseases.

BASELINE INFORMATION

59. The baseline conditions were investigated within this study area and for adjacent areas that could potentially be affected by the project. Baseline information has been quantified within three main topic areas - physical, biological and socio-economic.

*Gilan Province*

60. The major source of water in Rasht and Anzali is surface water. There are two rivers flowing in Rasht; Zarjoob (Siahrood) River and Goharood River, which join to form a main river called Syghlanroodbar (Pirbazar), which discharges into Anzali Lagoon and eventually into the Caspian Sea. The two rivers are mostly used for irrigation purpose. Based on 25 years of records the annual average flow at the GRWA bridge in Zarjoob River is 5.73 m³/sec. As for Goharood the annual average of the flows measured at Lakan is 1.08 m³/sec based on 10 years of measurements. Both rivers are highly polluted as they receive considerable wastewater discharges and pollutants from other sources such as solid wastes, or agricultural runoff. The available data on the water quality of these rivers confirm the deteriorating quality of the rivers where the BOD₅ levels in both rivers measured up to 30 mg/l when the normal level for clean rivers should be less than 1 mg/l and DO levels measured as low as 1.8 mg/l when DO saturation concentration is around 10 mg/l.

61. The other important river is Sephidrood, the main source of drinking water for Rasht and Anzali city. This river however only crosses through part of the project area and runs to the north east.
Sephidrood river quality at Sangar WTP intake is typically turbid with high TSS and TDS, however generally it is compliant with Iranian drinking water quality standards. As for the groundwater in the project area, it comprises a smaller part of the water supply system. Generally each well has 20 to 30 l/sec capacity. The water supply wells of Emamzadeh Hashem, and Sangar are located to the south east of the Rasht city and generally have good water quality.

62. Anzali is characterized by numerous short rivers (Rogas), which eventually discharge to Anzali lagoon; among which is Pirbazar Roga, which originates from the two rivers of Rasht city. Some of these rivers convey domestic sewage originated by the communities discharging into them. The sum total of the surface water that enters Anzali Lagoon is 2,400 million m³/year.

63. The Anzali Lagoon, the most prominent environmental feature in the project area, is listed as a ‘wetland of international importance’ under the 1971 Ramsar Convention due to its importance as a natural wetland characteristic of the southern Caspian lowlands, and as such, supports an extremely diverse wetland flora and fauna. This Lagoon is located on the South West of the Caspian Sea and is connected to the sea through a channel called Ghazian. The current total area of the wet land, covering both lagoon and the marsh land is 193 km². The lagoon itself is around 80 km² with average of depth ranges of 1 to 3 m. The wet lands include two wildlife refuge areas, two protected areas, and four no hunting areas. The site has been placed on the Ramsar Montreux Record of priority sites for conservation action since December 1993, due to environmental degradation: the diminishing areas of the wetlands and the lagoon, the excessive growth of reed beds, decreased production of fish quantities, and the eutrophication, which is causing excessive water fern growth. According to a recent study by JICA on the integrated management of the lagoon’s ecosystem, the lake is eutrophic at several locations as confirmed by measurements of chemical oxygen demand (COD) and total phosphorus (TP) in five locations of the lagoon. According to this study, the major adverse effects on the wetland are arising from the watershed, while other adverse effects were attributed to activities within the wetland. Adverse effects from the watershed to the wetland are as follows: (1) inflow of polluted water; (2) inflow and dumping of garbage; (3) inflow of sediment; and (4) changes of the water level of the Caspian Sea. Of these factors, the inflow of polluted water is the most serious factor due to the discharge of organic loads, which causes oxygen depletion, and the discharge of nutrients (nitrogen and phosphorus) leading to excessive algal growth and thus eutrophic conditions. The main contribution of polluted water comes from urban domestic wastewater, of which the discharge of Rasht and Anzali cities represent 83% of the total. The long term level changes in the Caspian Sea are the main cause for salinity changes in Anzali Lagoon, which has adverse impacts on its aquatic ecosystem.

64. There is one industrial city 25 km south of Rasht and two large industrial complexes 10 km away from Anzali City. These industrial cities will include a number of industry types and will produce different wastewater qualities. However, these industries will not be connected to the
proposed sewerage system, but will have their own central treatment facility, which will be monitored by the DoE-Gilan. Nevertheless, there are scattered small size industries in both cities. These industries include soft drinks, canning, chemicals, dairy, and slaughterhouse. In Rasht there are 17 industries producing 355 m$^3$/day of wastewater, with only 7 industries generating more than 10 m$^3$/day. Whereas in Anzali there are only four industries. According to current policy that limits the operation of industries to rural areas of the City, no further industrial development within the urban areas of the cities is expected. Furthermore, existing legislation provides for the control of industrial discharges which are monitored by the Department of Environment.

65. Agricultural areas are dispersed around Rasht and Anzali, with the majority located outside the urban areas. The total areas of cultivated lands in Rasht and Anzali amount to 62,860 hectares and 42,849 hectares respectively. Rice cultivation is the predominant agricultural activity in the region, with over 90% of cultivated areas are used for rice growing. Other crops include cereals, fruits and tea crops. Present irrigation sources include natural rainfall, supplemented occasionally by river water.

66. Although both Rasht and Anzali cities are among the oldest cities in north Iran, yet there are no structures or remains of any archeological or historical significance according to the Cultural and Heritage Department, Gilan.

**Mazandaran Province**

67. Both surface and ground water resources are used as a source for potable, industrial, and irrigation water in Sari and Babol regions. Presently, the major source of potable water supplying Sari and Babol is groundwater.

68. One of the important problems in Sari and Babol is the threat to public health caused by improper disposal of untreated wastewater and septage. These conditions have caused the spread of many water-borne infectious diseases such as diarrhea.

69. Agricultural areas are dispersed outside and around Sari and Babol. There is more than 100,000 hectares in Sari, and 80,000 hectares in Babol of prime agricultural land cultivated mostly by rice and citrus orchards. Irrigation sources include river water, ground wells, and springs. Irrigation water is estimated at 610 million cubic meters per year in Sari and 644 million cubic meters per year in Babol. Chemical fertilizers are widely used in the region.

70. Mazandaran Province is located in an active seismic region of Iran. There are at least 10 faults in Mazandaran. Sari and Babol are located on the same fault line of Khazar, which passes through Lahijan to the west and Golastan to the east. In year 2004, there have been two main seismic activities in Mazandaran province, one of which resulted in 35 deaths and hundreds wounded.

71. Mazandaran Province is rich in fauna and flora. In Babol and Sari cities, the flora species are similar and can be classified into three types: flora in or around the rivers, pasture flora, and forest flora around the cities. There are various habitats in the project area and different fauna species live in
Executive Summary

or migrate to this area. Fauna species are diverse and include some endangered species. Based on IUCN classification there are 8 mammalians, 18 birds, and 2 reptile species in danger.

72. In Sari, Tajan is the major river that passes through the city. It originates from Niz-Abad Mountains and flows to the north to discharge in the Caspian Sea. The annual average flow of Tajan River measured at Soleyman station (40 km upstream of Sari city) is 6.55 m³/sec and at Kordkheyl station (few km downstream of Sari) is 13.56 m³/sec. Tajan River is used to irrigate farms and orchards. During the past few years Tajan water quality, in Sari city and downstream of it, has deteriorated because of agriculture drainage, and untreated wastewater discharges. The fifteen water quality analyses that were made over a five month period demonstrate that the pollution level of the river is low to medium. Some measurements of fecal coliform levels exceeded the 400 coliforms/100 ml limit set by Iranian standards for irrigation use. The average of the BOD₃ measurements was 6 mg/l with highest recorded was 17 mg/l.

73. Currently there are 19 wells that supply water to Sari. The wells have an average depth of 120 meters and production capacity between 30 to 90 l/sec. The groundwater level is diminishing each year as the withdrawal rate is exceeding the recharge rate.

74. A number of industrial facilities are located around Sari, however only one dairy and one soft drink industry are located within the project area. The volume of wastewater produced by these industrial facilities is about 800 m³/d and both have pre-treatment facilities, which are producing effluents that comply with Iranian standards for industrial discharge to public sewerage systems. According to current policy of the Iranian Government which limits the industries to rural areas, no further industrial development is expected within the City. Furthermore, existing legislation control and limit industrial discharges to set standards.

75. The Sari solid waste landfill is about 8 km to the south of Sari near Zarea Park. The solid waste generated presently by the City of Sari is estimated at 192 tons/d. There are two wildlife refuges near Sari: the first is Semskandeh located about 5 km towards south east of Sari having an area of 937 ha and the second is Dasht-e-Naz located about 42 km north east of Sari with an area of 55 hectare.

76. The proposed wastewater treatment plant is located in the northern part of Sari city at distance of 1 km from the city. The nearest residential area is Oja village, which is located around 500 m away from the plant site. The plant surroundings comprise of agricultural areas with rice and citrus orchards, which are irrigated mainly by the Tajan River.

77. Babol. The main river crossing Babol is Babolroud. It originates from Savadkoh Mountains and flows to the north to discharge in the Caspian Sea. The annual average flow of Babolroud River measured at Babol station, in the city itself is 16 m³/sec. Babolroud River is used to irrigate farms and
orchards. The river’s water quality has deteriorated because of agriculture drainage and untreated wastewater discharges. The average of the BOD₃ levels was 6 mg/l with highest recorded was 9 mg/l.

78. Shazedroud flows to the north of Babol city and discharges in the Caspian Sea, at Babolsar city coastline. It is a relatively small river, which runs dry in its upper reaches during the summer season. On average the river has a flow of 1 m³/sec at its downstream end near the sea, and 200 to 300 l/sec at its upstream end, where the treated effluent outfall of Babol treatment plant is proposed to discharge. The river water is strictly used for irrigation; wherein the area around it is comprised of agricultural fields. Presently, Shazedroud is polluted as it receives a considerable amount of raw wastewater and agriculture drainage as well as solid waste.

79. Ground water is the main source of water for Babol. There are twelve wells, located in the Haraz alluvial plain close to Amol town, which supply water for Babol. On average the wells are 125 m to 150 m deep, and produce 90 l/sec. The ground water quality of Babol is in compliance with Iranian drinking water quality standards except for Selenium concentrations. All the measured concentrations of Selenium, however, are less than the maximum contaminant limit for Selenium specified by US EPA for drinking water. No immediate health impacts are envisaged; however regular monitoring of the water quality is required to determine if there is any trend for deterioration and to take required mitigation measures.

80. Two industrial towns are located some 25 km to the south and southwest of Babol city. However, there are no industrial establishments in the project area. Babol solid waste landfill is located adjacent to the old Babol-Tehran road, 40 km away south of Babol. It is estimated that Babol City currently generates 156 tons/d of solid waste.

81. Babol wastewater treatment plant, which is under construction, is located in the North of Babol city at of 5 km from the boundary of Babol city. The nearest residential area is Amir- Kola, located at 3 km distance from the treatment plant. The surroundings of the plant are mainly agricultural areas with rice fields and citrus orchards.

Beneficiary attitudes to project.

82. In all four cities, attitudes toward the project were broadly congruent. In Anzali, the poor majority believe that the project will bring a positive benefit. However, the higher income groups are more skeptical about the level of improvements likely to accrue from the Project. In all cities, it was recognized that the project would bring benefits. However, there was expressed across all cities the same skepticism and doubts as to whether the existing WWC management has the institutional capacity to deliver improvements or the means to interact effectively with the beneficiaries. The public was, therefore, broadly skeptical that the companies would actually deliver the promised benefit, and this skepticism adversely affected willingness to pay. This skepticism was reflected in
the high non response rate to the questionnaire survey on willingness to pay, and reluctance to disclose information on private family matters such as incomes, their self-perceived class ranking.

83. In all four cities, respondents expressed considerable scepticism about the management capacity of the companies, and in particular their ability to work effectively with beneficiaries. There was a distinct feeling that community participation in monitoring of service delivery, through lane and neighbourhood committees with ability to make representation to the WWW companies, should be complemented by a capacity developed in the companies to enable them to present essential information on water and sanitation issues in a user friendly way that the community can relate to. The companies should each have a community liaison function. This in turn would require training and technical assistance.

84. **Willingness and ability to pay.** At present, households pay broadly from 16% to 22% of their incomes on all public services aggregated: water, solid waste, education health and transport, on clearly modest incomes for the poorer groups of $1 - $1.50 per person per day. Water charges are estimated to comprise about 1-2 percent of incomes, which is low by global standards. Modelling scenarios suggested that a doubling of connection fees and usage tariffs might increase this combined utility component of household budgets by around 5%, which would certainly be felt significantly, particularly by the poorer sections of the population. The willingness to pay component of the social assessment therefore led to the obvious conclusions: a) the poor are most willing to pay, because they suffer the most deplorable environmental health conditions; and b) people were unwilling to commit to a specific amount, yet reluctant to show unwillingness lest their refusal might prejudice their opportunity to gain a needed service. The operational consequences of this conclusion are spelt out in the recommendations for communication and public education.

**IMPACTS OF THE PROJECT**

85. The environmental assessment indicates that the implementation of the project will have long-term positive environmental impacts in terms of reducing pollution of natural resources, generation of significant economical, social and public health benefits, and will enable the government to enforce existing environmental regulations and standards.

86. The provision of wastewater collection and treatment facilities will have a strong long-term positive effect on the overall environment and on public health conditions. There will be improvement in the water quality in the streams and rivers that flow throughout the project area. A major benefit of the project is the protection of groundwater resources from contamination by untreated sewage, and the elimination of direct sewage discharge to the Caspian Sea from Anzali City. Furthermore, by eliminating the direct discharge of raw sewage from Rasht and Anzali cities, the project will

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3 Surveys, however, usually underreport incomes, because respondents typically report only formal incomes and omit many other sources. The survey showed a marked reluctance to respond to this type of question.
substantially reduce the current organic and nutrient loads that are originating from urban centers on Anzali Lagoon, and will thus address one of the major environmental problems affecting Anzali Lagoon today.

87. It is worth noting that the design of the treatment plants has taken into consideration the use of their by-products (generated sludge, and indirectly treated effluent) with the aim of protecting the environment and the scarce water resources. This will generate significant economic, social and health benefits and will enable the Government to enforce the laws that prohibit discharging raw wastewater in the environment.

88. As a result of the project, economic benefits will occur in terms of increased water volume of good quality, increased tourism activities, and lower medical costs associated with treating water-borne diseases.

89. Finally, the wastewater treatment facilities will also provide an opportunity to better control industrial discharges through enforcing pretreatment and connection to the collection system as stipulated in the Iranian law.

**Potential Adverse Impacts of the Project**

90. **Drinking Water Quantity and Quality**: treated water quantity and quality should meet water demand as well as allowable drinking water standards set by the Iranian Government and WHO. In order to safeguard public health, it is imperative that regular monitoring of raw and treated water at the treatment plants, groundwater wells, storage reservoirs and in the distribution network be implemented to ensure that drinking water limits are not exceeded.

91. **Treated Effluent Quality**: the treated effluent should be of acceptable quality so that it can be safely discharged into water bodies. Furthermore, since treated effluent may be directly re-used in agriculture as in the case of the Babol wastewater treatment plant and its discharge to the Shazedroud River, it must also be safe for this application. This means that the effluent quality should meet the standards for discharge into water bodies and the WHO guidelines for agriculture re-use. One of the major concerns is the level of nematode eggs, which should be less than 1 egg per liter of water used in irrigation. Another major concern is the concentration level of nutrients such as ammonia, nitrate and phosphate which could result in algal growth in the receiving water bodies. Regular monitoring of these variables will be required to ensure strict adherence to the prevailing standards. In the case of Babol, close coordination with the Alborz Water and Land management Project (Bank-financed) will be sought to avoid duplication of monitoring activities.

92. **Sludge Quality**: In the case of dried sludge re-use by farmers as soil conditioner or fertilizer, the sludge quality will have to comply with the WHO guidelines for the use of sludge in agriculture, including the limit of less than one intestinal nematode egg per 100 gm of dry solids and the limits on the concentration of heavy metals. The adopted treatment processes, sludge composting process,
Executive Summary

including proper curing period followed by storage of up to one year, and the control of industrial discharges to the sewage system would have to ensure that the acceptable standards for nematodes and toxic substances would not be exceeded for the use of sludge in agriculture.

93. **Other Impacts:** Adverse environmental impacts during the construction phase might be significant, however they are only temporary. Typical impacts are those of dust, noise, traffic congestion, and disturbance to the residents of the area. Good construction practices would mitigate most of these temporary impacts to acceptable levels. Moreover, the project will have a positive impact on employment resulting from the increased construction activities.

94. The project will have no significant long term negative impact on air quality, climate, biological environment, socio-economic conditions, or other development projects. In summary, once operational, most of the impacts of the Project will be positive.

**ANALYSIS OF ALTERNATIVES TO THE PROJECT**

95. The option of continuing with the current water supply system and wastewater disposal methods, as well as alternative water supply schemes and other wastewater treatment processes have been explored and compared in terms of capital costs, operational costs, land requirements, length of transmission lines, consumed energy, environmental impacts, management needs, reliability of the process and local conditions.

96. The "no project" option would avoid the temporary environmental impacts of installing pipelines and constructing treatment plants; however, this option is rejected on the grounds of economic cost and adverse long-term environmental and social impacts. It would mean a whole region with poor and unreliable water supply system and no wastewater collection and treatment. Under such conditions severe adverse environmental impacts such as pollution, flooding, and poor health conditions would increase and the prevailing environmental conditions will further deteriorate.

97. Moreover, the economic benefits of the proposed project are greater than the cost of not implementing it; taking into account increased revenues from tariffs from new connections to water supply and wastewater, the cost of the degradation of surface and ground water resources; the cost of treating additional water quantities to compensate for the high unaccounted for water; the high maintenance cost for the aged water supply system; lost working days due to water related diseases; cost of medical treatment; costs of indiscriminate wastewater disposal by tankers, and the use of commercial fertilizer instead of treated sludge.

98. With respect to wastewater collection and treatment, a number of alternatives have been considered including on-site sanitation, decentralized treatment and centralized treatment. On-site
sanitation in Rasht, Anzali, Sari and Babol has proved to be difficult to achieve because of the high ground water level in most of the project area, management issues, treated effluent quality, as well as financial issues. People living in areas served with on-site sanitation facilities face severe difficulties disposing their sewage, and in many instances there is no controlled disposal of septage from these facilities. Furthermore, the government has already initiated the construction of Rasht and West Anzali wastewater treatment plants and various sections of the collection and conveyance networks are being implemented, which would offer a more feasible and reliable method for sewage disposal to house owners. Hence, the option of on-site sanitation is rejected.

99. Taking into consideration the prohibition set by the Department of Environment on the construction of wastewater treatment plants within city limits, the option of decentralized treatment by having additional WWTPs serving sub-areas of the cities was also rejected based on cost, availability of land and potential adverse environmental impacts.

100. The proposed activated sludge process and other processes (aerated lagoons, stabilization ponds, extended aeration-activated sludge, and oxidation ditch activated sludge) were also evaluated and compared. In the Gilan Province, since the plots of land for Rasht and West Anzali WWTPs have already been acquired and since land availability in general is very limited in both cities, both the stabilization ponds and the aerated lagoons were rejected, as they would require larger areas. The activated sludge system was selected in view of reliability and operational flexibility; furthermore, the activated sludge process was found to be most suitable for upgrading the plants under construction by including the BNR process, which is required for nitrogen and phosphate nutrients removal according to the revised designs of the plants. For the Mazandaran Province, among all the processes considered, the activated sludge process with nitrogen control ranked first in terms of reliability to produce compliant effluent with required nutrient levels, and least area requirements. All of these factors are critical considering the groundwater and surface water situation in the area of influence as well as the limited land availability, particularly since 13 ha and 10 ha of land have already been acquired for both Sari and Babol. Therefore the activated sludge system is the most environmentally sound option and thus it was the selected alternative. The option of extended aeration was rejected due to higher construction and operation cost, and land acquisition costs.

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

101. The EMP identifies feasible cost effective measures to mitigate any adverse environmental impacts that might occur during the construction and operation of the project. The EMP covers mitigation measures, monitoring and institutional strengthening.
Mitigation of Adverse Environmental Impacts in Gilan

102. Mitigation measures have been identified to ensure that the defined objectives of the project are achieved whilst preventing and reducing any adverse environmental impacts. The mitigation measures are to be executed by the construction contractor (construction phase) and the treatment plant operators (operation phase) with supervision by the GWWC. The tables in Annex I summarize the major impacts and the mitigation measures for the construction and operation phases.

103. Water Quality: Water quality analyses indicate that the water quality is chemically acceptable. The concentrations of all chemical parameters are below the maximum allowable standards set by the Iranian Government and WHO. The Project is expected to improve quality of water in the rivers, Anzali Lagoon and the Caspian Sea. The provision of a wastewater network for collecting and diverting the generated wastewater to treatment plants will certainly minimize potential bacteriological contamination of ground water. Furthermore, the proposed project will finance the regular monitoring of water quality. During project implementation, a continuous monitoring program would be implemented to ensure that treated water would always meet the required standards. The monitoring program will cover biological and physical parameters as well as heavy metals and pesticides residues.

104. Effluent Quality: The proposed secondary treatment level is based on activated sludge process with provision for nutrient control by the BNR system, which would ensure a treated effluent of acceptable quality for discharge in receiving water bodies. This process will result in the reduction of BOD<sub>5</sub>, total nitrogen, total phosphorus and fecal coliforms, to levels that are in accordance with prevailing standards. Emergency storage of raw wastewater for 24 hours is also provided to provide further mitigation measure for the protection of Anzali Lagoon from any upset in the treatment process. As soon as the wastewater treatment plants start operating, monitoring of BOD<sub>5</sub>, suspended solids, total phosphorus, total nitrogen, and fecal coliforms, in the influent and effluent will be conducted by the GWWC to ensure adherence to the required standard.

105. In view of the treated effluent quality, which will be in compliance with the prevailing standards for discharge to water bodies, and the dilution effects of the rainy season, no adverse impacts are envisaged on the rivers of Zarjoob and Goharood in Rasht and on Anzali lagoon and Rogas in Anzali.

106. In fact, the environmental state of the rivers is expected to improve in comparison to the base condition due to improved water quality of the discharging rivers.

107. Sludge Quality: The sludge treatment processes of the two treatment plants include: sludge blending, thickening, anaerobic digestion, and sludge dewatering. These processes will ensure the elimination of toxics and pollutants in the sludge. For the use of dried sludge in agriculture as soil conditioner or fertilizer, the project will ensure compliance with WHO applicable guidelines including
the limit of less than one intestinal nematode egg per 100 gm of dry solids by monitoring the quality of treated sludge and ensuring a drying period of one year.

108. Industrial Discharges: The discharge of untreated industrial effluents can affect the performance of the wastewater treatment plants, resulting in a lower quality treated effluent. The project will only provide connections to those industries that do not discharge toxics that affect the performance of the wastewater treatment plants. The discharge of industrial effluents will be subject to the approval of both the Director of the treatment plant and the provincial director of the DoE. For those industries for which their industrial effluents will not be pre-treated, and/or will not be connected to the network, the DOE will require that each polluting industrial establishment will prepare a compliance action plan (CAP), which will address the pollutants of concern, the type of pre-treatment required and the investments and monitoring costs of the pre-treatment facility. Operational permits for these industries (new permits or renewal for existing industries) will be subject to the implementation of the CAP to be monitored annually by the GWWC and enforced by the DOE.

109. Moreover, under the World Bank funded sewage project for Tehran, standards for industrial effluent discharged into sewage systems are being developed in close coordination with DOE and other concerned line ministries. These standards include the following industrial sectors: food, textiles, tanneries, pulp and paper, metal, pharmaceutical and electronic industries as well as general standards for the remaining industrial sector. Also, the DOE has promulgated standards for industrial discharges to surface waters. The project will ensure compliance with all these standards, where applicable, and with the planned future promulgation of a national law for the discharge of industrial effluents to sewage networks.

110. Septage Handling: The project will include septage handling facilities at Rasht and West Anzali WWTP for receiving the septage from on-site disposal facilities. The septage will be co-treated with the wastewater that is discharged to the plant from the collection network. The need to adjust the plant design to accommodate the septage will be evaluated.

111. Odors emissions from the wastewater treatment plants will be minimized by the provision of odor removal equipment at Rasht WWTP, and by careful planning and implementation of the plant operation and maintenance procedures at all treatment plants. Regular Odor emissions monitoring from the wastewater treatment plants will be implemented to mitigate any non-compliance by taking appropriate operating measures.

Mitigation of Adverse Environmental Impacts in Mazandaran

112. Mitigation measures have been identified to ensure that the defined objectives of the project are achieved whilst preventing and reducing any adverse environmental impacts. The mitigation measures are to be executed by the construction contractor (construction phase) and the treatment
Executive Summary

Iran - Environmental and Social Assessment for the Northern Cities Water Supply and Sanitation Project

plant operators (operation phase) with supervision by MWWC. Tables in Annex 1 summarize the major impacts and the mitigation measures for the construction and operation phases.

11.3. **Water Quality:** Water quality for water sources for Sari and Babol are summarized in Tables 12 to 15. In Sari and Babol, the analysis indicates that the water quality of the existing well comply with the National Standards except for selenium. However, all measurements of selenium meet EPA drinking quality standards. Therefore careful monitoring of the water quality is required to verify compliance with prevailing standards and to detect any trend in adverse change in water quality. Ammonia and nitrite have high values, but are within the national standards.

11.4. Bacteriological analyses of Sari and Babol groundwater supply indicate the absence of bacteriological contamination and confirm the efficiency of the chlorination system.

11.5. The provision of a wastewater network for collecting and transmitting the generated wastewater to a treatment plant will certainly minimize potential bacteriological contamination of ground water. Furthermore, the proposed project will finance the regular monitoring of water quality. During project implementation, a continuous monitoring program would be implemented to ensure that treated water will always meet the required standards. The monitoring program will cover biological and physical parameters as well as heavy metals and pesticides residues.

11.6. **Effluent Quality:** The proposed treatment level, which is based on the activated sludge process and chlorination, would ensure a treated effluent of acceptable quality for discharge in receiving surface water bodies. The wastewater treatment processes, include nitrification and de-nitrification processes in Sari’s WWTP. In Babol the current process design includes for nitrification only. These processes will result in the removal of organic materials and nutrients down to the required levels. Furthermore, effluent chlorination, and filtration if needed for Babol’s WWTP, will insure the bacteriological quality of effluent. As soon as the wastewater treatment plants start operating, monitoring of wastewater quality in the influent and effluent will be conducted to ensure adherence to the required standards.

11.7. In view of the treated effluent quality of Sari WWTP, which will be in compliance with the prevailing standards for discharge to surface water resources, the impacts on Tajan River is insignificant and will be localized to the discharge point. In fact, the environmental state of the river is expected to improve in comparison to the base condition due to elimination of direct wastewater discharge to the river once the WWTP will be put in operation.

11.8. The treated effluent of Babol WWTP, which will be in compliance with national standards for discharge to surface water bodies, will have only limited impact on Shazedroud River. Since the treatment plant does not include de-nitrification, the nitrate effluent concentrations will be 20 mg/l, thus exceeding the national standards of 11 mg/l for discharge to surface water bodies. However, as
Shazedroud River is used as an irrigation source only, the additional nitrate concentration will not be
causing significant impact on this river or on the environment.

119. In the summer season the effluent will be used in agriculture. The treatment process at Babol WWTP will result in the removal of nematodes to less than one percent of the concentration in the raw wastewater entering the treatment plant. Therefore the presence of nematodes in the treated effluent will be directly related to their concentration in the raw wastewater. As soon as the wastewater treatment plants start operating, monitoring of nematodes in the effluent will be conducted to ensure adherence to the required standard. In the winter season, the effluent of Babol WWTP will be mixing with the river water to discharge in the Caspian Sea. The project is expected to improve the Caspian Sea general environmental state by preventing the untreated wastewater to the Caspian Sea via the surface water bodies of Tajan and Babolroud. Regular monitoring will be required to ensure treated effluent adherence with the Iranian discharge standards.

120. Sludge Quality: The sludge treatment processes of Sari and Babol treatment plants include sludge blending, thickening, aerobic digestion for Sari and anaerobic digestion for Babol, sludge dewatering, and composting. These processes will ensure the elimination of toxics and pollutants in the sludge. For the use of composted sludge in agriculture as soil conditioner or fertilizer, the project will ensure compliance with applicable guidelines through sufficient compost curing and storage period of one year.

121. Septage Handling: The project will include septage handling facilities at Sari and Babol WWTP for receiving the septage from on-site disposal facilities. The septage will be co-treated with the wastewater that is discharged to the plant from the collection network. The project includes a study to evaluate the extent to which this septage can be incorporated into the WWTP and the need for additional facilities to receive the septage. Moreover, the issue of septage from the remaining cesspits will be taken up by the proposed Basin Council (under the World Bank-financed Alborz Land and Water Management Project) which will be responsible for coordination of all water and wastewater management at the basin level.

122. At both treatment plants, regular odors emissions monitoring from the wastewater treatment plants will be implemented to mitigate any non-compliance by taking appropriate operating measures. Furthermore, space and electro-mechanical provisions for the installation of odor control equipment shall be made at Sari WWTP, main lift station of Babol and the remaining lift stations located in Babol city center. Following commissioning of the relevant works, the need to provide odor control equipment shall be verified, and installation shall be implemented if necessary.

Other environmental mitigation actions in both Gilan and Mazandaran

123. The general disruption during construction will be mitigated by coordinated planning of construction activities. This will include coordination with all concerned authorities prior to the start.
of the construction activities. Other adverse impacts due to construction activities will be mitigated through the adoption of good environmental practice procedures. For instance, noisy construction activities can be limited to normal working hours and providing muffler to minimize noise nuisance. Dust emissions can be avoided by using dust suppression measures, such as periodically sprinkling water in certain areas, providing appropriate covers, and removal of excess material from the site. Dangerous activities in public areas will be controlled to reduce risk to the public, traffic and warning signs will be placed at construction sites, trenches will be provided with fences, or railings. The construction contract document will incorporate all requirements to minimize disturbance from construction activities, which will be monitored by the Supervision Engineer and the Environment Officer of the WWCs to ensure compliance and implementation of the required provisions by the contractors.

124. Impacts arising from the potential occurrence of earthquakes will be mitigated through (i) following the Iranian and International seismic design requirements as well as (ii) developing and implementing emergency preparedness plans which would cover activities to be implemented before, during and after earthquake occurrence.

125. The final design process will detail and finalize construction drawings and tender documents of the project components. This process has incorporated final review of the designs by environmental specialists to ensure that all required environmental issues are properly addressed and tender documents include specific provisions concerning environment, health, and safety.

126. Furthermore, pre-tender conferences will be held to brief pre-qualified contractors on the effective implementation of mitigation measures. All pre-qualified contractors will be called to a pre-tender conference at which environmental, health and safety issues will be outlined.

127. Liaison arrangements will be established between the public, contractors, and the Project Management Unit. A procedure will be established to allow the general public to lodge complaints at the Project Management Unit about excessive disturbance.

128. The contractors will provide suitable and reliable equipment for construction, with a formal maintenance program to ensure efficient operations. The WWCs will develop and establish appropriate safety procedures for the operation and maintenance of the water and wastewater treatment plants. All employees of the contractors and the WWCs will get suitable training in occupational health, safety, and emergency preparedness procedures for earthquakes. Safety equipment will also be provided.

129. The WWCs will develop and implement monitoring programs for raw water, treated water, surface water, raw wastewater, treated effluent and sludge and industrial discharges to the sewage network.
130. The DOE will establish formal programs for monitoring discharges to the environment from the wastewater treatment plants and industries, treated sludge, surface water, and soil including actions to be taken in case of non-compliance. It will develop a system of controls on discharges to Tajan and Shazedroud Rivers. DOE will also develop a system for the enforcement of standards related to industrial discharges.

131. The Ministry of Health and Medical Education will establish a program for monitoring drinking water quality and the occurrence of water-borne diseases. A public hygiene education campaign will also be conducted by the Ministry and will include video tapes, TV programs, and distribution of leaflets.

132. The Ministry of Agriculture Jihad will establish and implement formal programs for monitoring the quality of soil and agricultural products on a pilot area located in around Sari and Babol and include actions to be taken in case of deterioration in quality. The Ministry will develop educational programs and will develop awareness campaigns on best agricultural and irrigation practices.

**Social Considerations**

133. *Implications for project design and sequencing.* In view of the fact that the poor areas will show more marked benefits from the project, that the residents are aware of it, while the better off areas tend to be more skeptical of the benefits, where technically possible measurable benefits, the sequencing of connections should begin in the poorer areas, and where financially possible the recovery of the connection fee and the application of the new tariff structure should only begin after connection, or at the earliest after visible physical works have commenced.

134. *Communications, awareness and education (timing of measurable benefits).* There is need to use appropriate channels and education; need for consumer relations and education. There is a relatively high degree of literacy, but public information travels through trusted channels. Therefore there is need for user-friendly information systems, and training of WWC officials. The key informants recommended the project should adopt a Community-WWC participation approach by which the residents should be able to monitor the implementation and service delivery. The lane/neighborhood water and wastewater committees (NWCs) under this approach should look after the local issues and their elected representatives participate in the decision-making process. The Community Development Unit at the WWC should act as the liaison between the WWC and the NWCs. However, to avoid mistrust of officialdom, appropriate use should be made of trusted local channels and opinion leaders.

135. *Beneficiary participation.* The project should make explicit provision for the informed participation of beneficiaries that will help to develop a culture of civic responsibility in relation to water use, wastewater disposal, monitoring of delivery and service standards, and reduce the “free
rider” problem. Such a partnership could be implemented through lane/neighborhood water and wastewater committees with elected representatives, liaising with the Community Development Unit at the WWC.

136. **Tariff and connection fees for the poor.** Connection fees (both the cost and the connection right) should be smoothed out by a mechanism such as spreading it over the regular monthly payments; cross subsidy may be needed, and intervention of charitable institutions for the most indigent. The stakeholders suggested i) training and support to the WWC in efficiency in organizational management and O&M of the systems, ii) develop effective mechanism for beneficiary participation, (monitoring service quality, information systems that are sensitive to client needs so they understand).

137. **Recruitment of part-time project social development specialist.** In order to ensure the above community actions and facilitate liaison between the communities and the company, the project will employ a part-time project social development specialist to cover the four cities.

**Monitoring Plan**

138. Monitoring of construction activities will have to ensure that mitigation measures of construction impacts are being implemented properly, while monitoring of operation activities is to ensure that no unforeseen negative impacts are arising.

139. During construction, the monitoring program will include dust and noise. Monitoring of the water supply will include biological, physical and chemical parameters as well as heavy metals and pesticides residues. During the operation of the wastewater system, monitoring will include data on BOD, COD, suspended solids, phosphates, nitrates, salinity, heavy metals, fecal coliform and nematodes eggs. Water quality monitoring in Tajan, Shazedroud, Zarjoob, Goharoood and Anzali lagoon will include data on BOD, COD, suspended solids, pH, phosphates, nitrates, salinity, and heavy metals. Soil and agricultural products will be monitored for significant pollutant levels.

140. The Ministry of Health will monitor the occurrence of water borne diseases and the Ministry of Agriculture Jihad will monitor soil and agricultural products. The DOE will develop and implement its own monitoring program for Quality Assurance and Quality Control and will generate and issue periodic review reports.

141. A project monitoring report will be prepared on the effectiveness of the EMP once every 6 months and will be sent to the World Bank after review and approval of DOE.

**Monitoring of Social Outcome indicators**

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4 The Monitoring Plan of the project will have to be coordinated with the activities planned under the Alborz Integrated Land and Water Management Project (financed by the Bank and covering the water basin that includes the city of Babol). A number of comprehensive studies (groundwater and surface water baselines) and monitoring activities are contemplated under that project. A close coordination is required at the implementation phase of these two projects to avoid unnecessary duplication of efforts.
142. The social assessment did not address how social development outcome indicators could be derived and measured. Local knowledge indicates that it is feasible and desirable to develop in consultation with local communities one or more very simple but reliable indicators that respond to their vividly desired outcomes, and that could be used for participatory baseline and evaluation. Such pragmatic indicators for discussion and piloting at project inception could include: length of streets and alleys in residential areas subject to regular standing sewage problems; percentage of school-going children who have to pass through polluted streets to get to school; number of households within 100 meters of stagnant polluted ponds; annual cost to households of cleaning/pumping septic tanks and absorption wells.

143. Measuring and reporting on such indicators in a participatory way, would demonstrate to the communities the value of the project and greatly increase willingness to pay for improvements, and should form part of a community education and awareness campaign.

Institutional Strengthening

144. The institutional arrangement and capacities of the organizations in-charge with the implementation and management of the proposed project were reviewed with the intention of providing technical assistance and proposing reinforcement of these organizations as required.

145. Training programs will be designed and implemented with the assistance of local and international experts and will include:

- **GWWC, MWWC, Treatment Plant Operators, Rasht, Anzali, Sari and Babol Municipalities and the Mazandaran and Gilan DoE:** At the initiation of the project, a training workshop will be provided to the staff of the MWWC, GWWC, the Municipalities of Rasht, Anzali, Sari and Babol and the DOE to raise environmental awareness and to clarify the specific environmental requirements related to the project. The workshop will cover the following topics:
  - Effective implementation of mitigation measures
  - Project supervision
  - Sampling and analysis
  - Monitoring and evaluation

- **MWWC, GWWC, Municipalities, DOE and Line Ministries:** A two day workshop will be provided to the staff of MWWC, GWWC, Municipality, and representatives of line ministries to strengthen capacities in the application of treated effluent.

- **Laboratory Staff of Water and Wastewater Treatment Plants:** A one week training workshop will be provided to strengthen capacities in sampling and analysis methods, environmental monitoring, quality assurance and quality control as well as safety procedures.

- **Staff at Water and Wastewater Treatment Plants:** A one day training workshop on occupational health, safety and earthquake emergency preparedness procedures will be provided.
In coordination with the Bank-financed Alborz Integrated Land and Water Management Project, workshops and awareness campaigns will be also implemented to raise awareness of farmers, NGOs and residents of Rasht, Anzali, Sari and Babol; these would include:

- Local NGOs, communities and farmers: Training would be provided through 1 or 2 days workshop for local NGOs, communities and farmers, focusing on public awareness and on re-use of treated sludge for agricultural purposes.

- Awareness campaign and pamphlets: two awareness campaigns will be conducted; pamphlets in Farsi will be distributed to all farmers highlighting the adverse health and public safety impacts resulting from the use of untreated effluents; and measures to be taken when using treated sludge. A public hygiene education campaign will be also conducted by the Ministry of Education.

- An assessment of analytical capacities of the laboratories at the GWWC, MWWC and at the wastewater treatment plants has been conducted; additional required equipment was also identified and will be supplied as part of the proposed project. For the Anzali East Wastewater Treatment Plant and Sari WWTP, a fully equipped laboratory will be provided as part of the construction contract. For Babol the existing contract for the WWTP include the supply of a fully equipped laboratory.

**Costs Estimate**

146. The costs of the Environmental Management Plan (mitigation measures for impacts activities resulting from construction, i.e., noise and dust reduction, etc.) will be borne by the contractors who will make the necessary provisions as part of their contracts for this project.

147. During the operation phase, mitigation measures and monitoring activities will be implemented by the operator of each plant. In the Gilan Province, the existing Sangar WTP and the emergency water treatment plant will be operated by GWWC. Hence, the required mitigation measures and monitoring activities will be implemented by GWWC as part of their mandates. Similarly for the Rasht wastewater treatment plants, which will be operated by GWWC with one year supervision by the Contractor, the cost of mitigation measures and monitoring requirements will be borne by GWWC. In the Mazandaran Province, the Babol wastewater treatment plant will be operated by MWWC. Hence, the required mitigation measures and monitoring activities will be implemented by MWWC as part of their mandates. For Sari wastewater treatment plant, cost of mitigation measures and monitoring requirements will be included in the contractor price, which will include the necessary provisions as part of the construction and one year operation and maintenance cost. Allowance in the Contractor’s price for the addition of tertiary filtration, which may be required for compliance with nematode concentration levels for effluent reuse, has already been included.

148. A total amount of US$1.8 million and US$1.1 million will be allocated for the implementation of the environmental management plan for the Gilan and Mazandaran Provinces, as
Executive Summary

Iran - Environmental and Social Assessment for the
Northern Cities Water Supply and Sanitation Project

Detailed in the Annex, and will be included in the project costs. It should be noted that the total costs do not include the following:

- Cost of additional treatment incorporated in the design of the project;
- Cost of mitigating negative construction impacts (included in the construction contract cost);
- Cost of mitigation measures and environmental monitoring of the East Anzali WWTP as well as the Sari wastewater treatment (included in the construction and operation and maintenance contract cost);
- Cost of setting up a new laboratory at the East Anzali, Sari and Babol wastewater treatment plants (included in construction cost).
- Cost of Environment and Safety Officer at PMU (included in PMU cost).

LAND ACQUISITION AND RESETTLEMENT

149. The installation of a city-wide wastewater collection network requires, in each city, the expropriation of some land a) linear, for pipelines and b) locational, for treatment plants and pump stations. In the great majority of cases, these are on public land, rights of way, thoroughfares etc. However, for technical reasons, here and there small additional expropriations are required to complete the network.

Resettlement Policy Framework

150. Any expropriation should be minimized and conducted in accordance with the Resettlement Policy Framework (Annex 2, section A). This is identical to that already presented to the Board for the Ahwaz and Shiraz Water and Sanitation Project approved on August 15, 2004.

151. **Rationale for expropriation of land.** Land acquisition is necessary in this project in order to provide for 1) water treatment plants 2) pumping stations and 3) channels and pipes to carry the outfall to its destination. These requirements are determined by the engineering designs in each particular case, and result from a) the size of the population to be served and the volume of water to be treated; and b) the topography of the land, which normally requires wastewater treatment plants to be situated in the lowest-lying convenient area in order for maximum use of gravity. None of the public Water and Wastewater Companies (WWCs) owns sufficient land appropriately located that would allow the project to be undertaken without some additional expropriation.

152. **Minimization of expropriation of land.** The expropriation of private land is minimized in accordance with Iranian law, which requires public utility projects of any nature to make maximum use of public land, and only to resort to expropriation when there is no alternative. Minimal

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5. The law is entitled The Law Governing the Expropriation of Land for Public Projects, Military Usage & Infrastructure Improvements, dated Feb. 6 1980.
Executive Summary

Expropriation of private land also serves the interest of the public water and waste water companies which are obliged to pay compensation awarded by independent assessment as explained below. Preference is always given to transfer of government or public land from other agencies where this is available, but even in this case compensation is payable.

153. **Legal process is obligatory.** All expropriations must be carried out according to the provisions of Iranian law. The law of expropriation defines the procedures to be followed and protects the rights of all parties involved. Wrongs committed during expropriation may be redressed by the courts with provision for payment of damages and punishment of offenders. The law under which WWCs are established gives the WWC the power to expropriate land (Article 14). The company must also obtain from the Article 5 Commission agreement to any necessary changes in land use in accordance with the city master plan.

154. **Compensation and eligibility principles.** Whenever expropriation of private land is unavoidable, Iranian law clearly indicates that land should be expropriated through full compensation at market value, independently determined, with advance public notice, negotiation and right of appeal. Rights to compensation extend to owners, tenants, workers, or any person who can demonstrate any interest lost as a result of expropriation.

155. **Estimated Population Displacement.** The present project necessitates the physical displacement of one family in Rasht and is the subject of a separate, individual Resettlement Action Plan. Some displacement of agricultural activities occurred in Sari between 1996 and 2000 in the course of the company’s expropriation for future treatment plant and network expansion. These cases were investigated in the field with due diligence, were found to conform fully to Bank social safeguard standards of resettlement, no residual grievances were found and are documented in the respective Land Acquisition Plans. Besides these exceptions, all expropriation concerns the asset value of property only, and no other physical displacement of persons, residences, or economic enterprises has been found. There are no informal settlements of any kind nor illegal occupants. Typically only a few persons are affected by the acquisition of land.

**Land Acquisition Plan**

156. The Land Acquisition Plan has been prepared by the Project (NCWWP) in conformity with the Resettlement Policy Framework (RPF). In May 2004 the RPF was prepared and publicly disclosed in Washington and Iran under the Ahwaz and Shiraz Water and Wastewater project. The legislation, procedures and instruments of land expropriation in Iran not having changed since that time, and the overall project design being identical, the RPF has been applied unchanged to this project.

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6. An English translation of this law has been transmitted to the Bank.
7. See Appendix 1 for membership of the Article 5 Commission, which regulates urban land use.
8. All such cases are explained in cities LAP/RAP.
Executive Summary

Project. The RPF in English and Farsi was disclosed on March 20, 2005, in the four northern cities of Anzali and Rasht (Gilan Province) and Babol and Sari (Mazandaran Province) at the offices of the respective WWCs and the four city public libraries, together with this LAP. Appropriate notice being placed in the main daily newspapers of each city.

157. A detailed schedule of expropriations and compensation payable, demonstrating compliance with Bank Policy, has been prepared for each city as a Land Acquisition Plan (see Annex 2, section B).

Abbreviated Resettlement Action Plan

158. The unique case of displacement of a family of four through expropriation of their residence, and the compensation arrangements that comply with Bank policy, are detailed in a separate RAP for the city of Rasht (see Annex 2, section C).

PUBLIC INVOLVEMENT

159. Numerous governmental and non-governmental organizations were consulted at various stages of project preparation. At the initiation of the project, technical, financial, environmental and social issues associated with the project were discussed in meetings attended by the design consultants, representative of the City councils, Rasht, Anzali, Sari and Babol municipalities, Gilan Regional Water Board, the Mazandaran and Golestan Regional Water Board and various other stakeholders. The Terms of Reference for the EIA and social assessment studies were developed and shared with the key stakeholders in scoping meetings, which were held as of August and December 2002 for the Mazandaran and Gilan Provinces respectively.

160. The preparation process for the environmental assessment included public consultations which were carried out at various stages. The consultations involved line ministries, city authorities, provincial departments of environment, operating water and wastewater companies, local communities, NGOs and the public.

161. Upon the completion of the draft EA report, the executive summary was translated to Farsi and a public hearing was held on the 12th and 13th of January 2005 for the Gilan Province and on January 4th, 2005 for the Mazandaran Province. In Gilan, the meeting was attended by more than 250 participants from various organizations including representatives of GWWC, local health authorities, local law enforcement authorities, Gilan Regional Water Board, NGOs, Rasht municipality, Anzali municipality, DOE of Gilan, members of the press, experts and professionals from the community of Rasht and Anzali. In Mazandaran, the meeting was attended by more than 120 participants from various organizations including representatives of MWWC, local health authorities, local law enforcement authorities, Mazandaran and Golestan Regional Water Board, NGOs, Sari municipality,
Babol municipality, DOE of Mazandaran, members of the press, experts and professionals from the community of Sari and Babol.

162. Invitation letters were prepared in Farsi and were accompanied with the draft Executive Summary for each province. Announcements about the meeting were also made through the local newspapers and public bulletin boards. The meeting was covered by the local newspapers, television and radio. The meeting consisted of an opening session, a presentation of the project financial arrangements and the current cooperation between the World Bank and the Gilan and Mazandaran WWCs. This presentation was followed by a short documentary film which showed the current status of the water and wastewater services in the project cities and the ongoing works of these facilities. The film was followed by a presentation of the project’s major components and the environmental aspect of each component. The common view held was that the project should be implemented as soon as possible as it would result in improved health and welfare benefits not only to the project cities but for the whole region.

163. In Gilan, the main concerns expressed by some of the stakeholders were the environmental impacts of the project, particularly the effluent and sludge from the wastewater treatment plants. A university professor requested clarification on how the project will impact environmental state of the local rivers and Anzali Lagoon, as well as the Caspian Sea. It was clarified that adequate design provisions have been incorporated to include biological nutrient removal (BNR) systems within the wastewater treatment plants. This, together with the proper collection and treatment of wastewater in the two cities, will improve the quality of the local rivers, and the lagoon, and will have a positive impact on the environment. A concern was raised regarding the proposed disposal of the sludge from the wastewater treatment plants and the reuse of treated sludge in agriculture considering the constraints and the health quality limits required by various standards. It was clarified that the design took into account sludge application rates, sludge and soil monitoring to address all the requirements of the national and international standards.

164. In Mazandaran, the main concern was expressed by the NGOs and MOE representatives concerning the impact of noise, dust, traffic congestion, and disturbance of utility services during construction stage of the project. Also the potential impacts of odor emissions during the operation stage. The consultants clarified that odor emissions will be minimized by proper design and operation of the works. The environmental monitoring program will include odor monitoring to ensure compliance with standards. As for the short term impacts caused during the construction stage, mitigation measures and monitoring will be included to minimize their effect. Clarifications were requested on how the project will address the reuse of treated sludge in agriculture considering the constraints and the health quality limits required by various standards. It was clarified that adequate design provisions have been incorporated in the sludge treatment process, sludge application, sludge and soil monitoring to address all the requirements of national and international standards.
### ANNEX 1: EMP FOR THE GILAN AND MAZANDARAN PROVINCES

#### Environmental Mitigation Measures during the Construction Phase (Gilan)

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<tr>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Responsible Organization</th>
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| **Noise generation**      | - Selection of up to date, well maintained plant with reduced noise levels ensured by suitable in-built damping techniques.  
                          | - Confining noisy work to normal working hours in the day.  
                          | - Providing the construction workers with suitable hearing protection and training them in its use.  
                          | - Restricting construction traffic movements during the night time.                  | DC/PMU | DOE |
| **Generation of dust**    | - Construction activities causing dust will not be carried out on excessively windy days.  
                          | - Excavation work will be sprayed with water.  
                          | - To cover stockpiles of excavated material with tarpaulins  
                          | - Provide construction workers with masks and train them for their use             | CC | DOE |
| **Traffic congestion**    | - Advance warnings to the affected residents and road users  
                          | - Advance programme for proposed transportation activities, type of vehicles and number of trips.  
                          | - Continual services of the police for the diversion and control of traffic        | MoRA/MoBS  
                          |                                                          | CC | DOE |
| **Damage to access roads and streets** | Site access roads will be inspected regularly and repairs made where necessary; All roads and streets used for laying pipes will be covered and paved. | CC | DOE |
| **Water pollution**       | - Ensure proper control on fuel and oil spillage.  
                          | - Unauthorized bore wells shall not be allowed  
                          | - Untreated effluents shall not be allowed to be directly disposed of in water bodies | CC  
                          |                                                          | RWB  
                          |                                                          | DeEG  
                          |                                                          | D2H:M | DOE |
| **Public safety and site security** | - Construction employees shall be trained in safety procedures for all relevant aspects of | PMU/GWWC  
<pre><code>                      |                                                          | CC/MWWC | DOE |
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<th>Potential Impacts</th>
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<tr>
<td></td>
<td>Construction</td>
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<td>• Training of appropriate number of site personnel in first aid</td>
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<td>• Development of formal emergency procedures for each construction site required in the event of an accident</td>
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<td></td>
<td>• Appropriate public education regarding health and safety</td>
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<td></td>
<td>• To adopt safety measures like flags, warning tapes and barriers.</td>
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<tr>
<td>Air pollution</td>
<td>• Waste are not to be burnt on site</td>
<td>CC</td>
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<td>• Construction machinery, vehicles and generators to minimize exhaust emissions by properly maintaining and tuning them.</td>
<td>DOE</td>
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<td>Generation of wastes</td>
<td>• Minimize wastes generated during construction and reuse construction wastes where practicable;</td>
<td>CC/PMU</td>
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<td>and spoil disposal</td>
<td>• Use appropriate methods for the storage of waste materials;</td>
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<tr>
<td></td>
<td>• Dispose of wastes to an appropriate site.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Transporting spoil in closed containers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The spoil material should be filled in layers and properly rolled and sprinkled to avoid any negative environmental impacts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Avoid and move away from protected areas.</td>
<td></td>
</tr>
</tbody>
</table>

CC: Construction Contractor
DC: Design Consultants
DoEG: Department of Environment Guilan
MoRA: Municipalities of Rasht and Anzali
GWWC: Guilan Water and Wastewater Company
PMU: Project Management Unit
RWB: Regional Water Board
DoEM: Department of Environment Mazandaran
MoSB: Municipalities of Sari and Babol
MWWC: Mazandaran Water and Wastewater Company
### Environmental Mitigation Measures during the Operation Phase of Wastewater System (Gilan and Mazandaran)

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
<th>Responsible Organization</th>
</tr>
</thead>
</table>
| Health and environmental risks associated with discharge of treated effluent  | • Regular monitoring of effluent quality discharging from the WWTP  
• Untreated effluents shall be treated before disposing off into river. Disinfection to be used before disposal at all times  
• Aquatic life shall be monitored regularly  
• Dispose of wastewater into rivers after proper treatment  
• Capacity building, training and awareness. | GWWC/DoEG  
MWWC/DoEM | DOE |
| Sludge quality and the risk of public and farmers acquiring infection          | • Drying beds for one-year storage will be provided to dry and store sludge following de-watering and digestion.  
• Monitoring of nematodes, coliforms and heavy metal content of treated sludge.  
• Transportation of treated sludge in closed containers.  
• Site Selection analysis and EA to be prepared prior to construction of Ghazian WWTP  
• Capacity building, training and awareness | GWWC/MWWC | DOE |
| Odor generation from the wastewater treatment plant                           | • Careful operation of odor control equipment  
• Careful planning and implementation of operation and maintenance.  
• Providing covers to equipments and containers that are likely to cause odor nuisance. | GWWC/MWWC | DOE |
### Potential Impacts

<table>
<thead>
<tr>
<th>Health and Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Train the concerned officials of the WWTP about health and safety procedures.</td>
</tr>
<tr>
<td>- Ensure that operation and maintenance personnel of the WWTP are fully aware of the hazards involved in the running of a system of this nature.</td>
</tr>
<tr>
<td>- All site employees will be trained in hygienic procedures designed to avoid infection from wastewaters and sludge.</td>
</tr>
<tr>
<td>- Emergency procedures will be developed in the event of the release of chlorine gas.</td>
</tr>
<tr>
<td>- Workers will also be inoculated against infectious diseases and be under medical surveillance.</td>
</tr>
</tbody>
</table>

### Mitigation Measures

<table>
<thead>
<tr>
<th>Responsible Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performing</td>
</tr>
<tr>
<td>QA/QC</td>
</tr>
<tr>
<td>GWWC/MWWC</td>
</tr>
<tr>
<td>DOE</td>
</tr>
</tbody>
</table>
### Cost Estimate of Environmental Management Plan (Iran)

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
<th>Unit Rate in 1000 US$</th>
<th>Total Cost in 1000 US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GWWC</strong></td>
<td>14 months</td>
<td>12/month</td>
<td>84</td>
</tr>
<tr>
<td>International environmental consultant to provide technical assistance to GWWC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Monitoring Program for Water Supply System</td>
<td>5 years</td>
<td>30/year for R</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15/year for A</td>
<td></td>
</tr>
<tr>
<td>Environmental Monitoring Program for WWTP</td>
<td>4 years</td>
<td>75/year for R</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50/year for A</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td>534</td>
</tr>
<tr>
<td><strong>Studies, Training and Awareness</strong></td>
<td></td>
<td></td>
<td>359</td>
</tr>
<tr>
<td>Development of baseline data on water related diseases and a monitoring program for the occurrence of these diseases</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Environmental Assessment and site analysis for sludge treatment for Ghazian WWTP</td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Development and implementation of a QA/QC monitoring program for the proposed project to be implemented by DOEG</td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Development of earthquake emergency preparedness plan</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Development of Compliance Action Plan (CAP)</td>
<td>11 CAPs</td>
<td>4/CAP</td>
<td>28</td>
</tr>
<tr>
<td>Two days workshop to GWWC, Treatment Plant Operators, Rasht and Anzali Municipality and DOEG</td>
<td>2</td>
<td>7/workshop</td>
<td>7</td>
</tr>
<tr>
<td>Two days workshops for GWWC, Municipality, DOEG and Line Ministries on treated sludge re-use</td>
<td>2</td>
<td>7/workshop</td>
<td>7</td>
</tr>
<tr>
<td>One week training workshop to Staff of Water and Wastewater Treatment Plants on laboratory sampling, analysis, environment monitoring and QA/QC</td>
<td></td>
<td>4/workshop</td>
<td></td>
</tr>
</tbody>
</table>
### Cost Estimate of Environmental Management Plan (continued)

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
<th>Unit rate in 1000 US$</th>
<th>Total Cost in 1000 US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Studies, Training and Awareness</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One day training workshop on occupational health and safety to staff at Water and Wastewater Treatment Plants</td>
<td>4 workshop</td>
<td>1/workshop</td>
<td>2</td>
</tr>
<tr>
<td>One day workshop for local NGOs, communities and farmers, focusing on public awareness and on re-use of treated sludge for agricultural purposes.</td>
<td>4 workshop</td>
<td>1/workshop</td>
<td>2</td>
</tr>
<tr>
<td>Awareness campaigns and pamphlets</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td>140</td>
</tr>
<tr>
<td><strong>Laboratory Equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GWWC</strong></td>
<td></td>
<td></td>
<td>171.5</td>
</tr>
<tr>
<td>Rasht WWTP</td>
<td></td>
<td></td>
<td>148.6</td>
</tr>
<tr>
<td>West Anzali WWT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td>320.1</td>
</tr>
<tr>
<td>Monitoring and Evaluation at the project level</td>
<td>2 MM</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td><strong>Subtotal Per City</strong></td>
<td></td>
<td></td>
<td>1,086</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>1,854</td>
</tr>
</tbody>
</table>
## Cost Estimate of Environmental Management Plan (Mazandaran)

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
<th>Unit rate in 1000 US$</th>
<th>Total Cost in 1000 US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MWWC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International environmental consultant to provide</td>
<td>14 months</td>
<td>12/month</td>
<td>84</td>
</tr>
<tr>
<td>Environmental Monitoring Program for Water Supply System</td>
<td>5 years</td>
<td>30/year for Sari</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15/year for Babol</td>
<td>75</td>
</tr>
<tr>
<td>Environmental Monitoring Program for WWTP</td>
<td>3 years</td>
<td>75/year for Babol</td>
<td>225</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td>234</td>
</tr>
<tr>
<td><strong>Studies, Training and Awareness</strong></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Development of baseline data on water related diseases and a monitoring program for the occurrence of these diarrheal diseases</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Development and implementation of a QA/QC monitoring program for the proposed project to be implemented by DOEM</td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Development of earthquake emergency preparedness plan</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Two days workshop to MWWC, Treatment Plant Operators, Sari and Babol Municipality and DOEM on environmental management, monitoring, analysis and evaluation</td>
<td>1 workshop per city</td>
<td>7/workshop</td>
<td>7</td>
</tr>
<tr>
<td>Two days workshops for MWWC, Municipality, DOEM and Line Ministries on treated sludge reuse</td>
<td>1 workshop</td>
<td>7/workshop</td>
<td>7</td>
</tr>
<tr>
<td>One week training workshop to Staff of Water and Wastewater Treatment Plants on laboratory sampling, analysis, environment monitoring and</td>
<td>1 workshop</td>
<td>4/workshop</td>
<td>8</td>
</tr>
</tbody>
</table>


Table 26: Cost Estimate of Environmental Management Plan (Mazandaran – Continued)

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
<th>Unit rate in 1000 US$</th>
<th>Total Cost in 1000 US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Studies, Training and Awareness</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One day training workshop on occupational health and safety to staff at Water and Wastewater Treatment Plants</td>
<td>2 workshops per city</td>
<td>1/workshop</td>
<td>2 2</td>
</tr>
<tr>
<td>One day workshop for local NGOs, communities and farmers, focusing on public awareness and on re-use of treated sludge for agricultural purposes.</td>
<td>2 workshops per city</td>
<td>1/workshop</td>
<td>2 2</td>
</tr>
<tr>
<td>Awareness campaigns and pamphlets</td>
<td></td>
<td></td>
<td>25 25</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>112 112</strong></td>
</tr>
<tr>
<td><strong>Laboratory Equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MWWC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Babol WWTP</td>
<td></td>
<td></td>
<td>100 100</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>100 150</strong></td>
</tr>
<tr>
<td>Monitoring and Evaluation at the project level</td>
<td>2 MM</td>
<td>12</td>
<td>12 12</td>
</tr>
<tr>
<td><strong>Subtotal Per City</strong></td>
<td></td>
<td></td>
<td><strong>458 658</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>1,116</strong></td>
</tr>
</tbody>
</table>
ANNEX 2 - RESETTLEMENT POLICY FRAMEWORK (OP4.12)

A. Resettlement Policy Framework

Introduction

Since Iran geographically lies in a semi-dry region, water shortage always has been a major problem. Rapid population growth at least until 1996 coupled with massive urban population growth and expansion have exaggerated the problem. An irrational pattern of water consumption complicates the situation. Thus projects to promote water conservation and reuse are important. Most Iranian cities lack a sewerage system. Untreated waste water usually ends up in agricultural land outside cities, causing health risks and environmental hazard to natural habitats, such as Anzali lagoons. The Water and Wastewater program, which has covered Tehran, Ahwaz and Shiraz is now extended to cover four major cities of the southern Caspian provinces of Gilan and Mazandaran: Anzali, Rasht, Babol and Sari.

Project Description

The Resettlement Policy Framework (RPF) prepared for Ahwaz and Shiraz Water Supply and Sanitation Project explicitly took into account the “repeater project” that would include the four northern cities. The proposed project intends to enhance environmental and health conditions in the above mentioned cities. Moreover the project development objectives also include: 1) To improve the quality of life and alleviate poverty in the proposed four cities in Iran, 2) Increasing coverage of sanitation services, 3) Implementing a pilot program of hygiene and sanitation practices to improve health conditions of targeted population.

The RPF already presented to the World Bank Board for the Ahwaz and Shiraz Water Supply and Sanitation Project, therefore, explicitly applied to the four cities of this project, and is reproduced here with minor edits to ensure consistency with this second project. However individual city land acquisition

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9 The Iran Northern Cities Water Supply and Sanitation project is the second in a program of repeater Water and Sanitation projects that will involve land expropriation for works (treatment plants, pumping stations and sewerage lines). This Resettlement Policy Framework (RPF) was presented to the Board as an annex to the first project, for Ahwaz and Shiraz, on August 15, 2004. The RPF is the instrument used because the exact expropriation requirements for future sites are not known. This annex is identical to that for the first project mutatis mutandis for the four northern cities, because the patterns of project design and land requirements are very similar to that of Ahwaz and Shiraz. Pre-feasibility studies indicate that land acquisition generally entails no physical resettlement or impact on residences or economic activities and that only the asset value of undeveloped land is concerned. Therefore, for ease of communication with the client and the public, the resettlement instruments have been entitled respectively Land Acquisition and Compensation Policy Framework and Land Acquisition and Compensation Plan for each city concerned. This makes the purpose of the instruments clear to the client. The only exception is the city of Rasht, where the necessary expropriation of one house occupied by a family of four requires a Resettlement Action Plan. Irrespective of the title, the instruments respond fully to the Bank’s OP 4.12 policy requirements in the context of this project.
plans are prepared and presented to the Bank as individual “Land acquisition Plans”, or “Resettlement Action Plans” under the present policy framework.

**PRINCIPLES AND OBJECTIVES GOVERNING RESETTLEMENT**

**Rationale for expropriation of land.** Land acquisition is necessary in this project in order to provide for 1) water treatment plants 2) pumping stations and 3) channels and pipes to carry the outfall to its destination. These requirements are determined by the engineering designs in each particular case, and result from a) the size of the population to be served and the volume of water to be treated; and b) the topography of the land, which normally requires wastewater treatment plants to be situated in the lowest-lying convenient area in order for maximum use of gravity. None of the public Water and Wastewater Companies (WWCs) owns sufficient land appropriately located that would allow the project to be undertaken without some additional expropriation.

**Minimization of expropriation of land.** The expropriation of private land is minimized in accordance with Iranian law,\(^{10}\) which requires public utility projects of any nature to make maximum use of public land, and only to resort to expropriation when there is no alternative. Minimal expropriation of private land also serves the interest of the public water and waste water companies which are obliged to pay compensation awarded by independent assessment as explained below. Preference is always given to transfer of government or public land from other agencies where this is available, but even in this case compensation is payable. No work can begin until affected persons have been compensated for land acquisition or any other compensation due to them.

**Legal process is obligatory.** All expropriations must be carried out according to the provisions of Iranian law.\(^ {11}\) The law of expropriation defines the procedures to be followed and protects the rights of all parties involved. Wrongs committed during expropriation may be redressed by the courts with provision for payment of damages and punishment of offenders. The law under which WWCs are established gives the WWC the power to expropriate land (Article 14). The company must also obtain from the Article 5 Commission\(^ {12}\) agreement to any necessary changes in land use in accordance with the city master plan.

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\(^{10}\) The law is entitled The Law Governing the Expropriation of Land for Public Projects, Military Usage & Infrastructure Improvements, dated Feb. 6 1980.

\(^{11}\) An English translation of this law has been transmitted to the Bank.

\(^{12}\) See Appendix 1 for membership of the Article 5 Commission, which regulates urban land use.
Compensation and eligibility principles. Whenever expropriation of private land is unavoidable, Iranian law clearly indicates that land should be expropriated through full compensation at market value, independently determined, with advance public notice, negotiation and right of appeal. Rights to compensation extend to owners, tenants, workers, or any person who can demonstrate any interest lost as a result of expropriation.

Description of Procedure for Preparing and Approving Land Acquisition Plans (Resettlement Action Plans per OP 4.12)
The expropriating authority is the relevant WWC serving the city concerned. The following steps apply in this project whereby a WWC prepares a Land Acquisition Plan.

1. The Third Development Plan established the principle that cities of a certain size should have water and wastewater treatment facilities in the public interest. The WWC is responsible for establishing the public necessity of constructing the facilities, and drawing up terms of reference for the consultant engineers.

2. Consulting engineers prepare a number of design scenarios for decision by the WWCs. One of the criteria for the best scenario is least expropriation impact on private land and least disturbance of any nature. At this stage land expropriation requirements are known in broad outline.

3. Under Article 14 of the expropriation law, the WWC applies to Minister of Energy for permission to expropriate. The company justifies the specific need for land acquisition and its urgency. They annex to the letter the full rationale together with sketch maps. No further actions may be taken without the express consent of the Minister.

4. On review of the evidence, and on finding the application justified, the Minister gives permission to the company to expropriate with the consent of the owner and to pay agreed compensation.

5. The details of planned expropriation, together with details of any expropriations for the project that have already been undertaken, are consolidated in a Land Acquisition Plan. The WWC ensures that the LAP conforms to the requirements of Bank policy. The document is transmitted to the Bank which determines whether the plan conforms to Bank requirements for financing.

Estimated Population Displacement
The present project necessitates the physical displacement of one family in Rasht and is the subject of a separate, individual Resettlement Action Plan. Some displacement of agricultural activities occurred in Sari between 1996 and 2000 in the course of the company's expropriation for future treatment plant and network expansion. These cases were investigated in the field with due diligence, were found to conform
fully to Bank social safeguard standards of resettlement, no residual grievances were found and are documented in the respective Land Acquisition Plans. Besides these exceptions, all expropriation concerns the asset value of property only, and no other physical displacement of persons, residences, or economic enterprises has been found. There are no informal settlements of any kind nor illegal occupants. Typically only a few persons are affected by the acquisition of land.\textsuperscript{13}

**ELIGIBILITY CRITERIA FOR DEFINING CATEGORIES OF DISPLACED PERSONS.**

1. Private land in Iran is classified as
   - Barren land
   - Land with defined specific land use as defined by Ministry of Housing and Urban Development for urban land; and by the Ministry of Jihad of Agriculture for agricultural land including pasture, forest, farmland etc.

2. Entitlements to compensation vary according to the type of land classification.

3. In barren land only the owner is compensated.

4. In land with defined use, the law explicitly recognizes for the purposes of entitlement to compensation all holders of any rights. The following main categories of rights are entitled to compensation where loss is established.
   - Owners
   - Tenants with and without occupancy rights
   - Usufructiers
   - Owners of trees or other permanent improvements
   - People who use the land for commercial purposes
   - People who have made or maintained improvements of any nature, including caretakers, guardians, etc.

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**Legal framework showing fit between borrower laws and regulations and bank Policy requirements**

<table>
<thead>
<tr>
<th>Bank policy</th>
<th>Borrower laws and regulations</th>
<th>Conciliation required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimization of expropriation</td>
<td>Explicit provision</td>
<td>None</td>
</tr>
<tr>
<td>Expropriation only by legal procedures</td>
<td>Explicit provision</td>
<td>None</td>
</tr>
<tr>
<td>All right holders compensated</td>
<td>Explicit provision</td>
<td>None</td>
</tr>
</tbody>
</table>

\textsuperscript{13} All such cases are explained in cities LAP/RAP which follows this framework.
Executive Summary

Environmental and Social Assessment for the
Northern Cities Water Supply and Sanitation Project

<table>
<thead>
<tr>
<th>Bank policy</th>
<th>Borrower laws and regulations</th>
<th>Conciliation required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full replacement value of land and assets</td>
<td>Full market value</td>
<td>None</td>
</tr>
<tr>
<td>Public notification</td>
<td>Public notification required</td>
<td>Public hearings under</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environment Management Plan</td>
</tr>
<tr>
<td>Right of appeal on awards</td>
<td>Explicit provision</td>
<td>None</td>
</tr>
<tr>
<td>Owners have option of equivalent land or monetary compensation</td>
<td>Monetary compensation only to protect livelihoods</td>
<td>Not an issue in this project</td>
</tr>
</tbody>
</table>

Iranian law conforms in all major respects to Bank guidelines, and provides for minimization of disturbance, advance notification to owners, compensation of all right holders at full value independently assessed, and right of negotiation and appeal.

**METHODS OF EVALUATING ASSETS**

**Notification of intent to expropriate and identification of owners.** The WWC identifies the owners of the parcels affected from the Land Registry. If the registry has no information on the owner, the company conducts a field survey to identify the owner from local knowledge. Notification is made through the local or national press. Thus anyone other than the owner/s can present their claims.

**Evaluation, negotiations and acceptance of offer.** Through repeated visits to the plots, the WWC identifies the owners and all right holders. They obtain an expert evaluation of the plot and all the rights, including the price of the land, and they make an offer to every person concerned. If the offer is accepted they sign a preliminary agreement contract and fix a date to go to the land registry for legal transfer of title. Some WWCs have decided to create an expropriation committee. The main reason is to avoid individual decision making. The committee is not a judicial body and its creation is not mandatory.

**Independent assessment.** If the offer is not accepted, an independent evaluation is made by three assessors. Assessors are trained, certified and registered with the Ministry of Justice. But they do not have any judicial status and their assessments may be rejected by the owners. One is appointed by WWC, one by the owner, and the third by consensus between both parties. Each assessor independently visits the plot concerned and makes a professional evaluation based on local market price at that time. Each assessor prepares a written evaluation. These evaluations are opened in the presence of the owner. These three assessments form the basis of negotiation for a final price agreed by the owner.

If the independent evaluations are widely different, or if the owner is not willing to accept the offer, the WWWW legal office or land expropriations committee prepares a report to the managing director explaining the situation and reporting the owner’s demand. The company may settle with the owner for the owner’s proposed price or may confirm the original offer in which case the owner has right of appeal (see below).
If the owner cannot be found, or if the owner fails to appear, all other parties sign an affidavit which states that the owner was duly notified and invited to appear and failed to do so. This document is filed as evidence of due process. The local Prosecutor (district attorney) is informed and obtains from the local court an order for the owner to appear, which is served by the police. The police report the outcome and if the owner still fails to appear the court acts on the owner’s behalf.

**ORGANIZATIONAL PROCEDURES FOR DELIVERY OF ENTITLEMENTS**

When agreement is reached between WWWC and the owner, a letter of agreement is signed. This letter sets a date to appear in the Land Registry for transfer of title. The Company writes to the Land Registry authorizing its official to sign on the company’s behalf. The Land Registry transfers the title on certification by the owner that he has received full compensation.

**Compensation of other right holders.** Other affected persons may be compensated directly by the WWWC. In this case they sign a letter to the WWC stating that they have been paid full compensation for their rights, which the WWWC provides to the Land Registry prior to transfer of title.

Alternatively, the owner may agree during negotiations to compensate all right holders, in which case the owner provides the same evidence to the WWWC as a condition of payment of compensation which includes reimbursement of the owner’s payments to right-holders.

**Procedure when owner cannot be traced.** If the owner has not appeared, the court opens and administers an account in the owner’s name and administers the transfer of title.

**IMPLEMENTATION PROCESS**

As above, section I.

**GRIEVANCE REDRESS**

Agreement is reached in the great majority of cases without recourse to appeals for redress of grievance. Grievances and appeals may arise in the following cases:

**Owner not willing to part with land.** Since the public interest has been determined, the court acts in place of the owner.

**All other cases.** Any affected person may appeal to the court for redress. The court has the power to hear submissions, review the process, and make such provisions as it deems fit. These include ordering compensation to be paid, halting works, fining the owners.
In most cases, the owner benefits from such appeals. However, in the case of any delay, owners lose since no provision is made for inflation.

**ARRANGEMENTS FOR FUNDING COMPENSATION**

Compensation is always paid by the WWC. Transfer of land may not take place prior to payment. There are two ways that this is funded.

a) Through budgetary provision in the recurrent budget, where the WWC earns revenue. This is not normally the case in this project.

b) Where the need for expropriation has been foreseen in the five-year development plan. This is the case with most expropriations in this project. Expropriation takes place under Article IX of the law of expropriation of Land in the public interest. A translation of this article already has been submitted to the WB.

**MECHANISMS FOR CONSULTATIONS WITH AND PARTICIPATION OF AFFECTED PERSONS IN PLANNING, IMPLEMENTATION AND MONITORING**

As explained above, owners and right holders are actively involved in the negotiation process.

**MONITORING OF IMPLEMENTATION**

In each case, when any type of land acquisition and compensation is involved, the WWWC reports on the following timetable. This timetable serves as a monitoring device showing all actions involved, the responsible agency, expected completion date, the reason(s) for any delay and new expected completion date:

<table>
<thead>
<tr>
<th>Action (full description)</th>
<th>Agency(s) involved</th>
<th>Expected completion date</th>
<th>Reason(s) for delay and new expected completion date</th>
</tr>
</thead>
</table>
B. Land Acquisition Plan for Anzali, Rasht, Babol and Sari
(In conformity with World Bank Safeguard Policy OP 4.12 Involuntary Resettlement)

Background. This Land Acquisition Plan has been prepared by the Northern Cities Water and Wastewater Project (NCWWP) in conformity with the Resettlement Policy Framework (RPF). In May 2004 the RPF was prepared and publicly disclosed in Washington and Iran 2004 under the Ahwaz and Shiraz Water and Wastewater project. The legislation, procedures and instruments of land expropriation in Iran not having changed since that time, and the overall project design being identical, the RPF has been applied unchanged to this NCWWP. The RPF in English and Farsi will be publicly disclosed in the four northern cities of Anzali and Rasht (Gilan Province) and Babol and Sari (Mazandaran Province) at the offices of the respective WWW companies and the four city public libraries, together with this LAP on March 20, 2005. Appropriate notice is being placed in the main daily newspapers of each city.

Applicability and terminology. The Bank’s Operational Policy OP 4.12 on Involuntary Resettlement is triggered by this project: expropriation of privately owned land or fixed assets in the public interest is de facto involuntary by Bank definition, since the property owners have no choice whether or not to part with their property. Locally, however, this expropriation process is generally referred to as “voluntary”, both by the Iranian administration and the property owners. This is because the transfer is referred to as “purchase” and the owners willingly accept, out of court, the “purchase price” (compensation) awarded by independent assessment, and sign over title to the property thus acquired. If the owner contests the award, then a judicial process of “involuntary” expropriation is triggered, whereby the court hears the case and awards judgment, compelling the owner to surrender title. Since assessment awards are usually generous and may be negotiated, such contestation and compulsion is a very rare event, and has not occurred in this project. Nor has there been any physical resettlement of persons or economic activities. Therefore, to avoid the possibility of misunderstandings arising between Bank and Client, the present instruments are each referred to as a “Land Acquisition Plan”. The Bank understands that the LAP is the full functional equivalent of the restricted Resettlement Action Plan that the policy framework requires.

Expropriation requirements and Bank due diligence. The expropriation requirements are modest, being a few hectares in all, mostly for pump stations and lift stations. The full table of expropriations is provided below. In most cases this expropriation has already taken place, and compensation has been awarded. The lines to be laid are almost entirely in public rights of way already belonging to the
municipality. A Bank mission in July 2004 was provided with detailed maps for each city, visited all the expropriation sites and the main network routes, and verified in general that the information provided is accurate; that expropriation requirements have been appropriately minimized; and that there is no adverse impact on livelihoods and economic activities. It was also verified that there were no cultural sites, public amenities such as parks or recreation areas, or community rights in land affected. A subsequent pre-appraisal mission obtained full information on the expropriation status on three sites (Anzali, Babol and Sari) and was fully satisfied that in these three sites, expropriation had been duly conducted and documented according to Bank standards. However, for Rasht the information provided for phase 2 of the treatment plant and the pumping stations was insufficiently clear and detailed. In particular, the technical necessity for expropriation of a residential house, which earlier had been questioned, had still not been justified. The project team investigated this expropriation issue, interviewed the owner of the house, and is satisfied with the process so far and with the expected outcome, that full compensation according to Bank standards is expected that will enable the owner and his family willingly to agree to relocate to a better property of their choice. (An abbreviated Resettlement Action Plan has been prepared for this single case and the outcome will be monitored as conforming with Bank requirements). With this provision, it is considered that the social safeguard policies are adequately complied with.

The total expropriations so far are summarized in table 1 below, with compensation converted in dollars at the approximate rate at time of payment. As indicated in the land expropriation tables for the four cities this process is already far advanced and is expected to be completed by the end of 2005.

<table>
<thead>
<tr>
<th>City</th>
<th>Area (ha) expropriated</th>
<th>Compensation paid (to date)</th>
<th>Area (ha) under negotiations</th>
<th>No of persons affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anzinois</td>
<td>9.2</td>
<td>$195,000</td>
<td>.04</td>
<td>16+</td>
</tr>
<tr>
<td>Rasht</td>
<td>45</td>
<td>$600,000+</td>
<td>5 (approx)</td>
<td>55 (approx)</td>
</tr>
<tr>
<td>Babol</td>
<td>10.1</td>
<td>$129,655</td>
<td>0</td>
<td>Not known (expropriation was 8 years ago)</td>
</tr>
<tr>
<td>Sari</td>
<td>12.3</td>
<td>$885,000+</td>
<td>1.1</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>76.6</td>
<td>$1,809,655</td>
<td>6.5</td>
<td>88 (excl. Babol)</td>
</tr>
</tbody>
</table>
Table 1.1 Anzali (Gilan): Land and property expropriation requirements, status and compensation

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Area m²</th>
<th>No. of Owners</th>
<th>Use/developments</th>
<th>Compensation</th>
<th>Rate $/m²</th>
<th>Expropriation Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment plant</td>
<td>90 857.4</td>
<td>15</td>
<td>Agricultural land, no structures</td>
<td>$120,000</td>
<td>$2.20</td>
<td>Paid</td>
<td>Compensation was negotiated and accepted. Responsibility for compensating any induced (indirect) impact (outside OP 4.12 scope), loss of seasonal employment on paddy fields, accepted by owners in writing. No such claims arose.</td>
</tr>
<tr>
<td>Pump station</td>
<td>606</td>
<td>1</td>
<td>Urban, no structure</td>
<td>$25,000</td>
<td>$40</td>
<td>Negotiations complete, offer accepted</td>
<td>No other rights held</td>
</tr>
<tr>
<td>Pump station</td>
<td>420</td>
<td>Not confirmed</td>
<td>Undeveloped urban land</td>
<td>$50,000</td>
<td>$120</td>
<td>Offer under negotiation</td>
<td>No private owners. Plots owned by government department, and charitable foundation</td>
</tr>
<tr>
<td>2 pump stations</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Already in public domain</td>
<td>Located entirely in public right of way. No expropriation.</td>
</tr>
<tr>
<td>Network (Water)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Already in public domain</td>
<td>Located entirely in public right of way. No expropriation.</td>
</tr>
<tr>
<td>Network (Sewerage)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Already in public domain</td>
<td>Located entirely in public right of way. No expropriation.</td>
</tr>
<tr>
<td>Total</td>
<td>91,883</td>
<td>16 plus</td>
<td></td>
<td>$195,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 1.2 Rasht (Gilan): Land and property expropriation requirements, status and compensation

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Area (m²)</th>
<th>No. of Owners</th>
<th>Use/developments</th>
<th>Compensation USD equiv. rounded (@8750IRR/USS)</th>
<th>Rate S/m²</th>
<th>Expropriation Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment plant phase 1</td>
<td>131,000</td>
<td>14</td>
<td>Agricultural</td>
<td>$299,000</td>
<td>$2.30</td>
<td>Completed</td>
<td>Verified in field, as written consultant report lacked sufficient detail</td>
</tr>
<tr>
<td>Treatment plant phase 2</td>
<td>269,000</td>
<td>1 owner</td>
<td>Agricultural Two structures (used for storage)</td>
<td>Approximately $300,000 plus assessed value of structures</td>
<td>Ca $1.10</td>
<td>Settlement agreed, title to be transferred on payment</td>
<td>Verified in field, as written consultant report lacked sufficient detail</td>
</tr>
<tr>
<td>Pump stations</td>
<td>588m²</td>
<td>14 owners</td>
<td>Undeveloped urban land</td>
<td>Under negotiation</td>
<td>Negotiation in progress</td>
<td>In negotiation</td>
<td></td>
</tr>
<tr>
<td>Pump Station</td>
<td>324 m²</td>
<td>n/a</td>
<td>Undeveloped urban land belonging to municipalities</td>
<td>n/a</td>
<td>n/a</td>
<td>Already in public domain</td>
<td></td>
</tr>
<tr>
<td>Large Pump Station</td>
<td>300 m²</td>
<td>1</td>
<td>Residential occupied family of 4</td>
<td>Under negotiation</td>
<td>n/a</td>
<td>Offer accepted transfer in progress</td>
<td>Expropriation necessary for technical reasons. Separate Draft RAP has been prepared</td>
</tr>
<tr>
<td>Network (Water)</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>Already in public domain</td>
<td>Located entirely in public right of way. No expropriation.</td>
</tr>
<tr>
<td>Network (Sewerage)</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>Already in public domain</td>
<td>Located entirely in public right of way. No expropriation.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>450,000</strong></td>
<td></td>
<td></td>
<td><strong>$600,000 plus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 1.3 Babol (Mazandaran): Land and property expropriation requirements, status and compensation

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Area m2</th>
<th>No. of Owners</th>
<th>Use/ developments</th>
<th>Compensation</th>
<th>$/m2</th>
<th>Expropriation Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment plant</td>
<td>100 450</td>
<td>2 owners</td>
<td>agricultural</td>
<td>$52,655 (1996)</td>
<td>$0.50c</td>
<td>Complete</td>
<td>Expropriated in Feb 17, 1996 and March 18, 1996. Negotiated, no complaint or appeal.</td>
</tr>
<tr>
<td>Network (Water)</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Already in public domain</td>
<td>Located entirely in public right of way, municipal land. No expropriation.</td>
</tr>
<tr>
<td>Network (Sewerage)</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Already in public domain</td>
<td>Located entirely in public right of way, municipal land. No expropriation.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>101,099</strong></td>
<td></td>
<td></td>
<td><strong>$129,655</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 1.4 Sari (Mazandaran): Land and property expropriation requirements, status and compensation

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Area (m²)</th>
<th>No. of Owners</th>
<th>Use/Development</th>
<th>Compensation</th>
<th>$/m² rounded</th>
<th>Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment plant</td>
<td>110000</td>
<td>10</td>
<td>Developed agricultural (mainly rice)</td>
<td>$675,000</td>
<td>$6</td>
<td>Completed</td>
<td>Owners willingly accepted, confirmed by field visits.</td>
</tr>
<tr>
<td>Pump station</td>
<td>2000</td>
<td>1</td>
<td>Developed agricultural (citrus)</td>
<td>$210,000</td>
<td>$105</td>
<td>Completed</td>
<td>Owner accepted offer and settled.</td>
</tr>
<tr>
<td>Lift station</td>
<td>1000</td>
<td>2</td>
<td>Urban undeveloped waste land</td>
<td>Not yet disclosed</td>
<td>-</td>
<td>In progress, offer made</td>
<td>Owners identified, public notice of intention to expropriate posted in newspapers. Offer likely to be accepted.</td>
</tr>
<tr>
<td>Line pump-collector</td>
<td>10,000 (1 km x 10 m)</td>
<td>4</td>
<td>Developed agricultural (edges only)</td>
<td>Not yet disclosed</td>
<td>-</td>
<td>In progress, partly negotiated</td>
<td>Negotiations expected to complete. One owner sold, other 3 owners volunteered to sell.</td>
</tr>
<tr>
<td>Network (Water)</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Already in public domain</td>
<td>Located entirely in public right of way. No expropriation.</td>
</tr>
<tr>
<td>Network (Sewerage)</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Already in public domain</td>
<td>Located entirely in public right of way. No expropriation.</td>
</tr>
<tr>
<td>Total</td>
<td>123,000</td>
<td>17</td>
<td></td>
<td>$885,000 plus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C. Abbreviated Resettlement Action Plan

Description of resettlement. The construction of the water and wastewater network in the city of Rasht, Gilan province, requires the expropriation of one inhabited residence for the construction of a pumping station. There is no technically feasible alternative, the available land being limited on one side by a main road, and on the other by a river. This is the solution that involves least expropriation, since moving the road would affect a very large number of structures on the other side.

There are no other displacements of persons or families in this project. All other land acquisition at prices already negotiated or in negotiation has been reported separately under a Land Acquisition Plan.

Displaced persons. 4 Persons: the owner-occupier of the lot and house, together with his family. There are no other-right holders.

Description of compensation and other assistance. The owner has negotiated monetary compensation which he is confident is sufficient to allow him to purchase and move to a better house of his choice. He is fully satisfied with the outcome. The amount was privately negotiated and as is customary, has not been made public.

Consultations. The owner was consulted well in advance and was entirely comfortable with the arrangements and with the process and outcome of negotiations. This was confirmed independently on interview with a social scientist.

Institutional responsibility. Gilan Water and Wastewater Company reporting to the Ministry of Energy. Written permission from the Minister himself is required by law to initiate land acquisition.

Arrangements for monitoring and implementation, grievance redress. The owner having accepted the amount, the only possible grievance would be non-payment, which being a legal obligation enforced by court order, is unheard of. In such a case, title would not be transferred and the owner would remain in possession.

A report will be made to the next Bank supervision mission on the outcome of the action.

Budget timetable. The Gilan WWWC has adequate funds to pay the compensation awarded, and compensation is expected to be completed by the end of 2005.
ANNEX 3: MAPS
Executive Summary

Environmental and Social Assessment for the
Northern Cities Water Supply and Sanitation Project

Note:
Distance to Caspian Sea is 30 Kms.

Length of Pipes (m)

<table>
<thead>
<tr>
<th>Dia.</th>
<th>Name of Source</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>150/90</td>
<td>110/80</td>
<td>90/65</td>
<td>80/60</td>
<td>70/70</td>
<td>150/90</td>
</tr>
<tr>
<td>800</td>
<td>150/150</td>
<td>120/120</td>
<td>100/100</td>
<td>90/90</td>
<td>80/80</td>
<td>150/150</td>
</tr>
<tr>
<td>1000</td>
<td>150/150</td>
<td>120/120</td>
<td>100/100</td>
<td>90/90</td>
<td>80/80</td>
<td>150/150</td>
</tr>
<tr>
<td>1200</td>
<td>150/150</td>
<td>120/120</td>
<td>100/100</td>
<td>90/90</td>
<td>80/80</td>
<td>150/150</td>
</tr>
<tr>
<td>1500</td>
<td>150/150</td>
<td>120/120</td>
<td>100/100</td>
<td>90/90</td>
<td>80/80</td>
<td>150/150</td>
</tr>
<tr>
<td>1800</td>
<td>150/150</td>
<td>120/120</td>
<td>100/100</td>
<td>90/90</td>
<td>80/80</td>
<td>150/150</td>
</tr>
</tbody>
</table>

Total 150/150 120/120 100/100 90/90 80/80 150/150

Legend

- Water Supply System
- Waste Water System
- Other Infrastructure Systems
- Road

67