TEMPORARY SOLUTION FOR W16
AL FALLUJA – AL ANBAR

ENVIRONMENTAL IMPACT ASSESSMENT
(Addendum to ESMP for the Rehabilitation of Al-Falluja Sewerage Lift Station F1 dated April 20, 2017)

May 2019
## Revision History

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**Prepared by:** PMT  
**Reviewer:** Linda Khalil
## Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AXO</td>
<td>Abandoned Explosive Ordnance</td>
</tr>
<tr>
<td>BOD₅</td>
<td>Biochemical Oxygen Demand</td>
</tr>
<tr>
<td>BRC</td>
<td>Bar Reinforcement Concrete</td>
</tr>
<tr>
<td>dBA</td>
<td>Decibel</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>EHS</td>
<td>Environmental Health and Safety</td>
</tr>
<tr>
<td>EODP</td>
<td>Emergency Operation Development Projects</td>
</tr>
<tr>
<td>ERW</td>
<td>Explosive Remnants of War</td>
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<tr>
<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
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<tr>
<td>ESMF</td>
<td>Environmental and Social Management Framework</td>
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<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
</tr>
<tr>
<td>GRM</td>
<td>Grievance Redress Mechanism</td>
</tr>
<tr>
<td>HCs</td>
<td>Hydrocarbons</td>
</tr>
<tr>
<td>HSE</td>
<td>Health, Safety and Environment</td>
</tr>
<tr>
<td>NH₃</td>
<td>Ammonia</td>
</tr>
<tr>
<td>NOₓ</td>
<td>Nitrogen Oxides</td>
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<tr>
<td>OHS</td>
<td>Occupational Health and Safety</td>
</tr>
<tr>
<td>OP</td>
<td>Operational Policy</td>
</tr>
<tr>
<td>PM</td>
<td>Particulate Matter</td>
</tr>
<tr>
<td>PMT</td>
<td>Project Management Team</td>
</tr>
<tr>
<td>SOₓ</td>
<td>Sulfur Oxides</td>
</tr>
<tr>
<td>TSS</td>
<td>Total Suspended Solids</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Program</td>
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<td>UXO</td>
<td>Unexploded Ordnance</td>
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<tr>
<td>VO</td>
<td>Variation Order</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>WWLS</td>
<td>Waste Water Lifting Station</td>
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<td>WWTP</td>
<td>Wastewater Treatment Plant</td>
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Executive Summary

An ESMP was prepared for the Rehabilitation of Al Fallujah Sewage Lift Station (WWLS-F1) and was cleared by the WB in April 2017. The Project comprises rehabilitation of the sewage lift station and the force main that will discharge the sewage into a Wastewater Treatment Plant (WWTP) that is also damaged and under rehabilitation by the United Nations Development Program (UNDP). The plan was to have rehabilitation works for the lift station and the WWTP in parallel so that the WWTP will be ready to receive the sewage by the time the lift station is rehabilitated by the project. Unfortunately, there are delays in the rehabilitation of the WWTP while the rehabilitation of the lift station was progressing as scheduled and is currently ready to operate. As F1 is the main sewage lift station in Al Fallujah and its operation is necessary to alleviate the existing environmental and health conditions in the city, the operation of F1 cannot wait until the WWTP is rehabilitated and ready to receive the waste water (forecasted for January 2020).

PMT visited the WWTP site and its surroundings and prepared a field survey report that included a suggestion for a temporary solution. The latter consists of discharging the sewage to 2 existing holding tanks (designed to receive bypass of the WWTP during emergencies), provide an aeration system to those tanks to reduce the organic load of the sewage, and discharge overflow of the holding tanks to an open channel that ends at a low desert land far from any nearby settlements in a lagoon. The World Bank (WB) requested an Addendum to the ESMP of WWLS-F1 that covers the temporary solution.

The lagoon is located on a plot owned by the state having a total area of 3,659,667 m². The results of the water balance calculations over 2 years revealed that for a wastewater generation rate of 200 l/person per day, the lagoon/pond area will expand over 1,454,000 m² while if the wastewater generation rate is taken as 128 l/person per day, it will expand over 923,000 m². Therefore, the lagoon is not expected to flood beyond the public land assigned for this purpose. However, although the soil at the location of the lagoon is clayey with a low infiltration rate, the water table is shallow (at 1.4m) and the risk of infiltration into the groundwater is high.

Mitigation measures include digging 7 boreholes (at a distance of around 1km between boreholes) at the perimeters of the lagoon to take samples and establish ground water quality baseline, Add air blowers in the lagoon to ensure treatment of the wastewater, house the air blowers to reduce noise and keep the embankments around the lagoon in good conditions to limit access and prevent leakages of wastewater.

Special monitoring measures include performing monthly ground water quality tests, site inspection of the status of the embankments and the boreholes and measurement of the noise level.

The present Addendum to ESMP concludes that the proposed temporary solution for W16 will certainly have an overall significant positive impact on the population in Al Falluja affected by wastewater flooding the streets and the neighborhood. However, its implementation may have significant impacts particularly during operation. It should be monitored closely to prevent irreversible negative impacts especially on the groundwater.
1. Context and Objectives

1.1 Context

The Emergency Operations for Development Project (EODP) Project is to support the Republic of Iraq in the reconstruction of damaged infrastructure and the restoration of public services delivery in targeted municipal areas. Component entitled “Restoring Municipal Waste, Water and Sanitation Services” entails, among other utilities, the repair and reconstruction of damaged infrastructure relevant to sanitation.

An ESMF has been prepared for the Project by appraisal and it included guidelines and principles to prepare site specific safeguard instruments for different sub-projects, ranging from Checklists, ESMPs to full-fledged ESIAs. Within the water and sanitation component there are 20 sub-projects where correspondent safeguards checklists and ESMPs were prepared, according to the sub-project’s risks, by the Project Management Team (PMT) and cleared by the World Bank (WB).

An ESMP was prepared for the Rehabilitation of Al Fallujah Sewage Lift Station (WWLS-F1) and was cleared by the WB in April 2017. The sub-project comprises rehabilitation of the sewage lift station and the force main that will discharge the sewage into a Wastewater Treatment Plant (WWTP) that is also damaged and under rehabilitation by the United Nations Development Program (UNDP) and other donors are interest of rehabilitation the WWTP. The plan was to have rehabilitation works for the lift station and the WWTP in parallel so that the WWTP will be ready to receive the sewage by the time the lift station is rehabilitated by the project. Unfortunately, there are delays in the rehabilitation of the WWTP while the rehabilitation of the lift station was progressing as scheduled and is currently ready to operate. By the end of June, 2019, As F1 is the main sewage lift station in Al Fallujah and its operation is necessary to alleviate the existing environmental and health conditions in the city, the operation of F1 cannot wait until the WWTP is rehabilitated and ready to receive the waste water (forecasted for January 2021).

1.2 Objectives

In an attempt to find an alternative for disposal, the Project Management Team (PMT) visited the WWTP site and its surroundings and prepared a field survey report that included a suggestion for a temporary solution. The latter consists of discharging the sewage to 2 existing holding tanks (designed to receive bypass of the WWTP during emergencies and will continue to work as a by pass after the rehabilitation of WWTP), provide an aeration system to those tanks to reduce the organic load of the sewage, and discharge overflow of the holding tanks to an open channel that ends in a lagoon at a low desert land far from any nearby settlements. The field survey report was reviewed by the WB and it was requested to upgrade this report to an Addendum to the ESMP. Furthermore, the Bank team requested review of the ESMP for the rehabilitation of the WWTP as this would be an associated facility to the sub-project. PMT consulted with UNDP and checked for an EIA prepared for the WWTP. UNDP confirmed that no EIA was prepared.
2. Description of the Temporary Solution

The proposed temporary solution relies on existing plans and infrastructure, and proposes interventions and minor improvements to relieve Al Fallujah from the burden of raw sewage flooding the roads. The proposed temporary solution is presented in the figure below and described hereafter.

![Diagram showing the temporary solution components]

**Figure 1: General location of the different components of the temporary solution for W16**

2.1 Existing Infrastructure

a. **F1 pump station** (WWLS-F1) is the last lifting station designed to boost the sewage of the whole served quarters of the city of Al Falluja to the WWTP (called also Al Nuaymiyah WWTP). It will currently serve fifty thousand (50,000) inhabitants out of the four hundred thousand (400,000) inhabitants of Al Falluja. Considering that each inhabitant generates two hundred (200) l/day, the total daily volume that WWLS-F1 should handle is in the order of 10,000 m$^3$. The pump station consists of 3 pumps capable of pumping 400l/s and 3 pumps capable of pumping 250 l/s (equivalent to 6,120 m$^3$/h at full operation). The rehabilitation works at WWLS-F1 is completed.

b. **A Force Main**, 1,000mm in diameter, 2,300m in length, made of Glass fiber Reinforced Plastics (GRP), with a capacity of 6,400 m$^3$/hr., transfers the waste water from WWLS-F1 pump station to Al Falluja WWTP. The rehabilitation works on the force main were 100% completed.

c. The rehabilitation of Al Falluja WWTP is not completed yet. As per UNDP, the WWTP will not be operational before January 2021. However, currently, Al Falluja WWTP has in place two **standby reservoirs** 10,000 m$^3$ each and 4m deep, that were constructed in order to absorb the wastewater flows in case of emergency. These 2 reservoirs are inter-connected by a Ductile Iron (DI) pipe, 1000 mm in diameter and equipped with a pipe 1000mm in diameter for overflow. It is planned that the treated effluent will be disposed of through an outfall in the Euphrates. Accidental overflow is intended to discharge into a public land located near the WWTP having an area of 3,659,667 m$^2$ consisting of natural soil without any cover (Refer to deed of land in Annex A).
The figures below show the two standby reservoirs filled with water during the testing of the force main using clean water.

![Image of two standby reservoirs filled with water](image)

**Figure 2: Existing standby reservoirs in Al Falluja WWTP**

### 2.2 Proposed temporary solution

The temporary solution will rely on the existing infrastructure in particular it makes use of the rehabilitated WWLS-F1 in order to relief the city from the burden of the flowing wastewater. The solution will be adopted only for the period during which the WWTP is still not operational, that is estimated at 18 months will be start from June 2019 till Jan. 2021. The main components of the proposed temporary solution are listed below:

- **The two standby reservoirs can be used as aeration tanks**

  PMT is proposing to use the existing standby reservoirs as aeration tanks. This can be achieved by the **installation of air blowers of** adequate flow incorporated with a network of piping at the invert of the two basins in order to obtain the reactivated sludge as high as possible.

  PMT issued a Variation Order (VO) for the temporary solution including:

  - Supply the equipment and special machinery and conduct the required work for the transfer, installation, connection, testing and operation of air blowers with all their accessories of pipes supplied by the Directorate of Al-Anbar Sewerage
  - Install the air blowers on reinforced concrete base
  - Erect a suitable shed to protect the air blowers and reduce the noise that could potentially be generated by the blowers.
  - Supply the operating boards of the air blowers
  - Empty the storage basins and install suitable supports for the piping to ensure equal air distribution to the total area.

The volume of the reservoir being 10,000m$^3$ and the generation of wastewater of the same volume, consequently, the detention time will be for one day only.
b. **An Open Channel conveyor**

In that same VO, was included the “Supply of the equipment and the conduction of work needed for dredging the channel conveying the wastewater from the storage basins to the lagoon located south of the treatment plant”. The estimated length of the channel is 750 m, with 2.3 m width and 2 m depth. The following figure shows the first stretch of the proposed open channel connecting Al Falluja WWTP to the open air lagoon.

![Figure 3: Start of the proposed channel connecting Al Falluja WWTP to the proposed lagoon](image)

**Figure 3: Start of the proposed channel connecting Al Falluja WWTP to the proposed lagoon**

c. **Proposed Lagoon**

The overflow is ultimately intended to discharge into a land located near the WWTP having an area of 3,659,667 m² consisting of natural soil without any significant cover (Refer to deed of land in Annex A).

![Figure 4: General view on the location of the proposed lagoon](image)

**Figure 4: General view on the location of the proposed lagoon**
## 2.3 Project Activities

The proposed list of the works to achieve the temporary solution for W16 is provided in the VO submitted to the WB and is presented in the following Table.

### Table 1: Proposed activities for the construction of the Temporary Solution to W16

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply the equipment and special machinery including the required work for the transfer, installation, connection, testing and operation of air blowers with all their accessories of pipes supplied by the Directorate of Al-Anbar Sewerage/Al-Khalidiya Sewerage Center to the Sewerage Treatment Plant in Fallujah, including the work of installing the air blowers on An reinforced concrete base by using the (BRC) including the works erect a suitable shed for the air blowers. The work includes the supplying of operating boards for the air blowers. The work also includes the emptying of storage basins and install of suitable supports for the piping, to ensure equal air distribution to the total area and as directed by the supervisor.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Supply of materials, the required execution, to connect and to install high-tension electric poles with all the necessary accessories to join the electric power supply from the feeding source existing near the Gas Plant to the basin area including the work to cast concrete foundation of the poles. The Contractor must ensure the operation and according to the guidance of the supervisor.</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Supply of materials and carrying out the necessary works to deliver the electrical power supply to the junction node that includes work to extend, connect and test electrical overhead high tension 11KVA wires of the size 120 mm from the nearest feeder through approval of the Fallujah Directorate of Electricity, including the work of supply and installation of all accessories and as directed by the supervisor.</td>
<td>m.l</td>
</tr>
<tr>
<td>4</td>
<td>Supplying, installing, connecting, testing, and operating a three phase 400KVA electrical transformer 11/0.4 kV from sober origin and certified at the Fallujah Directorate of Electricity with cables of high pressure, high and low voltage, and according to technical specifications and directives of the Supervisor Engineer.</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Supply the equipment and the work needed for dredging the channel delivering the wastewater from the storage basins to the pond located south of the treatment plant.</td>
<td>ml</td>
</tr>
</tbody>
</table>

## 2.4 Clearance of UXO/ERW

The routing of the canal is cleared from UXO, the area of the lagoon has also received clearance from the Iraqi Armed Forces for the absence of UXO/ERW (See Annex B). However, accidental discovery is still possible. In such case, the personnel should be immediately evacuated and armed forces contacted. The works could be resumed only after removal of the munitions.

## 2.5 Construction Equipment

The following table presents the types and numbers of construction equipment that are expected to be used during the implementation of the temporary solution works.

### Table 2: Equipment to be used during construction of temporary solution to W16

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Type of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Compressor (diesel)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Jack – hammer</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Shovel</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Diesel generator</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Pickups &amp; sedan cars</td>
<td>1</td>
</tr>
</tbody>
</table>
2.6 Construction Site Facilities

The number of additional workers needed to execute the Temporary Solution is 30 workers/day. There will be no need for an additional construction site or camp as the workers will be preferably locals and no influx or workers is expected. Nevertheless, if any, additional workers can be accommodated in the camp that was constructed for the purpose of rehabilitating the pump/lifting station.

2.7 Land Acquisition

There will be no need for land acquisition as the discharging channel and the lagoon will be located in a public property. There are no livelihoods in the vicinity of the temporary solution components that are likely to be adversely affected by the project. Hence neither involuntary nor voluntary relocation of people is necessary or expected. All the works will be carried on a land owned by Al Falluja Municipality. (Refer to Deed of land ownership in Annex A.)

2.8 Project Duration

The execution of the temporary solution will take 70 calendar days and the lifetime of the project duration is 18 months. However, this solution can still be used after completion of the Project for emergency purposes.
3. Baseline Information

This chapter presents the description of the existing baseline conditions relevant to the temporary solution only. Other baseline information can be found in the ESMP for the Rehabilitation of WWLS-F1 dated April 20, 2017.

3.1 Physical Environment

3.1.1 Land Use
The land use around the proposed channel and the lagoon is a desert. The nearest settlement to the channel and the discharging pond is Nuaymiyah and Al- Fallujah Barrage and there isn’t any residential area around the site although there are some houses but inhabitants had left during the war and did not come back.

3.1.2 Soil
Referring to the soil tests conducted by Al Ahmed Bureau for Engineering Consultants & Construction Testing, for Fallujah Sewer Project, the first 1.5m of the soil depth were classified as MH as per USCS classification (Refer to Annex C). MH is known also as light brown sandy fat Clay. It has a hydraulic conductivity of $10^{-4}$ to $10^{-6}$ cm/sec. 1

3.1.3 Water Resources and wastewater

The flow of Euphrates near the Project ranges between a minimum 50m³/sec and a maximum of 300m³/sec. No flood was recorded during recent years.

Before ISIS invasion, water for domestic purposes was extracted from the river and distributed to the users. After the invasion, and although many WWTP along Euphrates are not operating properly, and discharging their “treated water” into Euphrates, water is still being extracted from the river and distributed to users. Furthermore, Al Falluja barrage diverts water into a canal that supply irrigation water to agricultural lands located downstream (see figure below). The main crops irrigated by this water are potatoes, tomatoes and eggplants. However the river and the bottom of irrigation canals are at an elevation of 5m higher than the proposed bottom of the lagoon the lagoon will be low level from Euphrates and the canal, so no impacts on them.

The level of the water table in the area is at 1.4m. The results of water quality test conducted during the geotechnical investigations are provided hereafter.

### Table 3: Results of ground water quality tests

<table>
<thead>
<tr>
<th>B.H No.</th>
<th>pH</th>
<th>SO\textsubscript{4} (ml g/liter)</th>
<th>CO\textsubscript{3} (ml g/liter)</th>
<th>B.H No.</th>
<th>pH</th>
<th>SO\textsubscript{4} (ml g/liter)</th>
<th>CO\textsubscript{3} (ml g/liter)</th>
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<tr>
<td>1</td>
<td>7.3</td>
<td>3210</td>
<td>115</td>
<td>8</td>
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<td>60</td>
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### 3.1.4 Climate

The climate in the project area is "desert." During the year, there is virtually no rainfall. The average yearly rainfall is 115 mm. The driest month is June, with 0 mm of rain. The greatest amount of precipitation occurs in February, with an average of 23 mm.

The average annual temperature is 25 °C in Al Falluja. July is the warmest month of the year, temperature averages 35 °C. The lowest average temperatures in the year occur in January, when it is around 10 °C as shown in the following figure.

![Variation of Temperatures in Al Fallujah](image)

Wind Intensity is the highest in July and reaches 28km/h (see figure below). Prevailing wind direction in North West and West North West as presented in the rose wind below.

---

2 WorldWeatherOnline.com
The evaporation from a water body is very variable in Al Falluja, it varies from 1.5 mm/day in January to 14.4 mm/day in June and July. It is worth mentioning that evaporation from a water body depends on a number of factors. The temperature of the water will govern how much water vapor will evaporate and the evaporation does not vary linearly with temperature. The Lake Mead Equation (Dalton Equation) quantifies the evaporation rate. The following Table presents the potential evaporation from a water surface in Al Falluja based on Dalton equation. It was assumed that in a day, there are 16 hours of high temperature and 8 hours of low temperature. Further calculation details can be found in Annex D.


Figure 7: Wind Intensity and Rose wind in Al-Falluja
### Table 4: Calculated water evaporation from water bodies in Al-Fallujah

<table>
<thead>
<tr>
<th>Month</th>
<th>Evaporation Max mm/day</th>
<th>Evaporation Min mm/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>2.77</td>
<td>1.52</td>
</tr>
<tr>
<td>Feb</td>
<td>3.58</td>
<td>1.18</td>
</tr>
<tr>
<td>Mar</td>
<td>4.18</td>
<td>1.73</td>
</tr>
<tr>
<td>Apr</td>
<td>5.11</td>
<td>2.45</td>
</tr>
<tr>
<td>May</td>
<td>7.29</td>
<td>5.05</td>
</tr>
<tr>
<td>Jun</td>
<td>14.44</td>
<td>6.93</td>
</tr>
<tr>
<td>Jul</td>
<td>14.42</td>
<td>8.14</td>
</tr>
<tr>
<td>Aug</td>
<td>14.17</td>
<td>7.50</td>
</tr>
<tr>
<td>Sep</td>
<td>10.76</td>
<td>5.31</td>
</tr>
<tr>
<td>Oct</td>
<td>7.51</td>
<td>5.30</td>
</tr>
<tr>
<td>Nov</td>
<td>4.92</td>
<td>3.64</td>
</tr>
<tr>
<td>Dec</td>
<td>3.77</td>
<td>2.28</td>
</tr>
</tbody>
</table>

#### 3.2 Biological Environment

The area that will be converted to lagoon is not covered with vegetation. Site visits by PMT, confirmed the absence of any endangered species. A general view of the area is shown in the following figure.

![View on the location of the proposed lagoon](image)
3.3 Socio-Economic and Health baseline conditions

Al Falluja community is still relying on septic tanks and the raw sewage is making its way onto the streets and into the storm sewers going directly to the Euphrates River. Furthermore, there are residents downstream that are taking their drinking water from that contaminated source. There is an urgent need to get the streets rid of wastewater.

Figure 9: Raw Sewage in Al Falluja Streets
4. Technical Analysis of the Proposed Temporary Solution

4.1 Improvement of wastewater quality due to aeration

The expected average quality of influent as presented in the Table below was taken from previous analysis of influents discharging into the WWTP (in full operation at the time - July-2012). More details of the water quality tests are provided in Annex D.

Table 5: Expected quality of Influent

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Average as per tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO (mg/l)</td>
<td>3.81</td>
</tr>
<tr>
<td>BOD5 (mg/l)</td>
<td>166.64</td>
</tr>
<tr>
<td>TSS (mg/l)</td>
<td>176.18</td>
</tr>
<tr>
<td>pH</td>
<td>7.61</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>30.56</td>
</tr>
<tr>
<td>TDS (ppm)</td>
<td>2865.45</td>
</tr>
</tbody>
</table>

Referring to WHO, the performance of the aerated ponds depends on loading, temperature, and pH. The following table shows expected removal efficiencies for municipal wastewaters.

Table 6: BOD5 Reduction in aerated lagoons as a function of detention time and temperature

(WHO, 1987)

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Detention Time (d)</th>
<th>BOD reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5</td>
<td>0-10</td>
</tr>
<tr>
<td>10-15</td>
<td>4-5</td>
<td>30-40</td>
</tr>
<tr>
<td>15-20</td>
<td>2-3</td>
<td>40-50</td>
</tr>
<tr>
<td>20-25</td>
<td>1-2</td>
<td>40-60</td>
</tr>
<tr>
<td>25-30</td>
<td>1-2</td>
<td>60-80</td>
</tr>
</tbody>
</table>

- The aerated ponds/reservoirs are considered to assure the following:
  - Effluent TSS can range from 20 to 60 mg/l, depending on the design of the settling basin and the concentration of algae in the effluent.
  - Removal of NH3 is less effective due to short detention times.
  - Phosphorus removal is only 15 - 25 percent.
  - Removal of total and fecal coliform depends on length of detention time and temperature.

---

5 EPA, Principles of design and operations of wastewater treatment pond systems for plant operators, engineers and managers, OHIO, 2011
As per Table 5, the BOD₅ is expected to be in the range of 166 mg/l. With reference to Table 6, on average, a reduction of 50% is expected leading to a BOD₅ of 83 mg/l. Further reduction of the BOD₅ is also expected in the lagoon.

### 4.2 Potential infiltration of wastewater in the soil and into the groundwater

Referring to the soil test conducted by Al Ahmed Bureau for Engineering Consultants & Construction Testing, the water table was encountered at 1.4m.

Referring to the same report, the first 1.5m of the soil has a clay content (53%), a silt content (15%) and a sand content (32%). It was classified as Clay as per the USDA Soil classification. The infiltration rate of such soil is in the order of 0.05 cm/hr. Consequently, if no excavation is taking place, the water in the lagoon/pond will reach the water table 117 days only. The wastewater influent might be partially treated during the stay in the aeration tanks and in the pond. However, the potential contamination of the groundwater should be closely monitored.

### 4.3 Analysis of the Water Balance

A water balance taking into account the volume of the wastewater collected, the infiltration rate, the monthly rainfall and the monthly evaporation was prepared. The proposed depth of water in the lagoon is taken as 1.2m. Two scenarios were considered, one for a wastewater generation of 200 l/person per day (as per the design criteria of the lift station and the WWTP) and the other for 128 l/person per day (more realistic).

The results of the water balance calculations revealed that for a wastewater generation rate of 200 l/person per day, the lagoon area will expand over 1,454,000 m². If the wastewater generation rate is taken as 128 l/person per day, the lagoon will expand over 923,000 m². As stated above, the land where the lagoon is located is very large 3,659,667 m². Therefore, the lagoon is not expected to flood beyond the public land assigned for this purpose. See figure below.

![Figure 10: Expected expansion of the pond area](image-url)
5. Legal Framework National Legislation

This section covers the legal frameworks directly relevant to the implementation of the proposed temporary solution. A comprehensive legal section is provided in details in the ESMP for the Rehabilitation of Al-Falluja Sewerage Lift Station F1 dated April 20, 2017.

5.1 Relevant National Legislations

Law No. 27 of 1999 concerning the establishment of the General Authority for Water and Sewage provides instructions to the local authorities on provision of drinking and processing of raw water and the discharge of sewage and rainwater in all parts of Iraq beyond the boundaries of the Municipality of Baghdad.

The regulations define the permissible discharge limits to both natural waters and sewers. Some of the values are presented in the Table below:

**Table 7: Effluent Discharge Parameters**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Limits for Discharge into Water Bodies</th>
<th>Limits to discharge into Sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Temperature</td>
<td>&lt;35°C</td>
<td>45°C</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>60 mg/L</td>
<td>750 mg/L</td>
</tr>
<tr>
<td>pH</td>
<td>6 -9.5</td>
<td>6 - 9.5</td>
</tr>
<tr>
<td>BOD</td>
<td>&lt;40</td>
<td>1000</td>
</tr>
<tr>
<td>COD</td>
<td>&lt;100</td>
<td>N/A</td>
</tr>
<tr>
<td>Nitrate</td>
<td>50 mg/L</td>
<td>N/A</td>
</tr>
<tr>
<td>Phosphate</td>
<td>3 mg/L</td>
<td>N/A</td>
</tr>
<tr>
<td>Free Chlorine</td>
<td>Trace</td>
<td>100 mg/L</td>
</tr>
<tr>
<td>Lead</td>
<td>0.1 mg/L</td>
<td>0.1 mg/L</td>
</tr>
<tr>
<td>Copper</td>
<td>0.2 mg/L</td>
<td>N/A</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.005 mg/L</td>
<td>0.001 mg/L</td>
</tr>
<tr>
<td>Sulphate</td>
<td>if the ratio of the discharge is to the amount of source water is 1:1000 or less, the sulphate concentration should not exceed 400 mg/L</td>
<td>300 mg/L</td>
</tr>
<tr>
<td>Total hydrocarbons &amp; derivatives</td>
<td>For the river with continuous flow, 5mg/L provided the ratio of discharge to source water is 1:500</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Ambient Noise and Vibration

Noise Prevention Law No. 21 of 1966 aims to prevent the excessive noise in public places. The regulations prevent broadcasting in public places that may disturb peace between 10 p.m. and 7 a.m.

Instruction No. 2 of 1993 details the levels of noise emitted from sound equipment in tourist facilities. Additionally, it sets the maximum permissible noise limits of 70 dB(A) for industrial and commercial activities and 55 dB(A) for residential activities.
**Directive No. 4 of 1993** concerning occupational health, protection of workers against vibration: Pursuant to Sections 3 and 105 of the Public Health Act (No. 89 of 1981), establishes work place procedures designed to minimize vibration and any harmful effects that it might have on workers. Stipulates maximum total daily limits for exposure to vibration.

**Table 8: EHS Maximum Acceptable Leq (2005)**

<table>
<thead>
<tr>
<th>Receptor</th>
<th>One Hour Lacq (dBA)</th>
<th>Daytime 07.00-22.00</th>
<th>Nighttime 22.00-07.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential, institutional, educational</td>
<td>55</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Industrial, commercial</td>
<td>70</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

**5.2 World Bank Policies and Guidelines**

The project is expected to trigger only OP/BP 4.01: Environmental Assessment, as the project could impact the physical environment. Because the lagoon site is quite far from any residential area, it is not expected that there will be a need for use of pesticides to minimize the breeding of insects and should the need for that be materialized the requirements of OP/BP 4.09 (pest management) will be complied with, and the requirements of the Pest Management Plan (part of the updated ESMF) will be fulfilled.

**WB Disclosure Policy** supports decision making process by the Borrower and WB through allowing public access to information on environmental and social aspects of projects. Disclosure of key project documents, including executive summaries in English and the local language, is mandated, in Country – prior to project appraisal in local language and in English and in the WB external website before project appraisal in English with the Executive Summary in English and in the local language.

**The Environmental, Health, and Safety (EHS) Guidelines** are technical reference documents with general and industry-specific guidelines. Wastewater facilities follow industry special EHS guidelines. This guideline applies to projects that have either direct or indirect discharge of wastewater to the environment.
6. Environmental and Social Analysis of the proposed temporary Solution

The Environmental actions, procedures and responsibilities as required during the construction phase must comply with the available specifications, legislation and laws. The construction contractor(s) will be responsible for compliance with the ESMP provisions during the rehabilitation phase of the project. The contractor will also be in charge of undertaking work in a manner that complies with all relevant environmental procedures, adheres to all legislative requirements, and ensures that all environmental objectives associated with the contract are achieved. The key environmental and social impacts and mitigation measures are described below.

6.1 Evaluation of Impacts Significance during construction Phase

This section of the report describes the environmental and social impacts that are likely to result from the implementation of the temporary solution for W16 and the mitigation measures addressing them.

6.1.1 Air Quality

**Impacts**

- Emissions of pollutants from engines of construction machinery and equipment during excavation of the channel and leveling of the lagoon may have negative impacts on the air quality. The use of construction equipment on-site is expected to release vehicular induced pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), sulfur oxides (SOx), particulate matter (PM) and hydrocarbons (HCs). Air emissions during the construction phase are temporary in nature and tend to be confined to the immediate vicinity of the site.

- Dust may be generated due to earthwork and movement of construction trucks and equipment on natural ground. The generation of considerable quantities of dust is usually associated with the release of high levels of particulate matter (PM) generated from land clearing, excavation schemes, and cut and fill operations. PM deposition on vegetation in the vicinity of the construction area may hinder photosynthetic processes. Owing to the nature of construction activities, the scattered nature of the project, the expected duration of construction activities and the absence of nearby receptors, the negative impacts associated with the degradation of ambient air quality in the vicinity of the construction site are not important but will, at any rate, not be overlooked.

**Mitigation Measures**

With the purpose to reduce the impacts related to emissions of gaseous pollutants from construction equipment, the mitigation measures and good practice are proposed also below:

- Employ construction machines with low emissions to reduce pollution, arranging sources of emission far from people's houses and public places;
- All construction machines and vehicles should meet the standard on emissions and have passed the emission test;
- Do not let machines idle when not necessary.

Concerning dust control methods and measures, the following actions are to be taken into account to reduce the generation of dust:

- Regular watering of areas subject to excavation;
- Covering of excavated soil temporary stored on site;
- Daily cleaning of tires of vehicles;
• Covering up any vehicle transporting materials and spoil to and from construction sites;
• Daily cleaning of streets and pathways in vicinity of construction site that are affected by soil and dust;
• Imposing speed controls for construction vehicles.

6.1.2 Noise and vibration

Impacts
• Noise may be generated from machinery and equipment during construction of the channel and leveling of the lagoon. Noise generation may cause disturbance to surrounding residences, however located at a safe distance from the site. Noise impacts during the construction phase are a function of the excavation scheme and the machinery used on site. In general, noise levels associated with various construction phases (80-90 dBA) exceed the Iraqi daytime noise standard. However, the effects of such adverse impacts are reduced owing on the location of the works away from residential and business areas, as well as their limitation in time and space.

Mitigation Measures
Mitigation measures foreseen to minimize the impact related to the noise emission comprise:
• Apply appropriate schedule to avoid any works that may cause noise and vibration during 10 pm – 6 am. Any nighttime activities should be done using noise reducing means or low-noise technologies,
• Use vehicles and equipment that meet national standards for noise and vibration.

6.1.3 Soil, subsoil and land

Impacts
• Soil erosion may occur from excavations, earth removal activities and other exposed surfaces during periods of rain and may result in alteration of landforms and natural drainage and contamination of waterways.
• Soil/subsoil may be subject to contamination by accidental spills and leaks from construction equipment.

Mitigation Measures
• Earthwork should be carried out during dry weather periods;
• Stockpiling of earth should be done a safe distance away from waterways;
• Other construction materials containing small/fine particles should be stored in a place not subjected to flooding;
• If necessary, silt/sedimentation traps should be used to prevent soil particles from getting into drains and canals;
• An accidental spill response plan should be prepared and implemented when necessary.

6.1.4 Solid and hazardous waste

Impacts
• Production and accumulation of excavation wastes are visually unsightly and may be rapidly eroded by rainfall. The suspended solids content of surface runoff (river and irrigation channel) may increase and they may become silted. Silting causes a loss of hydraulic carrying capacity, possibly resulting in flooding and turbidity and consequently degradation of the water quality thus impacting their biotic and aesthetic quality;
• Additional solid wastes may be produced from workers;
• Improper disposal and accidental chemical leakage or spillage along with the possibility of unintentional spillage of solvents, oils and other petroleum products used for equipment and machinery may contaminate the soil as well as surface and ground waters;

Mitigation Measures

• Excavation and Construction wastes should be removed as much as possible within 24 hours from the site to ensure public safety or if suitable, should be used for leveling and backfilling; creation of embankments or taken to a site approved for such disposal. Small quantities may be graded over adjacent land where this does not result in the deterioration of soil fertility. Where the generation of excess soil is unavoidable, it should be deposited in layers and compacted to provide stability. It should be soiled and seeded to prevent erosion and minimize visual impact;

• All waste should be collected and disposed in compliance with the local and national laws, in sites identified by the respective local authorities;

• Construction site should be cleaned from solid wastes, wastewater etc. before its closing;

• Hazardous wastes and contaminated soils should not be dumped on-site but removed to landfill/dumpsite designated by the local authority or the environmental agency as appropriate;

• Oil and lubricant waste should not be buried or burnt in the project site, but collected and stored in proper oil-cans and disposed for re-use or local authority approved designated sites.

6.1.5 Water resources

Impacts

• Excavation works and stock piles may enter water bodies which cause turbidity and sediments

Mitigation Measures

• Contractor should not obstruct or prevent water flow when working

• Construction material and stock piles should be covered to avoid wash off to water bodies.

• Borehole pits to be dug up to the water table (1.4 m depth) during the construction stage and groundwater water quality tests performed. The results of the tests should be reserved as baseline. The pits should be left open to allow monitoring of the groundwater quality. The pits should be located at the borders of lagoon.

6.1.6 Health and Safety of workers and public

Impacts

Although the proposed temporary solution will mostly involve small scale intervention, health and safety issues associated with construction activities are mainly related to accidents resulting from the improper handling and storage of construction material as well as accidents occurring with the operation of construction equipment. The nearest residential area to the construction site is more than 1.2 Km, the risk of public access to the site is very low and will be further minimized by putting barricades and delineation devises.

Mitigation Measures

• Observe health and safety regulations;

• Ensure appropriate safety equipment, tools and protective clothing are provided to workers and that safe working methods are applied;
• All workers will be required to wear shoes or strong boots to prevent sharp objects from penetrating or crushing the foot. Those working in muddy conditions and in canals with polluted water should avoid hand/foot contact with water and should never wear slippers.
• Ensure barricades and delineation devices are erected to inform vehicles drivers and workers in the area about work zones and restrict unattended public access.

6.2 Impacts Significance Evaluation during Operation
This section of the report describes the environmental and social impacts that are likely to result from the operation of the temporary solution for W16 and the mitigation measures addressing them.

6.2.1 Air Quality
Impacts
• Odors emission due to aerobic conditions may occur. They are produced mainly by the release of ammonia (NH₃). This odor is somewhat disagreeable but is much less objectionable than the odor of wastewater or sludge that has undergone anaerobic decomposition. The importance of odors in human terms is primarily related to the psychological stress they produce rather than to the harm they do to the body. The direction of wind being north-west will partially relieve those houses.

Mitigation Measures
• The installation of air blowers in the lagoon to enhance the wastewater treatment and reduce odor generation.

6.2.2 Noise emission
Impacts
• The air blowers in the aeration tanks could generate noise (estimated at 85 dbA)⁶ that may cause disturbance to workers of the WWTP.

Mitigation Measures
• The air blowers of the aeration tanks would be housed to minimize noise.

6.2.3 Water Resources
Impacts
• The soil being clayey, the infiltration rate is low. However, the water table is very shallow (at 1.4m). The wastewater does not leach for large depths before reaching the groundwater and no further natural treatment in the soil is expected. Therefore, there is a potential for groundwater contamination. On the other side, currently the wastewater is ponding in the roads and near houses. The proposed temporary solution although not ideal is expected to significantly improve the current situation and offers the wastewater to be collected in the sewerage network and disposed of far from the residential areas.
• The water level at the lagoon will be much lower than the water level at the adjacent irrigation canals and Euphrates River, so no risk of leaching contaminants from them. Also there will be no any discharge of the water to the river and canals, therefore, no impacts are expected in the downstream reaches.

The downstream area depends on surface water for irrigation, therefore, in addition to the low permeability of the soil, the risks on groundwater abstraction downstream of the proposed lagoon is very low.

Mitigation Measures
• The installation of air blowers in the lagoon would enhance the wastewater treatment and improve its quality.

6.2.4 Biodiversity

Impacts
- The original ESMP indicated the project area does not include any important habitats or fauna and flora species. The visit to the site of the lagoon confirmed that the lagoon area is bere from ant vegetation and no important habitats or fauna species were observed, therefore the risk of accidental fall of animals in the channel or the lagoon is minimum.
- There might be some impacts on reptiles and rodents in the area, but the impact is minimum as the development of the lagoon will be gradual, and most of those species will escape to other dry areas.
- The existing of the lagoon may attract birds but impact on birds is quite low because the project site is not a migratory route for birds.

Mitigation Measures
• Keep an embankment around the lagoon to limit access and discourage trespassing.

6.2.5 Health and Sanitation

• Temporary solution to W16 will result in the efficient collection of wastewater and disposal at a distance from the residential areas. Given the current status of the sewage flooding uncontrollably on the soil and in the residential areas, the project is anticipated to have a positive impact in noticeably improving the current environmentally unacceptable situation. Improvements in health and sanitation conditions will occur as a result of the project implementation. The expected impacts of the project are:
  • Improvement in surface water quality;
  • Improvement in sanitation conditions; and
  • Reduction of health risks from waterborne diseases for citizens.
• Accidental fall in the channel or the lagoon can happen.

Mitigation Measures
• Keep an embankment around the lagoon to limit access and discourage trespassing.
• Place permanent warning signs evidently around the site designating the nature of the facility. Signs should be posted every 150 m along the perimeter of the facility.
6.3 Impacts of the no-project alternative

In case the temporary solution to W16 is not implemented, the sewage flooding uncontrollably on the soil, roads and in the residential areas will continue having severe impacts on the surface water, sanitation and health of the residents of Al Falluja.
7. Environmental and Social Management Plan

7.1 Responsibilities for implementation of mitigation measures

In order to manage the Environmental & Social impacts in line with Iraqi Government policies, and policies of funding agencies for the project, an Environmental and Social Management Plan (ESMP) was prepared. The ESMP contains management measures avoidance, mitigation, as well as enhancements that would be implemented during the construction and operation/maintenance phase of the project.

The responsibility for implementation of the mitigation measures will be mostly upon the contractor. However, the supervision and assurance that the mitigation measures are implemented will be the responsibility of the Resident Engineer (RE) who represents the Ministry of Municipalities and Public Works as the Project owner.

The RE will be assisted by a team of environmental and social officers who will be responsible for supervising the daily activities of the contractor and will report non-compliances to the RE in order to take necessary actions towards the contractor. Regular supervision site visits will also be conducted the Ministry of Municipalities and Public Works. Project Management Team (PMT) environmental/social officer in association with a qualified environmental and social consultant who will provide technical advice in case there is a need to modify or add new mitigation measures as work necessitates.

The following tables summarize the mitigation measures which are required to be undertaken to avoid any negative impacts on the environment. Responsibilities and estimated costs are also presented.

7.2 Cost of mitigation measures

The costs of mitigation measures are estimated based on the average market rates for similar activities in Iraq and can be used as indicative costs. It is the sole responsibility of the contractor to estimate the costs associated with the recommended mitigation measures based on his work experience. The estimated cost of the mitigation measures for the construction phase is 3,000 US$. The estimated costs associated with the monitoring during the operation phase is 12,600 US$ as shown in the following Tables.

7.3 ESMP

All measures provided in the main Project ESMP apply. The following tables summarize the additional mitigation measures (addendum) which are required to be undertaken to avoid negative impacts on the environment caused by the temporary solution. Responsibilities and estimated costs are also presented.
# Table 9: Mitigation Measures for Temporary Solution (Addendum to Original ESMP)

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>DURING CONSTRUCTION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>1 Water Resources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ 7 Borehole pits to be dug up to the water table (1.4 m depth) during the construction stage. The pits should be left open but protected to allow monitoring of the groundwater quality. The pits should be located at the perimeter of the lagoon at 1000 m distance.</td>
<td>Contractor</td>
<td>Contractor/Resident Engineer/PMT</td>
<td>▪ 1,500</td>
</tr>
<tr>
<td></td>
<td>▪ Groundwater samples to be extracted from the pits and water quality tests performed. The results of the tests should be reserved as baseline.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ The installation of air blowers in the lagoon to enhance the wastewater treatment and improve its quality</td>
<td></td>
<td></td>
<td>Cost to be included in the construction BOQ (supplied by the Directorate of Al-Anbar Sewerage)</td>
</tr>
<tr>
<td></td>
<td><strong>Total cost US$ (Construction phase)</strong></td>
<td></td>
<td></td>
<td><strong>3,000 US$</strong></td>
</tr>
<tr>
<td></td>
<td><strong>DURING OPERATION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>1 Noise</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ The air blowers of the aeration tanks would be housed to minimize noise.</td>
<td>Contractor</td>
<td>Contractor/Resident Engineer/PMT</td>
<td>Cost to be included in the construction BOQ</td>
</tr>
<tr>
<td></td>
<td><strong>2 Biodiversity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Keep an embankment around the lagoon to limit access and discourage trespassing</td>
<td>Contractor</td>
<td>Contractor/Resident Engineer/PMT</td>
<td>Cost to be included in the construction BOQ</td>
</tr>
<tr>
<td></td>
<td><strong>3 Safety</strong></td>
<td></td>
<td></td>
<td>No additional Cost</td>
</tr>
<tr>
<td></td>
<td>▪ Keep an embankment around the lagoon to limit access and discourage trespassing</td>
<td>Contractor</td>
<td>Contractor/Resident Engineer/PMT</td>
<td>No additional Cost</td>
</tr>
<tr>
<td></td>
<td>▪ Place permanent warning signs evidently around the site designating the nature of the facility. Signs should be posted every 150 m along the perimeter of the facility.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total cost US$ (Construction phase)</strong></td>
<td></td>
<td></td>
<td>No Additional Cost</td>
</tr>
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</table>
8. Environmental and Social Monitoring Plan

The monitoring plan in the original ESMP applies, the following are additional monitoring measures needed (addendum) which are required to monitor the potential impacts of the temporary solution.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Monitoring Activities</th>
<th>Monitoring Indicators</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Supervision</th>
<th>Total estimated Cost in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Water resources</td>
<td>● Perform Water Quality Tests&lt;br&gt;● Make sure the embankments are in place and they are not leaking&lt;br&gt;● Water Quality Test: (Color, Temperature, Suspended Solids, pH, BOD, COD, Nitrate, Phosphate, Free Chlorine, Lead, Copper, Mercury, Sulphate, Total hydrocarbons &amp; derivatives)&lt;br&gt;● Site inspection and Photos with documentation</td>
<td>Monthly during the implementation of the temporary solution</td>
<td>Operator</td>
<td>PMT</td>
<td>12,600 (7 locations x 18 months x 100 US$) No Additional Cost</td>
<td></td>
</tr>
<tr>
<td>2 Noise</td>
<td>● Site inspection measuring the level of noise&lt;br&gt;● Report on the level of noise</td>
<td>Weekly</td>
<td>Operator</td>
<td>PMT</td>
<td>No additional cost</td>
<td></td>
</tr>
<tr>
<td>3 Safety</td>
<td>● Site inspection of the boreholes to make sure they are well protected&lt;br&gt;● Site inspection with photo documentation</td>
<td>Monthly during the implementation of the temporary solution</td>
<td>Operator</td>
<td>PMT</td>
<td>No additional cost</td>
<td></td>
</tr>
</tbody>
</table>

Total cost US$ (Operation phase) 12,600 US$
9. Public Consultations

9.1 Objectives of the Consultations

WB policies require that broad and open public consultations be held with the project-affected peoples (PAPs) on the project. These consultations are to ensure that PAPs and interest groups are provided with the opportunity to engage in the planning process, to raise questions and receive input and responses to their concerns. Public consultation helps to identify opportunities and risks, it improves project design / implementation and increases project ownership and sustainability.

9.2 Public Consultation Process

In order to fulfill the WB requirements, and as public collective meetings can be targeted by terrorists, a one on one interview was adopted with the residents of the area to obtain sound information on the possible impacts on the local communities. Accordingly, a questionnaire was prepared in order to cover the key environmental and social aspects related to the temporary solution. The questionnaire was then addressed to local individuals in the surrounding community randomly to have their opinions and thoughts regarding the temporary solution. In addition, the translated executive summary of the draft Limited/Simplified ESIA has been published on the RBD’s website to allow for feedback and wider dissemination of information related to the planned activities under this project. Consultations took place during the preparation of the ESIA on 5/9/2018 with 1 female and 5 male individuals. Minutes of Meetings can be found in Annex F.

During individual interviews, information about a grievance mechanism was introduced to interviewed individuals and a translated GRM form was also provided. All interviewed people were informed that they can submit their complaint to either site engineer, or to community leader or to PMT during construction. The community leaders’ information (mobile phone number) and PMT contact information (office and mobile phone numbers) will be available before implementation starts. Same GRM established for the Project applies for the temporary solution.
10. Conclusion and Recommendations

The present Addendum to ESIA concludes that the proposed temporary solution for W16 will certainly have an overall significant positive impact on the affected population. However, its implementation may have significant impacts especially during operation. The implementation should be monitored closely to prevent irreversible negative impacts especially on the groundwater.
Annexes

Annex A: Deed of land ownership for the area of the WWTP and surroundings

Annex B: Clearance from UXO/ERM document for Al Falluja Waste Water Project

Annex C: Extracts from the soil testing report and Water Table depths in the area of the WWTP and surroundings

Annex D: Detailed calculations of the expected evaporation and expansion area of the lagoon

Annex E: Results of Water Quality tests of the Influent (2012)

Annex F: Public Consultations
Annex A: Deed of land ownership for the area of the WWTP and surroundings
جموربة العراق
محافظة الالبار
قائممقامية قضاء الفلوجة الهندسية

لى د.م.م. المشروع اعداد تصاميم
وهيئز مشروع مجارى الفلوجة
م/ تايمين موقع

تقوم عليه
كتابكم المرقم 28 في 2/4/2017 تم تايمين المشروع من قبل شركة اوبتام
للعلم لطفاً

عبسي سابه مضمن
قائممقام قضاء الفلوجة
2017/9/19

نسخة إلى

مركز مجارى الفلوجة
القسم الهندسي
الإضمار...للحفظ
ينتمي 2017
Annex C: Extracts from the soil testing report and Water Table depths in the area of the WWTP and surroundings

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample Type</th>
<th>w.c. (%)</th>
<th>Index Properties, %</th>
<th>Partial Size Distribution, %</th>
<th>USCS</th>
<th>Description of Soil</th>
<th>qu kPa</th>
<th>S.P.T.</th>
<th>Chemical Tests, %</th>
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<td></td>
<td>From To</td>
<td>LL</td>
<td>PL</td>
<td>PI</td>
<td>Gs</td>
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### Annex D: Detailed calculations of the expected evaporation and expansion area of the lagoon

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<tr>
<th>Month</th>
<th>Waste/Water Temperature in °C</th>
<th>Waste/Water Temperature in °C</th>
<th>Air Temperature Average in °C</th>
<th>V=Wind Speed</th>
<th>P=Precipitation in mm</th>
<th>N=Precipitation</th>
<th>RH=Humidity</th>
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<th>Eti=Max</th>
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</table>

#### Climatic Database for Iraq AL FALAHJA 

<table>
<thead>
<tr>
<th>Interaction Area in m²</th>
<th>Income Water per day in m³</th>
<th>Income Water per Month</th>
<th>Variation of Temperature Per Day</th>
<th>(P,E) Result</th>
<th>Monthly Water Balance</th>
<th>Monthly Cumulative Water</th>
<th>Overflow Condition</th>
<th>Infiltration</th>
</tr>
</thead>
<tbody>
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<td>1,478,750</td>
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<td>310,000</td>
<td>-315,823</td>
<td>310,000</td>
<td>27,423</td>
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</tr>
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<td>-32,479</td>
<td>150,000</td>
<td>No-Overflow</td>
<td>6.4</td>
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</table>

#### WasteWater Temperature in °C

- **Temperature**: The expected temperature variation per day is shown in °C.

#### Monthly Calculations

**V=Wind Speed**

**P=Precipitation**

**N=Precipitation**

**RH=Humidity**

**Eti=Min**

**Eti=Max**

---

**Interaction Volume in m³**

1,774,598
<table>
<thead>
<tr>
<th>Month</th>
<th>Waste/Water Temperature in °C</th>
<th>Waste/Water Temperature in °C</th>
<th>Air Temperature Average in °C</th>
<th>V/Wind Speed</th>
<th>P/Precipitation in mm</th>
<th>N/Precipitation</th>
<th>RHI/Humidity %</th>
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<th>Etl (Max)</th>
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<td>3.4</td>
<td>80</td>
<td>3.77</td>
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</table>

| Average | 22.34 | 26.78 | 16.50 | 32.38 | 12.17 | 7.79 | 32.00 | 46.25 | 6.64 | 3.05 |

<table>
<thead>
<tr>
<th>Interaction Area in m²</th>
<th>Income Water per day in m³</th>
<th>Income Water per Month</th>
<th>Variation of Temperature Per Day</th>
<th>(P,E) Result</th>
<th>Monthly Water Balance</th>
<th>Monthly Cumulative Water</th>
<th>OverFlow Condition</th>
<th>Infiltration</th>
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<tr>
<td>198,400</td>
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</table>

| 925,000                | 128                         | 198,400                | -285,606                        | -87,206      | 0                    | No Overflow            | 6.4              |
| 198,400                | -202,415                    | 0                      | No Overflow                     | 6.4              |
| 152,000                | 198,400                     | 198,400                | -198,400                        | 0             | No Overflow            | 6.4              |
| 198,400                | -176,764                    | 41,636                 | No Overflow                     | 6.4              |
| 179,200                | 192,000                     | -151,229               | 130,771                         | 172,467      | No Overflow            | 6.4              |
| 152,000                | 198,400                     | 198,400                | -198,400                        | 0             | No Overflow            | 6.4              |
| 179,200                | 192,000                     | 198,400                | -198,400                        | 0             | No Overflow            | 6.4              |
| 152,000                | 192,000                     | 192,000                | -198,400                        | 0             | No Overflow            | 6.4              |
| 192,000                | 198,400                     | 198,400                | -198,400                        | 0             | No Overflow            | 6.4              |

Interaction Volume in m³
1,137,300
Annex E: Results of Water Quality tests of the Influent (2012)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>Average</th>
<th>Effluent Discharge maximum permissible levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/7/2012</td>
<td>9:40 AM</td>
<td>3.98</td>
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<tr>
<td>7/7/2012</td>
<td>7:50 AM</td>
<td>4.12</td>
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<td>9/7/2012</td>
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<td>3.44</td>
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<td>3.44</td>
<td>3.44</td>
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<tr>
<td>10/7/2012</td>
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<td>4.41</td>
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</tr>
<tr>
<td>11/7/2012</td>
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<td>4.20</td>
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<td>12/7/2012</td>
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<td>1.76</td>
<td>1.76</td>
<td>1.76</td>
<td>1.76</td>
</tr>
<tr>
<td>14/7/2012</td>
<td>10:00</td>
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</tr>
</tbody>
</table>

### Annex E: Public Consultations

**Questionnaire Form in English**

<table>
<thead>
<tr>
<th>Name of the project:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of the project:</td>
<td></td>
</tr>
<tr>
<td>Name of the respondent:</td>
<td></td>
</tr>
<tr>
<td>Occupation of the respondent:</td>
<td></td>
</tr>
<tr>
<td>Date of visit:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In your opinion, would the rehabilitation of water/sanitation facilities have positive impact on the residents of the area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Are there any claims on private land ownership in the project area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Would there be any damages to income generating crops, trees, and vegetation due to the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Would there be any losses of income of local residents due to the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Would there be any damages whether permanent or temporary which would affect the livelihood of the residents due to the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Would the rehabilitation activities require relocation of the residents of the area, whether permanent or temporary?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Is there any usage by local residents of the facilities or land of the facilities by the local residents?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. In your opinion, would there be any negative social impacts due to the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Would there be any changes to the demographics or social structure in the project area induced by the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Would there be any damages to the structures or houses induced by the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Would there be any disturbance to traffic during the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Is there any need for warning and directional signage during the rehabilitation activities?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name and signature of the interviewer:
## Responses to the Questionnaire

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Respondent</th>
<th>Occupation</th>
<th>Gender</th>
<th>Income Generating Crops, Trees, and Vegetation Due to Rehabilitation Activities?</th>
<th>Private Land Ownership in the Project Area?</th>
<th>Rehabilitation Activities Require Relocation of the Residents of the Area, Whether Permanent or Temporary?</th>
<th>Social Impacts Due to the Rehabilitation Activities?</th>
<th>Demographics and Social Structure in the Project Area Induced by the Rehabilitation Activities?</th>
<th>Recommendations</th>
<th>Warning and Directional Signage During the Rehabilitation Activities?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Amal Hassan</td>
<td>Teacher</td>
<td>Female</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Ahmed Hashim</td>
<td>Blacksmith</td>
<td>Male</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Mustafa Khalaf</td>
<td>Tractor Driver</td>
<td>Male</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Qased Nomma</td>
<td>Worker</td>
<td>Male</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Mohammed Eddan</td>
<td>Taxi Driver</td>
<td>Male</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Foaad Muhem</td>
<td>Teacher</td>
<td>Male</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
شروط البنك الدولي للدورة للاعه أعمار المناطق الحضرية

اسم المشروع: مجمع 208 العلوي / 2011-12 م/م
موقع المشروع: (الاسم)
الاسم: (الاسم)
المهنة: (المهنة)
تاريخ الزيارة: (تاريخ الزيارة)

1- هل تعتبر هذه إضافة إمكانيات مشروع الماء المجاري له تأثير إيجابي من الناحية الاجتماعية على السكان المحليين في المناطق المحيطة بالمشروع؟

2- هل هناك إعدادات أو متطلبات من قبل السكان المحليين بعدادية الأرض المتمم عليها المشروع؟

3- بسبب أعمال إمكانيات مشروع الماء/المجاري هل تتم عملية إزالة لمصالح زراعية أو بناية أو غطاء تباني تعود عائدة لمواطني أو السكان المحليين؟

4- هل تضرر مصالح المواطنين القاطنين بالقرب من المشروع بسبب أعمال إمكانيات التأهيل؟

5- هل هناك أي بنيات مؤقتة أو دائمة تلعب دورًا أساسياً في النشاطات الحياتية اليومية للسكان؟ استثناءً بعمليات ناهضة مشروع الماء/المجاري؟

6- هل اعمال إمكانيات مشروع الماء/المجاري ستمكن بإبقاء إمكانيات إعادة توطين للنساء (و/أ) لاستدامة في المناطق الجديدة؟

7- هل تتم عملية إمكانيات مشروع الماء/المجاري بطريقة ما من قبل السكان المحليين، علمًا أن الأرض ذيبة للدولة؟

8- هل تتوفر وجود نتائج إعدادية سلبية لمنطقة نتيجة أعمال إمكانيات التأهيل؟

9- هل هناك تغييرات ديموغرافية أو تغيير في النشاط الاجتماعي من جراء أعمال إمكانيات التأهيل؟

10- ما هي المجاميع الأكثر ضعفاً ومشذبة التي من المقرر أن تتأثر بإمكانيات التأهيل؟

11- هل سيزعج المشروع من عمليات النقل ويؤثر من ارتفاعية المجتمعات الموجودة بالقرب من منطقة المشروع؟

12- هل يعتزم المواطنين المقيمين بالقرب من موقع المشروع إلى وضع عمليات تجارية أو استثمارية لزيادة مدة الآمن والانسان لاستخدام مشروع الماء/المجاري؟

اسم وتوقيف المذكورين

الجهة المذكورة
قرض البنك الدولي الديوبتية للاستثمار في المناطق المحروفة

اسم المشروع: خطة تنمية / تطوير

موقع المشروع: [موقع المشروع]

المهنة: [مهنة]

تاريخ القيادة: [تاريخ القيادة]

1 س: هل تم اعتماد عملية إعادة تأهيل مشروع المياه الحادي للمحافظة من الناحية الاجتماعية على السكان المحليين في المنطقة المحروفة؟

لا

2 هل هناك ادعاءات أو طعون في مناقشات من قبل السكان المحليين بشأن الأراضي المقدمة للمقاول؟

لا

3 س/ بسباب إعمال إعادة تأهيل مشروع المياه الحادي للمحافظة تم العمل بمشوار أراضي زراعية أو أراضي أو أي خطط للمشي بها نباتات تعود على ا施工单位؟

لا

4/ هل تصرفت مصالح المواطنين بالقرب من المشروع بعد إعمال إعادة التأهيل؟

لا

5 س/ هل هناك أي بنية تحتية مؤقتة أو دائمة تلعب دوراً أساسياً في النشاطات الحياتية اليومية للسكان؟ ستائر عملية تأهيل مشروع المياه الحادي للمحافظة؟

لا

6/ هل تم إعمال إعادة تأهيل مشروع المياه الحادي للمحافظة لتشييد بناءات لأشخاص (و/أ) لا يتبعونها من منطقين جدد؟

لا

7 س/ هل تم استخدام إعادة تأهيل مشروع المياه الحادي للمحافظة بطريقة ما من قبل السكان المحليين، طابًا أن الأرض تابعة للدولة؟

لا

8 س/ هل توجد تأثيرات إجتماعية سلبية بالضبط نتيجة إعمال إعادة التأهيل؟

لا

9 س/ هل هناك تغييرات دموية أو ضرر من أجل الإجتماعي من جراء إعمال إعادة التأهيل؟

لا

10 س/ ما هي المجتمعات الأكثر ضعفًا وتشابهًا التي فشلت في إعمال إعادة التأهيل؟

لا

11 س/ هل سيطر الطمأن والسكينة من عمليات إنزال و误导 من الركاب المحجوزين بالقرب من منطقة المشروع؟

لا

12 س/ هل يوجد تواتين للمقيمين بالقرب من موقع المشروع إلى وضع علاقات احتداثية أو استدلالية لزيادة معدلات الإدمان والالتزام

لا

اسم وتوقع معايير الاستدلالين
السم الشروط: مصدقة في 2010/09/24
وقع الشروط: مصدقة في 2010/09/24
الاسم:...
الهيئة:...
تاريخ الزيارة:...

1: هل تعتقد أن عائلة تأهيل مشروع الماء المجاري لها أثر إيجابي من الناحية الاجتماعية على السكان المحليين في المناطق المجاورة بالمشروع؟

2: هل هناك ادعاءات أو مطالبات من قبل السكان المحليين بعائدات الأرض المقام عليها المشروع؟

3: هل إعمالات تأهيل مشروع الماء المجاري عن ت automáticamente لمحاصيل زراعية أو إنجاز أو أي عطاء بذلته تعود عائداته لمواطني أو السكان المحليين؟

4: هل تضررت مصالح المواطنين القاطنين بالقرب من المشروع بسبب إعمالات تأهيل؟

5: هل هناك أي نهج شرعيّة دائمة تلعب دوراً أساسياً في النشاطات الحياتية اليومية للسكان تستتر بعمليات تأهيل مشروع الماء المجاري؟

6: هل هناك أي إعمالات تأهيل مشروع الماء المجاري تستتر بإجراءات اعفاءات للوطنين أو لشخص (وى) أو لشخص من مناطق جديدة؟

7: هل تم إعمالات تأهيل مشروع الماء المجاري بطريقة ما من قبل السكان المحليين، علماً أن الأراضي تابعة للدولة؟

8: هل توفر وجوه نتائج اجتماعية جيدة بالنسبة لمنطقة إعمالات تأهيل ما هي؟

9: هل هناك تغييرات مثيرة أو ضرر في النمط الاجتماعي من جراء إعمالات تأهيل؟

10: ما هي المجاعيد الأكثر ضعفاً وشائعة التي من المحتمل أن تنتشر بالإعمالات التأهيل؟

11: هل سيؤثر المشروع على عمليات النقل ونقل من العزلية المجتمعات الموجودة بالقرب من منطقة المشروع؟

12: هل يحتاج المواطنون المحليون بالقرب من موقع المشروع إلى وضع علاقات تجارية أو استدلالية لزيادة مصالح الأمن والامناء لمستخدمي مشروع الماء المجاري؟
قرض البنك الدولي الطارى للاستعمال ضمن المخطط المحدد

اسم المشروع: مصرف يستثمر البلاد / 0-1441/1442 الابناة

موقع المشروع: هاتف: 0-

الاسم: محطة

المؤسسة: العمر

تاريخ الزياره:

1- هل تعتبر من عملية تأهيل مشروع الماء المحلي له الادخار بناءاً على الناحية الاجتماعية على السكان القادمين في المناطق المجاورة بالمشروع؟

لا

2- هل هناك ادعاءات أو اتهامات من قبل السكان المحليين بناءً على الاوضاع الملاحية للمشروع؟

لا

3- بسب اعمال تأهيل مشروع الماء المحلي هل تم عمله آلة لتحسين الشروط الاجتماعية أو الشروط أو أي غياب نتائج تعود عائشة لقانون أو السكان المحليين؟

لا

4- هل تشير المصالح المطلبية بالقرب من المشروع بسبب اعمال تأهيل؟

لا

5- هل هناك أي نصائح موقعة أو دورية تلعب دورًا أساسية في النشاطات الاجتماعية اليومية للسكان ستنعكس بشكل تأهيل مشروع الماء المحلي؟

لا

6- هل أن أعمال تأهيل مشروع الماء المحلي سيستجيب بأغراض الموارد البشرية (لا) لا تخصص إلى مناطق جديدة؟

لا

7- هل تم عمله آلة تأهيل مشروع الماء المحلي بطريقة ما من قبل السكان المحليين، علماً أن الارض مملوكة للدولة؟

لا

8- هل توفر وجود تأثيرات اجتماعية إيجابية بالمنطقة نتيجة أعمال تأهيل؟ ماهي؟

لا

9- هل هناك تغيرات دموغرافية أو تغييرات في الترتيب الاجتماعي من جراء أعمال تأهيل؟

لا

10- ما هي الملاحظات الأكثر ضغطاً وتشكل التي تم تحملها من قبل应用于 أعمال تأهيل؟

لا

11- هل تلعب محافظة الموارد البشرية في اعمال التدريب والتعليم النابع من اعمال مشروع الماء المحلي؟

لا

12- هل يحتاج المرضى المقيمين بالقرب من موقع المشروع إلى وضع علامات تحذيرية أو استدلالات لزيادة مهارات الأمن والأمان؟

لا

اسم وتوقعات مع الاستثناء

47
فرص البنك الدولي الّلأعارة: إعمار المناطق المحرومة

اسم المشروع: معروف في أي طريقة/أي طريقة/أي طريقة
الموقع: معروف في أي طريقة
المشاهد: معروف في أي طريقة
تاريخ الزيارة: معروف في أي طريقة

1/ هل تعتقد أن عملية إعمار تأهيل مشروع الماء المجاري كأثر إيجابي على الناحية الاجتماعية من المنارة المحليّة بالموضوع?

لا

2/ هل هناك إعدادات أو مطالبات من قبل السكان المحليّين بDATED إعدادات الأراضي المقام عليها المشروع؟

لا

3/ بموجب إعدادات تأهيل مشروع الماء المجاري هل تم عملية إزالة للمحاصيل الزراعية أو السواق أو أي نوع؟

لا

4/ هل كثرت مصالح المواطنين المتضررة بالقرب من المشروع بسبب إعدادات التأهيل؟

لا

5/ هل هناك أي نية تعتيق مؤقتة أو دائمة للعب دوراً أساسياً في النشاطات الحياتية اليومية للسكان؟

لا

6/ هل تم إعمال معاصرة أو تأهيل إعدادات الماء المجاري بطريقة ما من قبل السكان المحليّين، كما أن الأراضي تابعة للدولة؟

لا

7/ هل تم إعمال إعدادات تأهيل مشروع الماء المجاري سببية بالمنطقة السياحية بالنسبة للمنطقة المحددة؟

لا

8/ هل توجد تأثيرات اجتماعية سلبية بالنسبة للمنطقة نتيجة إعمال إعدادات التأهيل؟

لا

9/ هل تغيرت debuggerية أو ضرر في السياح الاجتماعي من جراء إعمال إعدادات التأهيل؟

لا

10/ ما هي المجاميع الأكثر ضعفاً وهشاشة التي تم الحاسبة باعمال إعدادات التأهيل؟

لا

11/ هل سيتعزز المشروع من عمليات التنقل ويساعده من الحركة الاقتصادية الموجودة بالقرب من منطقة المشروع؟

لا

12/ هل يحتاج الموظفين المقيمون بالقرب من موقع المشروع إلى وضع علامات تحذيرية أو استدلالية لزيادة معدلات الأمن والامان؟

لا

اسم وتوقع من الاستهلال
فرض البنك الدولي الطارئ لعاجزة اعتبار المناطق المحررة

اسم المشروع:
موقع المشروع:
المعهد:
المحل:
تاريخ الزيارة:

س: هل تعدت عملية إنهاء مشروع الماء/المجري لآثار إيجابية من الناحية الاجتماعية على السكان المحليين في المناطق المحيدة بالمشروع؟

لا
نعم

س: هل هناك إعدادات أو متطلبات من قبل السكان المحليين ب ساعة الأراضي المائية عليها المشروع؟

لا
نعم

س: /بسبب أعمال إنهاء مشروع الماء/المجري هل تم تشغيل إعدادات لمحاولة زراعية أو الشجر أو أي غطاء نباتي محدود عاليته لمواطني أو السكان المحليين؟

لا
نعم

س: /هل تضررت مصالح المواطنين قانونية بالقرب من المشروع بسبب أعمال إنهاء التأهيل؟

لا
نعم

س: هل هناك أي بياني تحتوي مؤقتة أو دائمة تقع دوراً أساسيًا في النشاطات الخيرية البرمجية للسكان سانتوتان بتلبية تأهيل مشروع الماء/المجري؟

لا
نعم

س: /هل أن أعمال إنهاء مشروع الماء/المجري ستشتري بإجراءات إعدادات لتوتيت نشاطات (وا) لأشخاص إلى مناطق جديدة؟

لا
نعم

س: /هل تم استخدام إعدادات إنهاء مشروع الماء/المجري بطريقة ما من قبل السكان المحليين. عما إذا كان الأراضي تابعة للدولة؟

لا
نعم

س: /هل تتوقع وجود تأثيرات اجتماعية سلبية بالمنطقة نتيجة أعمال إنهاء التأهيل؟ ما هي؟

لا
نعم

س: /هل هناك تغييرات مدنية أو ضرر في الطبيعة الاجتماعية من جراء أعمال إنهاء التأهيل؟

لا
نعم

س: /ما هي المجتمع الأكثر ضعفاً وتشكيكًا التي من المحتمل أن تتكاثر أعمال إنهاء التأهيل؟

لا
نعم

س: /يرير مشروع من عمليات القنال ويقلب من التحول المجتمعية الموجودة بالقرب من منطقة المشروع؟

لا
نعم

س: /هل يحتاج الموارد المجموح بالقرب من موقع المشروع إلى وضع علاقات تطوعية أو استثمارية لزيادة مشاركات الإن و الإعانات المستلم من مشروع الماء/المجري؟

لا
نعم

اسم وتوقيع المشاركين

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