Ukraine: Urban Infrastructure Project

ENVIRONMENTAL ASSESSMENT REPORT

Volume 1

Part 1: Odessa City (water supply, wastewater, solid wastes)

FINAL

November 2005
NOTE TO FILE:

The following Environmental Assessment Report is one of several that was prepared in support of the Urban Infrastructure Project for Ukraine which was under preparation in 2005-2006. This is a category B project for rehabilitation of various utilities, including water supply, waste water treatment, and solid waste. The EAs cover investments under Component B for Rehabilitation Investments under the project. Any technical variations in the final plans for these sites will be addressed in the review of the EMPs scheduled to take place in conjunction with the launch workshop. All subsequently identified works under Component B must comply with the preparation of similar EAs in accordance with the Environmental Framework Policy dated November, 2005, before the disbursement of any funds for the specific site. Investments under C. for Energy Efficiency under the Project must comply with the preparation of an abbreviated EA/EMP specified under a separate Environmental Framework Policy prepared specifically for Component C.
PREFACE

Urban Infrastructure Project (UI Project) and Nistru River/Black Sea Protection Project (NR/BSP Project) (GEF sub-project) have been merged into a single Urban Infrastructure Project (GEF sub-projects are treated under the UI Project) as their broad environmental goals include improvement of hygiene and health of the population, provision of low-cost and sustainable water supply and sanitation delivery services, and improvement of environmental conditions in Ukraine, with a special focus on the Nistru River and Black Sea basin as a priority region.

Within the framework of this integrated project, the EA Consultant is responsible for preparation of:
- Environmental Framework Policy (EFP);
- Environmental Assessment (EA).

Environmental Framework Policy

The Environmental Framework Policy document reflects key provisions of environmental policies adopted by Ukraine and the World Bank, the results of their comparative review, and demonstrates their compatibility on all major issues.

The existing methodological frameworks for environmental assessment, developed in Ukraine and adopted by the World Bank, have been reviewed as part of the EFP preparation. This review reveals a very close similarity of these frameworks, with only few minor inconsistencies, which have not been encountered in the preparation of environmental assessments for selected investment projects.

Environmental Assessment

The Environmental Assessment documents, presented in this submission, have been prepared according to the World Bank environmental policies (OP4.01) and procedures, which are compatible with the Law of Ukraine “On Environmental Review” and the EIA-related State Construction Standard DBN A.2.2-1-2003 “The Environmental Impact Assessment Content and Composition for Construction Projects" (Kyiv, 2004).

There have been numerous changes in the list of proposed projects, which should be subject to environmental assessment. The most recent list of projects, provided to the EA Consultant and dated 12 October, 2005, appears to be different from the initial list, included in the Terms of Reference.

At the same time, the Environmental Assessment studies were carried out for a number of other projects/locations, included in the expert’s findings/e-mails dated 13 May, 11 June, 17 August and 26 August, 2005 (Ivano-Frankivsk, and towns in Kharkiv Oblast: Kupyansk, Izium, Chuguev).

According to above mentioned, the present report consists of two volumes:
- **Volume 1** - preliminary sub-projects identified for inclusion under UI project (according to the list dated 12 October, 2005).
- **Volume 2** - addition sub-projects reviewed according to expert’s findings.

The general content of Final EA Report is given below.
## CONTENTS

### INTRODUCTION

1. **WATER SUPPLY SYSTEM IN ODESSA**
   1.1. Existing Situation

   - 1.1.1.1. General
   - 1.1.1.2. Site Geology

1.1.2. Current State of Water Transmission System at the Water Main 7 Construction Site
   - 1.1.2.1. General
   - 1.1.2.2. Site Geology

1.2. Proposed Investment Projects
   - 1.2.1. Rehabilitation of the Carolina-Bugas Water Main Section near Nadlimansky Village
     - 1.2.1.1. Associated Hydroengineering Infrastructure
     - 1.2.1.2. Commissioning Provisions
     - 1.2.1.3. Active Corrosion Prevention System
     - 1.2.1.4. Sanitary Protection Zone
     - 1.2.1.5. Restoration of Landcover Affected by Construction Activity

   - 1.2.2. Completion of Construction of Water Main 7

1.3. Analysis of Potential Environmental Impacts
   - 1.3.1. Physical Impacts
   - 1.3.2. Social Impacts

1.4. Environmental Management Plan
   - 1.4.1. Brief Description of Key Environmental Issues
   - 1.4.2. Mitigation Plan
   - 1.4.3. Monitoring Plan

### WASTEWATER COLLECTION SYSTEM IN ODESSA

2.1. Existing Situation

2.1.1. General

2.1.2. Site Geology

2.2. Proposed Investment Projects
   - 2.2.1. Replacement of Gravity Sewer M.
   - 2.2.2. Completion of Construction of the Southern District Municipal Sewer Network
   - 22.3. Construction of Sludge Dewatering Facility at the Northern WWTP

2.3. Analysis of Potential Environmental Impacts
   - 2.3.1. Physical Impacts
   - 2.3.2. Social Impacts

2.4. Alternative Options

2.5. Environmental Management Plan
   - 2.5.1. Brief Description of Key Environmental Issues
   - 2.5.2. Mitigation Plan
   - 2.5.3. Monitoring Plan

### SOLID WASTE MANAGEMENT SYSTEM

3.1. Existing Situation

3.1.1. General

3.1.2. Site Description

3.2. Proposed Investment Project

3.3. Analysis of Potential Environmental Impacts
   - 3.3.1. Physical Impacts
   - 3.3.2. Social Impacts

3.4. Alternative Options

3.5. Environmental Management Plan
   - 3.5.1. Brief Description of Key Environmental Issues
   - 3.5.2. Mitigation Plan
   - 3.5.3. Monitoring Plan

### INSTITUTIONAL ISSUES

4.1. Environmental Management Plan

5. **PUBLIC CONSULTATION**

CONCLUSIONS

ANNEX A. Mitigation Plan
ANNEX B. Monitoring Plan
ANNEX C. Materials on Public Consultations
INTRODUCTION

Odessa is the administrative centre of Odessa Oblast and a major seaport in Ukraine, located on the Black Sea cost (the Odessa). The City occupies the area of 160 km² and, as of the 2003 census, has a population of 1,029,000 people. Odessa was founded in 1794, now being the third largest conurbation in Ukraine after Kyiv and Kharkiv, and a major industrial, cultural, transport, scientific research and recreational centre on the northern coast of the Black Sea.

Odessa is the largest seaport and naval fleet base in Ukraine handling a broad range of freights, including grain, sugar, coal, oil products, cement, metal, jute, timber, and machinery. Odessa has a well developed railway network. Major industries concentrated in Odessa include shipbuilding, oil refining, machine building, metal fabrication, textile industry, food processing, wood processing, agro-industry and chemical industry. Odessa is a major resort centre with extensive beach areas and health resorts.

Climate

Climate in Odessa is continental, with hot dry summer and mild low-snow winter. There are two hydrometeorological observation stations, in Odessa and Rasdelnaya.

Mean annual temperature is 9.8°C. January is the coldest month with maximum recorded temperature at 29°C. July is the warmest month with maximum recorded temperature at 37°C. The average duration of frost-free period ranges between 194 to 215 days.

The climate becomes progressively drier towards the south to the extent that there is a shortfall in available water resources. The average vegetative period ranges from 168 to 200 days, with the sum of temperatures being between 2,800 to 3,400°C.

The sun in Odessa is above 10°C. The average frost-free period is from 195 to 205 cm, with maximum precipitation being 70-73 cm.

Odessa Oblast annual precipitation is about 463 mm in Odessa and 495 mm is compensated by summer rains.
Snow cover typically forms towards the end of November or early December, and melts in early March. On the average, the snow cover lasts for about 50 days, with snow cover thickness being at about 4-5 cm. Maximum recorded snow cover thickness is 17-20 cm.

Northern and southern winds are predominant, with mean recurrence rate of 70%. Mean annual wind velocities, recorded at the hydrometeorological stations in Odessa and Rasdelnaya, are 4.8 m/s and 3.3 m/s, respectively.

Evaporation from the water surface is at 856 mm in Odessa, and 716 mm in Rasdelnaya. Evaporation from the land surface in Odessa is at 416 mm.

The river network, associated with the Black Sea Basin, comprises the Danube River (including the Kilia Branch), the Dnistro River (including the Kuchurhan tributary), the Kolyma and Savranka Rivers (the Southern Buh tributaries). The Danube Delta and Dnipro Estuary consist of extensive wetland areas, with numerous intermittent watercourses. Major rivers play a vital role for regional economy, being used for navigation, irrigation and hydropower generation. There are many lakes in the coastal area, both freshwater (Kahul, Yalpuh, Katlabuh) and saline (Sasyk, Shahany, Alibei, Burnas).

The Odessa Oblast occupies a significant part of the Black Sea Lowland, gently dipping towards the Black Sea and intersected by numerous estuaries, or limans (the largest being the Kuyalnik and Khajibei estuaries), completely or partially isolated from the sea by sand or shell bars. The northern part of Odessa Oblast extends into the Podol Upland with surface elevations of up to 268 m, dissected by deep valleys and gorges. In the area lying along the Ukrainian/Moldovan border between the Dnistro and Prut Rivers, the surface elevations reach 232 m.

Geology and Topography

Odessa Oblast lies on the Black Sea coast within Ukraine, occupying the southern part of the Dnipro-Buh steppe zone in the Black Sea Lowland.

Surface elevations range between 3 to 80 m. Local geology comprises Quaternary Aeolian and Diluvium loess-type silty clays, overlying the Upper Pliocene subaerial reddish brown clays. The thickness of Quaternary deposits varies between 20 to 25 m. Groundwater is present at depths ranging between 0.5-1 m to 5-15 m.

Soil pattern is dominated by southern-type and ordinary black earths, with medium to low humus content, with localized areas of low-humus podzolic black earths. Closer to the sea coast, the southern alkaline black earth is predominant. Alkali soils and salt marshes are common to the valleys and gorges.

The area’s seismic activity is estimated at 6 points.
1. WATER SUPPLY SYSTEM IN ODESSA

1.1. Existing Situation


1.1.1.1. General

The Carolina-Bugas water transmission system consists of single-line water mains, ranging in diameter from 700 to 400 mm and conveying water from the Dnistro Water Treatment Plant to Ovidiopol, Belgorod-Dnistrovsky, Carolina-Bugas, Zatoka and other municipalities in Belyaevka and Ovidiopol districts in Odessa Oblast.

This system has been in operation for about 30 years and is now in poor condition, particularly with regard to steel piping. In the event that the transmission system needs to be shut down for repair, water supply is discontinued for all municipalities, industries and organisations, connected to the Carolina-Bugas water main along its whole length of 44.8 km.

The following sections of this water main are in critical condition and urgently require rehabilitation:

1. The 4.7 km main section, starting at the 200 m distance from a recently relayed main section near the Teplodar WwTP connection branch and extending towards the air valve chamber, located at the highest point of the water main route after the booster pump unit No. 2 (surface elevation marks at 97 and 157 m).
2. The 2.8 km section between line valves KB-1 and KB-2 (surface elevation marks at 0 and 300 m): its rehabilitation would involve pipe relocation.

The reconstruction of these sections would significantly improve operational reliability of the Carolina-Bugas water main and reduce human health risks, associated with disruptions in water supply due to frequent repairs, overall socio-economic situation in the region would be thereby improved.
1.1.1.2. Site Geology

The proposed water main route is in 3 m uphill from existing main route. Land Acquisition Consent was obtained on the basis of the Route Selection Protocol.

The water main is routed along the left side of the Dnistrovsky Estuary valley, uphill from the Nadlimansky village, with absolute surface elevations ranging between 58.2 m to 77.0 m. The geology of the proposed water main route area comprises superficial Aeolian and Diluvium silty clays, which overlie the Upper Pliocene subaerial continental clays. The exposed of the Aeolian and Diluvium deposits is in the range 3.0 to 6.0 m.

The existing drain network diverts surface runoff from the water main route area. Prior to its construction, the groundwater was present at depths of 1.0-2.0 m. Currently, the recorded depths of groundwater table along the water main route range between 1.8 to 3.6 m. The aeration zone capacity is determined by the capillary rise characteristics of local clays. This is considered to be a key factor contributing to the elevated moisture content of soil material at pipe emplacement depths. According to the Construction Standard SNiP 2.03.11-85 "Protection of Structures against Corrosion", the soil, overlying the groundwater table, is classified as highly aggressive based on the following criteria: mean ambient air temperature at above 6°C, specific resistivity at above 20 Ohm, and regardless of chloride and sulphate content. The soil-induced corrosion rates are generally high in the area of the water main route.

1.1.2. Current State of Water Transmission System at the Water Main 7 Construction Site

1.1.2.1. General

The existing water transmission system (Figure 1.1, Table 1.1), comprising 7 water pipelines and the Carolina-Bugas water main, conveys water from the Dnistro Water Treatment Plant (WTP) to the municipality's water pump stations and other connected customers. The total length of existing transmission system is 288.8 km.

Table 1.1. Technical Characteristics of the Dnistro WTP – Odessa Transmission System

<table>
<thead>
<tr>
<th>No.</th>
<th>System Element (Pipe Material)</th>
<th>Year of Construction</th>
<th>Length, km</th>
<th>Technical State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Water Line 1 (750 mm, pig iron)</td>
<td>1873</td>
<td>37</td>
<td>Old and obsolete piping, replacement required</td>
</tr>
<tr>
<td>2.</td>
<td>Water Line 2 (750 mm, pig iron)</td>
<td>1902</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Water Line 3 (900 mm, pig iron)</td>
<td>1940</td>
<td>38.5</td>
<td>Extremely poor, accident-prone state</td>
</tr>
<tr>
<td>4.</td>
<td>Water Line 4 (1,200 mm, pig iron)</td>
<td>1959</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Water Line 5 (1,400 mm, steel)</td>
<td>1973</td>
<td>31.5</td>
<td>Technically adequate</td>
</tr>
<tr>
<td>6.</td>
<td>Water Line 6 (1,400 mm, steel)</td>
<td>1978</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Water Line 7 (1,400 mm, steel)</td>
<td>1989</td>
<td>32</td>
<td>Construction not completed for remaining 2.7 km section</td>
</tr>
<tr>
<td>8.</td>
<td>Carolina-Bugas Main (700-400 mm, steel/pig iron)</td>
<td>1978</td>
<td>44.8</td>
<td>Extremely poor, accident-prone state, urgent replacement required for 7.5 km section</td>
</tr>
</tbody>
</table>
Extremely poor condition as a consequence of water pollution and bacterial growth on the water lines 1, 2, and 4. The need to rehabilitate the water lines 1, 2, and 4. The rehabilitation of 1.5 km 1,400 mm water transmission lines at the Department of Public Services. 

The construction of additional lines commenced in the 1990s to reflect the needs to improve the system. The completion of water transmission lines 1,400 mm transmission lines (1 and 2).
1.1.2.2. Site Geology

The proposed water main route starts at the pipe network junction No. 4 and heads towards the pipe network junction No. 5a in Odessa via the Bolshoy Dolnik village and along the main Odessa-Chisinau carriageway.

Morphologically, the study area represents a part of watershed plateau, dissected by gorges, and occupies the slopes and bottom of the Dalnitsa valley. Absolute surface elevations range between 23.0 to 65.0 m.

The geology of the main route area comprises the Quaternary alluvium/diluvium and aeolian/diluvium deposits, which overlie a sequence of Upper Pliocene clay, Pontian limestone, and Meotian clay strata (Figure 1.2).

The presence of groundwater is limited to two locations: within the city area, at depths of between 2.20 to 4.50 m (with absolute elevations at 43.10-59.0 m); and in the base of the valley, along a small stream, at the depth of 0.50-2.20 m (with absolute elevations at 23.35-23.97 m. This aquifer is in hydraulic continuity with the stream flow.

Water is mildly aggressive in terms of chloride levels, based on the results of testing on Portland cement. The seasonal variations in groundwater table are at ± 1.0 m.

Loess-type silty clays are susceptible to settlement when wet, with relative settlement rate at 3.9 cm. In terms of settlement susceptibility, the soil of the study area is classified into Type 1.

On the right slope, the limestone strata lies at greater depths relative to those on the left slope, suggesting a potential impact of landsliding processes. Uneven settlement may be anticipated as a major consideration during pipe emplacement, particularly settlements along the borders between different lithological units (limestone on the valley slope and alluvium/diluvium deposits on the valley base and slopes), which will have influence on the pipe stability.

The area’s seismic activity is 6 points (Construction Standard SniP P-7-81), and the depth of frost penetration zone is 0.8 m (Construction Standard SniP P-A.6-72).
Figure 1.2. Geological Cross-Section of Construction Site
1.2. Proposed Investment Projects

The proposed investment project includes the following components:

- Rehabilitation of the Carolina-Bugas Water Main Section near Nadlimansky Village;
- Completion of construction of water line 7.

1.2.1. Rehabilitation of the Carolina-Bugas Water Main Section near Nadlimansky Village

Existing rising water main, laid in the area of the Nadlimansky village, is made of steel pipe with 720 mm diameter and 12 mm pipe wall with external insulation. Pipe walls show the signs of progressive pitting corrosion.

The proposed project involves:

- The laying of new water main;
- The construction of associated hydroengineering infrastructure for this rising main.

The same, 720x12 mm, diameter is proposed for a new water main, to be routed 3 m uphill from the existing water main route.

In the area of the Nadlimansky village, the existing and proposed water main routes (Figure 1.3) lie under the gas-mains, motor roads, electricity lines, communication cables, drains and sewers. Drains and sewers are laid at the depths of 1.9 m and more.

Due to the high corrosion potential of soil, particularly to steel pipes, the proposed design includes a provision for external protection system, both active and passive.

Due to the elevated groundwater levels and high frequency of pipe breakage, the existing pipework has deteriorated to the state where urgent replacement is required. To minimize the effect of these factors, the proposed design features a reinforced external lining system, designed in accordance with the State Standard GOST 9.602-89. The proposed liner system is a composite liner, comprising the following elements:
- Bitumen-polymeric liner (technical specification TU 102-340-83);
- Adhesive tape liner, thickness at least 1.2 m (technical specification TU 102-320-86);
- One-layer protective cover, made of roll material (technical specification TU 21 USSR 452-88).

Active protection system is based on the cathodic protection. Rubber flange is included in the design in order to prevent the effect of cathodic protection on adjacent structures. Proposed inner protection measures include water treatment and internal liner.

The proposed rising water main would help improve the constancy and reliability of water supply service, and ensure compliance with existing drinking water quality standards.

1.2.1.1. Associated Hydroengineering Infrastructure

The design and layout of proposed associated infrastructure should take account of existing water main appurtenances. Line valves are planned to be installed on the existing and new mains, and new main section is planned to be connected to the existing main.

Water main appurtenances are being designed in accordance with the provisions of the amended State Construction Standard SNiP 2.04.02.84 “Water Supply. External Networks and Structures”. The design solutions were identified on the basis of Generic Design Solutions Manual.

Surface elevations along the existing water main route range between 58.2 to 77 m, with the lowest point being approximately in the middle of the route. This topographic detail was a major consideration in the identification of technical options for isolating and emptying the main section.

The diameters of drain and air valves enable the emptying of adjacent main sections during 2 hours, at the estimated flow rate of 1.1-1.2 m/s (normally, the estimated flow rate for 700 mm piping is at about 1-1.1 m/s).

Subject to the consent of Odessa Vodokanal Water Utility and Dnistro Water Treatment Plant, the plan is to use 100 mm steel pipes to provide connection between existing water gauges and new water main.

A designed drain shaft is connected to a designed water main with 300 mm valve, and water is released to a wet shaft. The proposed approach is justified by the absence of steep depressions.

The following table (Table 1.2) summarises the land consent details for the construction of proposed water main section in the area of the Nadlimansky village.
Table 1.2. Land Consent Details for the Construction of Proposed Water Main Section in the Area of the Nadlimansky Village

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Length, m</th>
<th>Width, m</th>
<th>Allocated Area, ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Permanent withdrawal</td>
<td>Temporary use</td>
</tr>
<tr>
<td>Water main route</td>
<td>3935</td>
<td>2</td>
<td>0.002</td>
</tr>
<tr>
<td>Valve shaft</td>
<td>33</td>
<td>2</td>
<td>0.002</td>
</tr>
<tr>
<td>PK0+05 (2 shafts)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PK39+30 (1 shaft)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air valve shaft</td>
<td>2</td>
<td>2</td>
<td>0.001</td>
</tr>
<tr>
<td>Drain shaft</td>
<td>2</td>
<td>2</td>
<td>0.002</td>
</tr>
<tr>
<td>TOTAL</td>
<td>13.00</td>
<td>0.0009</td>
<td>13.00</td>
</tr>
</tbody>
</table>

1.2.1.2. Commissioning Provisions

The proposed supervision process for the water main construction and commissioning is compliant with the provisions for the Regulatory Guidance Document KDP 204-12 UA 242-95 “Water Supply and Sewerage System Operation Rules”.

Prior to commissioning and under the supervision of authorized representative of Vodokanal, the construction contractor should carry out the water main flushing and disinfection in a stepwise, three stage manner (“Water Supply and Sewerage System Operation Rules”, Clause 9.5.11):

1. Stage 1: preliminary mechanical treatment and flushing at 1 m/s flow rate;
2. Stage 2: disinfection with the use of chlorine water in accordance with the current regulations of the Ministry of Health.
3. Stage 3: final flushing to achieve satisfactory water quality, confirmed by bacteriological and chemical test results.

All these stages should be properly documented according to the existing procedure prior to the commissioning of constructed water main section.

The proposed design includes adequate provisions for the smooth operation of flushing process as described above.

1.2.1.3. Active Corrosion Prevention System

The soil in the project area has medium to high electric resistance, and circulating current is of soil-induced type. The subsurface electrical profile is suitable for anodic earthing system. In addition to composite liner system, the steel piping requires cathodic protection to meet the specifications of the State Standard 9.602-89.

Based on the results of electrometric survey and design calculations for the proposed cathodic protection system, it is anticipated to install one station of OPS-63-48-Y1 type.

The proposed anodic earthing system features the use of graphitised carbon electrodes (EGT-2900 type, 54 ps.).
The AVVG cable is proposed to be used for drainage, and power will be supplied from existing 0.4 kW electricity line via the connection on the existing power transmission pole.

The proposed system would be adjusted upon the completion of construction in order to identify the most efficient mode of operation.

1.2.1.4. Sanitary Protection Zone

A sanitary protection zone will be established in accordance with existing health regulations and State Construction Standard 2.04.02-84, with minimum width of 10 m for a water main up to 1,000 mm in diameter.

The proposed design includes provision for implementation of adequate sanitary measures within the sanitary protection zone in accordance with the Construction Standard SNiP 2.04.02-84 (Clauses 10.38 and 10.39).

No sources of soil and groundwater contamination have been identified within the sanitary protection zone.

The proposed water main route crosses agricultural land, where the sanitary protection zone should be established in accordance with the Construction Standard SNiP 2.04.02-84 (Clause 10.39).

In the future, relevant regulatory authorities involved in the land allocation procedure should take account of the sanitary protection zone regime, established for the proposed water main route, in reviewing other development projects that are proposed to be sited in this area.

1.2.1.5. Restoration of Landcover Affected by Construction Activity

The design includes provision for the restoration of landcover affected by construction activity, in order to make it suitable for arable agriculture as an original land use.

The restoration programme comprises the following activities:

- Removal and storage of top soil layer from the construction site surface at a specially designated temporary storage site;
- Restoration of top soil layer with the use of soil material stored at a temporary storage site;
- Final levelling and profiling of restored soil layer (Figure 1.4).

Top soil material should be emplaced during the warm season and at normal moisture regime.

Additionally, the restoration programme includes the biological restoration stage, which envisages the application of fertilizers to restore the fertility of emplaced top soil material.
1.2.2. Completion of Construction of Water Main

The proposed project involves the construction of a new water main made of 1,400 mm steel pipes from the existing pipework at junction 4 to the main junction 5a site. According to the Terms of Reference, the new water main will be laid with an offset of 4.0 m for chambers, and the total distance will cover 10.5 km. The proposed project includes the replacement of existing pipework (Figure 1.4).
1.2.2.1. Operational Considerations for the Proposed Design

The proposed design features a phased approach, with 5 pipe hook operating simultaneously to handle a 30 m pipe section each, to reach the total phase length of 150 m.

The following sequence of construction works is proposed.

1. Site preparation:
   - Pit excavation to expose existing pipework, installing a pipe suspension bridge;
   - Site fencing;
   - Pipe section aligning/welding;
   - Join/seam sealing (Figure 1.6)
2. Trench excavation;
3. Pipe emplacement;
4. Pipe testing;
5. Backfilling.

As can be seen from the above, the proposed design includes two stages, preparation and construction. The planned duration of preparatory stage is 1 month. The construction stage involves the emplacement of pipes.

Figure 1.6: Pipe Joining/Seam Sealing
1.3. Analysis of Potential Environmental Impacts

For the purposes of the World Bank's EA Operational Policy, all proposed projects, relating to the rehabilitation of water supply system in Odessa, are rated as an environmental category B in terms of significance of their potential environmental impacts.

1.3.1. Physical Impacts

Potential physical impacts on the environment will be limited to the construction phase, being associated with the construction of new water mains and related appurtenances. Key types of works associated with the construction of new water mains include earthworks, concrete works, and pipe emplacement works.

The potential environmental impacts that may arise during different stages of construction projects are considered below in relation to the proposed project:

- **Impact on local geology**: is unlikely, as the proposed project does not involve any activities/operations that may affect the geological environment;
- **Impact on local climate**: is unlikely due to the absence of identified sources;
- **Impact on fauna**: is unlikely, as the proposed water main routes do not affect the habitats of local fauna species;
- **Impact on air quality**: is likely to be at or below existing guideline levels, being limited to emissions from mobile sources (according to the Law of Ukraine “On Motor Transport” (No. 2344-III of 05.04.2001) and the Law of Ukraine “On Road Traffic” (No. 3353-XII of 30.06.1993), all motor vehicles and mobile plant are subject to the regular technical inspection and exhaust gas control, undertaken by the local offices of the State Traffic Inspection). The pipework and related appurtenances, as proposed in the design, do not emit any harmful substances to air;
- **Impact on water bodies**: short-term impact, limited to construction phase;
- **Impact on soil**: short-term impact, limited to construction phase. At the outset of construction, top soil cover will be stripped as part of the initial site preparation and used as surface soils in the final restoration of construction site. The proposed pipe specifications are considered to be adequate in terms of containing the transported flows and preventing corrosion of steel piping. Construction waste will be managed and disposed of at the local landfill in accordance with existing regulations and disposal limits (in accordance with the Law of Ukraine “On Waste” (No. 197/98-VR of 5 March 1998) and the Resolution by the Cabinet of Ministers of Ukraine “On the Development/Approval/Revision Procedure for Waste Generation and Disposal Limits” (No. 1218 of 3 August 1998);
- **Impact on vegetation cover**: is considered to be insignificant during construction, and will be mitigated by implementing landcover restoration measures;
- **Impact on existing utilities/infrastructure**: is obviously positive, as the proposed project will contribute to the improvement of existing municipal infrastructure.

The proposed project design includes adequate mitigation measures, designed to ensure compliance with existing environmental regulations, maintain the ecological equilibrium in the project area, and prevent contamination or degradation of soil.
1.3.2. Social Impacts

The implementation of the proposed project would significantly improve level and quality of water supply service, provided to population, industries and organizations in Odessa.

The proposed project is not likely to produce any adverse social impact, nor pose a threat to human health and living conditions.

The results of the environmental assessment indicate that the project implementation will not cause any adverse impact to local industries, agricultural activities, residential areas, surface and subsurface infrastructure, recreational areas and cultural assets.

No archaeological or cultural resources are expected to be encountered during the project implementation.

The project will not entail involuntary resettlement activity.
1.4. Alternative Options

Given that the proposed projects relate to the improvement of existing water supply system, no alternative options have been considered. The implementation of proposed project is seen as the most feasible way of improving the reliability of water service and preventing further deterioration of environmental situation and human health in the region.

The analysis of the 'status quo' scenario indicates that existing situation is not sustainable, and service disruption is possible if proposed improvements were not implemented.
1.5. Environmental Management Plan

1.5.1. Brief Description of Key Environmental Issues

The proposed investment project is aiming to improve, modernize and facilitate further development of existing water supply system in Odessa.

Given that the proposed project relates to the rehabilitation of existing municipal water supply system, its potential environmental impacts can be mitigated by adopting good construction practices and ensuring compliance with existing environmental regulations.

1.5.2. Mitigation Plan

The proposed project design includes provision for restoration of landcover along the water main routes. The detailed specification of construction works involved in the project has been prepared on the basis of Civil Engineering Manual USN 8-3.1 "External Networks".

The preparatory works include the relocation of existing fertilizer storage site, located near the main section No. 4, to a new location at the distance of 50 m from the main route; the cleanup of dump site near the main section No. 60; the elimination of effluent release source near the main section 108.

All these works are the responsibility of local authorities, and should be completed prior to the start of construction activity.

Other planned construction activities include:

- The construction of open drain where the main section No. 43 crosses a local stream;
- The restoration of 3.0 m wide concrete-face road near the main section junction No. 11a+55;
- The construction of concrete-lined canal (3.0 m width, 1.0 m depth) near the main section junction No. 83+60;
- The restoration of irrigation canals between the main sections No. 29 to 3;
- The construction of temporary flow diversion dam where the water main route crosses a local stream.

The details of proposed mitigation measures are provided in the Annex A.1.

1.5.3. Monitoring Plan

The ultimate objective of proposed investments is to develop a sustainable system for the provision of good quality drinking water to the service population.

In order to be able to measure the success in achieving this objective, the following target performance indicators can be recommended:

1. Percentage of population connected to centralized water supply service.
2. Number of noncompliant samples (i.e. samples that do not meet drinking water quality standards due to elevated levels of chemical, bacteriological, or radionuclide contamination), collected from the distribution system.
In Ukraine, drinking water quality regulation is based upon the following guideline documents:

1. State Standard DSTU 2874-82: "Drinking Water. Hygienic Requirements and Water Quality Control": this State Standard specifies the list of 28 water quality parameters that have to be monitored.

2. State Sanitary Norms and Rules SanPiN 383-96 "Drinking Water. Hygienic Quality Requirements to the Centrally Supplied Drinking Water": this document specifies a comprehensive list of 55 parameters, which have to be introduced into the mandatory monitoring programme in a phased manner from 2005 onwards.

3. State Regulation DR-97 "Permissible Levels of Caesium-137 and Strontium-90 Radionuclides in Food Products and Drinking Water".

4. Radiation Safety Norms NRBU-97: this regulatory document sets out the admissible levels of human exposure to radiation, and provides methodological guidance on the regulation of radioactive contaminant levels in drinking water.

Intermediate performance indicators can be used to measure the progress towards the specified project objective. These can be based on actual water quality determinations made in the process of implementing improvements in existing water supply systems. Other useful performance indicators relate to proactive leakage control in the whole water supply system. Water leaks may significantly affect the hydrological regime in the project area, resulting in the elevation of groundwater levels, groundwater contamination, landslipping and subsidence.

These processes need to be carefully monitored, with a special focus on those areas where they are considered to have been triggered by leaks from water distribution mains. It is essential to continue a periodic monitoring programme for groundwater levels in the project area after the completion of construction activity, as part of post-project monitoring.

Moreover, leaking pipelines may be a factor that contributes to the contamination of drinking water supplies, giving rise to water-borne disease outbreaks.

Another group of intermediate performance indicators for monitoring and evaluation may include impact indicators that relate to the control of construction/reconstruction activity effects on the environment, including potential pollution releases, noise and vibration, waste generation and management.

The details of proposed monitoring programmes for water supply rehabilitation projects are provided in the Annex B.1.

Odessa Vodokanal Water Utility has the analytical laboratory, accredited to undertake quality measurements on drinking water and effluent samples. Laboratory has adequate analytical capability to conduct chemical analysis with the use of modern laboratory equipment, manufactured by SHIMADZU company.

During the environmental assessment, the Odessa Vodokanal Water Utility provided the results of water quality measurements for 2001-2005. These results indicate that actual concentrations of all parameters in drinking water samples taken from the municipal water distribution system do not exceed maximum admissible concentrations.
After the completion of construction of proposed water main sections, the existing routine monitoring programme will be continued by Odessa Vodokanal in order to monitor the quality of water supplied to customers.

The following Table 1.3 summarises the 2005 mean annual concentrations of key parameters, the municipal water supply network.

Table 1.3. Municipal Water Supply System, 2005

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Mean Value</th>
<th>Maximum Admissible Concentration, set by State Standard GOST 2874-82</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Colour</td>
<td>7.85714286</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Turbidity</td>
<td>0.51</td>
<td>1.5</td>
</tr>
<tr>
<td>3.</td>
<td>Odour (points)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Taste</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>pH</td>
<td>7.73</td>
<td>6.0-9.0</td>
</tr>
<tr>
<td>6.</td>
<td>Nitrites</td>
<td>&lt;0.003</td>
<td>3.3</td>
</tr>
<tr>
<td>7.</td>
<td>Nitrates</td>
<td>7.84</td>
<td>45.0</td>
</tr>
<tr>
<td>8.</td>
<td>Sulphates</td>
<td>93.82</td>
<td>500</td>
</tr>
<tr>
<td>9.</td>
<td>Chlorides</td>
<td>42</td>
<td>350</td>
</tr>
<tr>
<td>10.</td>
<td>Hardness (total)</td>
<td>4.6</td>
<td>7.0</td>
</tr>
<tr>
<td>11.</td>
<td>Dry residue</td>
<td>422.6</td>
<td>1000</td>
</tr>
<tr>
<td>12.</td>
<td>Oil products</td>
<td>0.013</td>
<td>0.1</td>
</tr>
<tr>
<td>13.</td>
<td>Bacterial number</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>14.</td>
<td>Coli-index</td>
<td>&lt;3</td>
<td>3</td>
</tr>
</tbody>
</table>
2. WASTEWATER COLLECTION SYSTEM IN ODESSA

2.1. Existing Situation

2.1.1. General

Existing sewer network in Odessa is structurally and operationally deficient due to years of inadequate maintenance and under-investment. The operational condition of sewer network in the Southern District is particularly challenging.

In 1970, the sewage pumping station No. 8 (SPS-8) was constructed in Arcadia following the cholera outbreak. Other sewage system developments, completed in that period, include the centralized sewer rising main, connecting all sewage pumping stations in the Southern District and delivering sewage flows from the SPS-8 to the Southern Wastewater Treatment Plant (WwTP). This sewer main consists of pipes ranging in diameter from 700 to 1,200 mm, made of steel, pig iron and reinforced concrete.

In 1985–1987, sewer pipe break frequency considerably increased due to pipe abrasion and corrosion, particularly in main section connecting the SPS-8 and Novgorodsky Street. Due to the absence of alternative options for sewage flow diversion, the sewage pumping stations in the Southern District had to be shut down for the whole duration of repair, and untreated sewage flow released into the Black Sea. This arrangement posed a serious threat to human health, therefore in 1987, the decision was made to construct a new sewer rising main in the Southern District to provide a temporary solution, and in parallel continue the design development for the Southern sewer tunnel. The construction of sewer tunnel would provide the capacity required to decommission the sewage pumping stations in the Southern District (SPS-8, SPS-7, SPS-6, SPS-6A, sewage pumping station operated by the Oil College) and the Southern rising sewer.

Between October 1987 and May 1988, 6.3 km of rising sewer was constructed, providing connections between the SPS-8 in Arcadia and SPS-6B near the Black Sea Highway, and between SPS-6 in the Golden Coast area and the Black Sea Highway.

As an exception, the State Construction Committee, State Planning Committee and Ministry of Housing and Municipal Services endorsed the use of steel piping for this rising sewer. This piping has been in operation for 14 years and is now in poor condition due to abrasion, with pipe bottoms being particularly affected. The results of ultrasonic inspection survey, conducted by the specialists from the Odessa State University of marine Science, indicate that sewer sections, lying between the SPS-8 in Arcadia and SPS-7 near the Bolshoy Fountain Station 10, show a common defect in the form of multiple cavernous fractures up to 4 mm in depth. The sewer section on the Kamanina Street has been especially hard hit, with sewer wall thickness being as small as 4.6 mm on the bottom, and at about 6.1 mm on the top.

Sewage flow, collected from various customers in Odessa, is delivered to the municipal wastewater treatment plants (Northern WwTP and Southern WwTP) via gravity-operated and rising sewers. The total length of sewers maintained by the City is 647 km (Figures 2.1 and 2.2).

The Northern WwTP site is associated with the sludge fields in the Peresyp area, occupying the total area of 50.4 ha. The Plant’s design capacity is 400,000 m$^3$/day, though in wet periods it actually receives about 600,000 m$^3$/day. The Plant features a traditional
biological treatment process, which has been in operation since 1986, with no arrangement for sludge treatment and dewatering.

![Sewer Network Age Pattern](image)

Figure 2.1. Sewer Networks Age Pattern

![Piping Material Pattern of Municipal Sewer Networks](image)

Figure 2.2. Piping Material Pattern of Municipal Sewer Networks

2.1.2. Site Geology

Site geology comprises Quaternary Pliocene clay, Pontian limestone, three aquifers, being represented by frost penetration is between 1-3
2.2. Proposed Investment Projects

The proposed investment project for the rehabilitation of municipal wastewater collection and treatment system in Odessa includes the following components:

- Replacement of gravity sewer mains;
- Completion of construction of the Southern District municipal sewer network;
- Construction of sludge dewatering facility at the Northern WwTP site.

2.2.1. Replacement of Gravity Sewer Mains

The municipal sewer network in the historical centre of Odessa was constructed in 1863 and has been in operation for over 130 years. Sewer mains were made of locally available shell stone, which has lost its loading strength. As a result, hollows and fractures have become frequent, both on the road surfaces and near old historical buildings, posing a threat to their integrity. In view of all difficulties involved in the replacement of pipework in the historical part of the City, it is proposed to use the trenchless technique.

Currently, 237 km of sewer mains with average diameter of 500 mm are in extremely poor condition and required urgent replacement (Table 2.1, Figure 2.3). Of that, 15 km is accounted for by rising sewers.

**Table 2.1. Condition of Sewer Mains**

<table>
<thead>
<tr>
<th>Sewer Main/Type</th>
<th>Rate of Wear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Below 50%</td>
</tr>
<tr>
<td>Total length (m), including:</td>
<td>132,087</td>
</tr>
<tr>
<td>Concrete, m</td>
<td>6,200</td>
</tr>
<tr>
<td>Ceramic, m</td>
<td>118,046</td>
</tr>
<tr>
<td>Pig iron, m</td>
<td>4,345</td>
</tr>
<tr>
<td>Steel, m</td>
<td>2,000</td>
</tr>
<tr>
<td>Reinforced concrete, m</td>
<td>1,496</td>
</tr>
<tr>
<td>Asbestos-concrete, m</td>
<td>0</td>
</tr>
<tr>
<td>Shell stone, m</td>
<td>0</td>
</tr>
</tbody>
</table>
2.2.2. Completion of Construction of the Southern District Municipal Sewer Network

The construction of the Southern District municipal sewer network (Figure 2.4) commenced in 1990, and the following components have been completed:

- Sewer tunnel section between Shaft 1 to Shaft 2, total length 1,666.81 m;
- Sewer tunnel section between Shaft 3 to Shaft 2, total length 750 m;
- 4 shafts along the sewer tunnel route.

The estimated funding requirement for the completion of construction is 82.9 million UAH. to finance the cost of the following components:

- Construction of sewer tunnel sections: 3.2 km section between Shaft 2 to Shaft 4, 0.6 km section between SPS-6B to Central SPS; 0.4 km section between Shaft 4 to Central SPS; 0.7 km section between SPS-6 to Shaft 4. Estimated cost of this component is 43.7 million UAH.
- Construction of Central Sewage Pumping Station (Central SPS) in the Rybachia Valley (valley length 26 m, depth 36 m). Estimated cost of this component is 32.6 million UAH.
- Construction of 2 rising sewer lines (1,200 mm diameter, 1 km length) to provide a connection between the Central SPS and existing rising sewers. Estimated cost of this component is 1.6 million UAH.
- Construction of rising sewer line 2 with pipe diameter 1,000 mm, 5 km in length, to transport sewage flows to the Southern WwTP. Estimated cost of this component is 0.5 million UAH.

The implementation of proposed project would significantly improve the reliability and constancy of sewage collection service in the City, thus preventing the release of untreated effluent to the sea and contributing to the improvement of sanitary state of the coastal area.
2.2.3. Construction of Sludge Dewatering Facility at the Northern WwTP

Currently, the surplus activated sludge from secondary clarifiers is pumped to the existing sludge thickening facility without stabilization. The resulting sludge is pumped to the reserve sludge lagoons, whose capacity is inadequate. The operation of these sludge lagoons poses a health risk and gives rise to the elevation of groundwater levels. The dewatered sludge is trucked from sludge lagoons to the designated sludge field site.

In order to improve the existing sludge management arrangement, it is proposed to introduce the mechanical dewatering stage with press filters or centrifuges. Additional analysis is required to make a final decision on the preferred dewatering option. At this stage, it is proposed to implement a pilot project in order to provide additional data, which would be used as a basis for the preparation of detailed design for sludge dewatering facility at the Northern WwTP site.

The estimated cost of proposed pilot project, including the construction of sludge dewatering facility, is 11.0 million UAH. The final sludge could be used in agriculture, or trucked to the municipal landfill site.
2.3. Analysis of Potential Environmental Impacts

For the purposes of the World Bank’s EA Operational Policy, all proposed projects, relating to the rehabilitation of municipal sewer system in Odessa, are rated as an environmental category 82 in terms of significance of their potential environmental impacts.

2.3.1. Physical Impacts

Potential physical impacts on the environment will be limited to the construction phase, being associated with the construction of new sewer mains and related structures. Key types of works associated with the construction of new sewer mains include earthworks, concrete works, and pipe emplacement works.

The potential environmental impacts that may arise during different stages of construction projects are considered below in relation to the proposed project:

- **Impact on local geology:** is unlikely, as the proposed project does not involve any activities/operations that may affect the geological environment;
- **Impact on local climate:** is unlikely due to the absence of identified sources;
- **Impact on fauna:** is unlikely, as the proposed construction activities will be conducted in the built-up areas;
- **Impact on air quality:** is likely to be at or below existing guideline levels, being limited to emissions from mobile sources (according to the Law of Ukraine “On Motor Transport” (No. 2344-III of 05.04.2001) and the Law of Ukraine “On Road Traffic”(No. 3353-XII of 30.06.1993), all motor vehicles and mobile plant are subject to the regular technical inspection and exhaust gas control, undertaken by the local offices of the State Traffic Inspection). The pipework and related appurtenances, as proposed in the design, do not emit any harmful substances to air. Emissions inherent to the operation of sewer mains and wastewater treatment plants are within the existing regulatory limits, and a reduction in concentrations of these substances can be expected as a result of proposed installation of modern and efficient process equipment;
- **Impact on water bodies:** short-term impact, limited to construction phase. Accidental releases of untreated effluent into the sea is excluded;
- **Impact on soil:** short-term impact, limited to construction phase. At the outset of construction, top soil cover will be stripped as part of the initial site preparation and used as surface soils in the final restoration of construction site. The proposed pipe specifications are considered to be adequate in terms of containing the transported flows and preventing corrosion of steel piping. Construction waste will be managed and disposed of at the local landfill in accordance with existing regulations and disposal limits;
- **Impact on vegetation cover:** is considered to be insignificant. The design includes a provision for on-site grass planting and tree-planting along the site boundary;
- **Impact on existing utilities/infrastructure:** is obviously positive, as the proposed project will contribute to the improvement of existing municipal infrastructure and overall sanitary situation in the city.

---

3 OP 4.01 Environmental Assessment
The proposed project design includes adequate mitigation measures, designed to ensure compliance with existing environmental regulations, maintain the ecological equilibrium in the project area, and prevent contamination or degradation of soil.

2.3.2. Social Impacts

The implementation of the proposed project would significantly improve level and quality of sanitation services, provided to population, industries and organizations in Odessa.

The proposed project is not likely to produce any adverse social impact, nor poses a threat to human health and living conditions.

The results of the environmental assessment indicate that the project implementation will not cause any adverse impact to local industries, agricultural activities, residential areas, surface and subsurface infrastructure, recreational areas and cultural assets.

No archaeological or cultural resources are expected to be encountered during the project implementation.

The project will not entail involuntary resettlement activity.
2.4. Alternative Options

Several alternative options have been reviewed in the process of project preparation. Due to the specifics of the sewer network rehabilitation/construction project, these alternatives mainly relate to various routing options. There are four alternative routing options for the proposed sewer mains in Odessa.

Given that all these options are nearly identical in terms of associated environmental impacts, the final choice of option would be made on the basis of detailed examination of technical and economic feasibility of each option.
2.5. Environmental Management Plan

2.5.1. Brief Description of Key Environmental Issues

The proposed investment project aims to improve, modernize and facilitate further development of existing municipal sewer network in Odessa.

Considering that all proposed project components, including the replacement of gravity sewers, completion of construction of municipal sewer system in the Southern District, and construction of sludge dewatering facility at the Northern WwTP, are designed to ensure the sustainability and acceptable quality of sanitation service, their potential environmental impacts will be mitigated/minimised by adopting the environmentally sound construction practices and ensuring compliance with existing environmental regulations.

2.5.2. Mitigation Plan

The proposed sewer system development project is expected to provide significant environmental benefits through:

- The decommissioning of old and worn pumping stations and rising mains, which currently contribute significantly to the pollution load on the sea and coastal areas due to inefficient operation and poor technical condition;
- The improved operational reliability of sewer system and reduced risk of accidental release of untreated effluent into the Black Sea;
- The elimination of accidental effluent release practice.

The application of shield tunnelling method would help protect vegetation cover, existing infrastructure and utilities along the tunnel construction route.

Standby pumps will be available to handle accidental spills. Continuous power supply will be provided to ensure the uninterrupted delivery of effluent to treatment process.

No additional sanitary protection zone is required for the Central Sewage Pumping Station as it will be located at the existing Southern Sewage Pumping Station site.

The details of proposed mitigation measures are provided in the Annex A.2.

2.5.3. Monitoring Plan

Key environmental objective of the proposed investment project is to minimize the potential for soil and groundwater contamination through improved control and elimination of leaks from sewer network.

The key performance indicator to measure the success in achieving this objective is the percentage reduction in leakage from the rehabilitated sewer mains.

Intermediate performance indicators relate to key potential environmental impacts, identified in the environmental assessment, which need to be monitored in order to ensure compliance with existing environmental and health legislation of Ukraine.
Intermediate performance indicators should address the following impacts or concerns: impacts on vegetation cover, soil and groundwater during construction; and the levels of soil and groundwater contamination during operation.

Other environmental performance indicators relate to the impact of noise and vibration, waste generation and management during construction.

Odessa Vodokanal Water Utility has the analytical laboratory, accredited to undertake quality measurements on drinking water and effluent samples. Laboratory has adequate analytical capability to conduct chemical analysis with the use of modern laboratory equipment, manufactured by SHIMADZU company.

During the environmental assessment, the Odessa Vodokanal Water Utility provided the results of water quality measurements for 2001-2005. After the completion of proposed project, the existing routine monitoring programme will be continued by Odessa Vodokanal in order to monitor the quality of effluent at each stage of transportation and treatment.

The details of proposed monitoring programme for wastewater collection system projects are provided in the Annex B.2.
3. SOLID WASTE MANAGEMENT IN ODESSA

3.1. Existing Situation

3.1.1. General

Waste collection services in Odessa, which has 4 administrative districts and population of over 1 million people, are mainly provided by three collection companies:

- Soyuz Ltd.;
- RAF-PLUS Ltd.;
- "Odessa KommunTrans" Municipal Company.

In order to maintain the proper sanitary state of the City, collections are generally made every day, or sometimes even twice per day. Due to high collection frequency, waste material stored in containers has low density and loose state.

Existing waste collection system, operated by the above mentioned companies, covers the areas with high-rise residential buildings and single-family houses. However, the relatively good level of existing collection service is undermined by the lack of adequate capacity for proper, environmentally sound, waste disposal, given that the annual solid waste generation in the City is at about 627,000 tonnes. It should be noted that this amount does not include process sludge from the Northern and Southern WwTP sites. This material is first pumped to the on-site sludge lagoons for natural drying, and subsequently trucked to the designated sludge fields, located separately from the existing MSW disposal sites.

Generally, waste collection companies have sufficient container and vehicle capacity for the provision of waste collection service.

The Soyuz collection company operates the collection vehicle fleet of 24 vehicles to provide collection service in 3 districts (Malinovsky, Primorsky, Kyivsky), with the total container capacity of over 3,500 containers. All collection companies currently use plastic containers, ranging in capacity between 0.2 to 1.1 m³.

The City recognizes the need for improving the existing waste management system. Currently, the annual waste generation in the City is over 3.0 million m³ of waste (with density of 118-179 kg/m³). There are no specialized facilities for solid waste management in accordance with existing standards and regulations.

The collected solid waste is delivered to 2 landfills, located at the Dalnitsa quarry site and near the cement plant. These sites are overloaded, and neither of them was designed or constructed to the current standard. There is an urgent need in identifying an environmentally acceptable route for solid waste generated in Odessa.

The situation is exacerbated by the absence of suitable sites for construction of a new sanitary landfill around the City.

The MSW Landfill 2, used as a temporary disposal option, is located near the cement plant site, very close to the City boundaries, occupying the area of 7.6 ha. The landfill does not meet even basic environmental requirements, including the one for sanitary protection zone.
Similarly, the Main MSW Landfill 1, located at the Dalnitsa quarry site, is operated beyond its capacity (Figure 3.1). Administratively, the landfill site is located in the Ovidiopol and Belyaevka Districts, occupying the closed quarry site. According to the official land acquisition consent, the total area, occupied by the landfill, is 96.2 ha. The landfill operator holds a long-term tenancy of this site for 49 years.

The older part of landfill site, no longer used for waste emplacement, has been partially restored. Some estimates suggest that the landfill contains over 3 million m$^3$ of compacted solid waste. There is a possibility for an extension to the landfill to some 50 ha (within the boundaries of currently allocated site). There are two unfinished and slowly degrading structures at the landfill site.

3.1.2. Site Description

The Dalnitsa Quarry landfill is located 9 km to the west of Odessa, some 3 km from the nearest villages of Dalnik and Prilimansky, lying to the north-east of the landfill site.

The Dalnitsa Quarry landfill site is located within the Black Sea Lowland, representing a part of plain steppe, gently dipping to the south and south-east, and dissected by gorges and river valleys.

The south-eastern part of the quarry (about 17 ha), which is no longer used for waste emplacement, is surrounded by the 10 m high earthfill bund. Its working surface has not been capped/restored, and currently represents a slightly undulating area, covered with weed.

Currently, waste emplacement operations are limited to the central part of the quarry, with the western and south-western parts being nearly complete. Absolute surface elevations range between 16 to 38 m, with overall heights of landfill landform reaching 41-42 m.

The local hydrographic network, represented by estuaries (limans) and small rivers, is associated with the Black Sea Basin.
3.2. Proposed Investment Project

Key elements of the proposed project are as follows:

- Restoration of completed landfill phase (27.3 ha);
- Landfill extension proposal, featuring an additional operational area of 55 ha and improved waste containment arrangements in line with existing regulations (liner system, leachate collection, landfill gas collection, use of daily cover);
- Waste separation facility at the landfill site, to occupy 4.0 ha and provide basic separation and treatment for non-recyclable components (compaction and milling, in order to reduce void space requirement).

The landfill extension is proposed to be constructed in 3 stages.

The estimated excavation requirement for the proposed landfill extension is about 1.4 million m$^3$, the quantity is considered to be adequate to restore the existing landfill site and construct retention bund along the landfill site boundary.

To protect the underlying aquifer, it is intended to place a drainage blanket and construct a lining system, featuring the natural clay layer as a base sealing system.

Waste will be placed after compaction, the leachate generation is thereby reduced.

It is estimated, that the extension will provide the capacity of about 5.0 million m$^3$ for disposal of compacted waste during the period of over 20 years.

The design capacity of proposed waste separation facility is about 200,000 tonnes/years. The design features 2 separation lines for the following components:

- Plastic (including PET bottles): 7,000 tonnes/year;
- Glass: 2,000 tonnes/year;
- Paper: 6,000 tonnes/year;
- Metal: 3,000 tonnes/year.

It is also proposed to include a composting plant for organic material, with the output capacity of 5,000 tonnes/years.

At the feasibility study stage, various equipment and mobile plant options will be considered, both local and foreign. It is planned to use prefabricated construction and unfinished buildings, available at the site (Figure 3.2), for the installation of equipment.

It is anticipated that the following units will be established at the support facility area:

- Boiler house;
- Social building;
- Laundry;
- Office building;
- Entrance control room.

Other design features include extract-input ventilation system, electricity supply, workshop heating.
Figure 3.2. Unfinished, abandoned structures at the landfill site, which can be used for the proposed waste separation facility

The proposed design includes the following provisions for the reliable and safe operation of landfill extension in accordance with existing environmental regulations and standards:

- Bottom liner system;
- Leachate collection system;
- Surface runoff collection system;
- Groundwater monitoring system.

The proposed project, involving the restoration of infilled part of the landfill site, construction of engineered landfill extension, and introduction of waste separation process, would significantly improve the quality and sustainability of waste management in Odessa and reduce environmental stress associated with current waste disposal practice.

The landfill site layout is shown in Figure 3.3 below.
Figure 3.3. The layout of MSW landfill site
3.3. Analysis of Potential Environmental Impacts

For the purpose of the World Bank Operational Policy on Environmental Assessment, the proposed project can be rated as an environmental category A in terms of its potential environmental impacts and their significance.

3.3.1. Physical Impact

Atmospheric Effects
At the landfill site, potential sources of air emissions are vehicles, loaders, bulldozers, excavators, and waste material itself.

In order to estimate air emissions (Table 3.1), associated with the routine operation of the MSW landfill site, a basic scenario was prepared assuming the simultaneous operation of 4 bulldozers, 1 truck crane, 1 loader, 2 excavators, 3 collection vehicles, and 1 sewage truck.

On-site traffic is a source of exhaust emissions and dust, containing up to 70% of SiO₂. The estimates of air pollution levels are prepared in accordance with the "Methodology for Calculating the Mobile Source Related Pollutant Concentrations in the Ambient Air" and taking into account the background concentrations of pollutants. These estimates are produced by the DniproKommunProject Research and Design Institute on the basis of special contract. No exceedances of prescribed MAC limits for regulated pollutants have been recorded at the outer boundary of the sanitary protection zone. According to the "State Sanitary Rules for Urban Planning and Development", the mandatory width of the sanitary protection zone for MSW landfills is set at 500 m.

Table 3.1. Estimated Annual Emission Loadings

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Emission Load, tonnes/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carbon oxide</td>
<td>23.2446</td>
</tr>
<tr>
<td>2</td>
<td>Nitrogen dioxide</td>
<td>1.6786</td>
</tr>
<tr>
<td>3</td>
<td>Acrolein</td>
<td>0.7881</td>
</tr>
<tr>
<td>4</td>
<td>Soot</td>
<td>2.6447</td>
</tr>
<tr>
<td>5</td>
<td>Sulphurous anhydride</td>
<td>4.1932</td>
</tr>
<tr>
<td>6</td>
<td>Dust (non-organic)</td>
<td>5.6673</td>
</tr>
<tr>
<td>7</td>
<td>Methane</td>
<td>72.533</td>
</tr>
<tr>
<td>8</td>
<td>Chlorine</td>
<td>0.0388</td>
</tr>
</tbody>
</table>

Impact on Local Climate
The climate in the area of Odessa is characterized by significant variability of air temperature, atmospheric pressure, solar radiation intensity, precipitation, wind direction and strength, being the reflection of local topography and landscape. Any landscape has its specific features that determine its local climate. Any human activity may cause the impact on local climate by different mechanisms, including changes in the local landscape.

The analysis of seasonal variations in wind pattern indicates that airborne nuisances from operations at the landfill site are likely to be insignificant.

The proposed development does not include any significant sources of thermal pollution and evaporation, the impact on local climate is not likely to be significant.
Impact on Surface Water

The Dalnik River rises beyond the proposed project area. The river is small and shallow, with symmetrical trough-shaped valley and gentle slopes, lying along the river floodplain.

The chain of fish-breeding ponds has been established in the Dalnik River floodplain, on the other side of valley. Ponds are retained by earthfill dams with spillways. The 2 m deep drainage ditches, constructed on both sides of ponds, divert the river and drainage flow further downstream.

The rate of flow in the diversion ditch running along the right slope of river valley is 1.2 m³/s. A water-logged area, developed at the river valley, is considered to be the result of groundwater discharge to the quarry and accumulation of storm flow. This area is underlain by the thick Meotian clay layer with permeability of below 0.005 m/day.

The construction of diversion ditches helps prevent the accumulation of drainage flow within a quarry and minimizes the potential for migration of contaminated surface runoff to the subsurface aquifers and fish-breeding ponds, where water quality is regulated on the basis of the most stringent water quality standards, set for fishing water bodies.

Given that the diversion ditch is present at the river valley, the potential impact on surface water quality is considered unlikely.

Impact on Groundwater

The decomposition of the degradable fraction of typical MSW results in the production of liquid known as ‘leachate’. Leachate is produced by the biological and chemical decomposition under anaerobic conditions, of the organic compounds present in the waste mass. In terms of microbial contamination, the leachate is similar to the foul sewage, though shows significantly higher values of Coli-index (by 2-3-fold).

The results of laboratory analysis of water samples taken at the landfill site and from the Dalnik River indicate that the chemical composition of leachate is very similar to that of river water, and even shows lower concentrations of heavy metals.

The bacteriological properties of analysed samples are described in terms of lactopositive Escherichia coli number, which was at 24,000 in all water samples, and Escherichia coli number, ranging between 6,200 to 24,000. No coliphagous or enteric bacteria were detected in the analysed samples.

The Meotian clay, underlying the proposed landfill site, forms the interphase between the landfill and upper aquifer. The estimated rate of leachate migration to the upper water bearing layer is 400 days, assuming that the thickness of clay layer is over 2 m. Judging by core samples taken from the deeper Myrnensky and Balabanovsky boreholes, the actual thickness of clay deposits ranges from 10 to 40 m. Given that the maximum lifetime of pathogenic bacteria is 400 days, it can be concluded that the potential for groundwater contamination in the upper and lower aquifers is negligible, because the lower aquifer is overlain by a thick layer of low permeable clay, while the groundwater level in the upper aquifer is above the level of leachate collection system.

Impact on Soil

Spil testing results indicate that there are no abnormalities with regard to concentrations of chemical substances. Heavy metals and oil products are present at concentrations, which are close to below their respective guideline levels.
The proposed landfill development is designed to protect the environment (including soil) against adverse impact of waste. It is therefore expected that the implementation of proposed project would help improve the environmental situation in Odessa.

**Impact on Flora and Fauna**

The potential impact of solid waste landfill on flora and fauna is considered to be insignificant. The impact to landcover will be mitigated by offsite tree planting and progressive restoration.

### 3.3.2. Social Impact

Odessa has a permanent population of 1,029,100 people, and some 300,000 people visit it during summer season. The villages of Dalnik and Prilimansky are the nearest human settlements to the landfill site. The current state of existing solid waste landfill is considered unacceptable and does not comply with existing environmental and sanitary regulations.

The proposed project, involving the restoration and extension of existing landfill site, would provide a more sustainable waste management arrangement and minimize the impact to the environment and human health, especially in the adjacent area.

The construction and operation of the MSW landfill will provide employment opportunities for the local population. Approximately 13 permanent jobs will be created at the landfill site.
3.4. Alternative Options

No alternative locations were considered for the proposed MSW landfill, as the restoration and extension of existing landfill site is considered as an optimal solution. The second MSW landfill near the cement plant does not meet existing sanitary and environmental requirements, and has no provision for the sanitary protection zone.

Various alternative options were considered with regard to the siting of proposed waste separation facility within the boundaries of existing landfill site, as well as various options of mobile plant and equipment, both local and foreign.
3.5. Environmental Management Plan

3.5.1. Brief Description of Key Environmental Issues

Key environmental issues, associated with the construction and operation of MSW landfill, are summarized below:

- Local geology: the proposed development is designed to prevent and minimize adverse effects of waste on the environment, and is not likely to cause any significant impact on local geology;
- Air quality: the proposed design includes adequate control measures to minimize the potential impacts on air quality and prevent extreme events, that may result in accidental emissions to air (inflammation of waste material, accidental releases of methane), and airborne pollutant dispersion beyond the boundaries of sanitary protection zone;
- Water resources: the proposed design includes adequate provisions for groundwater protection, including:
  - Leachate collection, comprising the leachate interception system, drainage system, basal liner, leachate diversion pipeline and storage tank. The quantity of leachate generated at the MSW landfill site depends on precipitation and is estimated as 20-25% of incoming waste volume. According to the hydrometeorological observations, the mean annual precipitation in the area of landfill site is 400-420 mm, with 360-380 mm being lost due to evaporation. Based on this, the expected leachate generation rate would be minimal, and the collected leachate would be recirculated and used to wet the working face of landfill in spring and summer period;
  - Surface runoff collection (surface flow diversion ditch);
  - Groundwater quality monitoring system (2 new monitoring boreholes will be drilled in addition to 2 existing boreholes).
- Impact on soil: is considered to be of localized nature, and will be mitigated by restoration measures. The design provision is to restore the earlier phases of existing landfill, filled before 1984. These phases occupy 27.3 ha, and 2.5 ha section has already been restored. The ultimate objective of planned restoration programme is to ensure that after the completion of restoration the landfill site and surrounding area look appropriate to the local landscape character and are available for alternative uses;
- Impact on flora and fauna: is considered to be insignificant, and will be minimized by offsite tree planting;
- Social impact: beneficial, due to reduction in overall pollution load on the environment and due to local employment opportunities;
- Impact on existing utilities/structures: is unlikely.

The proposed mitigation measures will minimize the risk of large-scale accidents that may cause significant environmental consequences.

3.5.2. Mitigation Plan

The proposed design includes provisions for ensuring the environmentally safe operation of MSW landfill and improved control of:

- Waste levels and densities;
- Leachate levels in the control boreholes and gas wells;
- Waste temperature:
• Air emissions (methane, chlorine, carbon oxide, soot, acrolein, dust, nitrogen oxide, sulphur dioxide);
• Groundwater pollution (2 monitoring boreholes);
• Soil contamination by heavy metals and oil products.

Air emissions will arise in the process of operation of proposed landfill facility. As a result of the decomposition of organic waste, landfill gas and methane will be generated.

Proposed mitigation measures, designed to minimize the atmospheric effects of the landfill operation, include:

• Control of ambient pollution levels within the sanitary protection zone and within 1 km zone around the landfill site in the event of non-compliance of actual concentrations with existing limits. This control is exercised by the Hydrometeorological Service of the Black Sea/Azov Sea Basin;
• Reduction in number of mobile plant and equipment, operating at the landfill site, under inclement weather conditions. The landfill site operation manual specifies the rate of reduction at 20% to 25%;
• Temperature control within the waste body to prevent the increase in methane generation. The temperatures ranging between 40-45 °C may be likely, therefore the system of gas wells will be installed after the completion of restoration, to be located at the distance of 25 m from each other. At the existing landfill site, the accidental releases of methane have been effectively managed by applying the daily cover;
• Construction of vertical vents within the waste body in order to prevent the accumulation and accidental release of methane. The design provision is to install 14 gas vents at the restored section, to be located in 25 m from each other.

As the biological degradation of organic waste progresses, the temperature within the waste body increases up to 65-70°C. Further growth in temperature to above 80°C is an indication of increasing oxygen levels, suggesting oxygen inputs via the liner. In this case the increased control of liner integrity and installation of additional extraction wells will be required. At the existing landfill site, the bottom liner integrity is controlled through a special sampling programme, including 4 sampling boreholes (2 shallow and 2 deeper, drilled below the landfill bottom level).

The proposed mitigation measures are considered to be adequate in terms of preventing/minimising the adverse effects of landfill operation on the environment and human health.

3.5.3. Monitoring Plan

For this type of projects, the major objective is to achieve a general improvement in the public health and environmental conditions through the provision of sustainable and environmentally sound waste management services. The sustainable element to this goal has many dimensions, including an integrated approach where several waste management options are used together to maximize waste recovery (including recycling and energy-from-waste incineration) and minimize void and space requirement for waste landfilling.

With regard to waste landfilling, which is likely to remain a dominating option for waste management in Ukraine in the foreseeable future, the improved standard of design and operation is required to ensure that the environmental impacts of landfilling are effectively
minimized or mitigated, including improved control of leachate and landfill gas, and landfill restoration after the completion of filling phase.

Environmental performance indicators for this type of projects are closely linked to key environmental impacts, identified in the EIA. The list of proposed monitoring parameters is provided in Annex B.3.
4. INSTITUTIONAL ISSUES

The Environmental Management Plan will be implemented by the Borrower in order to ensure compliance with existing environmental and sanitary regulations in the process of construction and operation of proposed water supply, wastewater collection and solid waste management facilities in Odessa. Relevant executive authorities will be responsible for overall control and supervision of construction and operation of all proposed facilities. These include: the Odessa Oblast State Department of Environment and Natural Resources, Odessa Oblast Department of Land Resources, Odessa Oblast Department of Water Management and Land Reclamation, Odessa Oblast State Department of Occupational Safety, Odessa Oblast Sanitary and Epidemiological Service, Odessa Oblast State Department of Road Traffic Inspection, Odessa Oblast Health Protection Department, Oblast Department of Emergencies and Civil Defence, State Department of Veterinary Medicine. The day-to-day supervision of environmental performance will be part of the design/construction supervision process.

There is no plan for the involvement of non-governmental organizations in the independent monitoring of the project.

5. PUBLIC CONSULTATION

In accordance with the World Bank requirement, the public consultation process was organized as part of the environmental assessment, in order to discuss the proposed urban infrastructure development projects with various stakeholder groups in Odessa, Teplodar, Illichevsk and Belgorod-Dnestrovsky. This public consultation involved two stages, and the minutes of these public consultation meetings are provided in the Public Consultation Section.

The first public consultation was held on 16 August 2005 to discuss the EA Terms of Reference, EA report structure and preparation schedule. Relevant project information was distributed among the participants present at the meeting.

The second public consultation was held on 9 September 2005 to discuss the results of environmental assessment for all proposed investment projects. Among other participants, this meeting was attended by the following representatives of all potential borrowers:

- Infox Vodokanal Water Utility, Odessa: O. Voitenko, Deputy Director;
- Belgorod-Dnestrovsky Vodokanal: A. Dukach, Director;
- Teplodar Vodokanal: N. Krotenko, Director;
- Soyuz Waste Management Company: F. Pavlyuchenko, Chief Environmental Specialist.

The main objectives of public consultation process were to:

- Ensure transparency of environmental assessment;
- Provide project information to key stakeholder groups;
- Provide a forum for discussion of social/public concerns;
- Receive feedback from key stakeholder groups in order to gain better understanding of their perceptions and expectations.

The following stakeholders were involved in the public consultation process:
- Project sponsors/borrowers;
- Representatives of relevant design institutions;
- Representatives of EA/EIA team, experts;
- Statutory and political authorities;
- Local self-governance bodies;
- Trade unions, public groups and political parties;
- Local communities;
- Other stakeholder groups.

The public consultation on the proposed project provided valuable feedback from various stakeholders (see Annex C), which was taken into account in the present Environmental Assessment report.
CONCLUSIONS

The objective of this Environmental Assessment was to identify and assess the potential environmental impacts associated with the proposed urban infrastructure improvements in Odessa, including:

**Water supply improvements**
- Rehabilitation of the Carolina-Bugas Water Main Section near Nadlimansky Village;
- Completion of construction of water line 7.

**Wastewater management improvements:**
- Replacement of gravity sewer mains;
- Completion of construction of the Southern District municipal sewer network;
- Construction of sludge dewatering facility at the Northern WwTP site.

**Solid waste management improvements:**
- Restoration of completed landfill phase (27.3 ha);
- Landfill extension proposal, featuring an additional operational area of 55 ha and improved waste containment arrangements in line with existing regulations (liner system, leachate collection, landfill gas collection, use of daily cover);
- Waste separation facility at the landfill site, to occupy 4.0 ha and provide basic separation and treatment for non-recyclable components (compaction and milling, in order to reduce void space requirement).

Based on the results of the Environmental Assessment, it can be concluded that the proposed projects would improve the sanitary and environmental situation in Odessa, and can be promoted to the next stage of project preparation cycle.
### Annex A.1. Mitigation Plan: Rehabilitation of Water Supply System

<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigating Measure</th>
<th>Cost</th>
<th>Institutional Responsibility</th>
</tr>
</thead>
</table>
| Construction    | Traffic increase in the course of construction activity             | • Provision of appropriate warning signs around the construction site.  
• Reasonable daytime working hours (from 8.00 a.m. to 5.00 p.m.).  
• Identification of acceptable alternative routes for construction traffic.                                                                                           | Allowance made in the project budget | Contractor                 |
|                  | Potential impact of construction activity on the pedestrian safety in the location of construction site | • Provision of safety fence around the construction site.  
• Restricted access to the construction site on the basis of passes                                                                                                        | Allowance made in the project budget | Contractor                 |
| Dust emissions during construction | • Implement dust avoidance measures:  
• Provision of proper package for loose materials.  
• Watering of access roads and excavation zones, implementation of good construction practice, site cleaning at the end of working hours.  
• Use of protective covers and screens to contain fugitive dust emissions wherever possible. |
| Noise and vibration | • Restricting noisy construction activities to normal daily working hours.  
• Adopting a reasonable work schedule.  
• Use of acoustical enclosures or noise suppressors for noisy equipment where appropriate.                                                                            | Allowance made in the project budget | Contractor                 |
| Interim stockpiling of the stripped soils and construction waste can be a potentially significant effect unless properly managed | • All waste materials, generated during construction, including hazardous waste, should be delivered to the official sanitary landfill(s).                                                       | Allowance made in the project budget | Contractor                 |
| Surface water and soil contamination from leaks or spills of process chemicals such as fuel oils/lubricants, paints, cooling agents etc. | • Regular inspection and proper maintenance of vehicles and equipment.  
• Provision of adequate containment for fuel oils and lubricants, paints, cooling agents, solvents etc. in accordance with the Operation Rules for Centralised Water Supply and Sewerage Systems (approved by the State Municipal Utility Management Committee of Ukraine Order No. 30 of 05.07.95)  
• Prompt elimination and control of leaks and spills.  
• Identification of a minimum required number of delivery routes for fuel and lubricants, cooling agents, paints, solvents and asphalt material to minimize risk of accidental spills and releases.  
• Limiting vehicle maintenance operations to specially designated sites. | Allowance made in the project budget | Contractor                 |
<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigating Measure</th>
<th>Cost</th>
<th>Institutional Responsibility</th>
</tr>
</thead>
</table>
|       | Air emissions during equipment operation | - Ensure proper technical state of all equipment.  
- Regular inspection of motor vehicles, control of compliance with emissions guidelines, in accordance with the Guideline Document RD 52.04.186-89 “Air Pollution Control Manual” and the Technique for Determination of Emission Loads from Mobile Sources (the RF Ministry of Transport, 1993).  
- Restricting construction activities to reasonable working hours (from 8.00 a.m. to 5.00 p.m.). | Allowance made in the project budget | Contractor |
|       | Potential for soil erosion and degradation as a result of earthworks or during storage | - Height and profiling of stockpiles to minimise degradation of soil components in accordance with the State Construction Standard DBN 360-92** “Urban Development. Planning and Development of Urban and Rural Settlements” | Allowance made in the project budget | Contractor |
|       | Soil disturbance/landslipping due to construction activity | - Comprehensive geoengineering survey prior to construction, survey results to be accounted for in the final design.  
- Strict compliance with safety rules in accordance with the Operation Rules for Centralised Water Supply and Sewerage Systems (approved by the State Municipal Utility Management Committee of Ukraine Order No. 30 of 05.07.95) | Allowance made in the project budget | Contractor |
|       | Damage to trees and other vegetation during construction | - Minimise the potential for damage in accordance with the State Construction Standard DBN 360-92** “Urban Development. Planning and Development of Urban and Rural Settlements”.  
- Replant/restore affected vegetation cover. | Allowance made in the project budget | Contractor |
| Operation | Leaks in the distribution mains. | - Proper control/prompt elimination of leaks in accordance with the Operation Rules for Centralised Water Supply and Sewerage Systems (approved by the State Municipal Utility Management Committee of Ukraine Order No. 30 of 05.07.95) | Operating costs | Service operator |
## Annex A.2. Mitigation Plan: Rehabilitation of Municipal Sewer Network

<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigation Measure</th>
<th>Cost</th>
<th>Institutional Responsibility</th>
</tr>
</thead>
</table>
| Construction              | Potential impact of construction activity on the pedestrian safety in the location of construction site | • Provision of safety fence around the construction site.  
• Restricted access to the construction site on the basis of passes | Allowance made in the project budget | Contractor                    |
| Dust emissions during construction | • Implement dust avoidance measures: Provision of proper package for loose materials during transportation.  
• Covering of earth/building material transporting vehicles.  
• Watering of access roads and excavation zones, implementation of good construction practice, site cleaning at the end of working hours.  
• Use of protective covers and screens to contain fugitive dust emissions wherever possible. | Allowance made in the project budget | Contractor                    |
| Noise and vibration       | • Restricting noisy construction activities to normal daily working hours (from 8.00 a.m. to 5.00 p.m.).  
• Adopting a reasonable work schedule.  
• Use of acoustical enclosures or noise suppressors for noisy equipment where appropriate. | Allowance made in the project budget | Contractor                    |
| Short-term surface water and soil contamination from leaks or spills of process chemicals such as fuel oils/lubricants, paints, cooling agents etc. | • Regular inspection and proper maintenance of vehicles and equipment.  
• Provision of adequate containment for fuel oils and lubricants, paints, cooling agents, solvents etc.  
• Prompt elimination and control of leaks and spills.  
• Identification of a minimum required number of delivery routes for fuel and lubricants, cooling agents, paints, solvents and asphalt material to minimize risk of accidental spills and releases.  
• Limiting vehicle maintenance operations to specially designated sites. | Allowance made in the project budget | Contractor                    |
| Short-term groundwater and soil contamination from spills during the connection of new piping to the existing sewer network | • Strict compliance with construction standards and design specifications | Allowance made in the project budget | Contractor                    |
| Air emissions during equipment operation | • Ensure proper technical state of all equipment.  
• Restricting construction activities to reasonable working hours. | Allowance made in the project budget | Contractor                    |
| Top soil stripping may affect soil properties | • Provide adequate temporary storage for top soil material and subsequent restoration of disturbed site | Allowance made in the project budget | Contractor                    |
| Interference with natural drainage | • Short-term impact. No special mitigation measures are required. | Allowance made in the project budget | Contractor                    |
| Damage to trees and other vegetation during construction | • Minimise the potential for damage.  
• Replant/restore affected vegetation cover. | Allowance made in the project budget | Contractor                    |
<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigation Measure</th>
<th>Cost</th>
<th>Institutional Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Construction waste and old piping can be a potentially significant effect unless properly managed</td>
<td>- All waste materials, generated during construction, including hazardous waste, should be delivered to the official sanitary landfill(s).</td>
<td>Allowance made in the project budget</td>
<td>Contractor</td>
</tr>
<tr>
<td>Operation</td>
<td>Odours and noise generated by sewage pumping station can cause considerable nuisance to local residents</td>
<td>- Air emissions from sewer mains should be minimised in accordance with the Operation Rules for Centralised Water Supply and Sewerage Systems (approved by the State Municipal Utility Management Committee of Ukraine Order No. 30 of 05.07.95). - Pumping stations should be appropriately located at a sufficient distance from residential areas, in adequately insulated buildings.</td>
<td>Allowance made in the operating cost estimate</td>
<td>Operator</td>
</tr>
<tr>
<td>Operation</td>
<td>Soil and groundwater contamination due to leaks from sewer system</td>
<td>- Adequate leak control. - Comprehensive quality assurance/control programme during construction, with subsequent technical inspection and maintenance programme</td>
<td>Allowance made in the operating cost estimate</td>
<td>Operator. The control of soil contamination in the surrounding area is the responsibility of local Sanitary Epidemiological Service (bacteriological control unit of local Department of Environment and Natural Resources)</td>
</tr>
</tbody>
</table>
ANNEX B Monitoring Plan
### Annex B.1. Monitoring Plan: Rehabilitation of Water Supply System

<table>
<thead>
<tr>
<th>Phase</th>
<th>Monitoring Parameter</th>
<th>Monitoring Location</th>
<th>Monitoring Technique</th>
<th>Monitoring Frequency</th>
<th>Institutional Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction and Supervision</strong></td>
<td>Percentage of population connected to upgraded water supply service</td>
<td>Human settlement</td>
<td>Monitoring report by a municipal utility's laboratory</td>
<td>Monthly</td>
<td>Contractor, Sanitary Epidemiological Service</td>
</tr>
<tr>
<td>Operation</td>
<td>Leaks in the distribution system</td>
<td>Within a water distribution system</td>
<td>Visual inspection, public complaints</td>
<td>As part of regular maintenance</td>
<td>Operating Agency</td>
</tr>
<tr>
<td><strong>Construction and Supervision</strong></td>
<td>Drinking water quality parameters, set out in the State Sanitary Standard DSanPIN 383-96 “Drinking Water. Hygienic Requirements to the Centrally Supplied Drinking Water”</td>
<td>Within a water supply system, in accordance with the Water Quality Control Plan</td>
<td>Instrumented measurements (physical, chemical, bacteriological, radiological parameters) in accordance with the DSanPIN 383-96</td>
<td>Daily or weekly during construction</td>
<td>Contractor, Sanitary Epidemiological Service, Environmental Inspectorate</td>
</tr>
<tr>
<td>Construction</td>
<td>Air emissions (dust, nitrogen dioxide, carbon oxide, carbon dioxide, iron oxide, manganese, nickel oxide, chromium (6+), fluorides, xylene, phenol, glycol, butyl acetate, ethyl acetate, ethylcellulose, acetone, cyclohexanone, solvent, white spirit)</td>
<td>Construction site and surroundings</td>
<td>Instrumented measurements in accordance with the Guideline Document RD 52.04.186-89 “Air Pollution Control Manual” and the Technique for Determination of Emission Loads from Mobile Sources (the RF Ministry of Transport, 1993)</td>
<td>Daily or weekly during construction</td>
<td>Contractor, Sanitary Epidemiological Service, Environmental Inspectorate</td>
</tr>
<tr>
<td>Construction</td>
<td>Soil contamination by oil products and paints</td>
<td>Construction site</td>
<td>Instrumented measurements in accordance with the Regulation on Land Monitoring (approved by the Cabinet of Ministers of Ukraine Resolution No. 661 of 20.06.1993)</td>
<td>Monthly during construction</td>
<td>Contractor, local environmental authorities, sanitary service, supervisor</td>
</tr>
<tr>
<td>Project Phase</td>
<td>Monitoring Parameter</td>
<td>Monitoring Location</td>
<td>Monitoring Technique</td>
<td>Monitoring Frequency</td>
<td>Institutional Responsibility</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------</td>
<td>------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>----------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Construction</td>
<td>Waste generation and management</td>
<td>Construction site and surroundings</td>
<td>Visual inspection, waste inventory, evidence from landfill operator</td>
<td>Continuous daily</td>
<td>Construction contractor, supervisor</td>
</tr>
<tr>
<td>Construction /</td>
<td>Water leaks from the distribution</td>
<td>Within a water distribution system</td>
<td>Water meters to meter production/distribution input and customer</td>
<td>Weekly</td>
<td>Contractor, supervisor, customers</td>
</tr>
<tr>
<td>Supervision</td>
<td>system</td>
<td></td>
<td>metering</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex B.2. Monitoring Plan: Rehabilitation of Municipal Sewer Network

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Monitoring Parameter</th>
<th>Monitoring Location</th>
<th>Monitoring Technique</th>
<th>Monitoring Frequency</th>
<th>Institutional Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>% of losses in sewer network</td>
<td>Centralized sewer system</td>
<td>Instrumented measurements</td>
<td>Daily during construction, monthly</td>
<td>Contractor, local environmental and water management authorities, sanitary service</td>
</tr>
<tr>
<td>and Operation</td>
<td></td>
<td></td>
<td></td>
<td>during operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intermediate Performance Indicators</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Groundwater contamination by oil products, sewage</td>
<td>Storm drains in the locations of sewer</td>
<td>Instrumented measurements (physical, chemical, bacteriological, radiological parameters) in accordance with the Unified Inter-Ministerial Regulation on the Organisation and Implementation of State Water Monitoring (approved by the Ministry of Environment and Natural Resources of Ukraine Order No. 485 of 24.12.2001)</td>
<td>Daily during construction</td>
<td>Contractor, local environmental and water management authorities, supervisor</td>
</tr>
<tr>
<td></td>
<td>grease, bacteriological contamination</td>
<td>collection mains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil contamination by oil products and sewage grease in the locations of sewer collectors</td>
<td>Monitoring boreholes drilled in the selected locations</td>
<td>Instrumented measurements in accordance with the Regulation on Land Monitoring (approved by the Cabinet of Ministers of Ukraine Resolution No. 661 of 20.06.1993)</td>
<td>Monthly during construction</td>
<td>Contractor, local environmental authorities, sanitary service, supervisor</td>
<td></td>
</tr>
<tr>
<td>Air emissions (dust, nitrogen dioxide, carbon oxide, carbon dioxide, iron oxide, manganese, nickel oxide, chromium (6+), fluorides, xylene, phenol, glycol, butyl acetate, ethyl acetate, ethyl-cellulose, acetone, cyclohexanone, solvent, white spirit</td>
<td>Construction site and surroundings</td>
<td>Instrumented measurements in accordance with the Guideline Document RD 52.04.186-89 &quot;Air Pollution Control Manual&quot; and the Technique for Determination of Emission Loads from Mobile Sources (the RF Ministry of Transport, 1993)</td>
<td>In accordance with the State Sanitary Rules (DSP 201-97) for Air Protection in the Populated Areas</td>
<td>Contractor, local environmental authorities, sanitary service, supervisor</td>
<td></td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>Construction site and surroundings</td>
<td>Acoustic measurements in accordance with the State Standard GOST 20444-85 &quot;Noise. Traffic Flows in Populated Areas. Technique for Determination of Noise Levels&quot;; public/personnel complaints</td>
<td>Daily or as deemed necessary during construction</td>
<td>Contractor, sanitary service, supervisor</td>
<td></td>
</tr>
<tr>
<td>Waste generation and management</td>
<td>Construction site and surroundings</td>
<td>Visual inspection, waste inventory, evidence from landfill operator</td>
<td>Continuous daily control</td>
<td>Contractor, supervisor</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Groundwater contamination by oil products, sewage</td>
<td>Storm drains in the locations of sewer</td>
<td>Instrumented measurements (physical, chemical, bacteriological, radiological parameters) in accordance with the Unified Inter-Ministerial Regulation on the Organisation and Implementation of State Water Monitoring (approved by the Ministry of Environment and Natural Resources of Ukraine Order No. 485 of 24.12.2001)</td>
<td>Weekly during operation</td>
<td>Contractor, local environmental authorities, sanitary service</td>
</tr>
<tr>
<td></td>
<td>grease, bacteriological contamination</td>
<td>collection mains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Phase</td>
<td>Monitoring Parameter</td>
<td>Monitoring Location</td>
<td>Monitoring Technique</td>
<td>Monitoring Frequency</td>
<td>Institutional Responsibility</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Soil contamination by oil products and sewage grease in the locations of sewer collectors</td>
<td>Monitoring boreholes drilled in the selected locations</td>
<td>Instrumented measurements in accordance with the Regulation on Land Monitoring (approved by the Cabinet of Ministers of Ukraine Resolution No. 681 of 20.06.1993)</td>
<td>Monthly during operation</td>
<td>Contractor, local environmental authorities, sanitary service</td>
<td></td>
</tr>
<tr>
<td>Air emissions (dust, nitrogen dioxide, carbon oxide, carbon dioxide, iron oxide, manganese, nickel oxide, chromium (6+), fluorides, xylene, phenol, glycol, butyl acetate, ethyl acetate, ethyl-cellulose, acetone, cyclohexanone, solvent, white spirit)</td>
<td>Along the sewer main route</td>
<td>Instrumented measurements in accordance with the Guideline Document RD 52.04.186-89 &quot;Air Pollution Control Manual&quot; and the Technique for Determination of Emission Loads from Mobile Sources (the RF Ministry of Transport, 1993)</td>
<td>In accordance with the State Sanitary Rules (DSP 201-97) for Air Protection in the Populated Areas</td>
<td>Contractor, local environmental authorities, sanitary service</td>
<td></td>
</tr>
<tr>
<td>Surplus activated sludge generation and management</td>
<td>Plant site and surroundings</td>
<td>Visual inspection, waste inventory, evidence from landfill operator</td>
<td>Continuous daily control</td>
<td>Contractor, supervisor</td>
<td></td>
</tr>
<tr>
<td>Process waste management</td>
<td>Plant site and surroundings</td>
<td>Visual inspection, waste inventory, evidence from landfill operator</td>
<td>Continuous daily control</td>
<td>Contractor, local environmental authorities, sanitary service, supervisor</td>
<td></td>
</tr>
<tr>
<td>Waste generation and management</td>
<td>Plant site and surroundings</td>
<td>Visual inspection, waste inventory, evidence from landfill operator</td>
<td>Continuous daily control</td>
<td>Contractor, supervisor</td>
<td></td>
</tr>
</tbody>
</table>
### Annex B.3. Monitoring Plan: Rehabilitation of Municipal Solid Waste Management System

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Monitoring Parameter</th>
<th>Monitoring Location</th>
<th>Monitoring Technique</th>
<th>Monitoring Frequency</th>
<th>Institutional Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction and Supervision</td>
<td>Number of illegal dumps</td>
<td>Within the area of human settlement</td>
<td>Regular inspection</td>
<td>Monthly</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities, supervisor</td>
</tr>
<tr>
<td>Construction and Supervision</td>
<td>Sanitary state of access road(s) to landfill site(s)</td>
<td>Access road and surrounding area</td>
<td>Regular inspection</td>
<td>Weekly</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities, supervisor</td>
</tr>
<tr>
<td>Construction and Supervision</td>
<td>Sanitary state of collection points (container sites)</td>
<td>Container sites and surroundings</td>
<td>Regular inspection, instrumented measurements where necessary</td>
<td>Daily during construction and operation</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities, supervisor</td>
</tr>
<tr>
<td>Construction and Supervision</td>
<td>Level of collection service</td>
<td>Container sites</td>
<td>Regular inspection</td>
<td>Daily during construction and operation</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities, public</td>
</tr>
<tr>
<td>Construction and Supervision</td>
<td>State of waste transfer stations</td>
<td>Transfer station sites</td>
<td>Regular inspection</td>
<td>Daily during construction and operation</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities, public</td>
</tr>
<tr>
<td>Construction and Supervision</td>
<td>Environmental performance of sanitary landfill operator</td>
<td>Landfill sites</td>
<td>Regular inspection</td>
<td>Weekly during construction and operation</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities</td>
</tr>
<tr>
<td>Construction and Supervision</td>
<td>Progressive restoration of landfill sites</td>
<td>Landfill sites and surroundings</td>
<td>Regular inspection</td>
<td>Monthly during construction and operation</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities</td>
</tr>
<tr>
<td>Construction and Supervision</td>
<td>Environmental performance of waste incineration/recycling facilities</td>
<td>Facility sites and surroundings</td>
<td>Regular inspection</td>
<td>Weekly during construction and operation</td>
<td>Contractor, Sanitary Epidemiological Service, local environmental authorities</td>
</tr>
</tbody>
</table>
Annex C  Materials on Public Consultations
THE Need for Public Consultation

According to the requirements of the World Bank and Ukrainian legislation, it is necessary to consult project-affected groups and local nongovernmental organizations (NGOs) about the project's environmental aspects and to take their views into account when performing Environmental Assessment (EA) of investment project on municipal infrastructure. Thus, generation of positive attitude on all stages of projects is the necessary requirement for the project performance.

Organisation of Public Consultations

According to Terms of References, the Consultant (IWMC) has organized the public consultation process in the following way:

1. Two public consultations for each project location were carried out:
   - **The first public consultation** - the purpose of this consultation was to present the planned project, review the EA outline and schedule, Terms of Reference, and to solicit from affected groups and local NGOs any environmental issues they consider to be a priority and they wish to see addressed in the EA report.
   - **The second public consultation** - the purpose of this consultation was to present the results of EA work, discuss positive and negative impacts of planned project, to review the draft EA document to insure that the issues identified in the first public consultation have been properly addressed and resolved to the satisfaction of locally affected groups and NGOs.

   The main objectives of public consultations were as follows:
   - To make the EA project transparent and open for the public;
   - To discuss various issues and concerns with project-affected groups, to familiarize public with potential negative impacts and problems during realization of investment projects;
   - To have feedback from competent bodies and local project-affected groups during the EA process on potential positive and negative impacts.

2. To invite local stakeholders, the places and dates of two public consultations were announced in local/oblast newspapers, followed by the telephone and fax communications. Key participants are:
   - Loan Recipients (Municipal Utilities);
   - Key field institutions;
   - Key research organizations and organizations performing Environmental Impact Assessment (EIA);
   - Local state administrations;
   - State authorities (environmental authorities and sanitary epidemiological service);
   - NGOs;
   - TV, radio stations, newspapers.

3. Responsible persons (from IWMC and Grant Recipients) were appointed for each location.

4. The following information materials were prepared for each consultation:
• Agenda;
• Information on the project – distribution material;
• Press-release for mass-media.

5. Records of consultations were carefully documented, including the lists of attending persons, pictures/photos, and minutes of each consultation meeting.

6. All comments and opinions of participants were taken into account during the preparation of EA reports.

Public consultations in Odessa (for planned investment projects in Odessa city, Illichevsk town, Belgorod-Dnestrovskiy town and Teplodar town) were conducted according to the approved programme.
Public Consultations in Odessa City

**The First Public Consultation**

1. A working meeting with potential loan recipients to discuss key issues relating to the organization of the first consultation (for investment projects in Odessa city, Illichevsk town, Belgorod-Dnestrovskiy town and Teplovar town) was conducted at the Odessa City Council (8 Deribasovskaya street, Odessa). The date and venue of the first consultation meeting were discussed, and the Plan of Preparatory Activities for the First Public Consultation was agreed. It was decided to hold the first public consultation on August 16, 2005, at the Conference Hall of the Odessa City Council (8 Deribasovskaya street, Odessa).

2. The meeting announcement was published in the city newspaper “Pravoe Delo” on 12 August 2005, No. 87 (481) (Attachment 1).

3. The meeting agenda (Attachment 2), distribution material (Attachment 3) and press-release (Attachment 4) were prepared.

4. The minutes of the first consultation meeting were maintained (Attachment 5).

5. Mass-media (City TV channel and local newspaper “Odesskiy Vestnik”, N199-200 (3455-3456)) provided media coverage for the event and reflected the views and opinions of the public in their news programmes and publications (Attachment 6).

**The Second Public Consultation**

1. A working meeting with potential loan recipients to discuss key issues relating to the organization of the second consultation was held at the Odessa City Council (8 Deribasovskaya street, Odessa). The date and place of the second consultation meeting were discussed, and the 2nd Consultation Meeting Preparation Plan was agreed. It was decided to hold the second public consultation on September 9, 2005, at the Main Conference Hall of the Odessa City Council (1 Dumskaya square, Odessa).

2. The meeting announcement was published in the city newspaper “Odesskiy Vestnik” on 8 September 2005, No. 199-200 (3455-3456) (Attachment 7).

3. The second meeting agenda (Attachment 8), distribution material (Attachment 9) and press-release (Attachment 10) were prepared.

4. The minutes of the second consultation meeting were maintained (Attachment 11), and pictures (Attachment 12) were made.

5. Mass-media (City TV channel and local newspapers) provided media coverage for the event and presented the views and opinions of the public in their news programmes and publications.

**Conclusions**

A set of very important and interesting issues/comments/opinions were identified/received as a feedback from interested and project-affected groups, in particular, potential loan recipients, NGOs and general public. All comments have been taken into account and properly addressed during the preparation of EA reports.
The feedback received from the public consultations has proved invaluable in assessing the following aspects of the proposed projects:

- Compliance of planned investment projects with the Ukrainian environmental legislation and regulations;
- Completeness of available information on the current environmental situation;
- Current environmental permitting status of each proposed project;
- Completeness of available information on the potential environmental impacts associated with the proposed investment project implementation;
- Adequacy of proposed mitigation measures in terms of ensuring the environmental safety and sustainability;
- Acceptability of potential environmental impacts and environmental feasibility of each proposed project;
- Need for additional environmental information or clarification of available environmental data.

The generally positive feedback received from various stakeholder groups demonstrates the relevance and urgency of proposed projects in Odessa city and Odessa Oblast. Their implementation would contribute significantly to the improvement of existing water supply (completion of construction of water main, etc.), wastewater collection/treatment (completion of construction of sewer system, etc.), and solid waste management (restoration of completed landfill phase, waste separation facility, etc.) infrastructure. The proposed projects would produce broad environmental and social benefits, resulting from improved municipal infrastructure and service quality, which would help develop the unique recreational potential of Odessa, Illichevsk, Belgorod-Dnestrovskiy and Teplodar.

The projects will not cause involuntary resettlement of population.

The potential physical impacts on local geology, climate, air quality, fauna, water bodies, soil, vegetation cover and existing utilities/infrastructure are likely to be acceptable, being largely limited to the construction phase.
The first public consultation – 16 August, 2005

Announcement in the Newspaper

Source: the city newspaper “Pravoe Delo”, 12 August 2005, No. 87 (481)

Odessa City Council
Investment Policy Department
8 Deribasovskaya str. Odessa 65026 Ukraine
Tel.: 380 (482) 252424, fax: 250327

On 16 August 2005, at 11.00, in the conference hall of Odessa City Council, the WB, IWMC and Investment Policy Department will conduct the public consultation on investment projects on the rehabilitation of water supply, wastewater and solid waste management systems in Odessa City, Illichevsk town, Belgorod-Dnestrovskiy town and Teplodar town, for discussing the TOR on Environmental Assessment (schedule, structure of reports, etc.). Interested persons are welcome.
WORLD BANK
URBAN INFRASTRUCTURE PROJECT
NISTRU RIVER/BLACK SEA PROTECTION PROJECT

Agenda

of the First Public Consultation Meeting
(Conference Hall, Odessa City Council)

11.00
WB representative
About projects and their importance for Ukraine

11.20
A.K. Kuzin, Scientific Director of IWMC
About EA, TOR on EA, requirements of Ukrainian legislation and WB for EA, structure of EA Report

11.40
Representative of Odessa City Council

12.00
Representative of Infox Vodokanal Water Utility
About planned investment projects in Odessa in the field of water supply, wastewater and solid waste management

12.20
Representative from Teplodar town
About planned investment projects in Teplodar in the field of water supply and wastewater management

12.40
Representative from Illichevsk town
About planned investment projects in Illichevsk in the field of water supply and wastewater management

13.00
Representative from Belgorod-Dnestrovskiy town
About planned investment projects in Belgorod-Dnestrovskiy in the field of water supply, wastewater and solid waste management

13.20
Questions, comments, discussion
Information Material

WORLD BANK
URBAN INFRASTRUCTURE PROJECT
NISTRU RIVER/BLACK SEA PROTECTION PROJECT

Public Consultation

in the framework of EA process for proposed investment projects on development of urban infrastructure and Nistru river/Black Sea protection.

Key Activity Areas:
- Rehabilitation of Water Supply System;
- Rehabilitation of Waste Water Collection/Treatment System;
- Rehabilitation of Solid Waste Management System.

ODESSA CITY

Water supply:
- Treatment plant rehabilitation;
- Replacement of pipelines.

Waste water:
- Sludge treatment;
- Sludge recirculation;
- Main collector South coast + P.St.

Solid waste:
- Restoration of old site;
- Restoration of part of new site;
- Development of new site.

TEPLODAR TOWN

Water supply:
- Replacement of pumping equipment.

Waste water:
- Replacement of pumps;
- Treatment plant rehabilitation.

ILLICHEVSK TOWN

Water supply:
- Replacement of pumps;
- Supply of water meters.

Waste water:
- Rehabilitation of main sewage pumping station.

BELOGOROD-DNESTROVSKII TOWN

Water supply:
- Supply 5000 water meters;
- Replacement of 12 submersible pumps and construct 3 new wells;
- Replacement of steel pipelines.

Waste water:
- Complete new main pumping station;
- Rehabilitate / complete sewage treatment plant

Solid waste:
- Supply of 300 containers.

PUBLIC CONSULTATIONS

August 2005 - review the EA outline and schedule, Terms of Reference, and identification from affected groups and local NGOs any environmental issues they consider to be a priority and they wish to see addressed in the EA report.

September 2005 - review the draft EA document.

Head: Scientific Direction IWMC
Kuzin Alexander
Contact person: Utkina Kateryna
Tel./fax: (057) 702 15 78
E-mail: akousine@mail.ru
Press Release

Today, on 16 August 2005, at 11.00, at the conference hall of the Odessa City Council, the first public consultation on the WB investment projects on urban infrastructure was conducted. Key investment areas: rehabilitation of water supply, wastewater and solid waste management systems. Locations: Odessa City, Teplodar tow, Illichevsk town and Belgorod-Dnestrovskiy town.

According to WB requirements, a proposed project may be implemented only after EA process. EA must be conducted according to the WB procedure and relevant requirements of Ukrainian legislation.

The generation of positive public attitude at all stages is a key requirement for proposed projects. It is planned to conduct two public consultations in order to ensure that the identified issues have been properly addressed and resolved to the satisfaction of locally affected groups and NGOs. It is planned to have feedback from local population, corresponding points for meeting with representative of local population and NGOs will be organized.

The consultation process has been initiated by the Industrial Waste Management Centre Association (the Consultant responsible for EA preparation) and Odessa City Council.
Minutes (No. 1) of the First Public Consultation on WB Urban Infrastructure Project and Nistru River/Black Sea Protection Project

Odessa 16 August 2005

Place - Conference Hall, Odessa City Council.

Organizers - Association Industrial Waste Management Centre, Investment Policy Department, Odessa City Council.

Chairman – Yarotskaya I.V. – Director of Investment Policy Department

Secretary – Vydysheva O.G. – Head of Unit

Coordinator on public relations – Melova E. – Press secretary of Infox Vodokanal Water Utility

Presidium Members:
Kuzin A.K., Scientific Director of IWMC, Doctor of Geographical Sciences, Professor
Medinets V.I., Head of Regional Centre for Integrated Environmental Monitoring under Mechnikov Odessa National University, PhD, Physical-Mathematical Sciences, Member of Ukrainian Environmental Academy

50 persons were present. Registration sheets are available at the IWMC office.

Subject:
Discussion of proposed investment projects on rehabilitation of water supply, wastewater and solid waste management systems in Odessa City, Teplodar tow, Illichevsk town and Belgorod-Dnestrovskiy town.
Activities planned in the framework of WB investment projects.
Identification of any environmental issues public want to see addressed in EA Report.
Questions, comments.

Documents to be considered:
Terms of References on EA;
Structure of EA Report, schedule of preparation.

1. Yarotskaya I.V., Director of Investment Policy Department – told about the meetings with the WB representatives in Odessa in May-July 2005. about preparation and negotiation stage of the loan process.

2. Kuzin A.K., Scientific Director of IWMC – told about WB Urban Infrastructure and Nistru River/Black Sea Protection projects, about activities planned in Odessa City.
3. **Voitenko O.Yu**, Technical Director of Infox Vodokanal Water Utility - informed about key problems and underlined that the solution will be successful due to WB investments. In particular, completion of construction of water line 7 (10.6 mln UAH) and rehabilitation of the Carolina-Bugas water main section near Nadlimansky village (17.7 mln UAH), construction of deep waterpipe in Yuzhniy (82.9 mln UAH) are foreseen.

4. **Bondarenko V.G.**, Director of Illichevsk Vodokanal Utility - noted that co-financing was a key requirement for proposed projects. That is why Vodokanal of Illichevsk has performed activity of protection of Sewage Pumping Station against flooding, has installed grates (total amount 416,000 UAH) in 2004. In 2005 it is planned to rehabilitate ventilation systems, internal and external insulation systems (Total amount 830,000 UAH). He told about the development of design works for rehabilitation of Sewage Pumping Station. He gave information on key problems with waterpipes. He underlined that the estimated investment requirement is 16,880,000 UAH.

5. **Kindyuk B.V.**, Head of Department of Ecological Safety - noted that while Odessa is attractive for investment, but existing environmental problems are seen as a barrier to developing its recreational potential. The key problem is pollution of the Black Sea. That is why rehabilitation of the Southern and Northern Waste Water Treatment Plants are urgent. City landfills have reached the end of their life. There are no plants on treatment, utilization and burial of wastes, in particular toxic wastes. Due to inflammation of wastes, a lot of money is spent to fire-fighting. In the world, landfill gas is collected and used in industrial processes. Conclusion: waste separation facility at the landfill site and landfill extension are necessary.

6. **Pavluchenko F.K.**, Deputy Director on Environmental Protection of Souyz Ltd - told about the activity of the Souyz Ltd with regard to the operation of existing waste sites 1 and 2, which do not meet current sanitary and environmental requirements. Waste sites are practically full. Reconstruction of Dalnizkiy site is urgent and construction of waste treatment plant is necessary. As there is no readily identifiable site for new landfill, the restoration of completed landfill phase and site extension was recommended.

7. **Modyak A.P.**, Deputy Director of Dneproproject Institute - said that problems with waste collection are being effectively addressed by Souyz Ltd, Kommuntrans and Raf companies. The urgent problem is restoration of Dalnizkiy site. Dneproproject Institute has preformed design works and documentation on restoration.

8. **Kratenko N.I.**, Director of Teplodar Vodokanal Utility - told about problems and proposed investment projects in the domain of water supply (replacement of pumps), wastewater (reconstruction of main pumping station and wastewater treatment plants in Beliaevka and Mayaki).

9. **Dukach A.V.**, Director of Belgorod-Dnestrovskiy Vodokanal Utility - said that water supply was provided only 8 hours per day. Water is abstracted from artesian wells. The town authorities have to cancel the service contract with Infox Vodokanal services due to low quality of water and shortage of finance. That is why replacement of pipelines, construction of wells and replacement of pumps are very
urgent. The town expects loans and support from WB to solve most urgent problems.

Discussion:

- **Chetverik A.A.**, Kontext Information Agency – asked about the loan size and conditions.

- **Answer: Yarotskaya I.V.**, Director of Investment Policy Department - explained that that was only preliminary stage of projects. Preliminary amount is about 40-50 mln USD. Now there is negotiation process and projects should be supported and approved by City Administration and other authorities.

- **Maluta N.** – said that social impact should be studied. Social problems must be identified and ways for their solution must be found.

10. **Kuzin A.K.**, Scientific Director of IWMC – thanked all participants for attention, promised to address all identified issues in EA Report.

11. **Yarotskaya I.V.**, Director of Investment Policy Department - thanked all participants for attention, invited to cooperation during performance of proposed projects. She announced that the second public consultation would take place in September, corresponding advertisement would be published in newspaper.

Signatures:
Chairman
Secretary
Coordinator on public relations
Newspaper Publication

Source: local newspaper “Odesskiy Vestnik”, 8 September 2005, No. 199-200 (3455-3456)

What Can We Offer to the World Bank?

The article is devoted to the first public consultation on investment projects. Key problems in water supply, wastewater and solid waste in Odessa city and environmental situation in the region are described. Specific projects are explained in details and necessary funding is given. Benefits from projects implementation are given. The article focuses on the WB requirements, in particular to EA and documentation. The key questions are whether Odessa will be selected for loan funding and what should be done to be in shortlist.
Что предложить Мировому Банку

Состоялись общественные слушания по проектам развития коммунальной инфраструктуры и охраны окружающей среды в бассейне Днестра и Черного моря

Алексей СУПРАНОВИЧ, «Одеський вестник»

Одесса вела в Литературных городах, который на реализацию подобных проектов поэтому предоставить поддержку Мировому Банку реконструкции и развития, сообщила начальник управления инвестиционной политики Одесского городского совета им. АФРОЖА.

В ходе выступления на слушаниях был представлен проект, предусматривающий строительство систем тепло- и холодоснабжения в городских округах Одессы. Как известно, инфраструктура систем теплоснабжения по большей части не соответствует современным стандартам и требует капитального ремонта.

Открывая заседание, начальник управления инвестиционной политики Одесского городского совета им. АФРОЖА, главный инженер по вопросам реконструкции и развития городских систем теплоснабжения Одессы:

Черноморска, сообщил, что Одесская область является одной из наиболее перспективных для реализации подобных проектов. Банковский кредит позволит осуществить необходимые работы по улучшению экологической обстановки в городе. Комментируя данный проект, он отметил, что это будет способствовать значительному улучшению качества жизни населения.

Напомним, что этот проект был одобрен Европейским банком реконструкции и развития и поддержан Мировым банком.

В соответствии с проектом, планируется строительство новых котельных и реконструкция существующих, а также установка современного оборудования для улучшения экологической обстановки в городе. Кроме того, будет реализован комплекс мер по улучшению качества жизни населения, включая строительство новых жилых комплексов и реконструкцию существующих.

Черноморская компания - одно из местных предприятий, которое планирует принять участие в реализации этого проекта. Компания уже имеет значительный опыт в области строительства и реконструкции систем теплоснабжения.

Участники слушаний выразили поддержку проекту, отметив его важность для улучшения экологической обстановки в городе.

Выводы.

1. Начальник управления инвестиционной политики Одесского городского совета им. АФРОЖА, главный инженер по вопросам реконструкции и развития городских систем теплоснабжения Одессы, отметил, что данный проект будет способствовать значительному улучшению качества жизни населения.

2. Планируется строительство новых котельных и реконструкция существующих, а также установка современного оборудования для улучшения экологической обстановки в городе.

3. Черноморская компания - одно из местных предприятий, которое планирует принять участие в реализации этого проекта.

4. Участники слушаний выразили поддержку проекту, отметив его важность для улучшения экологической обстановки в городе.
The second public consultation – 9 September, 2005

Announcement in the Newspaper

Source: local newspaper "Odesskiy Vestnik", 8 September 2005, No. 199-200 (3455-3456)

On 9 September 2005, at 11.00, in the conference hall of Odessa City Council, the WB, IVMC and Investment Policy Department will conduct public consultation on investment projects on rehabilitation of water supply, wastewater and solid waste management systems in Odessa City, Illichevsk town, Belgorod-Dnestrovskiy town and Teplodar town, to discuss the results of Environmental Assessment.

Representatives of City State Administration, deputies, trade unions, NGOs, political parties and mass media will take part in the consultation. Interested persons are welcome.
Изма И». - "Одесский вестник".

Несколько дней назад в редакцию позвонили жители Суворовского района, которые беспокоят следующий вопрос: ремонтные работы на Николаевском шоссе идут полным ходом, при этом страдают деревья, что станет делать администрация города? Неужели в городе все настолько прекрасно в экологическом отношении, чтобы не бороться за деревья, что у нас есть? Николаевская дорога расширяется, а деревья страдают, что делать?

Что касается жителей, которые соглашались за расчистку около 3000 деревьев и четыре срока на участке от ул. Львовской до 7-й Переселенческой ведется в соответствии с Правилами о...

Учитесь ездить на велосипедах

Киев

В СТРАНЕ
WORLD BANK
URBAN INFRASTRUCTURE PROJECT
NISTRU RIVER/BLACK SEA PROTECTION PROJECT

Agenda

The Second Public Consultation Meeting
(Conference Hall, 1 Dumskaya sqr. Odessa)

11.00
Yarotskaya I.V., Director of Investment Policy Department
Opening, about the agenda

11.20
Kuzin A.K., Scientific Director of IWMC
About Draft EA Report for Odessa City, potential positive and negative impacts

11.50
Artemova E.S., IWMC expert
About Draft EA Report for Odessa Oblast (Teplodar town, Illichevsk town, Belgorod-Dnestrovskiy town), potential positive and negative impacts

12.20
Questions, comments, discussion
Information Material

WORLD BANK
URBAN INFRASTRUCTURE PROJECT
NISTRU RIVER/BLACK SEA PROTECTION PROJECT

Public Consultation

in the framework of EA process of investment projects on development of urban infrastructure and Nistru river/Black Sea protection

Key Activity Areas:
- Rehabilitation of Water Supply System;
- Rehabilitation of Waste Water Collection/Treatment System;
- Rehabilitation of Solid Waste Management System.

ODessa City

Water supply:
- Rehabilitation of the Carolina-Bugas Water Main Section near Nadlimansky Village;
- Completion of construction of water line 7.

Waste water:
- Replacement of gravity sewer mains;
- Completion of construction of the Southern District municipal sewer network;
- Construction of sludge dewatering facility at the Northern WwTP site.

Solid waste:
- Restoration of completed landfill phase (27.3 ha);
- Landfill extension proposal, featuring an additional operational area of 55 ha and improved waste containment arrangements in line with existing regulations;
- Waste separation facility at the landfill site, to occupy 4.0 ha and provide basic separation and disposal of non-recyclable components.

TeploDar Town

Water supply:
- Replacement of existing pumps with more energy-efficient ones;
- Replacement of latches on WPS;
- Replacement of return valves;
- Installation of frequency pressure regulators;
- Reconstruction and major overhaul of WPS buildings;
- Replacement of flow meters (water meters).

Waste water:
- Reconstruction of Wastewater Treatment Plant;
- Reconstruction of Sewage Pumping Stations.

Illichevsk Town

Water supply:
- Reconstruction of water pump station;

Waste water:
- Rehabilitation of main sewage pumping station.

Belegorod-Dnestrovskiy Town

Water supply:
- Construction of the Clean Water Reservoir at “Sadovy” Hill;
- Construction of the Clean Water Reservoir at “Severnny” Hill;
- Drilling Three Artesian Wells at “Yuzhny-III” Dwelling Region;
- Replacement of Boreholes Pumps;
- Installation of Water Meters.

Water water:
- Gravity Sewer Main;
- Reconstruction of the Main Pumping Station and Construction of the Pressure Pipelines;
- Reconstruction of Wastewater Treatment Units.

PUBLIC CONSULTATIONS

August 2005 - review the EA outline and schedule. Terms of Reference, and identification from affected groups and local NGOs any environmental issues they consider to be a priority and they wish to see addressed in the EA report.

September 2005 - review the draft EA document.

Head: Scientific Direction IWMC
Kuzin Alexander
Contact person: Utkina Kateryna
Tel./fax: (057) 702 15 78
E-mail: akousine@mail.ru
Press Release

Today, on 9 September 2005, at 11.00, at the Conference Hall of the Odessa City Council (1 Dumskaya square, Odessa), the second public consultation meeting on the WB investment projects on urban infrastructure was conducted. Key areas of investment – rehabilitation of water supply, wastewater and solid waste management systems. Locations – Odessa City, Teplodar town, Illichevsk town and Belgorod-Dnestrovskiy town.

**ODESSA CITY**

**Water supply:**
- Rehabilitation of the Carolina-Bugas Water Main Section near Nadlimansky Village;
- Completion of construction of water line 7.

**Waste water:**
- Replacement of gravity sewer mains;
- Completion of construction of the Southern District municipal sewer network;
- Construction of sludge dewatering facility at the Northern WwTP site.

**Solid waste:**
- Restoration of completed landfill phase (27.3 ha);
- Landfill extension proposal, featuring an additional operational area of 55 ha and improved waste containment arrangements in line with existing regulations;
- Waste separation facility at the landfill site, to occupy 4.0 ha and provide basic separation and treatment for non-recyclable components.

**TEPLODAR TOWN**

**Water supply:**
- Replacement of existing pumps with more energy-efficient ones;
- Replacement of latches on WPS;
- Replacement of return valves;
- Installation of frequency pressure regulators;
- Reconstruction and major overhaul of WPS buildings;
- Replacement of flow-meters (water meters).

**Waste water:**
- Reconstruction of Wastewater Treatment Plant;
- Reconstruction of Sewage Pumping Stations.

**ILLICHEVSK TOWN**

**Water supply:**
- Reconstruction of water pump station;

**Waste water:**
- Rehabilitation of main sewage pumping station.

**BELOGOROD-DNESTROVSKY TOWN**

**Water supply:**
- Construction of the Clean Water Reservoir at “Sadovy” Hill;
- Construction of the Clean Water Reservoir at “Severny” Hill;
- Drilling Three Artesian Wells at “Yuzhny-III” Dwelling Region;
- Replacement of Boreholes Pumps;
- Installation of Water Meters.

**Waste water:**
- Gravity Sewer Main;
- Reconstruction of the Main Pumping Station and Construction of the Pressure Pipelines;
- Reconstruction of Wastewater Treatment Units.

According to the WB requirements, a proposed project may be implemented only after EA process. EA must be conducted according to the WB procedures and Ukrainian legislation requirements.
The analysis of proposed projects has shown significant social benefits, associated with their implementation: water supply, waste water and waste management systems will be improved in Odessa, Teplodar, Illichevsk and Belgorod-Dnestrovskiy. The level of provided services will be higher. Proposed projects will help improve the municipal service quality, social conditions for population and environmental situation in the region. Potential physical impacts on local geology, climate, air quality, fauna, water bodies, soil, vegetation cover, and existing utilities/infrastructure, are expected to be minimal.

As generation of positive public attitude on all stages is a key requirement for proposed projects, results of EA are presented to public.

The consultation process has been initiated by the Industrial Waste Management Centre Association (the Consultant responsible for EA) and Odessa City Council.
Minutes (No. 2) of the Second Public Consultation on WB Urban Infrastructure Project and Nistru River/Black Sea Protection Project

Odessa 9 September 2005

Place - conference hall, Odessa City Council, 1 Dumskaya sqr.

Organizers - Association Industrial Waste Management Centre, Investment Policy Department, Odessa City Council.

Chairman - Yarotskaya I.V. - Director of Investment Policy Department

Secretary - Vydyseva O.G. - Head of Unit

Coordinator on public relations - Melova E. – Press secretary of Infox Vodokanal Water Utility

Presidium Members:
Kuzin A.K., Scientific Director of IWMC, Doctor of Geographical Sciences, Professor
Medinets V.I., Head of Regional Centre for Integrated Environmental Monitoring under Mechnikov Odessa National University, PhD, Physical-Mathematical Sciences, Member of Ukrainian Environmental Academy

42 persons were present. Registration sheets are available at the IWMC office.

Subject:
To review the draft EA document to insure that the issues identified in the first public consultation have been properly addressed and resolved to the satisfaction of locally affected groups and NGOs.

1. Yarotskaya I.V., Director of Investment Policy Department - told about the meeting of the City Mayor (Gurvitz E.I.) with the WB representatives.

2. Kuzin A.K., Scientific Director of IWMC - presented Draft EA Report on Odessa City. He explained the details of EA process for proposed investment projects in the field of water supply, wastewater and solid wastes, told about potential positive and negative physical and social impacts. He underlines that the sanitary situation and water quality would be improved as a result of proposed projects.

3. Artemova E.S., IWMC expert - presented Draft EA Report on Teplodar, Illichevsk and Belgorod-Dnestrovskiy towns. She told in details about the EA of proposed investment projects in the domain of water supply, wastewater and solid wastes, about potential positive and negative physical and social impacts. She emphasized that due to implementation of proposed project service quality would be improved,
environmental situation in region would become better. She underlined that potential physical impacts are likely to be minimal.

Discussion:

- **Myazina A.I.,** Methodologist of the Environmental Protection Society – question: why the project does not include the reconstruction of Belyaivka pumping station?

- **Answer:** Artemova E.S., IWMC expert – the proposed projects include the most urgent actions, that is why reconstruction of Belyaivka pumping station was not considered as part of the project.

- **Pavluchenko F.K.,** Deputy Director on Environmental Protection of Souyz Ltd – told that EA was performed on a high level and there were no comments and no negative remarks to the Draft EA Report.

- **Maluta N.P.,** Consultant of NGO Gromadska Rada – asked about alternative projects on urban structure development and why only reconstruction was foreseen.

- **Answer:** Kuzin A.K., Scientific Director of IWMC – said that at this stage, the WB is intending to finance the renovation/reconstruction/rehabilitation of existing systems. The WB does not consider any alternative projects at this stage.

- **Osadchuk S.S.,** Correspondent of TV channel Reporter – asked about the WB interests.

- **Answer:** Kuzin A.K., Scientific Director of IWMC – answered that this issue was outside his competence.

- **Sergeeva T.V.,** NGO Agency of Regional Development – asked why problem of rainstorm water accumulation and stagnation after rains in Peresyp district was not solved and was not among projects.

- **Answer:** Kuzin A.K., Scientific Director of IWMC – Infox Vodokanal Water Utility proposed to study this issue. This problem is not easy and representatives of road maintenance companies need to be invited.

- **Zakharkia A.N.,** Senior Lecturer of Odessa National University – question: as Infox Vodokanal Water Utility is a private company what are the sources of loan repayment?

- **Answer:** Kuzin A.K., Scientific Director of IWMC – Infox Vodokanal Water Utility will return loans from the profit.

- **Medinets V.I.,** Head of Regional Centre for Integrated Environmental Monitoring under Mechnikov Odessa National University, PhD, Physical-Mathematical
Sciences, Member of Ukrainian Environmental Academy – EA Reports will be presented to the WB and will be taken into account in decision-making on the loan.

Kuzin A.K., Scientific Director of IWMC – thanked all participants for attention, promised to address all identified issues in Final EA Report.

Yarotskaya I.V., Director of Investment Policy Department - thanked all participants for attention, invited to cooperation during performance of proposed projects.

Signatures:
Chairman
Secretary
Coordinator on public relations
Preparation, Mass Media Representatives
Artemova E.S., IWMC Expert

Medinets V.I., Head of Regional Centre for Integrated Environmental Monitoring under Mechnikov Odessa National University, PhD, Member of Ukrainian Academy of Sciences.
Discussion after the Consultation