6.2.3. 2nd step of the site selection

(1) Evaluation results of three likely candidate sites

The JICA Study Team evaluates the three candidate sites (Nasiryah, Hartha 2 and Alkahala Emara sites) based on the related information and data provided by MOE.

The evaluation points are as follows.

- Cost efficiency (Soil improvement, Transmission line reinforcement, Additional pipeline length)
- Infrastructure conditions (National gas pipeline, Transportability, Land expropriation)
- Social and natural environment negative impact

The comprehensive rank of three likely candidate sites is shown in Table 6-2, and the dry natural gas pipeline map is shown in Figure 6-5.

Table 6-2 Comprehensive rank of three likely candidate sites for thermal power plant

Evaluation Point		Nasiryah	Hartha 2	Alkahla Emara
Location		Beside Existing TPP	Opposite bank of Existing TPP	Right bank of Alkahla River
Land Area		51ha	More than 100ha	More than 100ha
Economical Efficiency	Bearing Pile Length	Less than 30m	Around 30 m	Less than 30m
	Transmission Line Length Reinforced	Distance from Baghdad 337km	Distance from Baghdad 495km	Distance from Baghdad 361km
	Additional Pipe Line Length	10 km from National Gas Pipeline	Vicinity of Eastern Gas Pipeline	20 km from Eastern Gas Pipeline
Infrastructure Conditions	National Gas Pipeline	One is under construction and the other is planned to construct by 2014	Eastern gas pipeline is planned to construct by 2015	Eastern gas pipeline is planned to construct by 2015
	Transportability	Waterway, Railway and Road are available	Waterway, Road and Airport are available	Only road (one-lane road) is available
	Land Expropriation	Owner is MOE	Owners are the local people	Owner is MOF, the local people rent the land
ent	Resettlement	Nil	Involuntary resettlement is anticipated	Involuntary resettlement is anticipated (many bricks factories exist)

Evaluation Point		Nasiryah	Hartha 2	Alkahla Emara
	National Park World Heritage	Out of National Park No heritage	Out of National Park No heritage	Out of National Park No heritage
	Endangered Species	Nil	Nil	Nil
Rank of Economical Efficiency		1	3	2
Rank of Infrastructure Conditions		1	2	3
Rank of Environment		1	2	3
Comprehensive Rank		**1**	**2**	**3**

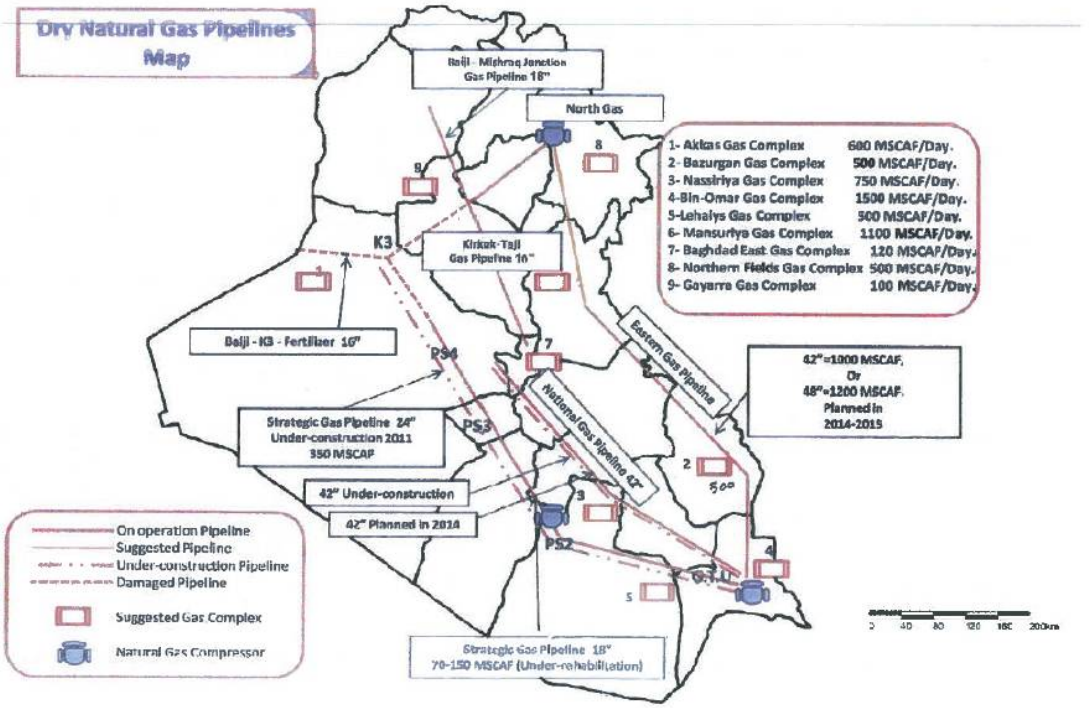


Figure 6-5 Development plan of gas pipelines[89]

All candidate sites have no critical problems for development of TPP. Nasiryah site (Nasiryah II site) is ranked as the highest priority site among three likely candidate sites, since infrastructure conditions (national gas pipeline, transportability and land expropriation) are already basically established. Therefore, Nasiryah site is selected as a Feasibility Study site.

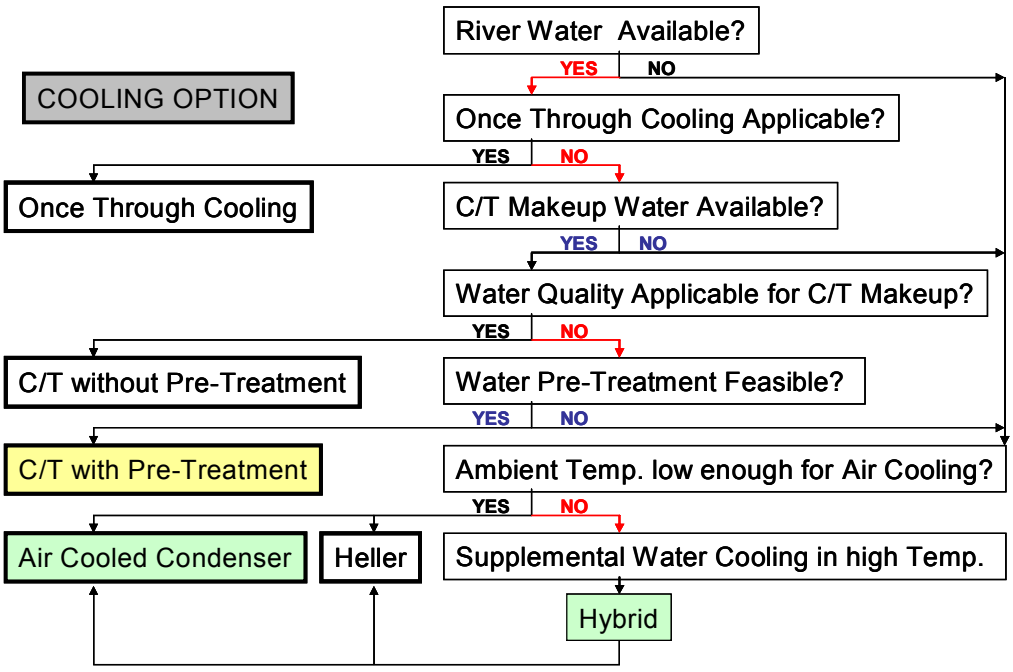
[89] Master Plan Final Report (2010)

(2) Detailed information on evaluation of each candidate sites

Detailed information and data on evaluation items of Nasiryah, Hartha 2 and Alkahla Emara sites are summarized in Appendix 5, 6 and 7.

6.3. Selection of cooling system for Nasiryah II

Steam turbine condenser cooling options are compared from technical, economical and environmental points of view. Regarding the environmental aspect, the following points are considered: decline of the entire water discharge of the Euphrates and Tigris Rivers, increase of water consumption, and important marshlands downstream. Figure 6-6 shows the flowchart of the comparison exercise of the options.



CT: cooling tower

Figure 6-6 Flow of the comparison exercise of cooling options

Once through cooling option: It is rejected because of the national policy of Iraq; once through cooling is not allowed for newly constructed thermal power plant.

Cooling tower (C/T) without pre-treatment: It is rejected because of high salinity level of Euphrates River. Its TDS value ranges from 2,860 to 2,900 (Table 5-7) and this water quality may cause damage to cooling tower.

C/T with pre-treatment: Although it is once considered as the optimal option for the Project, it is finally rejected because of decline of water of Euphrates River (refer to Table 5-3, Table 5-16 and Figure 5-13).

Heller: It is rejected because of cost and its requirement on area.

Hybrid Air cooled condenser: Air cooled condenser (ACC) is selected since it does not require water. However the region of the Project record high temperature (over 40 °C) during day time in summer, the efficiency of the function goes down. Therefore a hybrid air cooled condenser (Hybrid ACC) is considered as the cooling option for the Project. Hybrid ACC sprays water for cooling down the air only when high temperature (over 40 °C) is recorded. It requires much less water than C/T option.
Table 6-3 shows the water requirements of C/T and Hybrid ACC are compared: raw water from river (1st row).

Table 6-3 Results of the comparative study of water flow of C/T and Hybrid ACC

(the water flow is calculated per train)	**C/T water flow (unit: t/h)**	**Hybrid ACC water flow (unit: t/h)**
Raw water from river	1,500	470
Pre-treatment back-wash and rejection water	306	96

The estimated water requirement volume of the Hybrid ACC is under the condition of 50 °C. It indicates that water requirement under other conditions (e.g. at 40 °C) is much less than the figure shown in Table 6-3. This is because no spray water is required under 40 °C. According to the climate data around Nasiryah, high temperature (over 40 °C) is usually recorded from May to September, and it is recorded only day time. The time duration that requires spray water is therefore short.
The raw water from the Euphrates River is desalinized through RO system, and rejection water is discharged to the river. Because of the high salinity of the raw water (c. 3,000 TDS value), the rejection water has higher salinity (i.e. 6,000 – 9,000 TDS value). Table 6-3 compares the discharge water of C/T and Hybrid ACC: pre-treatment back-wash and rejection water (2nd row). The estimated discharge water from the Hybrid ACC is less than the C/T. The Hybrid ACC therefore is identified as "the least water consumption and the least waste water discharge" system, and selected as the cooling system of Nasiryah II.
For the Hybrid ACC, 54 cells of fin-fans are planned to be installed for each steam turbine.

Since the plot plan is design to have enough distance (50 m) [90] from the facility to the site boundary, the noise from the cells is expected not to exceed the standards (70 dBA).

Considering the above-mentioned points, the Hybrid ACC is selected as the cooling system for Nasiryah II.

6.4. Selection of generation and fuel types for Nasiryah II

Three generation types are considered to meet the master plan (2010) for Nasiryah II: CC; GT; and ST. The study to compare the three generation types is conducted from technical, economical and environmental points of view.

Table 6-4 shows the results of the comparative study of the three generation types. In conclusion, CC has better performances in technical, financial and environmental aspects than other two generation types, and CC has been selected for Nasiryah II.

Table 6-4 Results of the comparative study of the three generation types

		CC	GT	ST
Output		1,800MW	1,800MW	1200MW
		900MW x 2	300MW x 6	600MW x 3
Minimum output		450MW (50% of 1 train)	150MW (50% of 1 GTG)	180MW (30% of 1 unit)
Fuel		Natural gas	Natural gas	Residual oil
Fuel cost (USD/mmBTU)		5	5	16
Construction cost (USD/kW)		744	561	894
Operation and Maintenance cost	Fixed (USD/kW/year)	14.6	43.8	51.2
	Variable (USD/MWh)	3.11	12.4	3.51
Life (years)		25	25	25
Efficiency at rated net output (%)		57.3	38.7	41.0

[90] A study in India indicates that the noise level from an ACC reduces to 70dB at the point of 50 m from the ACC (ENERGO Engineering Projects Limited, 2009).

Forced outage rate (%)	6	33	6
Scheduled outage (days/year/unit)	21	12	34
Unit CO_2 emission (ton-C/MWh)	0.096	0.142	0.176
Other environmental considerations (emission of NOx and SOx)	NOx: low SOx: Nil	NOx: low SOx: Nil	NOx: middle SOx: middle

Applied assumptions are as follows:

Fuel Cost: US Energy Information Administration published Annual Energy Outlook 2010 that stated natural gas price and residual fuel oil price in 2015 as per the below figures.

Natural gas	5.54 USD/Million BTU	
Residual fuel oil	97.61 USD/bbl	
	15.8 USD/Million BTU	(assuming 41MJ/litre)

The residual fuel oil is assumed to be of low sulphur content (less than 1%) and priced on the FOB power plant basis in USA including freight charge to power plant.

Construction Cost: The CC construction cost is roughly estimated by GT-Pro[91] assuming the power plant is located in USA. The construction costs for simple GT and simple ST are respectively estimated in consideration of the cost for complete CC and the construction factors illustrated in the authorized report[92].

Operation and Maintenance Cost: All figures of annual &M cost are derived from the report[47].

Efficiency: Thermal efficiency of each type is calculated by GT-Pro. As for ST plant, the typical thermal efficiency of a 600MW class plant is applied.

Forced Outage Rate (FOR): Typical figures of FOR are cited from NERC Generating

[91] GT-Pro software commercially supplied by Thermoflow corporation is used to set out outline of a single shaft CCGT system based on model number M701F4 of Mitsubishi Heavy Industry Co. Dry Bulb=30℃ and Wet Bulb=20℃ are assumed respectively as atmosphere condition.

[92] Technical and Economic Assessment of Grid, Mini-Grid and Off-Grade Electrification Technologies, The World Bank Group Energy Unit, Energy, Transport and Water Department, September 2006

Availability Report 2006 - 2010 Annual Unit Performance Statistics. In USA, a simple cycle GT has the higher FOR compared to other types. Because it is obliged to undertake frequent start-and-stop operations as a peaking power supply source, its FOR could be higher under such severe operational condition. It is however supposed that FOR could be same between simple cycle GT and CC in Iraq. Because simple cycle GT could be operated continuously at its full capacity in Iraq.

Scheduled Outage: All figures of scheduled outage are derived from NERC Generating Availability Report 2006 - 2010 Annual Unit Performance Statistics.

Generating cost: Assuming the annual plant factor is 80%, the power generating cost of each type is shown as Table 6-5.

Table 6-5 Generating cost

(Unit: Cent/kWh)

		CC	GT	ST
Fixed	Capital	1.2	0.9	1.3
	O&M cost	0.2	0.6	0.7
Variable	O&M cost	0.3	1.2	0.4
	Fuel	3.0	4.4	13.3
Total		4.7	7.2	15.7

Figure 6-7 shows numerical relation between availability factor and generating cost. CC is the most advantageous through every factor area.

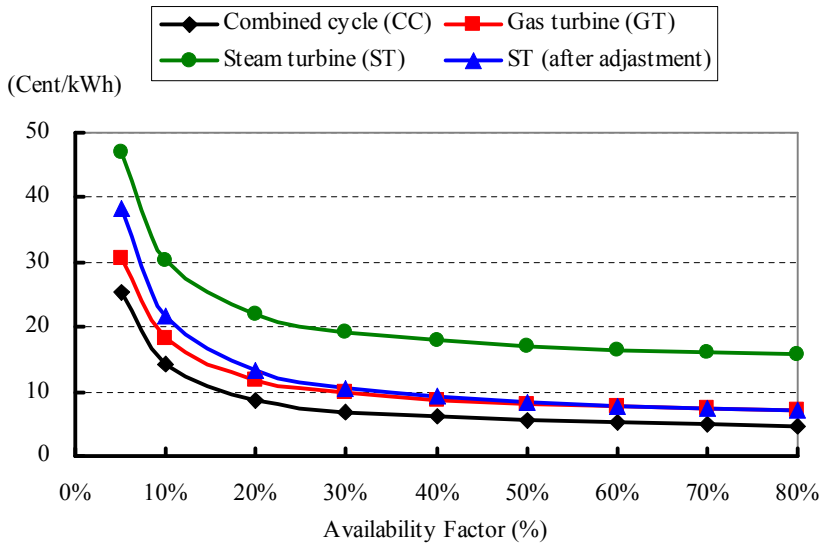


Figure 6-7 Relation between availability factor and generating cost

Supply reliability: Table 6-6 shows forced outage rate and scheduled outage of each generation type. The total output of each generation type was lined up at 1,800MW so as to precisely compare reliability of each generating type.

Table 6-6 Forced outage rate and scheduled outage

	CC	GT	ST
	900MW x 2	300MW x 6	600MW x 3
Forced outage rate (%)	6	33	6
Scheduled outage (days/year/unit)	21	12	34

Table 6-7 shows Loss of Load Expectation (LOLE) representing level of power supply reliability of each generation type. CC has the lowest LOLE and most reliable among the alternatives. ST has the same FOR=6% as CC, and it requires longer annual maintenance period than CC. Since CC has the biggest capacity per unit, it expects a big impact when it has FO.

Table 6-7 LOLE value

	CC	GT		ST
		FOR = 33%	FOR = 6%	
LOLE Value (hours/year)	18.7	51.7	12.3	18.5

Environmental impact (CO2 emission): Table 6-8 shows the calculated CO_2 emissions in a 1,800MW development case assuming the plant factor is 80%. As a result, CC has the lowest CO_2 emission.

Table 6-8 CO_2 emission

	CC	GT	ST
	900MW x 2	300MW x 6	600MW x 3
Fuel	Natural gas	Natural gas	Residual oil
CO_2 emission (million kg-CO_2)	4,447	6,584	8,124
Unit CO_2 emission (kg-CO_2/kWh)	0.35	0.52	0.64

Other environmental considerations: Table 6-9 shows relative emissions rate from each fuel type. CC uses natural gas and natural gas has better environmental features than oil and coal.

Table 6-9 Emissions from each fuel type[93]

	Natural gas	Oil	Coal
NOx	20 - 37	71	100
SOx	Nil	68	100
Note: The value of each pollutant is NOT absolute one but relative value comparing the one of the coal.			

[93] Agency for Natural Resources and Energy, Japan (2010), White Book on Energy (in Japanese)

7. Environmental impacts

The potential impacts and their analysis due to the Project are discussed in the following sections. They are categorized into the two stages: the construction and the operation stages.

In this chapter, impacts are identified and their mitigation measures are proposed. Some of the expected impacts are already avoided or mitigated by the basic design (refer to "3. Project description) and by the site selection and equipment (refer to "6. Analysis of alternatives"). The detailed mitigation measures taken in the two stages are described in the next chapter - "8. Environmental management plan".

Each item in "Environmental Pollution", "Natural Environment" and "Social Environment", which is described in the Scoping in chapter "4. Approach and methodology", is examined one by one, and summarized in a tabular form in the last page of each stage's description.

7.1. Environmental impacts during the construction stage

7.1.1. Environmental pollution

(1) Air pollution

- Impact origin and analysis

SOx, NOx and smoke dust from construction machines and heavy transportation vehicles are expected. The impact is expected in and around the construction site, and along the access roads to the site. The impact is expected to be low, and is to be mitigated.

Erath works may cause soil dust pollution. The impact is expected in and around the construction site. The impact is expected to be low, and is to be mitigated.

- Mitigation measures

Regarding the emissions from the machines and vehicles, regular monitoring and maintenance shall be conducted to keep these machines and vehicles in good conditions.

Mitigation measures such as utilization of soil cover, regular spraying the dusty area with water, regular maintenance of the access roads shall be conducted to prevent soil dust pollution.

At junctions where traffic jam is expected, an appropriate traffic control is introduced to reduce the emission from the vehicles as much as possible.

(2) Water pollution

- Impact origin and analysis

Cleaning water for the machines and vehicles, drainage water with soil and sewage from the camp may contaminate the Euphrates River. The impact is expected in the river. The impact is expected to be low, and is to be mitigated.

During the construction of the intake for cooling water, the river bed of the Euphrates River is disturbed, and the turbidity is increased. The impact is expected in the river. The construction works shall be planed to give the smallest impact to the river bed.

- Mitigation measures

Fences are established around the excavation works to prevent soil erosion, and temporal settlement pond is prepared to decrease turbidity of the discharged water.

Since cleaning water for machines and vehicles may contain oil / grease and chemicals, they shall be separated from water and be kept in temporal storage tanks. Sewage from the camp shall be treated by temporal septic tanks.

The construction of the intake shall be designed and carried out to be confined in the smallest area to be disturbed. The construction timing shall also be considered to prevent the disturbance as little as possible. The months of the lowest water level can be the candidate of the construction works.

(3) Solid wastes

- Impact origin and analysis

Two kinds of solid wastes are expected; industrial solid wastes such as scrap metals and waste oil, and domestic wastes such as papers and food wastes. Inappropriate management of these wastes may cause contamination of river water and/or underground water, and hygiene problems.

Industrial wastes are segregated according their characteristics such as hazardousness/ toxicity, and treated by the contractor under MOE's supervision.

Regarding the domestic wastes, since the local workers are to be employed, the domestic wastes are expected to be small. The impact is expected to be low, and is to be mitigated.

- Mitigation measures

A solid waste management programme shall be formulated to reduce and sort out wastes into appropriate groups to be discarded.

The workers shall be given a basic waste management education at the beginning of their employment to reduce the domestic wastes at the camp as much as possible. Since the existing Nasiryah TPP has been trying to re-use or recycle the wastes, domestic wastes are recycled as much as practical.

(4) Noise / vibration

- Impact origin and analysis

The machines and vehicles are expected to make noise and vibration. For example, the following heavy machines and vehicles are to be deployed: dump trucks, backhoes, bulldozers, hydraulic hammers, truck cranes and cement mixer trucks. The impact is expected to be confined in the construction site and low, and is to be mitigated.

The traffic may cause impact by vibration along the access road.

- Mitigation measures

The latest noise-reduction machines and vehicles shall be deployed, and schedule of these machines and vehicles are managed to standardize the work loads to reduce noise as much as possible.

All vehicles are to be instructed to observe speed limit and to avoid over load. Some parts of the access road may need to be repaved.

At junctions where traffic jam is expected, an appropriate traffic control is introduced to reduce the noise and vibration from the vehicles as much as possible.

(5) Odor

- Impact origin and analysis

The construction works are expected basically not to produce any bad odor. At the camp, inappropriate management of the domestic wastes may induce bad odor. The impact is expected to be confined in the construction site and very low, and is to be mitigated.

- Mitigation measures

Appropriate domestic waste management shall be introduced at the camp.

7.1.2. Natural environment

(1) Climate

- Impact origin and analysis

If large area of forest is cut down or wetland is reclaimed, local climate may be affected. During the construction stage, there is no such a case is planned, and impact on the climate is not expected.

- Mitigation measures

It does not need any mitigation measures.

(2) Hydrology

- Impact origin and analysis

If large area is topographically changed or large amount of water is extracted, local hydrology may be affected. During the construction stage, there is no such a case is planned, and impact on the hydrology is not expected.

- Mitigation measures

It does not need any mitigation measures.

(3) Flood

- Impact origin and analysis

If large area is topographically changed or large area of forest is cut down, local flood mechanism may be affected (e.g. the area may become prone to flooding). During the construction stage, there is no such a case is planned, and impact on the flood mechanism is not expected.

- Mitigation measures

It does not need any mitigation measures.

(4) Underground water

- Impact origin and analysis

If large amount of water is extracted, local underground water (aquifer) may be affected. During the construction stage, there is no such a case is planned, and impact on the underground water is not expected.

- Mitigation measures

Regarding the extraction of water, it does not need any mitigation measures.

(5) Ground subsidence

- Impact origin and analysis

If large amount of water is extracted, aquifer may shrink and ground may subside. During the construction stage, there is no such a case is planned, and ground subsidence is not expected.

- Mitigation measures

It does not need any mitigation measures.

(6) Soil

- Impact origin and analysis

Soil erosion may happen due to rain and/or wind. The impact is expected to be confined in the construction site and low, and is to be mitigated.

- Mitigation measures

Refer to the mitigation measures described in "7.1.1 (1) Air pollution and (2) Water pollution".

(7) Protected areas

- Impact origin and analysis

If project site is within or in a close vicinity of a protected area, precious natural environment of the protected area may be affected.

The boundary of the proposed national park is about 50 km downstream of the site, and impact on the protected area is not expected.

- Mitigation measures

Mitigation measures such as careful site selection has already been taken to avoid impact on the proposed national park (protected area).

(8) Terrestrial ecosystem

- Impact origin and analysis

If project site has important terrestrial ecosystem, construction works may eliminate the local terrestrial ecosystem.

The site has already been prepared for the industrial development. Although there may be some common species in the site, little impact on the terrestrial ecosystem is expected.

- Mitigation measures

Mitigation measures such as careful site selection has already been taken to reduce impact on the terrestrial ecosystem.

(9) River ecosystem

- Impact origin and analysis

If large amount of water is extracted from river, river water quality is deteriorated by water contamination or large area of river bed is disturbed for a long time, local river ecosystem may be affected.

During the construction stage, the river water quality may decrease by drainage water discharge and a small area of the river bed of the Euphrates River is disturbed. Some impacts on the river ecosystem are expected, and to be mitigated.

- Mitigation measures

Refer to the mitigation measures described in "7.1.1 (2) Water pollution".

(10) Endangered species

- Impact origin and analysis

If project site is within or in a close vicinity of an important habitat for endangered species, endangered species may be affected.

The site is not located in the vicinity of the IBAs and the site does not have good habitat for endangered species (refer to "7.1.2 (8) Terrestrial ecosystem"). Impact on endangered species is not expected.

- Mitigation measures

Mitigation measures such as careful site selection has already been taken to avoid impact on the endangered species.

(11) Global warming

- Impact origin and analysis

CO_2 emission from the construction machines and vehicles gives impact on global warming. The impact shall be mitigated to reduce the emission as much as possible.

- Mitigation measures

Refer to the mitigation measures described in "7.1.1 (1) Air pollution".

7.1.3. Social environment

(1) Involuntary resettlement

- Impact origin and analysis

If local people live or their working places (e.g. a factory) are located within a project site, it is necessary to relocate their houses and/or factories.

There is neither house nor factory within the site, and no involuntary resettlement occurs. The site belongs to MOE, and the expropriation of the land does not occur.

- Mitigation measures

Careful site selection as a mitigation measure has already been taken to avoid involuntary resettlement.

(2) Employment / livelihood

- Impact origin and analysis

The local economy of the Nasiryah City has not been developed well (refer to "5. Baseline data") and the aspiration of the local people is to obtain benefits from the Project (refer to "9. Consultation"). Positive impact on employment and livelihood of the local people by the Project is expected. During the construction, 1,000 workers/day is expected as an average figure, and 1,500 workers /day at a peak of the construction.

- Mitigation measures

The local people shall be given the highest priority to be employed as workers during the construction stage. Since they are supposed to be unskilled, adequate and basic trainings shall be given to the local people in close collaboration with the local authorities. Appropriate and acceptable guidelines for employment qualification shall be formulated before the construction stage to give fair and equal opportunities of the employment for the local people. It is also important to avoid and mitigate negative impact on the local people such as anxiety, envy and excessive expectation (refer to "7.1.3. (12) Uneven distribution of benefits and losses").

(3) Local economy

- Impact origin and analysis

The local economy shall also receive positive impact from the construction works.

- Mitigation measures

As described in "(1) Employment / livelihood" above, the local people shall be given the highest priority to be employed as workers.

(4) Land utilization

- Impact origin and analysis

If project needs to change land utilization of site, impact on land utilization such as compensation may be expected.

The site belongs to MOE, and impact on land utilization is not expected.

- Mitigation measures

Careful site selection as a mitigation measure has already been taken to avoid such an impact.

(5) Social infrastructure / service facilities

- Impact origin and analysis

As an adverse impact, transportation by heavy vehicles may damage bridges and roads. Impact on traffic around the Project site such as traffic congestion is expected, and to be mitigated.

Regarding social service facilities such as hospital and school, they have some distances (about 5 km) from the Project site. Impact is not expected.

- Mitigation measures

Damaged social infrastructure shall be repaired by MOE as soon as MOE is informed by the local authorities. Issues on the traffic are described in "(7) Land traffic" below.

(6) River traffic

- Impact origin and analysis

If river is used for local people for their main transportation route, the construction of intake may affect the river traffic. In the vicinity of the Project site, the Euphrates River is not used as the main transportation route. Impact on the river traffic is not expected.

- Mitigation measures

The local people who may use their own small boats for their transportation will be notified well in advance about the construction of the intake: its location and the construction period.

(7) Land traffic

- Impact origin and analysis

Number of vehicles will increase and there may be impacts such as traffic congestion. Heavy vehicles may damage infrastructure such as roads and bridges. Especially when the initial earth formation works are implemented, since the number of dump trucks is tentatively expected to be 800 /day for six (6) months, the impact is expected between the borrow pit and the Project site.

The impacts may be expected on the access roads to the site, and is to be mitigated.

- Mitigation measures

Regarding the traffic congestion, during the initial earth formation works phase, a special traffic control plan needs to be established to mitigate the impact because of the heavy traffic of the dump tucks.

During the plant construction phase, since the site is located at the outskirt of the city, appropriate schedule management of the construction vehicles is established to avoid traffic congestion around the site during the plant construction stage.

Big buses will be used to transport the local employers from the city to the site to reduce the number of vehicles. Road signs shall be established for smooth traffic flow around the site.

MOE shall be informed by the local authorities on damaged traffic infrastructures, and MOE shall take appropriate actions to repair them.

(8) Sanitation

- Impact origin and analysis

Sewage and domestic wastes from the camp are expected. The impact is confined in the camp, and is to be mitigated.

- Mitigation measures

Regarding the sewage, septic tanks are placed to treat sewage.

The workers shall be given a basic waste management education at the beginning of their employment to reduce the domestic wastes at the camp as much as possible.

(9) Risks for infectious diseases such as HIV/AIDS

- Impact origin and analysis

If project employs migrant workers, there are risks that they may bring infectious diseases from outside. The Project shall employ the local people, and there is not a big risk to receive infectious diseases from outside.

- Mitigation measures

Since prevention is one of the most important mitigation measures for the infectious diseases, the following measures shall be taken: regular medical check-up and a basic health education to the workers at the beginning of their employment.

(10) Local custom

- Impact origin and analysis

If project employs migrant workers, they may cause troubles with local people due to cultural differences. Since the Project shall employ the local people, impact is not expected.

- Mitigation measures

The Project shall employ the local people.

(11) Burden on socially vulnerable groups

- Impact origin and analysis

If project interferes with their rights without any appropriate measures, they may receive impacts. Since there are no settlers within nor in the close vicinity of the Project site, it is expected that the Project does not interfere the right of socially vulnerable groups.

- Mitigation measures

Regarding the employment, refer to the next item - "(12) Uneven distribution of benefits and losses".

(12) Uneven distribution of benefits and losses

- Impact origin and analysis

Without appropriate and acceptable guidelines for employment qualification, it may give unfair impression to the local people and may cause social conflict among them.

- Mitigation measures

With close consultation with the local leaders and authorities, appropriate and acceptable guidelines for employment qualification shall be established before the construction stage.

(13) Utilization / Right of water, including groundwater

- Impact origin and analysis

Although water pollution may cause impact on fishery, there is no commercial fishery in the vicinity of the Project site.

The Project does not use any ground water and there is no activity which gives impact to ground water during the construction.

- Mitigation measures

Refer to "7.1.1 (1) Water pollution".

(14) Cultural heritage

- Impact origin and analysis

If there is local or national cultural heritage in the Project site, impact is expected.

In and in the vicinity of the Project site, there is neither local nor national heritage, and impact is not expected.

- Mitigation measures

Careful site selection as a mitigation measure has already been taken to avoid such an impact.

(15) Landscape

- Impact origin and analysis

If project site is close to local or national heritage, or important social infrastructures such as school, its existence may give impact on landscape.

The Project shall be implemented in the industrial area. The site is about 17 km from the Uru proposed World Heritage Site, and at some distances from social infrastructures such as hospital. Impact on landscape is not expected.

- Mitigation measures

Careful site selection as a mitigation measure has already been taken to avoid such an impact.

(16) Accident

- Impact origin and analysis

Accidents may happen at the construction site, and traffic accidents may happen around the site.

- Mitigation measures

Regarding the accidents at the construction site, a health and safety plan shall be formulated and safety activities shall be conducted based on the plan. A basic education on safety shall be given to the local people at the beginning of the employment.

Regarding the traffic accidents, a basic education shall be given to the drivers on a safety drive. For other mitigation measures, refer to "7.1.3 (7) Land traffic".

Table 7-1 Project activities and potential impacts for Nasiryah II: construction stage

Items (construction stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
(1) Environmental Pollution	1	Air pollution	▪ SOx, NOx and smoke dust from construction machines and heavy transportation vehicles ▪ Dust from the earth works	Adverse (A)	L (M at road junction)	To be mitigated (refer to "8. Environmental management plan").
	2	Water pollution	▪ Cleaning water for the machines and vehicles, drainage water with soil and sewage from the camp ▪ The construction of the intake for cooling water (the turbidity to be increased)	A	L	To be mitigated (refer to "8. Environmental management plan").
	3	Solid waste	▪ Industrial solid waste ▪ Domestic wastes from the camp	A	M L	To be mitigated (refer to "8. Environmental management plan".
	4	Noise/Vibration	▪ Noises from machines and vehicles	A	L (M at road junctions)	To be mitigated (refer to "8. Environmental management plan").
	5	Odor	▪ Bad odor from the domestic wastes at the camp	A	(very low)	To be mitigated (refer to "8. Environmental management plan").

Items (construction stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
(2) Natural Environment	1	Climate	▪ Not expected: Large area of natural environment such as forest and/or wetland is not cleared.	Not Expected (N.E.)	-	-
	2	Hydrology	▪ Not expected: Large area of natural environment such as forest and/or wetlands is not or cleared.	N.E	-	-
	3	Flood	▪ Not expected: Large area of natural environment such as forest and/or wetlands is not or cleared.	N.E	-	-
	4	Underground water	▪ Not expected: There is no plan to extract water from underground aquifer.	N.E	-	-
	5	Ground subsidence	▪ Not expected: There is no plan to extract water from underground aquifer.	N.E	-	-
	6	Soil	▪ Soil erosion due to rain and/or wind	A	L	To be mitigated (refer to "8. Environmental management plan").
	7	Protected areas	▪ Not expected: It has been avoided by the site selection.	N.E	-	-
	8	Terrestrial ecosystems	▪ Not expected: It has been avoided by the site selection.	N.E	-	-
	9	River ecosystems	▪ Water discharge and the construction of the intake	A	L	To be mitigated (refer to "8. Environmental management plan").
	10	Endangered species	▪ Not expected: It has been avoided by the site selection.	N.E	-	-
	11	Global warming	▪ CO2 emission from the construction machines and vehicles	A	L	To be mitigated (refer to "8. Environmental management plan").

Items (construction stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
(3) Social Environment	1	Involuntary resettlement	▪ Not expected: It has been avoided by the site selection.	N.E	-	-
	2	Employment/ livelihood	▪ Employment by the Project	Beneficiary (B)	M	No mitigation measure is taken but careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	3	Local economy	▪ Employment by the Project ▪ Procurement of minor things by the Project	B	M	No mitigation measure is taken but careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	4	Land utilization	▪ Not expected: It has been avoided by the site selection. The land has been prepared for an industrial development.	N.E	-	-
	5	Social infrastructure/ service facilities	▪ Damages on some social infrastructure such as bridges and roads by heavy vehicles	A	M	To be mitigated (refer to "8. Environmental management plan").
	6	River traffic	▪ The Euphrates River in the vicinity of the Project is not used for the main transpiration route for the local people.	N.E	-	The local people who use their own small boats for their transportation will be notified well in advance about the construction of the intake: its location and the construction period.
	7	Land traffic	▪ Traffic congestion by vehicles. ▪ Damages to the infrastructure such as roads and bridges.	A	L M (traffic congestion at junction at the initial phase))	To be mitigated (refer to "8. Environmental management plan").

Items (construction stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
					M (damages)	
	8	Sanitation	▪ Sewage and domestic wastes from the camp	A	L	To be mitigated (refer to "8. Environmental management plan").
	9	Risks for infectious diseases such as HIV/AIDS	▪ The Project shall employ the local people, and there is not a big risk to receive infectious diseases from outside.	A	L	The prevention is the most important mitigation measures and it is to be considered in "8. Environmental management plan".
	10	Local custom	▪ Not expected: It can be been avoided by employing the local people, which has already been expressed to the local people at the stakeholders' meeting.	N.E	-	-
	11	Burden on socially vulnerable groups	▪ Not expected: It has been avoided by the site selection not to give any interference to these people, however equal and fair employment mechanism is desired..	N.E	-	Careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	12	Uneven distribution of benefits and losses	▪ Without appropriate and acceptable guidelines for employment qualification, it may give unfair impression to the local people and may cause social conflict among them.	A/B	L	Careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	13	Utilization /Right of water, including groundwater	▪ Not expected: Individual fishing for their own consumption may be considered.	A	(very low)	Mitigation measures for water pollution shall be considered (refer to "8. Environmental management plan").
	14	Cultural heritage	▪ Not expected: It has been avoided by the site selection. There is no	N.E	-	-

Items (construction stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
			cultural heritage within or in vicinity of the Project site.			
	15	Landscape	▪ Not expected: It has been avoided by the site selection. The land has been prepared for an industrial development.	N.E	-	-
	16	Accident	▪ Accidents at the construction site ▪ Traffic accidents around the site	A	L	To be mitigated (refer to "8. Environmental management plan").

Type of impact: A=adverse effect, B=beneficiary effect, N.E = not expected
Intensity of impact: L=low intensity, M=medium intensity, H=high intensity

7.2. Environmental impacts during the operation stage

7.2.1. Environmental pollution

(1) Air pollution

- Impact origin and analysis

Since natural gas is used as the fuel for the operation, air pollution is expected lower than burning oil or coal as fuel. Since the sulphur content of the natural gas is removed, the emission of SO_2 is not expected. However NOx is expected to disperse from the stacks, a simulation is conducted to evaluate its impact below.

The simulation is conducted for the two HRSG stacks, each of which has height of 60 m. The Bosanquet-Sutton simulation, a popular method for air pollution dispersion from stack, is applied for simulating the effluent from the two stacks. Since detailed information on the site (e.g. year-around weather conditions) is not available, the simulation is conducted as a preliminary one to identify whether any significant impacts are expected.

Table 7-2 shows the conditions are considered for the simulation.

Table 7-2 Conditions for the simulation

Specification of the emission		**Unit**
Flue gas amount	573	Nm^3/s
Flue gas temperature	115	°C
Stack leaving velocity	25	m/s
Stack height	60	m
NOx emission*	50	ppm
NOx emission amount	212	kg/h
Weather conditions		**Unit**
Wind speed	6	m/s
Wind stability	neutral	-

*Note: Since the standard of NOx emission in Iraq is 70 – 500 ppm (Table 2-6) and the one of IFC is 25 ppm, the simulation is conducted on the safe side.

Figure 7-1, 7-2 and 7-3 show the results of the simulation at 30°C, 40°C and 50°C respectively.

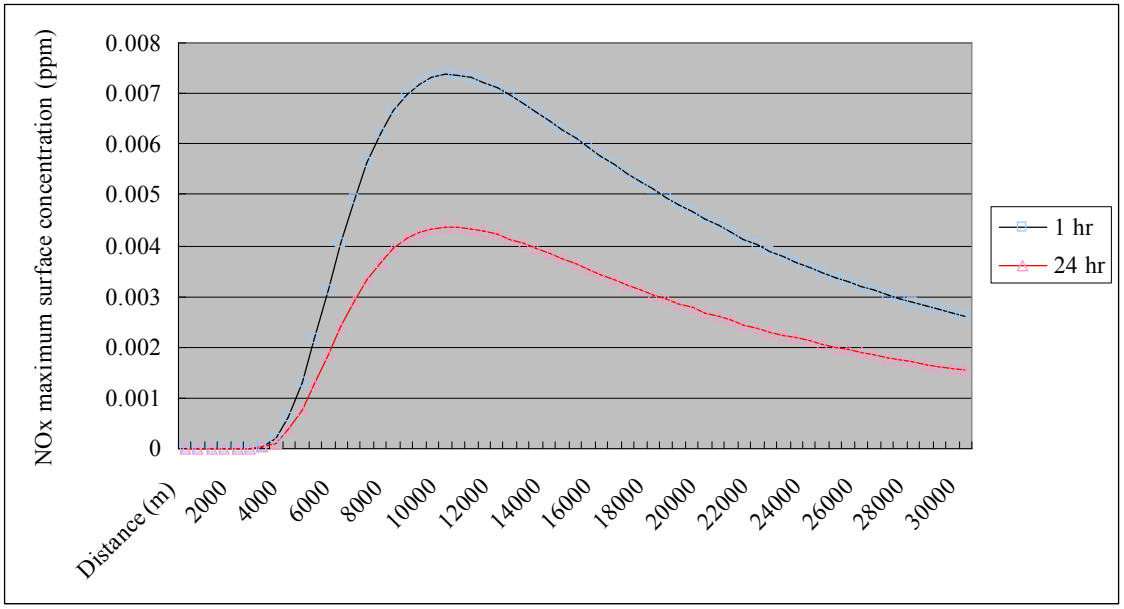


Figure 7-1 Simulation at 30°C

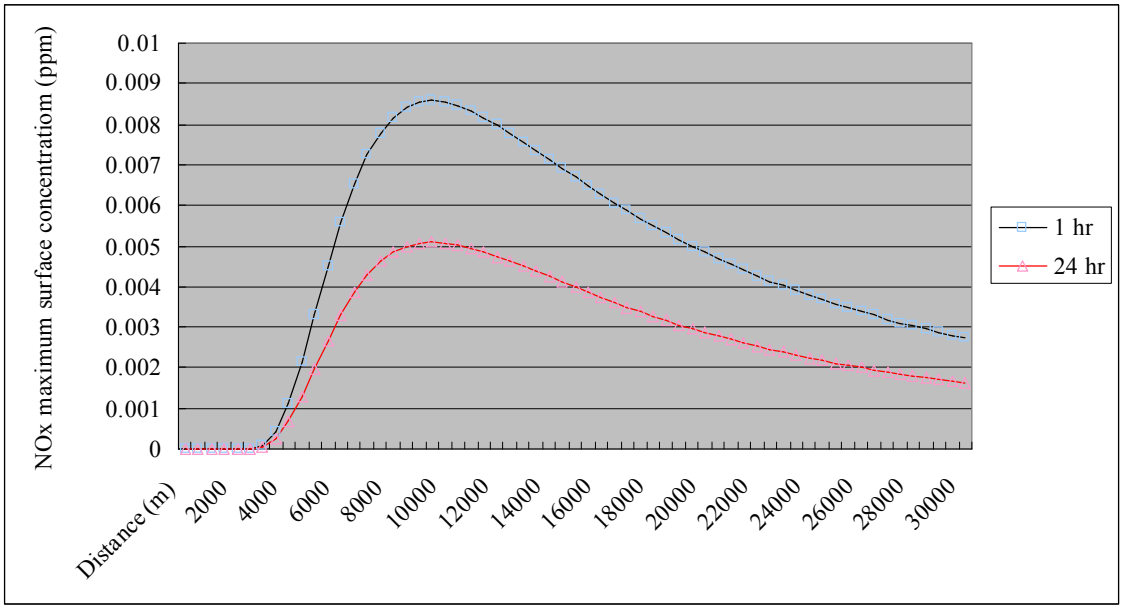


Figure 7-2 Simulation at 40°C

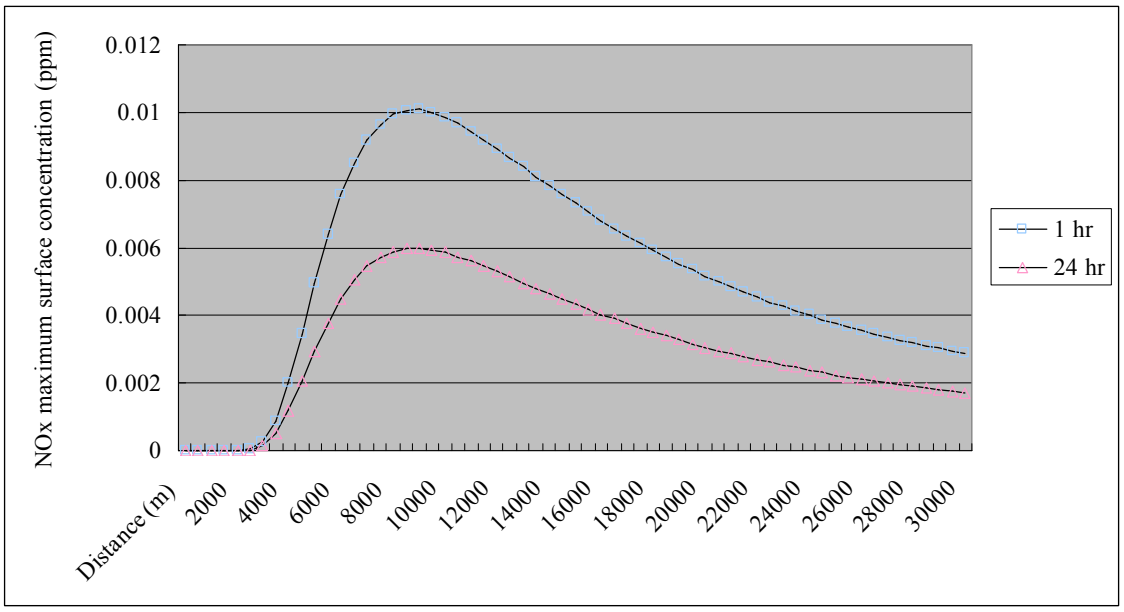


Figure 7-3 Simulation at 50°C

Table 7-3 shows the results of the simulation at the ambient air temperatures of 30, 40 and 50 °C. All figures of the maximum surface concentration are less than the Iraqi standard (Table 2-5).

Table 7-3 Results of the simulation

Ambient air temperature (unit: °C)	Duration	Maximum surface concentration (unit: ppm)	Iraqi standard (unit: ppm)	Distance of maximum surface concentration (unit: m)
30	1 hr	0.00737	0.04	10,175
	24 hr	0.00437	0.05	
40	1 hr	0.00859	0.04	9,496
	24 hr	0.00509	0.05	
50	1 hr	0.01008	0.04	8,823
	24 hr	0.00598	0.05	

Regarding cumulative impacts induced by the three TPPs (existing Nasiryah TPP, Nasiryah I and II), an assessment is not conducted because of the following reasons.

The baseline data (Table 5-10 and 5-11) were collected at two (2) sampling points for one (1) day, which are not sufficient to know the current status of the ambient air quality around the existing TPP. The exiting TPP sometimes stops or reduces its operation

because of its aging equipment and other factors such as cleaning steam turbine condensers, which makes it difficult to understand how the air effluents actually emit from the plant. Since detailed information of Nasiryah I is not available, it is not practical to conduct a simulation. Regarding Nasiryah II, as described in the previous lines, a simple simulation is conducted as a preliminary one to identify whether any significant impacts are expected.

- Mitigation measures

The mitigation measures have already been considered in the Project design. The natural gas is selected as fuel to reduce the air pollutants as much as possible. The stacks are designed to observe the Iraqi standards.

(2) Water pollution

- Impact origin and analysis

The effluents from Nasiryah II are categorized into two groups: RO rejection water and domestic waste water. The RO rejection water has high salinity concentrations, and they may cause impact to the river ecosystem and the people down stream of the Euphrates River. There is no standard for effluent water with high TDS.

Domestic waste water may contaminate the Euphrates River.

Since Hybrid ACC is applied for Nasiryah II, thermal effluent to the river is not expected.

Regarding the RO rejection water, the Hybrid ACC is the cooling system of the least water consumption and the least waste water discharge among the alternative systems (refer to 6.3.). Regarding the comparison with other TPPs, the existing Nasiryah TPP also has RO system and discharges of its rejection water at 150 t/h. The Hybrid ACC produces much less discharge water (c. 1/10 of the volume from the existing TPP per year). The impact is expected to be the smallest among the alternative systems (also refer to "7.2.2 (2), (7), (8), (9), (10) and 7.2.3 (13) for further assessment).

- Mitigation measures

Nasiryah II introduces the Hybrid ACC for the cooling system that is expected to give the smallest impact to the river.

The domestic waste water shall be treated by a septic tank to observe the Iraqi standard.

(3) Solid wastes

- Impact origin and analysis

Two kinds of solid wastes are expected; industrial solid wastes such as the sludge from waste water, oil and chemicals, and domestic wastes such as papers and food wastes. Inappropriate management of these wastes may cause contamination of river water and/or

underground water, and hygiene problems.

Solid waste management facility (landfilling site) within the plant site is proposed. Industrial solid wastes during the operation are expected to be the followings: dehydrated sludge (cake); deposits on the screen[94]; filter screens for gas turbines (exchange per 8,000 operation hours) and miscellaneous electric wires, and it is not expected to cause leachate generation. The amount of the solid wastes is expected to be 2,500 m^3 /year. They will be deposited at a solid waste management facility to prevent the impacts to the surrounding environment. The facility is constructed and managed under the IFC guidelines "Environmental, Health, and Safety Guidelines for Waste Management Facilities (2007). The profile of the facility is as follows:

Location - the western area of the plant site. The exact location should be determined after detailed survey of the area especially the depth of the groundwater level.
Capacity - 25,000 m^3 (100 m x 50 m, depth 3 m, dyke height 2m). The facility is expected to be functional for ten years.
Structure - Concrete pool with double containment and roofed.
Observation well – An observation well is established to monitor the ground water quality.

The facility is a concrete pool with double containment, and it is expected solid wastes do not drain to outside of the pool. It is roofed to prevent scatter of dried sludge to outside. Its location is carefully determined after the detailed area survey to avoid high groundwater level. It has the dyke with 2m height. The height is the same as the plant ground level not to be submerged by any flood. Regarding a risk of earthquake, since it is located within the plant site, the risk is low as discussed in "5. Baseline data". The impacts induced by the industrial solid wastes are expected to be limited.

Since the local workers are to be employed, the domestic wastes are expected to be small. The present recycling programme and exercises at the existing Nasiryah TPP are encouraged to be developed.

- Mitigation measures

A solid waste management programme shall be formulated to reduce and sort out wastes into appropriate groups to be discarded. Landfilling site should be monitored and maintained in an appropriate manner.

The workers shall be given a basic waste management education at the beginning of

[94] Some deposits may contain organic matters, and they should be segregated to be re-used or recycled such as fertilizers like the trial by the existing Nasiryah TPP.

their employment to reduce the domestic wastes at the plant as much as possible. Since the existing Nasiryah TPP has been trying to re-use or recycle the wastes, domestic wastes are also recycled as much as practical.

(4) Noise / vibration

- Impact origin and analysis

Although the machines are expected to make noise, the impact is confined within the plant site and there are sufficient distances between the main machines and the site boundary.

A distance of 50 m is set up from the Hybrid ACCs to the boundary of the plant and the noise level is expected to be less than 70 dBA at the boundary.

The gas turbines are in insulation enclosures and the noise level at 1 m aside of the turbine is expected to be less than 85 dBA. The insulated gas turbines are set up in a building and their noise level at the site boundary is expected to be less than 70 dBA.

Each steam turbine is also located in a building, and their noise level at the site boundary is expected to be less than 70 dBA.

Most vehicles deployed in the plant are not heavy construction ones but cars and buses, and the noise level of them are expected low. However, the traffic may cause impact along the access road.

Main facilities are expected not to produce any vibrations, and the impact is not expected. Vehicles are also expected not to produce vibrations which cause impact within the plant.

Regarding an impact to the residential area located at one (1) km from Nasiryah II (Thermal power plant 1 residential area: Figure 5-15) and cumulative impacts induced by the three TPPs, assessments are not conducted because of the following reasons.

The baseline data (Table 5-13) were collected at two (2) sampling points for one (1) day, which are not sufficient to know the current status of the noise level around the existing TPP. The exiting TPP sometimes stops or reduces its operation, which makes it difficult to understand how the noise comes from the plant. Although it is expected that the noise from Nasiryah I does not affect the residential area (Nasiryah II is located between the two locations), detailed information on noise sources of Nasiryah I is not available. Regarding Nasiryah II, although the main source of the noise is expected to be the Hybrid ACC, magnitude of its noise level is not known at the present moment, the details of which needs to be obtained from producers.

- Mitigation measures

The plot design is already set up enough distance from the Hybrid ACCs to the site

boundary. The machines are already designed to observe the Iraqi and international standards, and sufficient distances are allocated between the main machines and the site boundary.

If heavy vehicles are used, schedule of them are managed to standardize the work loads to reduce noise as much as possible.

All vehicles are to be instructed to observe speed limit and to avoid over load.

(5) Odor

- Impact origin and analysis

Nasiryah II is expected not to produce any bad odor. At the workers quarter, inappropriate management of the domestic wastes may induce bad odor. The impact is expected to be confined in the site and very low, and is to be mitigated.

- Mitigation measures

Appropriate domestic waste management shall be introduced at the workers quarter.

7.2.2. Natural environment

(1) Climate

- Impact origin and analysis

Nasiryah II will not produce huge heat which may affect the local climate.

- Mitigation measures

It does not need any mitigation measures.

(2) Hydrology

- Impact origin and analysis

If large amount of water is used by project, local hydrology may be affected.

The Project has considered the alternatives for its intake water and has selected Hybrid ACC system as the cooling system. The Hybrid ACC consumes the minimum amount of water from the Euphrates River, and it is expected to give the smallest impact to its hydrology.

Nasiryah II is expected to use the river water mainly from May to September when the river water level is relatively high. During that period, since the utilization of water occurs when the temperature exceeds 40 °C (i.e. not 24hour continues operation), the amount of the intake water is expected to be limited. In November, when the lowest river water flow was recorded in 2010, the plant is not expected to use water for the Hybrid ACC since it is winter time. Nasiryah II has already been granted the water quota from MWR, which manages the river water of Euphrates. Considering the decline of the water

quality and quantity of the rivers, MOE has been participating in the committee of the national water resource development strategy managed by MWR, and plans to raise the actual figure of river water demand for all the TPP projects planned over the country for better water management.

Regarding cumulative impacts induced by the three TPPs, an assessment is not conducted because of the following reasons.

The exiting TPP sometimes stops or reduces its operation because of its aging equipment and other factors such as cleaning steam turbine condensers, which makes it difficult to understand the amount of water taken from the river. MOE plans to improve its cooling system, which may change the amount of utilized water, but detailed information of the improvement works is not available yet. Regarding Nasiryah I, there are two (2) stages are planned. At the first stage, cooling system is planned to be closed cycle fin fan coolers, and at the second stage, C/Ts are used for steam turbines. Power generation style is simple cycle GT at the first stage, and CC at the second stage. The capacity of Nasiryah I will change accordingly, but its details are not decided yet. It means that factors for calculating the amount of water utilized by two TPPs are not yet clear.

- Mitigation measures

The plant is designed to use minimum amount of water from the Euphrates River for its operation.

(3) Flood

- Impact origin and analysis

Nasiryah II is located at the next to the existing thermal power plant (Nasiryah), and it is not expected to give impact on the flood mechanism.

- Mitigation measures

It does not need any mitigation measures.

(4) Underground water

- Impact origin and analysis

If large amount of water is extracted, local underground water (aquifer) may be affected. Nasiryah II will not use underground water, and no impact on the underground water is expected.

Interaction with the solid waste management facility needs to be considered (possible water contamination). Since the facility is a concrete pool with double containment, it is expected that contamination does not occur.

- Mitigation measures

Since it does not extract underground water, it does not need any mitigation measures.

Regarding the contamination by the solid waste management facility, water quality monitoring is conducted.

(5) Ground subsidence

- Impact origin and analysis

If large amount of water is extracted, aquifer may shrink and ground may subside. Nasiryah II will not use underground water, and ground subsidence is not expected.

- Mitigation measures

It does not need any mitigation measures.

(6) Soil

- Impact origin and analysis

Soil erosion may happen due to rain and/or wind.

- Mitigation measures

The storm water drainage system is designed not to cause any soil erosion by rain water. Regular spraying the plant with water is implemented to reduce soil erosion /dust by wind.

(7) Protected areas

- Impact origin and analysis

If a project site is within or in a close vicinity of a protected area, precious natural environment of the protected area may be affected. Nasiryah II is about 50 km from the boundary of the proposed national park, and direct impacts on the protected area are not expected.

If a large volume of water is consumed and a large volume of high salinity water (i.e. RO rejection water) is discharged to the Euphrates River, it may give impacts to river ecosystem and subsequently the proposed national park downstream may be affected. The Hybrid ACC consumes the minimum amount of water from the Euphrates River and discharges the minimum waste water to the river, and it is expected to give the smallest impact to the proposed national park.

- Mitigation measures

Mitigation measures such as careful site selection has already been taken to avoid direct impact on the proposed national park (protected area).

Nasiryah II is designed to consume minimum water from the river, and to discharge the minimum waste water to the river.

(8) Terrestrial ecosystem

- Impact origin and analysis

If project site is in an important terrestrial ecosystem, operation of plant may give negative impacts to local terrestrial ecosystem. Since Nasiryah II is located in an industrial area, little impact on the terrestrial ecosystem is expected (there may be some common species in the site).

- Mitigation measures

Mitigation measures such as careful site selection has already been taken to reduce impact on the terrestrial ecosystem.

(9) River ecosystem

- Impact origin and analysis

If a large volume of water is consumed and a large volume of high salinity water (i.e. RO rejection water) is discharged to the Euphrates River, it may give impacts to river ecosystem and subsequently the marshlands downstream may be affected.

The river is brackish, and the lower part of the marshlands (downstream area) is also brackish and some of them have high saline water as the original condition. The Hybrid ACC consumes the minimum amount of water from the Euphrates River and discharges the minimum waste water to the river. It is therefore expected to give the smallest impact to the river ecosystem and the marshlands.

- Mitigation measures

Nasiryah II is designed to consume minimum water from the river, and to discharge the minimum waste water to the river.

(10) Endangered species

- Impact origin and analysis

If project site is within or in a close vicinity of an important habitat for endangered species, endangered species may be affected. Firstly Nasiryah II is far from IBAs, and secondly the site does not have good habitat for endangered species (refer to "7.2.2 (8) Terrestrial ecosystem"). Impacts on endangered species are not expected.

Regarding endangered species which depend on marshland habitat downstream of the Euphrates River, if a large volume of water is consumed and a large volume of high salinity water (i.e. RO rejection water) is discharged to the Euphrates River, it may give impacts to river ecosystem and subsequently these species downstream may be affected. The Hybrid ACC consumes the minimum amount of water from the Euphrates River and discharges the minimum waste water to the river, and it is expected to give the smallest

impact to the river ecosystem and the marshlands (also refer to the above "(9) River ecosystem") .

- Mitigation measures

Mitigation measures such as careful site selection has already been taken to avoid direct impact on the endangered species.

Nasiryah II is designed to consume minimum water from the river, and to discharge the minimum waste water to the river.

(11) Global warming

- Impact origin and analysis

CO_2 emission from Nasiryah II gives impact on global warming.

- Mitigation measures

Nasiryah II is already design to reduce the emission as much as possible. It uses natural gas and applies CC power generation (refer to 6.4.). They are the best alternatives to reduce the CO_2 emission with achieving the same goal.

7.2.3. Social environment

(1) Involuntary resettlement

- Impact origin and analysis

It does not occur during the operation stage.

- Mitigation measures

No mitigation measure is necessary.

(2) Employment / livelihood

- Impact origin and analysis

The local economy of the Nasiryah City has not been developed well (refer to "5. Baseline data") and the aspiration of the local people is to obtain benefits from the Project (refer to "9. Consultation"). Also during the operation stage, Nasiryah II is expected to employ the local people as much as possible, and it gives positive impact on employment and livelihood of the local people. During the operation, MOE plans to have 250 persons as workforce for the plant (refer to "8. Environmental management plan).

- Mitigation measures

The local people shall be given the highest priority to be employed as workers during the operation stage. Since they are supposed to be unskilled, adequate and basic trainings on plant operation shall be given to the local people in close collaboration with the local authorities. Appropriate and acceptable guidelines for employment qualification shall be

formulated before the operation stage to give fair and equal opportunities of the employment for the local people. It is also important to avoid and mitigate negative impact on the local people such as anxiety, envy and excessive expectation (refer to "7.1.3. (12) Uneven distribution of benefits and losses").

(3) Local economy

- Impact origin and analysis

The local economy shall also receive positive impacts from Nasiryah II.

- Mitigation measures

As described in "(1) Employment / livelihood", the local people shall be given the highest priority to be employed as workers / operators.

(4) Land utilization

- Impact origin and analysis

It does not occur during the operation stage.

- Mitigation measures

No mitigation measure is necessary.

(5) Social infrastructure / service facilities

- Impact origin and analysis

The workers are basically employed from the local communities, and it is not necessary to build new roads and/or schools.

- Mitigation measures

No mitigation measure is necessary.

(6) River traffic

- Impact origin and analysis

No impact is expected during the operation stage because of no plan of utilization of river traffic.

- Mitigation measures

No mitigation measure is necessary.

(7) Land traffic

- Impact origin and analysis

Number of vehicles will increase and there may be impacts such as traffic congestion. The impacts may be expected on the access roads to the site, and is to be mitigated.

- Mitigation measures

Regarding the traffic congestion, since the site is located at the outskirt of the city, appropriate schedule management of the construction vehicles is established to avoid traffic congestion around the site. Big buses will be used to transport the local employers from the city to the plant to reduce the number of vehicles. Road signs shall be established for smooth traffic flow around the site.

(8) Sanitation

- Impact origin and analysis

Sewage and domestic wastes from the plant are expected.

- Mitigation measures

Regarding the sewage, septic tanks are placed to treat sewage.

The workers shall be given a basic waste management education at the beginning of their employment to reduce the domestic wastes at the plant as much as possible.

(9) Risks for infectious diseases such as HIV/AIDS

- Impact origin and analysis

Nasiryah II employs technical workers / operators from outside and there are some risks that they may bring infectious diseases.

- Mitigation measures

Since prevention is one of the most important mitigation measures for the infectious diseases, the following measures shall be taken: regular medical check-up and a basic health education to the workers /operators at the beginning of their employment.

(10) Local custom

- Impact origin and analysis

If a project employs migrant workers, they may cause troubles with local people due to cultural differences. Since the Nasiryah II shall employ the local people, impact is not expected.

- Mitigation measures

Nasiryah II shall employ the local people.

(11) Burden on socially vulnerable groups

- Impact origin and analysis

If a project interferes in their rights without any appropriate measures, they may receive impacts. Since there are no settlers in the close vicinity of Nasiryah II, it is expected that it does not interfere the right of socially vulnerable groups.

- Mitigation measures

Regarding the employment, refer to the next item - "(12) Uneven distribution of benefits and losses".

(12) Uneven distribution of benefits and losses

- Impact origin and analysis

Without appropriate and acceptable guidelines for employment qualification, it may give unfair impression to the local people and may cause social conflict among them.

- Mitigation measures

With close consultation with the local leaders and authorities, appropriate and acceptable guidelines for employment qualification shall be established, and the guidelines should be notified to these people beforehand.

(13) Utilization / Right of water, including groundwater

- Impact origin and analysis

Although water pollution may cause impact on fishery, there is no commercial fishery in the vicinity of Nasiryah II.

Nasiryah II does not use any groundwater and there is no activity which gives impact to ground water during the operation. However, the landfilling site may give an impact to the groundwater quality.

Regarding the water utilization for the cooling system (including its waste water discharge), it may give impacts to whom use the Euphrates River as source of their water downstream. The following facts are considered:

- The water volume of the Euphrates River has been declining because of heavy water utilization of other countries upstream and upper parts of Iraq;
- The water quality of the river has been worsening because of agricultural water discharge (e.g. fertilizers) and other domestic and industrial discharges; and,
- The water consumption of the Nasiryah City and the downstream areas is expected to increase.

The alternative systems for achieving the goal are examined, and the Hybrid ACC is identified for Nasiryah II. The Hybrid ACC is the one to use minimum water and to

discharge minimum waste water to the river. It is therefore expected to give the smallest impact.

- Mitigation measures

Refer to "7.2.1 (1) Water pollution".

Nasiryah II is designed to consume minimum water from the river, and to discharge the minimum waste water to the river.

(14) Cultural heritage

- Impact origin and analysis

No impact is expected because there is not any cultural heritage in and around Nasiryah II.

- Mitigation measures

No mitigation measure is necessary.

(15) Landscape

- Impact origin and analysis

Since the site is in the industrial area and the plant area is confined to 50 ha, its impact on the landscape is expected to be small.

- Mitigation measures

Careful site selection as a mitigation measure has already been taken to reduce such an impact.

(16) Accident

- Impact origin and analysis

Accidents may happen in the plant, and traffic accidents may happen around the plant due to increase of the vehicles.

- Mitigation measures

Regarding the accidents in the plant, a health and safety plan shall be formulated and safety activities shall be conducted based on the plan. A basic education on safety shall be given to the local people at the beginning of the employment.

Regarding the traffic accidents, a basic education shall be given to the drivers on a safety drive. Other mitigation measures refer to "7.2.3 (7) Land traffic".

Table 7-4 Project activities and potential impacts for Nasiryah II: operation stage

Items (operation stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
(1) Environmental Pollution	1	Air pollution	▪ NOx is expected to disperse from the stacks. ▪ SOx, NOx and dust from vehicles.	Adverse (A)	L	Power generation type (combined cycle) and fuel (natural gas) are selected to optimize the emission from the plant. The facility design has optimized the emission from the plant. Other pollution issues are To be mitigated (refer to "8. Environmental management plan").
	2	Water pollution	▪ RO rejection water ▪ Cleaning water for the machines and vehicles, drainage water with soil and sewage from the plant	A	L	Nasiryah II is designed to discharge the minimum amount of the waste water. To be mitigated (refer to "8. Environmental management plan").
	3	Solid waste	▪ Industrial solid waste ▪ Domestic wastes from the plant	A	L L	To be mitigated (refer to "8. Environmental management plan".
	4	Noise/Vibration	▪ Noise from the Hybrid ACC ▪ Noises from machines and vehicles	A	L	The plot design has optimized the noise from the Hybrid ACC to observe the standard. To be mitigated (refer to "8. Environmental management plan").
	5	Odor	▪ Bad odor from the domestic wastes at the plant	A	(very low)	To be mitigated (refer to "8. Environmental management plan").
(2) Natural Environment	1	Climate	▪ Not expected: No activity is planned to give adverse impact to the local climate.	Not Expected (N.E.)	-	-
	2	Hydrology	▪ Not expected: No activity is planned to give adverse impact to the local hydrology.	N.E	-	-
	3	Flood	▪ Not expected: No activity is planned to give adverse impact to the local	N.E	-	-

Items (operation stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
			flood mechanism.			
	4	Underground water	▪ Not expected: There is no plan to extract water from underground aquifer. ▪ Water contamination from the solid waste management facility	N.E	-	-
	5	Ground subsidence	▪ Not expected: No activity is planned to extract water from underground aquifer.	N.E	-	-
	6	Soil	▪ Soil erosion due to rain and/or wind	A	L	To be mitigated (refer to "8. Environmental management plan").
	7	Protected areas	▪ Utilization of the river water and discharge of the RO rejection water	A	L	Nasiryah II is designed to use the minimum amount of the river water and to discharge the minimum amount of the waste water.
	8	Terrestrial ecosystems	▪ Not expected (refer to "7.1 Environmental impacts during the construction stage").	N.E	-	-
	9	River ecosystems	▪ Utilization of the river water and discharge of the RO rejection water	A	L	Nasiryah II is designed to use the minimum amount of the river water and to discharge the minimum amount of the waste water.
	10	Endangered species	▪ Utilization of the river water and discharge of the RO rejection water	A	L	Nasiryah II is designed to use the minimum amount of the river water and to discharge the minimum amount of the waste water.
	11	Global warming	▪ CO_2 emission from the turbines. ▪ CO_2 emission from the vehicles	A	L	Power generation type (combined cycle) and fuel (natural gas) are selected to optimize the emission from the plant. To be mitigated (refer to "8. Environmental management plan").

Items (operation stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
(3) Social Environment	1	Involuntary resettlement	▪ Not expected (refer to "7.1 Environmental impacts during the construction stage").	N.E	-	-
	2	Employment/ livelihood	▪ Employment by the plant	Beneficiary (B)	M	No mitigation measure is taken but careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	3	Local economy	▪ Employment by the plant ▪ Procurement of minor things by the plant	B	M	No mitigation measure is taken but careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	4	Land utilization	▪ Not expected (refer to "7.1 Environmental impacts during the construction stage").	N.E	-	-
	5	Social infrastructure/ service facilities	▪ Not expected: No new infrastructures are necessary because of employing the local people.	A	M/L	-
	6	River traffic	▪ Not expected: No plan to use the Euphrates River during the operation stage.	N.E	-	-
	7	Land traffic	▪ Traffic congestion by vehicles	A	L	To be mitigated (refer to "8. Environmental management plan").
	8	Sanitation	▪ Sewage and domestic wastes from the plant	A	L	To be mitigated (refer to "8. Environmental management plan").
	9	Risks for infectious diseases such as HIV/AIDS	▪ The plant shall employ the local people, and there is not a big risk to receive infectious diseases from outside.	A	L	The prevention is the most important mitigation measures and it is to be considered in "8. Environmental management plan".
	10	Local custom	▪ Not expected: It can be been avoided by employing the local people, which has already been expressed to the	N.E	-	-

Items (operation stage)			Impact origin	Type of impact	Intensity of impact	Mitigation measures
			local people at the stakeholders' meeting.			
	11	Burden on socially vulnerable groups	▪ Not expected: Equal and fair employment mechanism is desired.	N.E	-	Careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	12	Uneven distribution of benefits and losses	▪ Without appropriate and acceptable guidelines for employment qualification, it may give unfair impression to the local people and may cause social conflict among them.	A/B	L	Careful consideration is required how the local people are employed (refer to "8. Environmental management plan").
	13	Utilization /Right of water, including groundwater	▪ Not expected: No plan to use the Euphrates River during the operation stage. ▪ Ground water contamination may occur by utilizing the landfilling site in the site. ▪ Utilization of the river water and discharge of the RO rejection water	N.E. A A	- L L	- To be mitigated. Nasiryah II is designed to use the minimum amount of the river water and to discharge the minimum amount of the waste water.
	14	Cultural heritage	▪ Not expected (refer to "7.1 Environmental impacts during the construction stage").	N.E	-	-
	15	Landscape	▪ Not expected (refer to "7.1 Environmental impacts during the construction stage").	N.E	-	-
	16	Accident	▪ Accidents at the construction site ▪ Traffic accidents around the site	A	L	To be mitigated (refer to "8. Environmental management plan").

Type of impact: A=adverse effect, B=beneficiary effect, N.E = not expected
Intensity of impact: L=low intensity, M=medium intensity, H=high intensity

8. Environmental management plan

8.1. Objective of environmental management plan and monitoring

The main objective of the environmental management plan (EMP) is to implement the mitigation measures during the construction and operation stages as planned, and the one of Monitoring is to monitor the status of the environment during the two stages and to adjust the mitigation measures if necessary.

EMP and the Monitoring are planned based on the following principles:

- MOE is responsible for EMP and the Monitoring in the two stages;
- MOE organizes implementing organizations: one with a construction contractor in the construction stage and the other in the operation one;
- The mitigation measures shall be implemented to mitigate the expected adverse impacts; and,
- The mitigation measures shall follows the standards set by the Iraqi laws, and shall observe the international standards if the standards are not set by the Iraqi laws (refer to "2. Policy, legal and administrative framework).

8.2. Implementing organizations

8.2.1. Organization of MOE

MOE has a safety and environment division in each of Distribution, Transmission and Generation Offices in its Headquarter, and they are in charge of environmental issues. The safety and environment division of Generation Office is particularly important for Nasiryah II.

Figure 8-1 illustrates the organization chart of the MOE.

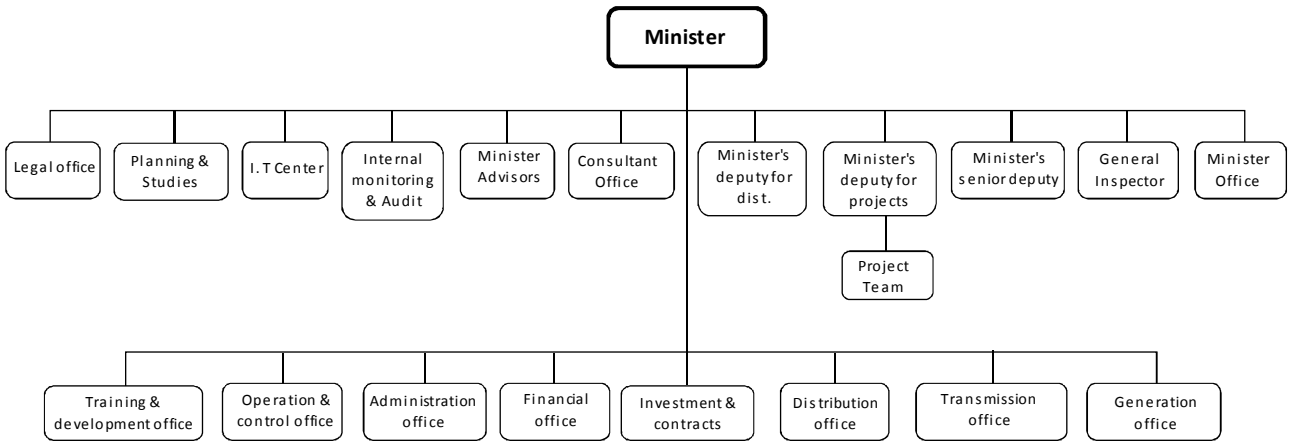


Figure 8-1 Organization chart of MOE

8.2.2. Construction stage

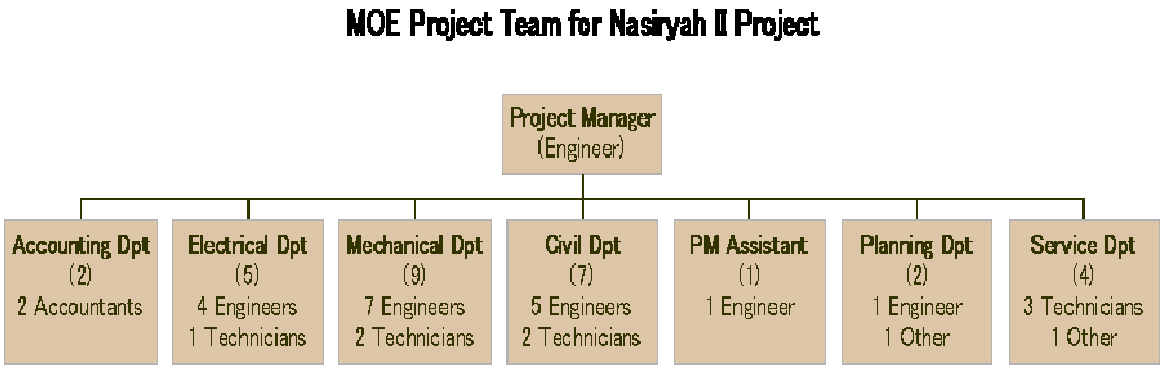
A Project Team is formed in MOE as if it might be an independent department in the Regional Office under the Directorate General of Production Project of the Project Directorate. The Project Team is expected to be provided with the following functions:

- To manage the power-plant construction mainly in view of the project-schedule progress and of the budget-consumption state, in the field of mechanical facilities, electrical facilities, electrical transmission, instruments and control, fuel-related facilities, water-related facilities;
- To conserve the environment;
- To coordinate the Project with the stakeholders in the area, and;
- To draw up an implementation plan on supply of the power, the operation and maintenance activities in the power plant.

The Project Team will supervise an Engineering/ Procurement/ Construction (EPC) contractor to achieve the above-functions. The Project Manager Assistant (PM Assistant) is in charge of safety and environmental issues as one of his tasks. The EPC contractor will propose their organizations and the precise functions. The EPC should employ at least one environmental specialist to handle the environmental issue.

The Project Team is located just under the Minister's Deputy for Project of MOE (Figure 8-1).

Figure 8-1 illustrates the Project Team formation with about 30 persons at the final stage.



Source: MOE

Figure 8-2 Project Team formation

8.2.3. Operation stage

The current organization for operating a TPP (Figure 8-3) of MOE is assumed to be employed for Nasiryah. Safety and Environment team under General Manager (GM) of the plant will be in charge of implementing the environmental management plan including monitoring. The team has about 10 staff including technician who is in charge of a laboratory. The laboratory is for monitoring such as water quality.

The entire force of the management organization is recommended as 250 persons.

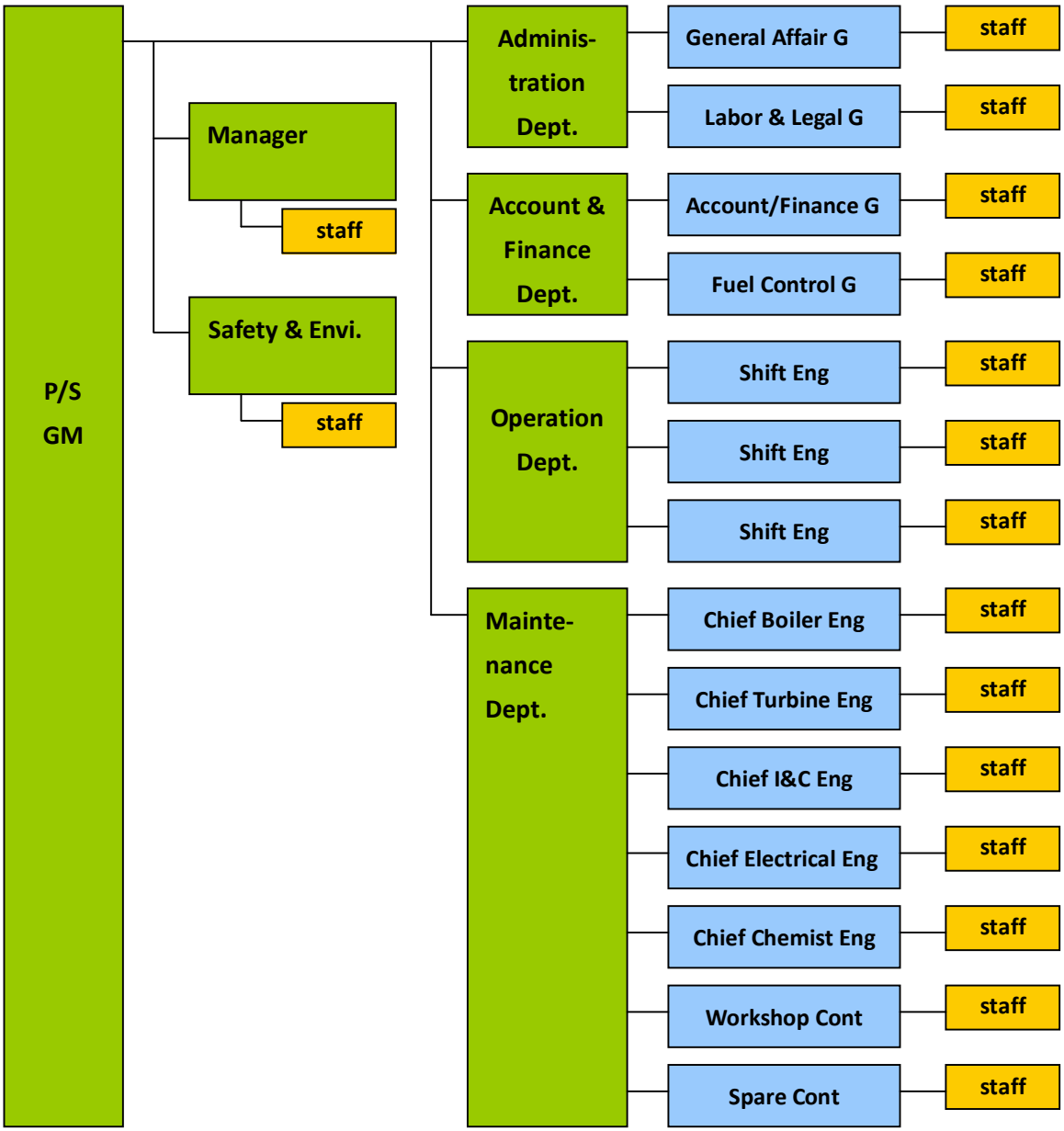


Figure 8-3 Current MOE's power plant organization

8.3. Environmental management plan

8.3.1. Mitigation measures

The mitigation measures during the construction stage are shown in Table 8-1, and the mitigation measures during the operation stage are shown in Table 8-2.

Table 8-1 Mitigation measures during the construction stage

Items (construction stage)			Impact	Mitigation measures	Responsible organization	Cost
(1) Environmental Pollution	1	Air pollution	SOx, NOx and smoke dust from construction machines and heavy transportation vehicles	▪ Regular monitoring and maintenance of the construction machines and heavy transportation vehicles are conducted. ▪ Regular cleaning of these machines and vehicles are conducted. ▪ Reduced speed of vehicles is observed. ▪ Limitation on weight loads of vehicles is observed. ▪ Regular maintenance of the access roads is implemented. ▪ Optimized transportation management to avoid unnecessary machines works and vehicle trips is implemented. ▪ The machines and vehicles in intermittent use are shut down or throttled to a minimum. ▪ The burning of rubbish in the site is strictly forbidden. ▪ An appropriate traffic control plan is introduced.	MOE and the contractor	Within con-struction cost (wcc)
			Dust from the earth works	▪ Spraying the site with water is conducted. ▪ Utilization of soil cover is applied wherever possible. ▪ Reduced speed of vehicles is observed. ▪ Limitation on weight loads of vehicles is observed. ▪ Regular maintenance of the access roads is implemented. ▪ Optimized transportation management to avoid unnecessary machines works and vehicle trips is implemented. ▪ Carries of construction material transport vehicles are covered not to scatter dusts.		wcc
	2	Water pollution	Cleaning water for the machines and vehicles	▪ Oil / grease and chemicals shall be separated from the cleaning water and be kept in temporal storage tanks.	MOE and the	wcc

Items (construction stage)			Impact	Mitigation measures	Responsible organization	Cost
				They will be treated as solid wastes. ▪ Vehicles and machines are maintained and refuelled on at sealed, bunded and roofed area. ▪ Fuel storage tanks are installed in sealed, bunded and roofed area.	contractor	
			Drainage water with soil	▪ Fences are established around the excavation works to prevent soil erosion, and temporal settlement pond is prepared to decrease turbidity of the discharged water.		wcc
			Sewage from the camp	▪ Sewage from the camp shall be treated by temporal septic tanks.		wcc
			Construction of the intake for cooling water (the turbidity to be increased)	▪ The construction of the intake shall be designed and carried out to be confined in the smallest area to be disturbed. ▪ The construction shall be implemented when the water level and volume are low. ▪ The construction timing shall also be considered to prevent the disturbance as little as possible.		wcc
	3	Solid waste	▪ Industrial solid waste	▪ Waste management plan shall be formulated. ▪ Hazardous and non-hazardous materials are segregated based on the plan. ▪ Avoiding materials which contain PCB (polychlorinated biphenyl) / PCT (polychlorinated terphenyl), asbestos and other dangerous substances as far as possible.	MOE and the contractor	wcc
			▪ Domestic wastes from the camp	▪ The domestic wastes at the camp are to be reduced as much as possible. ▪ The recycle of them should be studied and promoted.		Not applica-ble (N/A)
	4	Noise/Vibration	▪ Noises from machines and vehicles	▪ The latest noise-reduction machines and vehicles shall be deployed. ▪ Silencers and mufflers on the machines and vehicles shall be used if necessary.	MOE and the contractor	wcc

Items (construction stage)			Impact	Mitigation measures	Responsible organization	Cost
				▪ Regular monitoring and maintenance of the construction machines and heavy transportation vehicles are conducted. ▪ Schedule of the machines and vehicles optimized to standardize the work loads to reduce noise as much as possible (i.e. parallel noise operations shall be avoided). ▪ The construction work is suspended during night time (22:00 – 07:00).		
			▪ Vibration along the access road	▪ The drivers are instructed to observe the regulations and laws. ▪ Over load to the vehicles should be avoided.	MOE and the contractor	wcc
	5	Odor	▪ Bad odor from the domestic wastes at the camp	▪ The domestic wastes at the camp are to be reduced as much as possible ▪ The authority of Nasiryah City is consulted to collect domestic wastes at regular intervals.	MOE and the contractor	N/A
(2) Natural Environment	6	Soil	▪ Soil erosion due to rain and/or wind	▪ Spraying the site with water is conducted. ▪ Utilization of soil cover is applied wherever possible. ▪ Reduced speed of vehicles is observed. ▪ Limitation on weight loads of vehicles is observed. ▪ Regular maintenance of the access roads is implemented.	MOE and the contractor	wcc
	11	Global warming	▪ CO_2 emission from the construction machines and vehicles	▪ Regular monitoring and maintenance of the construction machines and heavy transportation vehicles are conducted. ▪ Reduced speed of vehicles is observed. ▪ Limitation on weight loads of vehicles is observed. ▪ Optimized transportation management to avoid unnecessary machines works and vehicle trips is implemented.	MOE and the contractor	wcc

Items (construction stage)			Impact	Mitigation measures	Responsible organization	Cost
(3) Social Environment	2	Employment/ livelihood	▪ Employment by the Project	▪ The local people shall be given the highest priority to be employed as workers during the construction stage. ▪ Appropriate and acceptable guidelines for employment qualification shall be formulated in close collaboration with the local authorities before the construction stage to give fair and equal opportunities of the employment for the local people.	MOE and the contractor	wcc
	3	Local economy	▪ Employment by the Project	▪ Refer to the previous row - "2. Employment/ livelihood".	MOE and the contractor	N/A
			▪ Procurement of minor things by the Project	▪ Appropriate and acceptable procurement guidelines shall be formulated, and then minor materials for the construction works shall be procured from the local market as much as possible.		N/A
	5	Social infrastructure/ service facilities	▪ Damages on some social infrastructure such as bridges and roads by heavy vehicles	▪ Close consultation with the authority of Nasiryah City shall be conducted to establish a communication mechanism to inform MOE about the damages. ▪ MOE shall repair the damage as soon as possible.	MOE and the contractor	wcc
	6	River traffic	▪ Individual residents may receive some inconvenience during the construction of the intake.	▪ The local people around the plant are informed about the location and duration of the construction of the intake well in advance.	MOE and the contractor	N/A
	7	Land traffic	▪ Traffic congestion by vehicles	▪ Optimized transportation management to avoid peak commuting time of the area is implemented. ▪ The drivers are instructed to observe the regulations and laws. ▪ Buses are deployed for the local people to commute to the site.	MOE and the contractor	wcc
			▪ Damages to the infrastructure such as roads and bridges	▪ Close consultation with the authority of Nasiryah City shall be conducted to establish a communication mechanism to inform MOE about the damages.		wcc
	8	Sanitation	▪ Sewage and domestic wastes from the camp	▪ Sewage from the camp shall be treated by temporal septic tanks.	MOE and the	wcc and

Items (construction stage)			Impact	Mitigation measures	Responsible organization	Cost
				▪ The domestic wastes at the camp are to be reduced as much as possible. ▪ The authority of Nasiryah City is consulted to collect domestic wastes at regular intervals. ▪ Refer also to the next column.	contractor	N/A
	9	Risks for infectious diseases such as HIV/AIDS	▪ The Project shall employ the local people, and there is not a big risk to receive infectious diseases from outside.	▪ Prevention measures are taken for the workers not be infected by infectious diseases such as hepatitis A.	MOE and the contractor	wcc
	12	Uneven distribution of benefits and losses	▪ Without appropriate and acceptable guidelines for employment qualification, it may give unfair impression to the local people and may cause social conflict among them.	▪ Appropriate and acceptable guidelines for employment qualification shall be formulated in close collaboration with the local authorities before the construction stage to give fair and equal opportunities of the employment for the local people.	MOE and the contractor	wcc
	16	Accident	▪ Accidents at the construction site	▪ Health and safety plan is formulated. ▪ Basic health and safety education programme is formulated. It shall be conducted at the beginning of the employment. ▪ Personal safety gears (protecting clothing and equipment) such as ear protection muff and safety shoes are provided to the workers. ▪ Safety measures near the construction machines such as “no man zone” shall be employed. ▪ A medical unit is established. ▪ An emergency patient transportation plan is discussed and formulate with the authority of the regional hospital in Nasiryah City. ▪ Regarding the Occupational Health and Safety, MOE and the contractor shall refer to the following guidelines: Environmental, Health, and Safety General Guidelines (IFC, 2007).	MOE and the contractor	wcc

Items (construction stage)			Impact	Mitigation measures	Responsible organization	Cost
			▪ Traffic accidents around the site	▪ Traffic control plan is formulated with the authority of Nasiryah City. ▪ Necessary traffic signals and signs are set up around the site. ▪ Basic traffic education is provided to drivers such as observation of reducing speed of vehicles.	MOE and the contractor	wcc

Table 8-2 Mitigation measures during the operation stage

Items (operation stage)			Impact	Mitigation measures	Responsible organization	Cost
(1) Environmental Pollution	1	Air pollution	▪ NOx from the plant	▪ Regular monitoring and maintenance are conducted.	MOE	Within operation cost (woc)
	2	Water pollution	▪ Cleaning water for the machines and vehicles	▪ Oil / grease shall be separated from the cleaning water and be kept in temporal storage tanks. They will be sent to MOO to be recycled. ▪ Chemicals shall be separated from the cleaning water and be kept in temporal storage tanks. ▪ Vehicles and machines are maintained and refuelled on at sealed, bunded and roofed area.	MOE	wcc & woc
			▪ Sewage from the plant	▪ Sewage from the camp shall be treated by septic tanks.		wcc
	3	Solid waste	▪ Industrial solid waste	▪ Waste management plan shall be formulated. ▪ Solid wastes are treated at the solid waste management facility within the plant site. ▪ Sludge is recycled as much as possible. ▪ Dehydrated sludge (cake), deposits on the screen and filter screens for gas turbines are treated as solid waste and deposited at the solid management facility (landfilling site) within the plant site. ▪ Ground water near the facility is monitored. ▪ The facility is a concrete pool with double containment to prevent impacts to the surrounding environment. The facility is constructed and managed under the IFC guidelines "Environmental, Health, and Safety Guidelines for Waste Management Facilities (2007).	MOE	wcc 9 – 13 million US dollars
			▪ Domestic wastes from the plant	▪ The domestic wastes at the plant are to be reduced as much as possible.		N/A

Items (operation stage)			Impact	Mitigation measures	Responsible organization	Cost
				▪ The recycle of them should be studied and promoted.		
	4	Noise/Vibration	▪ Noises from machines including the Hybrid ACC	▪ Regular monitoring and maintenance are conducted.	MOE	N/A
			▪ Vibration along the access road	▪ The drivers are instructed to observe the regulations and laws. ▪ Over load to the vehicles should be avoided.	MOE	N/A
	5	Odor	▪ Bad odor from the domestic wastes at the plant	▪ The domestic wastes at the plant are to be reduced as much as possible.	MOE	N/A
(2) Natural Environment	6	Soil	▪ Soil erosion due to rain and/or wind	▪ The storm water drainage system is designed not to cause any soil erosion by rain water. ▪ Regular spraying the plant with water is implemented to reduce soil erosion /dust by wind.	MOE	wcc
	11	Global warming	▪ CO_2 emission from the plant	▪ Regular monitoring and maintenance of the turbines are conducted.	MOE	woc
(3) Social Environment	2	Employment/ livelihood	▪ Employment by the plant	▪ The local people shall be given the highest priority to be employed as workers/operators during the operation stage. ▪ Appropriate and acceptable guidelines for employment qualification shall be formulated in close collaboration with the local authorities before the operation stage to give fair and equal opportunities of the employment for the local people.	MOE	N/A
	3	Local economy	▪ Employment by the plant	▪ Refer to the previous row – "2. Employment/ livelihood".	MOE	N/A
			▪ Procurement of minor things by the plant	▪ Appropriate and acceptable procurement guidelines shall be formulated, and then minor materials for the operation works shall be procured from the local market as much as possible.		N/A
	7	Land traffic	▪ Traffic congestion by vehicles	▪ The drivers are instructed to observe the regulations and laws. ▪ Buses are deployed for the local people to commute to the site.	MOE	woc

Items (operation stage)			Impact	Mitigation measures	Responsible organization	Cost
	8	Sanitation	▪ Sewage and domestic wastes from the plant	▪ Sewage from the plant shall be treated by septic tanks. ▪ The domestic wastes at the plant are to be reduced as much as possible. ▪ Refer also to the next column.	MOE	wcc
	9	Risks for infectious diseases such as HIV/AIDS	▪ The Project shall employ the local people, and there is not a big risk to receive infectious diseases from outside.	▪ Prevention measures are taken for the workers not be infected by infectious diseases such as hepatitis A.	MOE	N/A
	12	Uneven distribution of benefits and losses	▪ Without appropriate and acceptable guidelines for employment qualification, it may give unfair impression to the local people and may cause social conflict among them.	▪ Appropriate and acceptable guidelines for employment qualification shall be formulated in close collaboration with the local authorities before the operation stage to give fair and equal opportunities of the employment for the local people.	MOE	N/A
	16	Accident	▪ Accidents at the plant	▪ Health and safety plan is formulated. ▪ Basic health and safety education programme is formulated. It shall be conducted at the beginning of the employment. ▪ Personal safety gears (protecting clothing and equipment) such as ear protection muff and safety shoes are provided to the workers. ▪ Medical unit is established. ▪ An emergency patient transportation plan is discussed and formulate with the authority of the regional hospital in Nasiryah City. ▪ Regarding the Occupational Health and Safety, MOE and the contractor shall refer to the following guidelines. 1) Environmental, Health, and Safety General Guidelines (IFC, 2007). 2) Environmental, Health, and Safety Guidelines THERMAL POWER PLANTS (IFC, 2008).	MOE	woc

Items (operation stage)			Impact	Mitigation measures	Responsible organization	Cost
			▪ Traffic accidents around the site	▪ Traffic control plan is formulated with the authority of Nasiryah City. ▪ Necessary traffic signals and signs are set up around the site. ▪ Basic traffic education is provided to drivers such as observation of reducing speed of vehicles.	MOE	woc

8.3.2. Monitoring

(1) Construction stage

The monitoring in the following fields is conducted in conjunction with the mitigation measures. If anything above the standards is detected by the monitoring, MOE and the contractor shall take appropriate actions to reduce the impacts by the construction activities. The standards are described in "2.2.3. Standards". Collecting baseline data at each monitoring point shall be conducted at least two times (summer and winter) before commissioning the construction stage. Table 8-3 summarizes the monitoring during the construction stage.

Ambient air quality: PM_{10}, SO_2, NO_2 and CO

The monitoring points are on the construction site boundary and the nearest road crossing point. During the construction stage, these parameters are monitored once a month. The meteorological data such as air temperature, relative humidity, wind direction and wind speed are also measured at the monitoring points.

Effluent water quality: water temperature, pH, DO, BOD5, COD, SS, oil and grease and heavy metals (indicated in the IFC standard (Table 2-11))

The monitoring point is the exit point of the temporal settlement pond. During the construction stage, these parameters are monitored once a month.

River water quality: water temperature, pH, DO, BOD5, COD, SS, TDS, oil and grease and heavy metals indicated in the Iraqi standard (Table 2-7)).

The monitoring point is the exit point of the all effluent from the plant. These parameters are monitored quarterly (four times a year).

Noise: The monitoring points are on the construction site boundary (three directions: west, east and south). During the construction stage, the parameter is monitored once a month. The meteorological data such as air temperature, relative humidity, wind direction and wind speed are also measured at the monitoring points.

Vibration: The monitoring points are on the construction site boundary (three directions: west, east and south). During the construction stage, the parameter is monitored once a month.

(2) Operation stage

The monitoring in the following fields is conducted in conjunction with the mitigation measures. If anything above the standards is detected by the monitoring, MOE shall take appropriate actions to reduce the impacts by the operation activities. The standards are described in "2.2.3. Standards". Table 8-4 summarizes the monitoring during the operation stage.

Effluent air quality: O_2, NO_x, SO_2, CO and PM

Each of the HRSGs will be provided with a complete set of Continuous Emission Monitoring System (CEMS). The following emission values will be measured, calculated, and recorded: O_2, NO_x, SO_2, CO, PM

Ambient air quality: SO_2, NO_2, CO and PM_{10}

The monitoring points are on the plant site boundary and four points in the radius of 2 km from the plant. These parameters are monitored once a month. The meteorological data such as air temperature, relative humidity, wind direction and wind speed are also measured at the monitoring points.

Effluent water quality: water temperature, pH, DO, BOD5, COD, SS, oil and grease and heavy metals (indicated in the IFC standard (Table 2-11))

The monitoring point is the exit point of the water treatment system. These parameters are monitored twice a month.

River water quality: water temperature, pH, DO, BOD5, COD, SS, TDS, oil and grease and heavy metals indicated in the Iraqi standard (Table 2-7)).

The monitoring points are two in the river: one is upstream of the intake and the other is the exit point of the all effluent from the plant. These parameters are monitored quarterly (four times a year).

Groundwater quality: water temperature, pH, DO, BOD5, COD, SS, oil and grease and heavy metals indicated in the Iraqi standard (Table 2-7)). However, the parameters are tentative. They need to be selected based on the types, quantities, and concentrations of constituents in wastes managed in the landfill; the mobility, stability, and persistence of waste constituents their reaction products in the unsaturated; the detectability of indicator parameters, waste constituents, and reaction products in ground water; the constituent

concentrations in the groundwater background[95].
The monitoring point is in the vicinity of the solid waste management facility (landfilling site). These parameters are monitored quarterly (four times a year).

Noise: The monitoring points are on the plant boundary (three directions: west, east and south). During the construction stage, the parameter is monitored once a month. The meteorological data such as air temperature, relative humidity, wind direction and wind speed are also measured at the monitoring points.

Vibration: The monitoring points are on the plant boundary (three directions: west, east and south). During the construction stage, the parameter is monitored once a month.

[95] IFC: Environmental, Health, and Safety Guidelines for Waste Management Facilities (2007)

Table 8-3 Monitoring during the construction stage

Monitoring field	Monitoring parameters	Monitoring locations	Sampling frequency
Ambient air quality	PM_{10}, SO_2, NO_2 and CO (Meteorological data such as air temperature, relative humidity, wind direction and wind speed)	The construction site boundary (three points: west, east and south) and the nearest road crossing point.	Once a month
Effluent water quality	Water temperature, pH, DO, BOD5, COD, SS, oil and grease and heavy metals (heavy metals are indicated in the IFC standard (Table 2-11))	The exit point of the temporal settlement pond	Once a month
River water quality	Water temperature, pH, DO, BOD5, COD, SS, TDS, oil and grease and heavy metals indicated in the Iraqi standard (Table 2-7))	The exit point of the all effluent from the plant	Quarterly (four times a year)
Noise	dBA (Meteorological data such as air temperature, relative humidity, wind direction and wind speed)	The construction site boundary (three points: west, east and south)	Once a month
Vibration	dB or ppv	The construction site boundary (three points: west, east and south)	Once a month

Table 8-4 Monitoring during the operation stage

Monitoring field	Monitoring parameters	Monitoring locations	Sampling frequency
Effluent air quality	O_2, NO_x, SO_2, CO and PM	HRSG Stacks	Continuous monitoring by CEMS
Ambient air quality	PM_{10}, SO_2, NO_2 and CO (Meteorological data such as air temperature, relative humidity, wind direction and wind speed)	The plant site boundary, and four points in the radius of 2 km from the plant	Once a month
Effluent water quality	water temperature, pH, DO, BOD5, COD, SS, oil and grease, and heavy metals (heavy metals are indicated in the IFC standard (Table 2-11))	The exit point of the water treatment system	Twice a month
River water quality	Water temperature, pH, DO, BOD5, COD, SS, TDS, oil and grease and heavy metals indicated in the Iraqi standard (Table 2-7))	Upstream point of the intake, and the exit point of the all effluent from the plant	Quarterly (four times a year)
Groundwater quality	Water temperature, pH, DO, BOD5, COD, SS, oil and grease and heavy metals indicated in the Iraqi standard (Table 2-7)) Regarding the parameters, refer to the main text.	Solid waste management site (landfilling site)	Quarterly (four times a year)
Noise	dBA (Meteorological data such as air temperature, relative humidity, wind direction and wind speed)	The plant boundary (three points: west, east and south)	Twice a year
Vibration	dB or ppv	The plant boundary (three points: west, east and south)	Twice a year

8.3.3. Environment, safety and health plans

(1) Construction stage

Based on EMP, the EPC contractor will prepare the following environment, safety and health (ESH) plans in close consultation and under the supervision of MOE Project Team for the smooth and steady implementation of the mitigation measures.

Recruitment plan: Appropriate and acceptable guidelines for employment qualification are formulated especially for the local people to avoid unnecessary social conflict among the local people. The plan should be formulated in close consultation with the local authorities.

Construction safety plan: The plan provides guidance on prevention and control of health and safety impacts during the construction.

Waste management plan: Since Thi Qar Province and Nasiryah City have no system for waste disposal, the waste should be treated by the contractor under MOE's supervision. The plan provides guidance on waste prevention, segregation, recycling, treatment of solid wastes and treatment of hazardous wastes.

Camp management plan: The plan provides guidance on environment, health, and safety at the construction camp.

Traffic control plan: It is expected that traffic will increase around the Project site, and the plan provides guidance on prevention and control of traffic. It shall include identification of congestion points, setting up traffic lights and signs, instructions to drivers such as safe drive and observation of limitation of load to truck. It shall be formulated in close consultation with the local authorities.

Monitoring plan: Based on the instructed monitoring items (refer to "8.3.2 Monitoring), the contractor prepares a monitoring plan.

(2) Operation stage

MOE will prepare the following ESH plans in close consultation with other authorities in Nasiryah City and the Province for the smooth and steady implementation of the mitigation measures.

Health and safety plan: The plan provides guidance on prevention and control of health and safety impacts during the operation.

Waste management plan: The plan provides guidance on waste prevention, segregation, recycling, treatment of solid wastes and treatment of hazardous wastes.

Monitoring plan: Based on the instructed monitoring items (refer to "8.3.2 Monitoring), MOE prepares a monitoring plan.

8.4. Environmental trainings for the operation of the plant

Nasiryah II has the Safety and Environment team under the General Manager of the plant (refer to Figure 8-3). The staff of the team needs initial trainings for the environmental consideration for the operation of the plant. The following two basic environmental trainings are planned. Table 8-5 illustrates contents of the training. The costs are included in the operation cost of the plant as personnel cost.

- General training on occupational health and safety (OHS)
  The trainees of the training course shall receive the same training every year and obtain the latest information of OHS. They shall serve as a trainer to the other workers / operators of the plan.
- Training on environmental monitoring
  The trainees shall conduct the environmental monitoring at and around the plant described in Table 8-4.

Table 8-5 Trainings required for the Safety and Environment team

Training Course	Contents	Type of Training	Participants	Proposed Scheduling
General training on occupational health and safety (OHS)	▪ Code of Safe Practices; ▪ general area safety; ▪ specific job safety; ▪ general electrical safety; ▪ handling of hazardous materials; ▪ entry into confined spaces; ▪ use of personal protective equipment; ▪ first-aid; and ▪ Contingency Plans & Emergency Procedures	Classroom and on-job-training.	Staff of Safety and Environment team	Once before commencement of the operation and, once a year during the operation stage
Training on environmental monitoring	▪ All over environmental performance of the plant; ▪ Day-to-day monitoring activities; ▪ Monitoring the stack emissions; ▪ Monitoring of the air quality; ▪ Monitoring of the water effluents; ▪ Monitoring the river water quality; ▪ Monitoring the noise; and ▪ Use of monitoring equipment and their operation and maintenance.	Classroom and on-job-training.	Staff of Safety and Environment team	Once before commencement of the operation and, once a year during the operation stage

8.5. Occupational health and safety (OHS)

8.5.1. Health hazards management

The health hazards associated with the construction activities are mainly due to dust and noise pollution. Excessive noise can cause loss of hearing and psychological changes. Dust pollution can cause eye and respiratory irritation and in some cases allergic reactions. The inhalation of exhaust gases from construction vehicles and machinery can also cause harmful effect to the health. Stress can also be caused by poor conditions such as working in shifts, high work load, and poor living condition of workers.

A quantification of the measures of severity in health hazards is not well defined. They are slow acting and cumulative, their effects may not be visible for years. During plant installation and commissioning exposure to the chemicals such as paints, solvents, thinners, batteries, welding materials, and lubricants, may cause hazardous effect to the workers, which ultimately could cause anaemia, liver and kidney damage, cardiovascular diseases and neurological disorder.

The following measures shall be taken to minimize the health hazards arising from the activities at the construction and operation stages:

- MOE (contractor during the construction stage) will inform his employees to submit full scale medical report (if possible) to the authority prior to join in to the project and MOE will take decision on this report;
- Works with volatile toxic chemicals will be undertaken in a well ventilated place;
- Labourers handling, toxic chemicals will be provided with protective gear and will be relieved frequently from their posting;
- Workers exposed to an excessive noise should be provided with protective gear and be relieved frequently from their post;
- Workers exposed to dust will be provided appropriate musk and other protective gear;
- Frequent spraying of water will be undertaken to minimize dust pollution and dispersion;
- Persons undertaking construction and installation works shall have access to amenities for their welfare and personal hygiene needs such as sanitary toilets, potable drinking water, washing facilities, shelter sheds;
- Proper disposal of waste and sewage will be in practice;
- Health education and information on hygiene will be provided to the workers;
- Regular checks on drinking water quality (if the water supplied by the contractors/ company) will be ensured within work site.

8.5.2. Hazardous material handling and storage

During the construction stage of the plant, commercially available chemicals such as paints and thinners will be used and stored in the construction area. Hence small amount of unused or spent chemicals (used paints, motor oils[96]) will be generated.

Hazardous wastes likely to be generated during routine project operations include oily water, spent catalyst, lubricants and cleaning solvents.

Operation and maintenance of the plant also generates some hazardous wastes. These include waste oil, spent solvents, batteries, fluorescent light tubes, lubricating oils. The project will involve the operation of gas pipe line and handling of large amount of natural gas. Natural gas poses some risk of both fire and explosion. Used lead acid batteries contain lead, sulphuric acid and several kinds of plastics which are hazardous to human health. Therefore the ideal place to store used lead acid batteries is inside an acid resistant sealed container to minimize the risk of an accidental spillage.

The following set of storage guidelines will be adopted:

- The storage place will be protected from rain and storm water, this place will also be provided with a good shed;
- The storage place will be protected from any sources of heat hazards;
- The storage place will have a ground cover;
- The storage place will have an exhaust ventilation system in order to avoid gas accumulation;
- The storage place will have a restricted access and be identified as a hazardous material storing place;
- Any other lead materials which may eventually arise, such as plumbing, should be conveniently packaged and stored in accordance with its characteristics; and
- The store premises will be provided with fire protection and fire fighting equipment.

These equipments will be installed, tested and maintained in accordance with the manufacturer's guidelines. MOE will ensure that a procedure for dealing with emergencies is in place, implemented, maintained and communicated to persons on the premises who may be affected by or respond to an emergency.

Ignition sources in hazardous areas will not be allowed. The facility staff will be trained and equipped with personal protective gear such as rubber gloves, boots, hard hats, apron or splash suit and a face shield with safety glasses or goggles.

[96] Waste oils are recycled as much as practical. Some of them will be sent to MOO factory to be recycled.

Safe access within and to and from the premises will be ensured. Unauthorized access and activity on the premises will be prevented. These measures will reduce the chances of accidents and facilities a safe environment for the workers, the staff and the plant.

8.5.3. OHS record keeping and reporting

There shall a record keeping system during the construction and operation stages. The records shall include OHS training provided to the workers, health records of workers during the operation stage and make those records available to any employee or relevant health and safety representative.

Records related to hazardous materials used during the construction and operation stages will be maintained and shall be kept and maintained for at least 30 years because some health effects may take a long period to become evident.

8.6. Emergency procedures and accident response

Instructions on emergency measures necessary to safeguard employees and the wider environment will be prepared as part of the operations manual for the power plant.

As part of the preparation of emergency procedures and the plans for accident response arrangements, MOE will carry out the followings:

- To review industry-specific and Iraqi and international standards and regulations;
- To establish general guidelines on potential safety and accident risks;
- To prepare job-specific operating instructions where appropriate;
- To establish safety and security notices for hazardous materials;
- To prepare specific emergency operating instructions;
- To provide protective equipment (including clothing, air and ear protection etc.) as required;
- To evaluate information and feedback from employees; and
- To record and investigate all accidents, injuries and incidents.

Contingency plans and emergency procedures are being developed to cover events due to operational failures, natural causes and acts of third parties. The plans and procedures will cover, as a minimum, the following:

- fire;
- explosion;
- bomb alerts;
- leaks and spills of hazardous materials;

- structure or equipment failures;
- injuries and illnesses;
- risk from natural disasters (wind, sandstorm, earthquake); and
- third-party risks (potential impacts of an accident occurring at another industrial facility which may impact upon the power plant).

8.7. Chance-find procedures for physical cultural property

The EPC contractor will be responsible for familiarizing themselves with the following "Chance Finds Procedures" in case culturally valuable materials are uncovered during excavation or any project activities, including:

- To stop work immediately following the discovery of any materials with possible archaeological, historical, or other cultural value, announce findings to the Project Manager and notify to the Department of Archaeology under Ministry of Cultural Affairs;
- To protect artefacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artefacts.
- To prevent and penalize any unauthorized access to the artefacts; and,
- To restart construction works only upon the authorization of the relevant authorities.

8.8. Costs for the environmental management

8.8.1. Construction stage

Alost all costs of the mitigation measures including monitoring during the construction stage are included in the construction cost. The rest of the mitigation measures do not need direct costs (refer to Table 8-1).

8.8.2. Operation stage

Alost all costs of the mitigation measures during the operation stage are already included in the construction cost or in the operation cost by MOE. The rest of the mitigation measures do not need direct costs (refer to Table 8-2).

9. Consultation

9.1. Objectives of the stakeholders' meetings

The objectives are the following; 1) to consult with stakeholders who may be affected by or involved in the Project on issues which may be induced by the Project, and 2) to reflect their comments and questions in the design of the Project in order to reduce their concerns and expected negative impacts.

MOE and the Study Team identified stakeholders as the following; officials from Nasiryah City and others such as Ministry of Agriculture and Ministry of Environment; officials from municipalities, hospitals and schools nearby; and 15 tribal leaders in the area.

9.2. Meeting with the major tribal leaders

The General Manager of the Nasiryah TPP, Mr. Jawad Bader, met the major tribal leaders of the area on 11 October 2011, and gave the leaders a general description of Nasiryah II. The leaders understood the importance of Nasiryah II and expressed their gratitude to its construction. Their signed letter is shown in Appendix 8.

9.3. 1st stakeholders' meeting

The 1st stakeholders' meeting is summarized in the Table 9-1.

Table 9-1 Summary of the 1st stakeholders' meeting

Date	5 January 2012
Time	10:00 – 13:00
Venue	Province Council Building of Thi Qar in Nasiryah City
Participants	About 150 people The representatives of the local communities (i.e. tribal leaders), the officials from the Nasiryah City and others (e.g. Ministry of Agriculture), the administrative officers from hospitals and schools, media representatives.
Agenda	1. Opening remarks 2. Address by the Governor of the Thi Qar Province. 3. Address by the General Manager of the Nasiryah TPP 4. Explanation of Nasiryah II Project by the Project Manager 5. Closing remarks

The Project Manager, Mr. Azeez Mofaq, MOE, gave the following explanation to the participants.

(1) Objectives of the stakeholders' meeting
(2) Proposed activities of the Project of Nasiryah II
(3) Objectives of Environmental Impact Assessment

Main points he explained are as follows using "EIA of Nasiryah II Preliminary Draft";

- The project site is located at next to the existing power plant. The Project will have minimum physical interaction with the local communities and hence social interface and consequently magnitude of the impacts induced by the Project on communities are expected to be low. MOE shall plan to mitigate the adverse impact of wastewater, noise and dust on the people, if any.
- Nasiryah II Thermal Power Plant (combined cycle power plant) and a construction contractor would employ the local people during the Project execution to ensure benefits for the local communities. He also emphasised on the need to provide trainings to the unskilled workers so that in future locals may also be hired for skilled jobs.
- Any damages to the infrastructure due to the movement of heavy vehicles shall need to be repaired by MOE.

The concerns of the participants are summarized as follows;

- The local people hope that the proponent and its contractors would employ local people during the Project construction and operation stages.
- The local people hope that they will get electricity as soon as possible to upgrade their life levels.
- Most of the communities and some of the local influential people are not concerned over the environmental issues. They are mostly interested in getting maximum benefits in terms of employment, local market development and community development programmes.
- The biggest aspiration of the locals can be identified as 'getting electricity and employment'.

Figure 9-1 Mr. Talib Kadhum Al Hassan, Thi Qar Governor, gave an address at the 1st stakeholders meeting

Figure 9-2 Mr. Jawad Bader, General Manager of the Nasiryah TPP, gave an address

Figure 9-3 Mr. Azeez Mofaq, Project Manager of Nasiryah II, explained the details of the Project

Figure 9-4 Participants of the 1st stakeholders' meeting

Figure 9-5 Participants of the 1st stakeholders' meeting

The reflections of the comments to the Project are summarized in Table 9-2.

Table 9-2 Reflections of the comments to the Project

No.	Commenter	Comments / Opinions	Responses to the Comments	Reflection of the comments to the Project
1.	Governor and other local representatives	Encouragement and agreement on the Project (refer to Appendix 9)	-	-
2.	Local representatives	Employment of the local people during the construction and operation stages of the Project.	MOE would employ the local people during the Project execution. Unskilled workers will be provided trainings.	Reflected.

9.4. 2nd stakeholders' meeting

The 2nd stakeholders' meeting is summarized in the Table 9-3.

Table 9-3 Summary of the 2nd stakeholders' meeting

Date	23 February 2012
Time	10:00 – 13:00
Venue	Cultural Center Building in Nasiryah City
Participants	About 150 people The representatives of the local communities (i.e. tribal leaders), the officials from the Nasiryah City and others (e.g. Provincial Office of Agriculture, Provincial Office of Environment, Provincial Office of Water Resources, Provincial Office of Municipalities, Women's Affairs Member in Nasiryah), the administrative officers from hospitals and schools, media representatives The list of participants (64 of the participants) is presented as Appendix 10.
Agenda	1. Opening remarks 2. Address by the General Manager of the Nasiryah TPP 3. Explanation of Nasiryah II Project by the Project Manager 4. Closing remarks

The Project Manager, Mr. Azeez Mofaq, MOE, first explained the following three points to the participants.

(1) Objectives of the 2nd stakeholders' meeting
(2) Proposed Improvement activities of the Project of Nasiryah II such as (water cooling system)
(3) Objectives of the EIA

Using "EIA Draft Final Report of Nasiryah II", he explained the followings:

- The EIA Report reflects stakeholders' idea on the employment by the Project, and a construction contractor would employ the local people during the construction stage to ensure benefits for the local communities; and
- The Project will apply the Hybrid ACC as the cooling water system to minimise the water consumption and waste water discharge considering the water consumption of the local people. The magnitude of the impacts to the communities caused by the Project, therefore, is expected to be minimised. Every mitigation measure will be

taken under MOE's supervision during both the construction and operation stages to observe the Iraqi standards.

The concerns of the participants are summarized as follows;

- The biggest aspiration of the local people is identified as 'getting electricity and employment'.

Figure 9-6 Mr. Jawad Bader explained the details of the Project

Figure 9-7 Mr. Azeez Mofaq explained the details of the Project

Figure 9-8 Participant of the 2nd stakeholders' meeting

Figure 9-9 Participants of the 2nd stakeholders' meeting

Figure 9-10 Participants of the 2nd stakeholders' meeting

The reflections of the comments to the Project are summarized in Table 9-4.

Table 9-4 Reflections of the comments to the Project

No.	Commenter	Comments / Opinions	Responses to the Comments	Reflection of the comments to the Project
1.	Local representatives	Encouragement and agreement on the Project	-	-
2.	Local representatives	Employment of the local people during the construction and operation stages of the Project.	MOE would employ the local people during the Project execution. Unskilled workers will be provided trainings.	Reflected.

10. Conclusions and recommendations

10.1. Conclusions

The EIA Study has indicated that the Project is designed to fulfil both Iraqi laws and JICA Guidelines for environmental considerations. The main points are summarized as follows:

- Comprehensive and logical evaluation of candidate sites have been successfully conducted to have resulted in the best site, Nasiryah, for the mega-power project (Nasiryah II Project) in financial, technical and environmental aspects;
- The facilities of Nasiryah II are designed to harmonize the current conditions of the water issues and the goal of the Project and to follow the Iraqi and international environmental standards;
- Every mitigation measure will be taken under MOE's supervision during both the construction and operation stages; and,
- Stakeholders and relevant authorities have been involved in the process of authorization of the EIA activities of the Project, and their comments are reflected in the Project.

The following sections explain the details of each point.

10.1.1. Site selection

Two steps of site selection were conducted to select the most feasible site for a 1,800 MW thermal power plant in the southern part of Iraq from financial, technical and environmental points of view.

At the 1st step, three (3) candidate sites were selected among 17 candidate sites identified by "Large Scale Thermal Power Plant Site Selection Study in Southern Iraq (2008)". These candidate sites are Nasiryah, Hartha 2 and Alkahala Emara 1&2.

At the 2nd step, the same but more detailed study was exercised, and Nasiryah was selected as the feasibility study site.

From the environmental points of view, the Nasiryah II site has no settlers (no involuntary resettlement is expected), is away from the proposed national park, the World Heritage Sites and IBAs (no direct impacts are expected), and does not have any important habitats for endangered species listed in IUCN Redlist (no direct impacts are expected).

10.1.2. Facility design

Cooling system: Iraq is now facing the critical water issues as follows;

- Decline of the entire water discharge of the Euphrates and Tigris Rivers;
- Decline of water quality especially high salinity of the downstream parts of the rivers; and,
- Increase of water consumption in domestic, commercial and industrial fields.

Further, Nasiryah II needs to consider the existence of the important marshlands downstream. Although the southern part of the marshlands has originally high salinity, it may receive impacts. Considering these water issues and the goal of the Project, a philosophy of "least water consumption and least water discharge" is developed to apply the facility design, which is expected to give the smallest impacts to the environment.

Since a TPP utilizes large volume of water for its cooling system, an intensive discussion on alternatives of cooling system has been conducted. Among once-through, cooling tower (C/T) without pre-treatment, C/T with pre-treatment, air cooled condenser (ACC), Hybrid ACC and Heller cooling systems, Hybrid ACC has been selected. The reasons are the followings;

- It meets the philosophy - "least water consumption and least water discharge"; and
- It is economically viable.

Comparing the water consumption and waste water discharge of the existing Nasiryah TPP, Nasiryah II can greatly reduce them per generating power.

Other requirements: Regarding air quality, noise and vibration, the facilities are designed to observe the Iraqi and international standards.
Regarding the global warming issue, combined cycle generation and natural gas (fuel) are selected to reduce the amount of CO_2 emission as much as possible.

10.1.3. Impacts and mitigation measures

Impacts during both construction and operation stages are identified and assessed through the EIA study, and appropriate mitigation measures are proposed. All these mitigation measures will be implemented by the contractor during the construction stage under the supervision of MOE, and by MOE during the operation stage.

Monitoring will be conducted to check the pollutants, and the mitigation measure will be taken if necessary.

10.1.4. Stakeholders' participation

A meeting with the major tribal leaders was held on 11 October 2011, and two stakeholders' meetings were held on 5 January 2012 and 23 February 2012 to reflect the ideas and concerns of the stakeholders - local people and related authorities - around Nasiryah II to the Project implementation.

Their concerns are electricity supply and employment, which are reflected in this report. Besides these concerns, the Project Manager explained the impacts, their mitigation measures and the facility design which accomplish the philosophy-"least water consumption and least water discharge".

The stakeholders agreed on the concept of the Project and gave authorization to the development of Nasiryah II.

10.2. Recommendations

MOE has participated in the committee of the national water resource development strategy managed by Ministry of Water Resources (MWR). The first preliminary report will be issued in March 2012. In the next meeting MOE intends to raise the actual figure of river water demand for all the thermal power projects planned over the country.

The initiative of MOE needs to be further elaborated and developed to realize the philosophy-"least water consumption and least water discharge" in close collaboration with other authorities such as MWR and MOEN.

10.3. Schedule of EMP

Table 10-1 provides a schedule for the review of the EMP, and the preparation and implementation of other ESH plans (refer to "8.3.3 Environment, safety and health plans"). The following schedule is formulated based on the envisaged schedule of the Project (Table 3-3), and the schedule of the EMP is therefore subject to change according to the entire schedule of the Project.

Table 10-1 Schedule of the review of EMP and other management plans

Plan	Responsibility	Schedule for submission	Schedule for implementation	Cost
Review of EMP				
1st review: To revise it if necessary with close consultation with MOEN	Project Team	3rd Quarter 2014	1st Quarter 2015	(*1)
2nd review: To revise it if necessary with close consultation with MOEN	GM of the plant Safety and Env. team	1st Quarter 2018	3rd Quarter 2018	(*1)
Construction stage				
Recruitment plan	Project Team EPC Contractor	2nd Quarter 2015	3rd Quarter 2015	Within construction cost
Construction safety plan	Project Team EPC Contractor	2nd Quarter 2015	3rd Quarter 2015	Within construction cost
Waste management plan	Project Team EPC Contractor	2nd Quarter 2015	3rd Quarter 2015	Within construction cost
Camp management plan	Project Team EPC Contractor	2nd Quarter 2015	3rd Quarter 2015	Within construction cost
Traffic control plan	Project Team EPC Contractor	2nd Quarter 2015	3rd Quarter 2015	Within construction cost
Monitoring plan	Project Team EPC Contractor	2nd Quarter 2015	3rd Quarter 2015	Within construction cost
Operation stage				
Health and safety plan	GM of the plant Safety and Env. team	1st Quarter 2018	3rd Quarter 2018 start of commissioning	Within O&M cost
Waste management plan	GM of the plant Safety and Env. team	1st Quarter 2018	3rd Quarter 2018 start of commissioning	Within O&M cost
Monitoring Plan	GM of the plant Safety and Env. team	1st Quarter 2018	3rd Quarter 2018 start of commissioning	Within O&M cost
(*1): The costs are included in the expenditure of Project Team and Safety and Environment team as their personnel costs.				

APPENDICES

Appendix 1 Important Bird Areas

Site No.	Site Name	Coordinates	
		Latitude (N)	Longitude (E)
001	Benavi	37 20	43 25
002	Dori Serguza	37 20	43 30
003	Ser Amadiya	37 10	43 22
004	Bakhma, Dukan and Darbandikhan dams	36 10	44 55
005	Huweija marshes	35 15	43 50
006	Anah and Rawa	34 32	41 55
007	Mahzam and Lake Tharthar	34 20	43 22
008	Samara dam	34 15	43 50
009	Abu Dalaf and Shari lake	34 15	44 00
010	Augla, Wadi Hauran	33 55	41 02
011	Baquba wetlands	33 55	44 50
012	Gasr Muhaiwir, Wadi Hauran	33 33	41 14
013	Attariya plains	33 25	44 55
014	Abu Habba	33 20	44 20
015	Al Jadriyah and Umm Al Khanazeer island	33 20	44 24
016	Haur Al Habbaniya and Ramadi marshes	33 16	43 30
017	Haur Al Shubaicha	33 15	45 18
018	Al Musayyib - Haswa area	32 48	44 17
019	Hindiya barrage	32 42	44 17
020	Haur Al Suwayqiyah	32 42	45 55
021	Bahr Al Milh	32 40	43 40
022	Haur Al Abjiya and Umm Al Baram	32 28	46 05
023	Haur Delmaj	32 20	45 30
024	Haur Sarut	32 19	46 46
025	Haur Al Sa'adiyah	32 10	46 38
026	Haur Ibn Najim	32 08	44 35
027	Haur Al Hachcham and Haur Maraiba	32 05	46 12
028	Haur Al Haushiya	32 05	46 54
029	Shatt Al Gharraf	31 57	46 00
030	Haur Chubaisah area	31 56	47 20
031	Haur Sanniya	31 55	46 48

Site No.	Site Name	Coordinates	
		Latitude (N)	Longitude (E)
032	Haur Om am Nyaj	31 45	47 25
033	Haur Al Rayan and Umm Osbah	31 40	47 01
034	Haur Auda	31 33	46 51
035	Haur Uwainah	31 25	46 20
036	Haur Al Hawizeh	31 22	47 38
037	Haur Lafta	31 21	45 30
038	Central Marshes	31 10	47 05
039	Haur Al Hammar	30 44	47 03
040	Shatt Al Arab marshes	30 27	47 58
041	Khawr Al Zubair	30 12	47 54
042	Khawr Abdallah	29 55	48 32

Evans, M.I. (1994). Important Bird Areas in the Middle East. BirdLife International, Cambridge, UK.

Appendix 2 IUCN Redlist Species (2010) in Iraq

1. Mammals (terrestrial mammals)

No.	Scientific name	English name	Status	Population trend
1	Acinonyx jubatus	Cheetah	Vulnerable	decreasing
2	Allactaga euphratica	Euphrates Jerboa	Near Threatened	decreasing
3	Dama mesopotamica	Persian Fallow Deer	Endangered	increasing
4	Equus hemionus	Asiatic Wild Ass	Endangered	decreasing
5	Gazella subgutturosa	Goitered Gazelle	Vulnerable	decreasing
6	Hyaena hyaena	Striped Hyaena	Near Threatened	decreasing
7	Lutra lutra	Eurasian Otter	Near Threatened	decreasing
8	Lutrogale perspicillata	Smooth-coated Otter	Vulnerable	decreasing
9	Myotis capaccinii	Long-fingered Bat	Vulnerable	decreasing
10	Nesokia bunnii	Bunn's Short-tailed Bandicoot Rat	Endangered	decreasing
11	Oryx leucoryx	Arabian Oryx	Endangered	decreasing
12	Panthera leo	Lion	Vulnerable	decreasing
13	Rhinolophus euryale	Mediterranean Horseshoe Bat	Near Threatened	decreasing
14	Rhinolophus mehelyi	Mehely's Horseshoe Bat	Vulnerable	decreasing
15	Vormela peregusna	European Marbled Polecat	Vulnerable	decreasing

IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. <www.iucnredlist.org>. Downloaded on 06 June 2011

2. Birds

No.	Scientific name	English name	Status	Population trend
1	Acrocephalus griseldis	Basra Reed-warbler	Endangered	decreasing
2	Aegypius monachus	Cinereous Vulture	Near Threatened	decreasing
3	Anser erythropus	Lesser White-fronted Goose	Vulnerable	decreasing
4	Aquila clanga	Greater Spotted Eagle	Vulnerable	decreasing
5	Aquila heliaca	Eastern Imperial Eagle	Vulnerable	decreasing
6	Aythya nyroca	Ferruginous Duck	Near Threatened	decreasing

No.	Scientific name	English name	Status	Population trend
7	Branta ruficollis	Red-breasted Goose	Endangered	decreasing
8	Chlamydotis undulata	Houbara Bustard	Vulnerable	decreasing
9	Circus macrourus	Pallid Harrier	Near Threatened	decreasing
10	Coracias garrulus	European Roller	Near Threatened	decreasing
11	Emberiza cineracea	Cinereous Bunting	Near Threatened	decreasing
12	Falco cherrug	Saker Falcon	Vulnerable	N/A
13	Falco naumanni	Lesser Kestrel	Vulnerable	decreasing
14	Falco vespertinus	Red-footed Falcon	Near Threatened	N/A
15	Ficedula semitorquata	Semi-collared Flycatcher	Near Threatened	decreasing
16	Gallinago media	Great Snipe	Near Threatened	N/A
17	Geronticus eremita	Northern Bald Ibis	Critically Endangered	N/A
18	Glareola nordmanni	Black-winged Pratincole	Near Threatened	decreasing
19	Haliaeetus leucoryphus	Pallas's Fish-eagle	Vulnerable	decreasing
20	Limosa limosa	Black-tailed Godwit	Near Threatened	decreasing
21	Marmaronetta angustirostris	Marbled Teal	Vulnerable	decreasing
22	Neophron percnopterus	Egyptian Vulture	Endangered	decreasing
23	Numenius arquata	Eurasian Curlew	Near Threatened	decreasing
24	Numenius tenuirostris	Slender-billed Curlew	Critically Endangered	N/A
25	Otis tarda	Great Bustard	Vulnerable	decreasing
26	Oxyura leucocephala	White-headed Duck	Endangered	decreasing
27	Pelecanus crispus	Dalmatian Pelican	Vulnerable	decreasing
28	Serinus syriacus	Syrian Serin	Vulnerable	decreasing
29	Tetrax tetrax	Little Bustard	Near Threatened	N/A
30	Vanellus gregarius	Sociable Lapwing	Critically Endangered	N/A

IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. <www.iucnredlist.org>. Downloaded on 06 June 2011

3. Reptiles

No.	Scientific name	English name	Status	Population trend
1	Carinatogecko heteropholis	Iraqi Keel-scaled Gecko	Data Deficient	unknown
2	Eublepharis angramainyu	N/A	Data Deficient	decreasing
3	Montivipera raddei	Armenian Viper, Radde's (Rock) Viper	Near Threatened	decreasing
4	Rafetus euphraticus	Euphrates Softshell Turtle	Endangered	(needs updating)
5	Testudo graeca	Spur-thighed Tortoise	Vulnerable	(needs updating)

IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. <www.iucnredlist.org>. Downloaded on 06 June 2011

4. Amphibians

No.	Scientific name	English name	Status	Population trend
1	Neurergus crocatus	N/A	Vulnerable	decreasing
2	Pseudepidalea variabilis	N/A	Data Deficient	unknown
3	Salamandra infraimmaculata	Arouss Al Ayn	Near Threatened	N/A

IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. <www.iucnredlist.org>. Downloaded on 06 June 2011

5. Fresh Water Fish

No.	Scientific name	English name	Status	Population trend
1	Caecocypris basimi	N/A	Vulnerable	(needs updating)
2	Typhlogarra widdowsoni	N/A	Vulnerable	(needs updating)

IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. <www.iucnredlist.org>. Downloaded on 06 June 2011

Appendix 3 World Heritage Sites

Information from UNESCO World Heritage Centre

1. Hatra
Governorate of Ninawa
Coordinates: N35 35 17.016 E42 43 5.988
Date of Inscription: 1985
Criteria: (ii)(iii)(iv)(vi)
Property: 324 ha
Brief description of the site: A large fortified city under the influence of the Parthian Empire and capital of the first Arab Kingdom, Hatra withstood invasions by the Romans in A.D. 116 and 198 thanks to its high, thick walls reinforced by towers. The remains of the city, especially the temples where Hellenistic and Roman architecture blend with Eastern decorative features, attest to the greatness of its civilization

2. Ashur (Qal'at Sherqat)
Governorate of Salah ad Din
Coordinates: N35 27 32.004 E43 15 34.992
Date of Inscription: 2003
Criteria: (iii)(iv)
Property: 70 ha
Buffer zone: 100 ha
Brief description of the site: The ancient city of Ashur is located on the Tigris River in northern Mesopotamia in a specific geo-ecological zone, at the borderline between rain-fed and irrigation agriculture. The city dates back to the 3rd millennium BC. From the 14th to the 9th centuries BC it was the first capital of the Assyrian Empire, a city-state and trading platform of international importance. It also served as the religious capital of the Assyrians, associated with the god Ashur. The city was destroyed by the Babylonians, but revived during the Parthian period in the 1st and 2nd centuries AD.

3. Samarra Archaeological City
Samarra Township, Salah al-Din Governorate
Coordinates: N34 20 27.562 E43 49 24.755
Date of Inscription: 2007
Criteria: (ii)(iii)(iv)
Property: 15,058 ha

Buffer zone: 31,414 ha

Brief description of the site: Samarra Archaeological City is the site of a powerful Islamic capital city that ruled over the provinces of the Abbasid Empire extending from Tunisia to Central Asia for a century. Located on both sides of the River Tigris 130 km north of Baghdad, the length of the site from north to south is 41.5 km; its width varying from 8 km to 4 km. It testifies to the architectural and artistic innovations that developed there and spread to the other regions of the Islamic world and beyond. The 9th-century Great Mosque and its spiral minaret are among the numerous remarkable architectural monuments of the site, 80% of which remain to be excavated

4. Proposed World Heritage Sites (IRAQ FOURTH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY (2010))

(1) Ur
Date of Submission: 07/07/2000
Criteria: (i)(iii)(iv)
Category: Cultural
Submitted by: Department of Antiquities and Heritage
Coordinates: 17 km south-east of the city of Nasiryah

(2) Nimrud
Date of Submission: 07/07/2000
Criteria: (i)(ii)(iii)
Category: Cultural
Submitted by: Department of Antiquities and Heritage
Coordinates: 34 km south of Mosul

(3) Ancient City of Nineveh
Date of Submission: 07/07/2000
Criteria: (i)(ii)(iii)(iv)(v)(vi)
Category: Cultural
Submitted by: Department of Antiquities and Heritage
Coordinates: 410 km north of the city of Bagdad on the eastern bank of the River Tigris

(4) Fortress of Al-Ukhaidar
Date of Submission: 07/07/2000
Criteria: (i)(ii)
Category: Cultural

Submitted by: Department of Antiquities and Heritage

Coordinates: 50 km south-west of Karbala

(5) Wasit

Date of Submission: 07/07/2000

Criteria: (i)(ii)(iv)

Category: Cultural

Submitted by: Department of Antiquities and Heritage

Coordinates: 54 km from the centre of Kut, along UM Adejail/Road

(6) Sacred Complex of Babylon

Date of Submission: 29/10/2003

Criteria: (iii)(vi)

Category: Cultural

Submitted by: Ministry of Culture

Coordinates: The site, part of the larger archaeological area of Babylon, is situated 90 km south of Baghdad, on the east of the Euphrates River, around 320 km above its junction with the Tigris.

(7) Marshlands of Mesopotamia

Date of Submission: 29/10/2003

Category: Mixed

Submitted by: Ministry of Culture

Coordinates: 31°-32° N - 46°5'-47°5' E

(8) Erbil Citadel

Date of Submission: 08/01/2010

Criteria: (i)(ii)(iii)(iv)(v)

Category: Cultural

Submitted by: High Commission for Erbil Citadel Revitalization & State Board for Antiquities and Heritage

State, Province or Region: Kurdistan Region

Coordinates: N36 11 23 E44 00 35

(9) Site of Thilkifl

Date of Submission: 21/01/2010

Criteria: (i)(ii)(iii)(iv)(v)(vi)

Category: Cultural

Submitted by: The State Board of Antiquities and Heritage

State, Province or Region: Babel (Al-Hilla), Al-Kifil sub-district.

Coordinates: N32 13 37 E44 22 02

(10) Amedy City

Date of Submission: 02/02/2011

Criteria: (i)(ii)(iii)(vii)(viii)

Category: Mixed

Submitted by: Permanent Delegation of Republic of Iraq to UNESCO

State, Province or Region: Kurdistan Region

(11) Wadi Al-Salam Cemetery in Najaf

Date of Submission: 24/01/2011

Criteria: (iii)(v)(vi)

Category: Cultural

Submitted by: Permanent Delegation of Iraq to UNESCO

State, Province or Region: Al-Najaf region, Al-Najaf province

Coordinates: N32 00 00 E44 18 59

Appendix 4 Freshwater fish in Iraq

No.	Species (scientific name)	Status	Fishbase name	Name in Iraq
1	Acanthalburnus microlepis	introduced	Blackbrow bleak	
2	Acanthobrama lissneri	misidentification		
3	Acanthobrama telavivensis	native		
4	Acanthopagrus berda	native	Goldsilk seabream	
5	Alburnus caeruleus	native		
6	Aphanius dispar dispar	native		
7	Aphanius mento	native		
8	Aphanius mesopotamicus	native	Mesopotamian tooth-carp	
9	Aphanius sophiae	native		
10	Aspius vorax	native		Shilik
11	Barbatula frenata	native		
12	Barbatula panthera	native		
13	Barbus grypus	native		Shabbout
14	Barbus longiceps	misidentification		
15	Barilius mesopotamicus	native		
16	Caecocypris basimi	endemic		
17	Capoeta damascina	native		
18	Capoeta trutta	native		
19	Carasobarbus luteus	native		Himri
20	Carassius auratus auratus	introduced	Goldfish	
21	Carcharhinus leucas	native	Bull shark	
22	Clarias gariepinus	introduced	North African catfish	
23	Ctenopharyngodon idella	introduced	Grass carp	
24	Cyprinion tenuiradius	native		
25	Cyprinus carpio carpio	introduced	Common carp	
26	Gambusia affinis	introduced	Mosquitofish	
27	Gambusia holbrooki	introduced	Eastern mosquitofish	
28	Garra rufa	native		
29	Heteropneustes fossilis	introduced	Stinging catfish	
30	Hypophthalmichthys	introduced	Silver carp	

No.	Species (scientific name)	Status	Fishbase name	Name in Iraq
	molitrix			
31	Hypophthalmichthys nobilis	introduced	Bighead carp	
32	Liza abu	native	Abu mullet	Hishni
33	Luciobarbus esocinus	native	Mangar	Biss
34	Luciobarbus xanthopterus	native		Gattan
35	Mesopotamichthys sharpeyi	native		Bunni
36	Mystus pelusius	native		
37	Nemacheilus insignis	misidentification		
38	Oncorhynchus mykiss	not established	Rainbow trout	
39	Oreochromis niloticus niloticus	not established	Nile tilapia	
40	Paracobitis tigris	native		
41	Sarotherodon galilaeus galilaeus	introduced	Mango tilapia	
42	Sillago sihama	native	Silver sillago	
43	Silurus triostegus	native		
44	Squalius lepidus	native		
45	Strongylura strongylura	native	Spottail needlefish	
46	Tenualosa ilisha	native	Hilsa shad	Shour
47	Typhlogarra widdowsoni	native	Iraq blind barb	

Fishbase <http://www.fishbase.org/home.htm>. Downloaded on 08 December 2011

Appendix 5 Detailed evaluation results of Nasiryah (Nasiryah II)

Site Name		Nasiryah (Nasiryah II) Project Site
A. Land Use	1. Location	- Northwestern edge of Nasiryah city on the right bank of Euphrates river - Close to the existing Nasiryah Power Station
	2. Near City	- Nasiryah City
	3. Land Area	- 51.29ha = [46.94ha + 4.35ha (new area:30m*1450m)].
	4. Land owner 5. Land use status	- Ministry of electricity is the official owner of the project area which will be a part of the existing Nasiryah Power Plant
	6. Accessibility	- Baghdad – Basra highway, it is located 25 km far from the project area. - Basra - Al Nasiryah road way, two lane road. - Beside railway line (Baghdad – Basra).
	7. Land Constraints	- There are no constraints
B. Power Network	8. Transmission Line	- Very near to existing 400kV network
	9. Transmission distance to Baghdad	- The distance from the site to Baghdad is 337km - Generated power subtracted local power supply will be transmitted to the demand center of Baghdad. Therefore, the shorter transmission distance is, the less necessary network reinforcement cost is.
C. Natural Condition	10. Meteorological condition 1) Rainfall (2000-2010)	[Nasiryah station] - Maximum annual rainfall amount : 245.8mm (2006) - Minimum annual rainfall amount : 56.9mm (2009) - Mean maximum monthly rainfall amount : 105.7mm (Apr. 2002)

	2) Ambient temperature (1992-2008)	- Mean maximum monthly temperature : 40.2C° (Jul. 2000) - Mean minimum monthly temperature : 9.0C° (Jan. 1992)
	3) Relative humidity (1992-2008)	- Mean maximum monthly relative humidity : 81% (Dec. 1997) - Mean minimum monthly relative humidity : 19% (Jun. 2006, Jul. 2005, 2006 and 2008)
	4) Wind speed (1992-2008)	- Mean maximum monthly wind speed : 9.3m/s (N/NW Jul. 1992)
	5) Atmospheric pressure	- No Information
	11. Record of historical floods	- No floods for more than 30 years
	12. Record of historical earthquakes	- No record of historical earthquake(2000-2010)
D. Topography / Geology	13. Topographic condition	- The site is located on the flat dry marsh deposits which are considered as an accumulated geomorphic unit represented essentially by fluvial deposits with intercalation of lacustrine and anthropegene deposits.
	14. Geological condition	- Mesopotamian plain which mainly consists of the Neogene deposits is distributed around the site. The thickness of Neogene (the Holocene and the Pleistocene) deposits is estimated around 20m in total - referred to the Nasiryah quadrangle-. - They cover the Paleogene sedimentary rocks which can be a bearing layer.
	15. Geotechnical survey result	- Bearing layer : less than 30m (conjectured from the soil investigation report for Nasiryah GT PS and Geological map)
	16. Civil design	- Bearing pile length for heavy equipment facilities is less than 30m
E. Water Condition	17. River water availability	- The project area is beside the existing Nasiryah PS locating beside Euphrates river

F. Fuel Condition	18. Fuel condition	- Gas (18″) and oil pipeline is located in the southern side. - Strategic Gas pipeline (24″) is under construction by 2011 in the southern side. - National Gas pipeline (42″) is under construction and another pipeline (42″) is planned to construct by 2014 in the northern side.
G .Transportation Condition	19. Transportability 1) Water way	- The available ports exists in Al Basra governorate with about 161 km distance
	2) Rail way	- Railway (Baghdad – Basra) exists beside the site.
	3) Road way	- Baghdad – Basra highway, it is located 25 km far from the project area. - Basra - Al Nasiryah road way: Two lane road
H. Environmental Considerations [Natural / Social Environment]	20. Resettlement (houses, farmlands, cemetery etc)	- No involuntary resettlement (including compensation and expropriation of land) is anticipated.
	21. Natural Park (e.g. proposed National Park), World Heritages	- In southern Iraq, there are two protected areas (or proposed protected area) declared by the Ministry of Environment. The Project area is located at the outside of them. - Ur Proposed World Heritage site is located at 15 km from the Project area. - No local heritage exists in the Project area.
	22. Endangered species	- No endangered species occur In the Project area
	23. Socially vulnerable people (including water right and fisheries in river)	- There are no ethnic minorities in the area and its surroundings. - The existing power station currently uses the water. However, the information on the water right issue is not available. - It is not confirmed whether fisheries are active in the vicinity of the Project area.
	23. Industrial Site Applicability	- The Ministry of Electricity is the official owner of the Project area, and it will be part of the existing power station. The project area is available for any industrial or economical activities.

Appendix 6 Detailed evaluation results of Hartha 2

Site Name		Hartha II Project Site
A. Land Use	1. Location	- Northwestern of Al Basra city on the left bank of Shat Al- Arab river - Opposite bank of the existing Al-Hartha Power station
	2. Near City	- Al-Basra city
	3. Land Area	- More than 100ha from Pre-FS report.
	4. Land owner	- Most of land owners are the Iraqi people who live in the project area.
	5. Land use status	- Most of the project area is empty land, there are small area of date palms and local seasonal crops near the Shat Al-Arab river bank
	6. Accessibility	- The project area has difficult transportation accessibility, and the only way is one lane road. - Shat Al-Arab river can be used for transportation.
	7. Land Constraints	- There are some constraints due to the ownership of the land of the site.
B. Power network	8. Transmission Line	- Very near to existing 400kV network
	9. Transmission distance to Baghdad	- The distance from the site to Baghdad is 495km - Generated power subtracted local power supply will be transmitted to the demand center of Baghdad. Therefore, the shorter transmission distance is, the less necessary network reinforcement cost is.
C. Natural condition	10. Meteorological condition 1) Rainfall	[Basra station] - No information
	2) Ambient temperature	- No information
	3) Relative humidity	- No information

	4) Wind speed (1993-2008)	- Mean maximum monthly wind speed : 7.7m/s (NW Jul. 2006)
	5) Atmospheric pressure (1993-2007)	- Mean maximum monthly atmospheric pressure : 1023mb (Dec. 1994) - Mean minimum monthly atmospheric pressure : 996mb (Jul. 1994, 1995 and 2000)
	11. Record of historical floods	- No floods for more than 30 years
	12. Record of historical earthquakes	- No record of historical earthquake(2000-2010)
D. Topography / Geology	13. Topographic condition	- The site is located on the left bank of the Shat Al-Arab river on the Mesopotamian plain. The site seems to be a natural levee from the Google earth image.
	14. Geological condition	- Mesopotamian plain which mainly consists of the Neogene sediments is distributed around the site. The Neogene sediments which lie on the Dibdibba Formation of the Paleogene rocks consist of the fluvial deposits, marine sediments, and marine-estuarine deposits. - They cover the Dibdibba Formation with unconformity structure, which can be a bearing layer. The thickness of the Neogene deposits is estimated at least 14-18m referred to the illustration in the report of the Al-Basra quadlangle. However, according to the draft report issued by the "Working team" of Gas Turbine power plant project, the bearing layer should be set moreover 22m based on their surveyed maximum depth. .
	15. Geotechnical survey result	- Bearing layer : 30m deep or deeper (conjectured from the Geological map) - Surface layer : Marine - estuarine deposits
	16. Civil design	- Bearing pile length for heavy equipment facilities is estimated 30m or more. - Soil improvement for the surface layer will be needed (Marine - estuarine deposits)

E. Water Condition	17. River water availability	- The project area is beside Shat Al-Arab river
F. Fuel Condition	18. Fuel condition	- The project area is near many fuel sources. - National Gas pipeline (42″) is under construction and another pipeline (42″) is planned to construct by 2014 in the western side. - Eastern Gas pipeline (42″ or 48″) is planned to construct by 2015 in the vicinity of the site.
G .Transportation Condition	19. Transportability 1) Water way	- The available ports exists in Al Basrah governorate
	2) Rail way	- No railway is available
	3) Road way	- There are two bridges which can be used to reach Al Basra from Baghdad; two lane road. - Airport exists at 30km distance from the site.
H. Environmental Considerations [Natural / Social Environment]	20. Resettlement (houses, farmlands, cemetery etc)	- Involuntary resettlement (or compensation, expropriation of land) is anticipated.
	21. Natural Park (e.g. proposed National Park), World Heritages	- In southern Iraq, there are two protected areas (or proposed protected area) declared by the Ministry of Environment. The Project area is far from them. - No World Heritage (or proposed) Site exists in or near the Project area. - No local heritage exists in the Project area.
	22. Endangered species	- No endangered species occur in the Project area.
	23. Socially vulnerable people (including water right and fisheries in river)	- There are no ethnic minorities in the area and its surroundings. - The existing power station currently uses the water. The information on the water right issue is not available. - The river is small and it is unlikely that fisheries are active in the river but it is not confirmed.

	24. Industrial Site Applicability	- Most of the land is private properties of the local people, and basically they live in the land. - Most of the project area is not utilized as farmland or other purposes, but the local people grow date palm and local seasonal crops near the river bank.

Appendix 7 Detailed evaluation results of Alkahla Emara

Site Name		Alkahla Emara Project Site
A. Land Use	1. Location	- South of Al Emara city, near the right bank of Alkahla river
	2. Near City	- Al-Emara city
	3. Land Area	- More than 100ha from Pre-FS report
	4. Land owner	- Most of land belongs to the Ministry of Finance, and the land is rented to the local people
	5. Land use status	- Most of the land is empty land, but there are small area of date palms and local seasonal crops. Many bricks factories are distributed in and around this area
	6. Accessibility	- Al Alkahla- Al Emara road way, one lane road. - Al Emara –Baghdad road way, two lane road.
	7. Land Constraints	-
B. Power network	8. Transmission Line	- Very near to existing 400kV network
	9. Transmission distance to Baghdad	- The distance from the site to Baghdad is 361km - Generated power subtracted local power supply will be transmitted to the demand center of Baghdad. Therefore, the shorter transmission distance is, the less necessary network reinforcement cost is.
C. Natural condition	10. Meteorological condition 1) Rainfall	[Al Gharbi station] - No information
	2) Ambient temperature (1994-2008)	- Mean maximum monthly temperature : 40.2C° (Jul. 2000) - Mean minimum monthly temperature : 8.7C° (Jan. 2008)

	3) Relative humidity (1994-2000)	- Mean maximum monthly relative humidity : 85% (Dec. 1997 and 2000) - Mean minimum monthly relative humidity : 16% (Jun. 1996, Jul 1996 and 1997, Aug. 1996)
	4) Wind speed (1994-2008)	- Mean maximum monthly wind speed : 9.6m/s (NW Jul. 1995)
	5) Atmospheric pressure (1994-2004)	- Mean maximum monthly atmospheric pressure : 1,023mb (Dec. 1994) - Mean minimum monthly atmospheric pressure : 996mb (Jul. 1995)
	11. Record of historical floods	- No floods
	12. Record of historical earthquakes	- Small scale earthquakes had occurred near border with Iran (2000-2010)
D. Topography / Geology	13. Topographic condition	- The site is located in the southeastern part of the Mesopotamian plain which is characterized by deltaic flood plain and vast marshes. The area has fault terrain with very low relief at EL +5.0-6.0m on the topographic map of Emara
	14. Geological condition	- Mesopotamian plain which mainly consists of the Neogene sediments is distributed around the site. The Neogene sediments consists of the fluvial and lacustrine origin and partly aeolian. Marine estuarine deposits are also recognized. - Fluvial sediments, marine sediments, and marsh and lake sediments cover the Peistocene sediments. Total thickness of these Neogene deposits is estimated around 20m referred to the illustration in the report of the Al-Amara quadrangle.
	15. Geotechnical survey result	- Bearing layer : less than 30m deep (conjectured from the Geological map)
	16. Civil design	- Bearing pile length for heavy equipment facilities is less than 30m

E. Water Condition	17. River water availability	- The project area is beside Al Kahal river
F. Fuel Condition	18. Fuel condition	- Eastern Gas pipeline (42″ or 48″) is planned to construct by 2015 in the western side.
G .Transportation Condition	19. Transportability 1) Water way	- Although there is Al Kahal river near the site, it is a small river.
	2) Rail way	- No railway is available.
	3) Road way	- Al Emara – Al kahal, one lane road
H. Environmental Considerations [Natural / Social Environment]	20. Resettlement (houses, farmlands, cemetery etc)	- Involuntary resettlement (or compensation, expropriation of land) is anticipated.
	21. Natural Park (e.g. proposed National Park), World Heritages	- In southern Iraq, there are two protected areas (or proposed protected area) decelerated by Ministry of Environment. The Project area is far from them. - No World Heritage (or proposed) Site exists in or near the Project area. - No local heritage exists in the Project area.
	22. Endangered species	- No endangered species occur in the Project area.
	23. Socially vulnerable people (including water right and fisheries in river)	- There are no ethnic minorities in the area and its surroundings. - The information on the water right issue is not available. - It is not confirmed whether fisheries are active in the vicinity of the Project area.

	24. Industrial Site Applicability	- Most of the land in this area belong to the Ministry of Finance, and are rented to local people. - Most of the land is not utilized but, in some part of it, the local people grow date palms and local seasonal crops. Many brick factories exist in the area.

Appendix 8 Signed letter from the major tribal leaders

To : Government of Japan

Subject : Gratitude and Appreciation of Japanese Government and Population

We, surrounding tribes of Nasiryah, offer our gratitude and appreciation for the Japanese Government for their continuous support to the disastrous Iraqi people.

Their support and back up to Iraqi people has continued throughout their willingness to establish Electrical Generation Power Plant at Nasiryah, Country of Ur Civilization.

We, therefore, appreciate the Japanese efforts to strengthen the ties between Japan and Iraq.

1) Sheikh
   Hameed Karim Ojail Tweili
   HUSSAINAT TRIBE CHIEF
2) Sheikh
   Ali Mohmamed Munshed
   GHAZA TRIBES CHIEF
3) Sheikh
   Adnan Bader Kate' AL Batty
   ZAIRAJ TRIBES CHIEF

Date: 11 October 2011

Endorsed by:
Thi Qar Governorate Council Member
Assistant of Technical Affairs

الى/ حكومة اليابان الصديقه

م/ شكر وتقدير لحكومة وشعب اليابان

نحن شيوخ العشائر المحيطه بمدينة الناصريه نتقدم بالشكر الجزيل والعرفان لحكومة وشعب اليابان الصديق على دعمهما المتواصل للشعب العراقي المنكوب واسهامهما الكبير في تجاوز معاناته من خلال نياتهما الطيبه في انشاء محطة توليد كهرباء سعة ١٠٠٠ ميكاواط في مدينة الناصريه موطن اور مهد الحضارات .

ولا يسعنا الا ان نسجل اعتزازنا وتقديرنا العا ليين للجهود العظيمه التي سوف تبذل من قبل الحكومه اليابانيه والتي سوف تزيد من اواصر الاخوه والروابط المتينه بين الشعبين العراقي والياباني .

الشيخ	الشيخ	الشيخ
حميد كريم عجيل التويلي	علي محمد المنشـــد	عدنان بدر كاطع البطي
شيخ عشائر الحسينات	شيخ عشائر الغزي	شيخ عشائر الزيرج

١١/١٠/٢٠١١

نصادق على تواقيع
شيوخ الشطرة

عضو مجلس محافظة ذي قار
المعاون للشؤون الفنية

Appendix 9 Approval from the participants of the 1st stakeholders' meeting

In the Name of God

Most compassionate and merciful

To : JICA

Approval

We welcome the establishment of Nasiryah II (Japanese Loan) in the assigned location near Owaijeh area.

We think that this project will have great benefit for our beloved country in terms of electrical generating and employment for the Iraqis during the establishment of the Power Plant and even after its operation.

We would like to thank the Japanese Government for this project.

Signatories:

1. Abdul Hasan Hadi Hajar- Thi Qar Council Chief Technical
2. Ahmad Taha Sheikh – Ministry of Planning
3. Mohammad Hadely – Council Member
4. Dr. Rafed Hannon – Thi Qar University – assistant Dean
5. Rajem Yaser Hasan – Assistant technical affairs
6. Qussay Abbadi – Head of Governorate Council
7. Talib Kadhum Al Hassan
8. Sabah Hasan – General Director of Police
9. Kareem Attieh – Chief of operations
10. Ghassan Hammood – Manager of Residential Planning
11. Qutad Hasson Ali – Country Real Estate Manager
12. Fakhri Kathem
13. Eng. Salameh Safi – Municipalities Manager
14. Mohsen Mohawesh – Chief Tribal affairs
15. Ali Sharqawi – Assistant Governorate
16. Mahdi Ali – Islamic Party

17. Watheq Owaid – Engineering and Maintenance
18. Abdul Hasan Joudeh – Intelligence
19. Eyad Ayyal – Police Officer
20. Abdul Latif Maleh – Chief of Sakour Tribe
21. Aziz Hashem Shurayti - Chief of Shreiqay Tribe
22. Hussain Mattar – Chief of Ibrahim Tribe
23. Helal Hamadi
24. Majed Saydat
25. Abdul Mohsen Harabi
26. Kathem Rahim
27. Hameed Teyan – Chief of Tribe
28. Naser Hasan – Hussainat
29. Abdul Ameer Raysan – Chief of Abu Hamdan Tribe
30. Adnan Bader Kate – Chief of Tribe
31. Omran Abdul
32. Tareq Sawad – Chief of Tribe Makabeel
33. Salman Sami – Chief of Tribe
34. Khader Haijar- Chief of Tribe
35. Atshan Mohamad – Chief of Tribe
36. Aber Sharshab
37. Abdul Ameer Merdas – Chief of Tribe
38. Salem Hamdan
39. Thamer Ajeel – Chief of Tribe
40. Dr. Adnan Allawi – Engineering Faculty – Thi Qar University
41. Abdul Ridha Afrawi – Investment Board Deputy Manager
42. Moayad Nasrallah – Chief of Shammar Tribe
43. Jawad Badr
44. Wared Al Salman – Chief of Bani Zayed
45. Hameed Shahed – Husainat Tribe
46. Abdul Hameed Al Ajeel – Husainat – General
47. Nasho Mashhout Mareed – Saleihan Tribe

48. Haj Adnan Waelly – Bani Wael Tribe
49. Atta Hajem – Chief of Abu Dayeh Tribe
50. Husain La Hassouneh – Sayed Tribe
51. Ahmad Ayal – Chief of Bani Mashra Tribe
52. Kareem Funjan – Chief of Bani Zayed Al Sultan Tribe
53. Mahdi Kareem – Husainat

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع: ٢٠١٤/١٢/٥

الاسم : عبد الحسين هادي الحجر

الصفة: عضو مجلس محافظة ذي قار
المعاون الفني لرئيس
مجلس محافظة ذي قار

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

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.....مع التقدير

التوقيع:

الاسم :

الصفة:

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الى / منظمة جايكا اليابانية

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نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : د. رافد معلك حمود

الصفة: معاون عميد كلية الهندسة / جامعة ذي قار

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

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.....مع التقدير

التوقيع:

الاسم :

الصفة:

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مع التقدير........

التوقيع:

الاسم : engineer : Qusay Al-ebadi قصي عمر العبادي

الصفة: Provincial Council Chairman Nassiriah رئيس مجلس المحافظة

بسم الله الرحمن الرحيم

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.....مع التقدير

التوقيع:

الاسم : طالب كاظم الحسن

الصفة: محافظ ذي قار

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

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.....مع التقدير

التوقيع:

الاسم : كريم جبار عطية

الصفة: مدير قسم العمليات / هيئة مستول تنفيذ ذي قار - شركة نفط الجنوب

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

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.....مع التقدير

التوقيع:

الاسم : عثمان صبري محمد

الصفة: مدير التخطيط العراقي

بسم الله الرحمن الرحيم

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مع التقدير........

التوقيع:

الاسم : حسنا دحسون محيل

الصفة: مدير قطارات الدولة

٥/١/٢٠١٢م

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

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.....مع التقدير

التوقيع:

الاسم : علي محمد بشير

الصفة: معاون محافظ ذي قار

١٥/١/٢٠١٨

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

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التوقيع:

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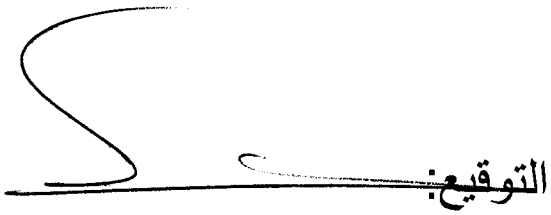
.....مع التقدير



التوقيع:

الاسم : [illegible]

الصفة: [illegible]

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

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.....مع التقدير

التوقيع:

الاسم : النقيب عبد الحسن هادي حمود

الصفة: ضابط اشارات فوج الثالث
لواء المشاة الثامن والعشرون
الفرقة العاشرة

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

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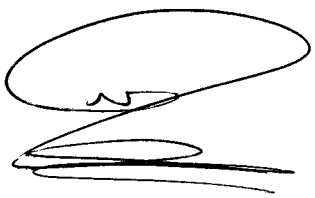

التوقيع:

الاسم :

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مع التقدير........

التوقيع:

الاسم : اياد رزاق عيال

الصفة: ضابط شرطة

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

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.....مع التقدير

التوقيع:

الاسم : عزيز هاشم الشرع

الصفة: شيخ عشائر الشرع

بسم الله الرحمن الرحيم

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الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم: شاهد محمد سعدون

الصفة: الهيئات التوضيحية

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : الشيخ احمد الحمد محمد صالح

الصفة: الجنسيات الجواسم

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : حميد جبار طاهر تيات

الصفة: شيخ عشيره

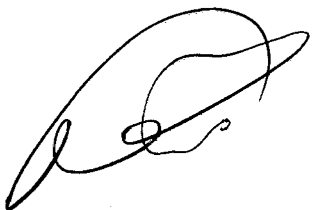
بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

........مع التقدير

التوقيع: 

الاسم : الشيخ ناصر [illegible]

الصفة: [illegible]

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : عبد الامير زيدان

الصفة: شيخ عشيرة آل بوحمدان

٢٠١٧/١/٥

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : الشيخ عمران عبد الطويل

الصفة: المرشد

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : طارق كاظم

الصفة: رئيس عشيرة المعابيل

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : عبد الكريم محمد

الصفة: شيخ عشيرة

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : عابر مزهر لشرشاب

الصفة: شيخ عشائر البدور

٢٠١٢/١/٥

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

مع التقدير........

التوقيع:

الاسم : عبد الامير مرداس

الصفة: [illegible]

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : سالم محمد

الصفة: رئيس الكتلة

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : الشيخ ثامر عاطل

الصفة: رئيس اتحاد اليوسفين

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : د. عزام علاوي فتيت

الصفة: استاذ جامعي

عميد الصنم / جامعة ذي قار

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : عبد الرضا محمد عفراوي

الصفة: نائب رئيس هيئة الاستثمار

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : عويد حمد آل نضر اللهم

الصفة: شيخ عشائر شمر

٢٠٠٧/١/٥

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : الشيخ وارد خلاب الاسلامي

الصفة: شيخ عام عشائر بني زيد

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

مع التقدير........

التوقيع:

الاسم : الشيخ عبد محمد ال العجيل

الصفة: [illegible] العام

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

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.....مع التقدير

التوقيع:

الاسم : شو مشحوت حريد

الصفة: شيخ عشيرة الصليان الزبيدي

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

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.....مع التقدير

التوقيع:

الاسم : حاتم عبدان كامل الوائلي

الصفة: عشيرة بني وائل

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم: عطا حسان طاهر

الصفة: شيخ عشائر اليوزبه

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : احمد كاظم عيال

الصفة: شيخ عشائر بني مسره

٢٠١٧/١/٥

بسم الله الرحمن الرحيم

إلى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بإنشاء محطة الناصرية الغازية /2 (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل أيدي عاملة أثناء إنشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم : الشيخ كريم طاهر غنجان

الصفة: شيخ عشيرة بني زيد السلطان

بسم الله الرحمن الرحيم

الى / منظمة جايكا اليابانية

م/موافقة

نحن الموقعون ادناه نرحب بانشاء محطة الناصرية الغازية /٢ (القرض الياباني) في الموقع المحدد بجانب محطة الناصرية البخارية منطقة العويجة لما لهذا المشروع من فائدة كبيرة لبلدنا الحبيب ومحافظتنا العزيزة من ناحية توليد الطاقة الكهربائية وتشغيل ايدي عاملة اثناء انشاء المحطة وبعد تشغيلها ونشكر الحكومة والشعب الياباني الصديق ومنظمة جايكا على هذا المشروع ومن الله التوفيق .

.....مع التقدير

التوقيع:

الاسم :

الصفة:

Appendix 10 Participants' list of the 2nd stakeholders' meeting

NO.	Name	Status
1	Jawad Bader Kata	Director General of Nasiryah TPP
2	Hassan Wrewish	Nasiryah council member
3	Hassan Ali	Nasiryah council member
4	Adnan Majeed Alhsona	Tribal leader
5	Abdul Hassan Hamad	Tribal leader
6	Ghalib Mutashar	Tribal leader
7	Hamid Jabbar	Tribal leader
8	Yasser Jassim Sadkhan	Tribal leader
9	Alaa Sabri Manhi	Tribal leader
10	Adnan Bader Kata	Tribal leader
11	Mohan Abdullah	Tribal leader
12	Maan Abdul Hussein Majid	Engineer
13	Kamal Aja Thamer	Engineer
14	Feisal Abdul Aali	Nasiryah TPP Director
15	Lyad Khudair	Engineer
16	Sama Shareef	Women's Affairs Member in Nasiryah
17	Manar Abdul Karim	Women's Affairs Member in Nasiryah
18	Maha Kazim	Engineer in Nasiryah Municipality
19	Ola Hamid	Engineer of Provincial Office of Environment
20	Sarah Muhammad	Engineer of Provincial Office of Environment
21	Doa'a Abdullah	Engineer of Nasiryah TPP
22	Farah Ahmed	Engineer of Nasiryah TPP
23	Marwa Hussein	Employee of Nasiryah Health Department
24	Zainab Abdul Sattar	Employee of Nasiryah Health Department
25	Shahad Ammar	Employee of Nasiryah Health Department
26	Anwar Muhammad	Employee of the Provincial Council Thi Qar
27	Saja Abdul Hassan	Employee of the Provincial Council Thi Qar
28	Noor Kazim	Employee of the Provincial Council Thi Qar
29	Rasha Falah	Employee of Provincial Office of Water Resources
30	Shaima Khalid	Employee of Provincial Office of Water Resources
31	Zina Muwafaq	Employee of Nasiryah Urban Planning Department

NO.	Name	Status
32	Hadeel Ammar	Employee of Nasiryah Urban Planning Department
33	Hoda Abdel-Hassan	Employee of Nasiryah Urban Planning Department
34	Baidaa Muzaffar	Engineer of Provincial Office of Agriculture
35	Noor Ali	Engineer of Provincial Office of Agriculture
36	Ansam Faleh	Engineer of Provincial Office of Agriculture
37	Hala Riad	Engineer of Nasiryah Electricity Distribution Department
38	Zainab Riaz	Engineer of Nasiryah Electricity Distribution Department
39	Rand Abdel-Azim	Engineer of Provincial Office of Sewage
40	lsra Ali	Engineer of Provincial Office of Sewage
41	Rana Tawfik	Engineer of Provincial Office of Water Resources
42	Rafael Jamil	Engineer of Provincial Office of Water Resources
43	Russell Lyad	Engineer of Provincial Office of Water Resources
44	Noha Majid	Engineer of Provincial Office of Water Resources
45	Wejdan Raheem	Engineer of Nasiryah Power Transmission Department
46	Hawra Ali	Engineer of Nasiryah Power Transmission Department
47	Noor lssam	Employee of Nasiryah Meteorological Department
48	Dhaha Muhammad	Employee in Nasiryah Meteorological Department
49	Rim Dia'a	Employee in Nasiryah Meteorological Department
50	Sarah Hashem	Employee Nasiryah Municipality
51	Marwa Muslim	Employee
52	Ahmed AbdulAmir	Engineer
53	Hossam Mahdi	Engineer
54	Atheer Abdul Hassan	Engineer
55	Haidar Ghalib	Engineer
56	Salah Siwan	Engineer
57	Aaron Joseph	Engineer
58	Ahmed Joawel	Engineer
59	Ahmed Mahdi	Engineer
60	Hossam lateef	Employee
61	Abbas Salman	Employee
62	Ahmed Gerhadd	Employee
63	Khalil Lbrahim	Employee
64	Haidar Qadri	Employee

Attachment - 16 JICA Environmental Check List for Thermal Power Plant

JICA Environmental Check List for Thermal Power Plant

"The Preparation Study for Development of Southern Large Scale Thermal Power Plant in Iraq"

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) Not yet (b) No yet (c) No yet (d) Not yet	(a) It is in process. Ministry of Electricity plans to submit the EIA Report to Ministry of Environment by the end of March 2012. (b) Not yet. (c) Not yet. (d) They are described in the report (refer to "5.3.5 Support for Preparation of EIA and Environmental Checklist".
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as	(a) Y (b) Y	(a)The details of the stakeholders' meetings held in Nasiryah are described in "Chapter 9: Consultation" of the EIA Report. (b) The comment from the stakeholders' is an issue on the employment. The Project Manager explained at the 1st stakeholders' meeting that the Project will employ the local people, and the comment and the answer are described in the

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		local residents) been reflected to the project design?		EIA report. The Project Manager explained it again at the 2nd stakeholders' meeting.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) The details of alternatives are described in "Chapter 6: Analysis of alternatives" of the EIA Report. The alternatives are thoroughly examined from financial, technical and environmental points of view.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust emitted by the power plant operations comply with the country's emission standards? Is there a possibility that air pollutants emitted from the project will cause areas that do not comply with the country's ambient air quality standards? Are any mitigating measures taken? (b) In the case of coal-fired power plants, is there a possibility that fugitive dust from the coal piles, coal handling facilities, and dust from the coal ash disposal sites will cause air pollution? Are adequate measures taken to prevent the air pollution?	(a) Y (b) Not applicable	(a) The operation of the plant complies with the Iraqi standards. Regarding the SOx emission, it is not applicable because of the utilization of natural gas as the fuel. Since the sulphur content of the natural gas is removed, the emission of SO_2 is not expected. Regarding cumulative impacts induced by the three TPPs (existing Nasiryah TPP, Nasiryah I and II), an assessment is not conducted because of the following reasons. The baseline data (Table 5-10 and 5-11 in the EIA report) were collected at two (2) sampling points and for one (1) day, which are not sufficient to know the current status of the ambient air quality around the existing TPP. The exiting TPP sometimes stops or reduces its operation because of its aging equipment and other factors such as cleaning steam turbine condensers, which makes it difficult to understand how the air

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				effluents actually emit from the plant. Since detailed information of Nasiryah I is not available, it is not practical to conduct a simulation. Regarding Nasiryah II, since detailed information on the site (e.g. year-around weather conditions) is not available, a simple simulation is conducted as a preliminary one to identify whether any significant impacts are expected. (b) The fuel is natural gas and the item (b) is not applicable for the Project.
	(2) Water Quality	(a) Do effluents including thermal effluents from the power plant comply with the country's effluent standards? Is there a possibility that the effluents from the project will cause areas that do not comply with the country's ambient water quality standards or cause any significant temperature rise in the receiving waters? (b) In the case of coal-fired power plants, do leachates from the coal piles and coal ash disposal sites comply with the country's effluent standards? (c) Are adequate measures taken to prevent contamination of surface water, soil, groundwater, and	(a) Y (b) Not applicable (c) Y	(a) Regarding the thermal effluent, it is not applicable because of the utilization of a hybrid air cooled condenser (ACC) cooling system. The Hybrid ACC does not produce any thermal effluent. Because of high salinity of the raw water from Euphrates River, the water needs to be treated by Reverse Osmosis (RO) system and the treated water are to be used in the plant (e.g. for cooling system). The RO rejection water has high salinity but there is no Iraqi standard on the effluent with high salinity. The Project analyzed alternatives of cooling system and the conditions of the river water (decline of quantity and quality,

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		seawater by the effluents?		increase of utilization of the water, and ecosystems in the downstream area). The Project reached the philosophy – "the least water consumption and the least waste water discharge" that will give the smallest impacts to the environment. The Hybrid ACC is the one that can realize the philosophy and the goal of the Project. (b) The fuel is natural gas and the item (b) is not applicable for the Project. (c) During the construction stage, all mitigation measures are taken not to contaminate waters by using devices such as oil separator for oil/grease and septic tank for ordinary waste water. During the operation stage, all mitigation measures such as introduction of a treatment system are also taken to comply with the Iraqi standards before they are discharged to the river. Since a solid waste management facility (landfilling site) is proposed to be established, it may contaminate the groundwater. The site is a concrete pit with double containment to prevent the groundwater reaching to the contents in the site. The location of the site will be carefully selected after the detailed survey of the ground water level.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				An observation well will be established near the site to monitor the water quality of the ground water. The IFC guidelines* will be applied for the site management. * IFC guidelines: "Environmental, Health, and Safety Guidelines for waste management facilities (2007)".
	(3) Wastes	(a) Are wastes, (such as waste oils, and waste chemical agents), coal ash, and by-product gypsum from flue gas desulfurization generated by the power plant operations properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) Since there is no waste treatment system in Nasiryah and Thi Qar province, establishment of a solid waste management facility (landfilling site) within the plant is proposed. The site will be established under the IFC guidelines during the construction stage and will be used during the operation stage. The details of the site are described in the previous column ((2) – (c)). In addition to these details, the following points are noted. It is roofed to prevent scatter of dried sludge to outside. It has the depth of 3m and the dyke with 2m height. The height of the dyke is the same as the plant ground level not to be submerged by any flood. Regarding a risk of earthquake, since it is located within the plant site, the risk is low. The impacts induced by the industrial solid wastes are expected to be limited. The capacity of the facility is 25,000 m^3, and the facility is expected to be functional for ten years.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				All wastes are segregated and recycled to reduce their amount as much as possible. For example, waste oils are separated from contaminated water and are sent to a factory of Ministry of Oil to be recycled as miscellaneous oil such as brake oil as the existing Nasiryah Thermal Power Plant (Nasiryah TPP) has already applied.
2 Pollution Control	(4) Noise and Vibration	(a) Do noise and vibrations comply with the country's standards?	(a) Y	(a) The area is in an industrial area. A railway runs along the south side of the Project area. The noise and vibration are expected within the standards. During the construction stage, necessary mitigation measures are taken such as adequate management of heavy duty vehicles. During the operation stage, since the noise sources such as gas turbines are set in an insulation enclosure and a house、and steam turbine is set in a house, the noise level at the plant boundary is expected to be less than 70 dBA . Air cooling fans are constructed at least 50 m from the plant boundary to reduce their noise to the level of the standard (70 dBA). Regarding an impact to the residential area located at one (1) km from Nasiryah II (Thermal power plant 1 residential area: Figure 5-15) and cumulative impacts induced by the three

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				TPPs, assessments are not conducted because of the following reasons. The baseline data (Table 5-13 in the EIA report) were collected at two (2) sampling points and for one (1) day, which are not sufficient to know the current status of the noise level around the existing TPP. The exiting TPP sometimes stops or reduces its operation, which makes it difficult to understand how the noise comes from the plant. Although it is not expected that the noise from Nasiryah I does not affect the residential area (Nasiryah II is located between the two locations), detailed information on noise sources of Nasiryah I is not available. Regarding Nasiryah II, although the main source of the noise is expected to be the Hybrid ACC, magnitude of its noise level is not known at the present moment, the details of which needs to be obtained from producers.
	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	(a) Extraction of a large volume of groundwater will not be taken place in the Project.
	(6) Odor	(a) Are there any odor sources? Are adequate odor control measures taken?	(a) N	(a) There are no odor sources in the Project except for the odor from domestic wastes. The domestic wastes are

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				treated properly not to cause any odor.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The Project site is not within a protected area. A site selection was conducted to avoid protected areas including Important Bird Areas indicated by BirdLife International.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N (d) N (e) N	(a) The Project site is in an industrial area and a vicinity of Nasiryah City. (b) The Project site is in an industrial area and a vicinity of Nasiryah City. (c) No significant impact is expected because the site is in an industrial area and in a vicinity of Nasiryah City. (d) During the construction stage, the river ecosystem may be disturbed for a short period. Appropriate construction measures (e.g. short construction period, small construction area) are taken to minimize the impacts. During the operation stage, alternatives have been examined and the Hybrid ACC cooling system is selected to minimize the water volume taken from the river and discharge the minimum amount of waste water. Regarding cumulative impacts on the river water induced by

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(e) Is there a possibility that discharge of thermal effluents, intake of a large volume of cooling water or discharge of leachates will adversely affect the ecosystem of surrounding water areas?		the three TPPs, an assessment is not conducted because of the following reasons. The exiting TPP sometimes stops or reduces its operation because of its aging equipment and other factors such as cleaning steam turbine condensers, which makes it difficult to understand the amount of water taken from the river. MOE plans to improve its cooling system, which may change the amount of utilized water, but the detailed information of the improvement works is not available yet. Regarding Nasiryah I, there are two (2) stages are planned. At the first stage, the cooling system is planned to be closed cycle fin fan coolers, and at the second stage, C/Ts are used for steam turbines. Power generation style is simple cycle GT at the first stage, and CC at the second stage. The capacity of Nasiryah I will change accordingly, but its details are not decided yet. It means that factors for calculating the amount of water utilized by two TPPs are not yet clear. (e) The Hybrid ACC cooling system is selected to minimize the water volume taken from the river and discharge the minimum amount of waste water. The system does not release thermal effluent.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?(d) Are the compensations going to be paid prior to the resettlement?(e) Are the compensation policies prepared in document?(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?(g) Are agreements with the affected people obtained prior to resettlement?(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?(i) Are any plans developed to monitor the	(a)(b)(c)(d) (e)(f)(g)(h)(i) (j) N	(a)(b)(c)(d)(e)(f)(g)(h)(i)(j) During the site selection, a consideration was paid to avoid resettlement. In the Project site, neither inhabitants nor factories exist. No resettlement is expected.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		impacts of resettlement?(j) Is the grievance redress mechanism established?		
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is sufficient infrastructure (e.g., hospitals, schools, and roads) available for the project implementation? If the existing infrastructure is insufficient, are any plans developed to construct new infrastructure or improve the existing infrastructure? (c) Is there a possibility that large vehicles traffic for transportation of materials, such as raw materials and products will have impacts on traffic in the surrounding areas, impede the movement of inhabitants, and any cause risks to pedestrians? (d) Is there a possibility that diseases, including infectious diseases, such as HIV, will be brought due to the immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?	(a) N (b) Y (c) N (d) N (e) N	(a) The Project enhances the employment in Nasiryah City and its surrounding areas. (b) The Project site is located at outskirt of Nasiryah City and there is sufficient social infrastructure in the city. (c) Traffic of construction vehicles for transportation of materials are expected during the construction stage, and appropriate mitigation measures such as development of traffic control plan (scheduling) are taken. (d) The Project shall employ the local people, and there is not a big risk to receive infectious diseases from outside. However, prevention measures should be considered, and regular medical check-up and a basic health education to the workers at the beginning of their employment are conducted. During the construction stage, appropriate health care are taken at the construction camp. (e) The Hybrid ACC cooling system is selected to minimize the water volume taken from the river and discharge the minimum amount of waste water. The system does not release thermal effluent.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(e) Is there a possibility that the amount of water used (e.g., surface water, groundwater) and discharge of thermal effluents by the project will adversely affect existing water uses and uses of water areas (especially fishery)?		
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) During the site selection, a consideration was paid to avoid cultural heritages. At the Project site, no local cultural heritage exists. Regarding cultural heritage of international importance such as World Heritage site, Uru archeological site is located 16 km south of Nasiryah City. It is not expected to give impact to the Uru archeological site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) The Project site is next to Nasiryah TPP and it is not expected to give impact to the local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N (b) Not applicable	(a) The Project site is in "Shia Arab" region, and neither ethnic minorities nor indigenous peoples live around the Project site. Regarding the "Marsh Arab", they do not live in the vicinity of the Project site. (b) Not applicable.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) Y (c) Y (d) Y	(a) MOE has a safety and environment division in each of Distribution, Transmission and Generation Offices of its Headquarter (HQ), and they are in charge of safety and environmental issues. During the construction stage, a Project Team is established and the Project Manager Assistant (PM Assistant) is in charge of safety and environmental issues as one of his functions. During the operation stage, “Safety and Environment” team under General Manager of the plant takes care of the issues. All of these activities are conducted under the relevant laws as well as the applicable international guideline including the IFC EHS guidelines. (b) During the construction stage, the Project Manager will supervise an EPC contractor to maintain the working conditions. During the operation stage, the General Manager will supervise the “Safety and Environment” team to maintain the working conditions in the plant. (c) During the construction stage, the EPC will develop “Construction safety plan”, “Camp management plan” and “Traffic control plan” to ensure prevention of any accidents.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				During the operation stage, the “Safety and Environment” team will be in charge of formulation “Health and safety plan” and conducing trainings to the employees on the occupational health matters in the plant. (d) The construction site and plant will be fenced with comfortable height, so that the access or contact of the local people to the project site and the plant will be minimized. The General Manager of Nasiryah TPP has a good relationship with the local authorities and the tribal leaders of the area. At the 1st stakeholders’ meeting on 15 January 2012 and the 2nd stakeholders’ meeting on 23 February 2012, the willingness of the construction of Nasiryah II was expressed by the local leaders. Good relationship with the local people is expected to be maintained.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce the impacts? (c) If construction activities adversely affect the social	(a) Y (b) N (c) N	(a) Adequate mitigation measures will be taken during the construction stage as described in “Chapter 8: Environmental management plan” of the EIA report. (b) Since appropriate site selection was conducted, direct impacts on natural environment (ecosystem) were avoided. (c) Basically it is not expected to give adverse impacts to the social environment. However, the recruitment of the local

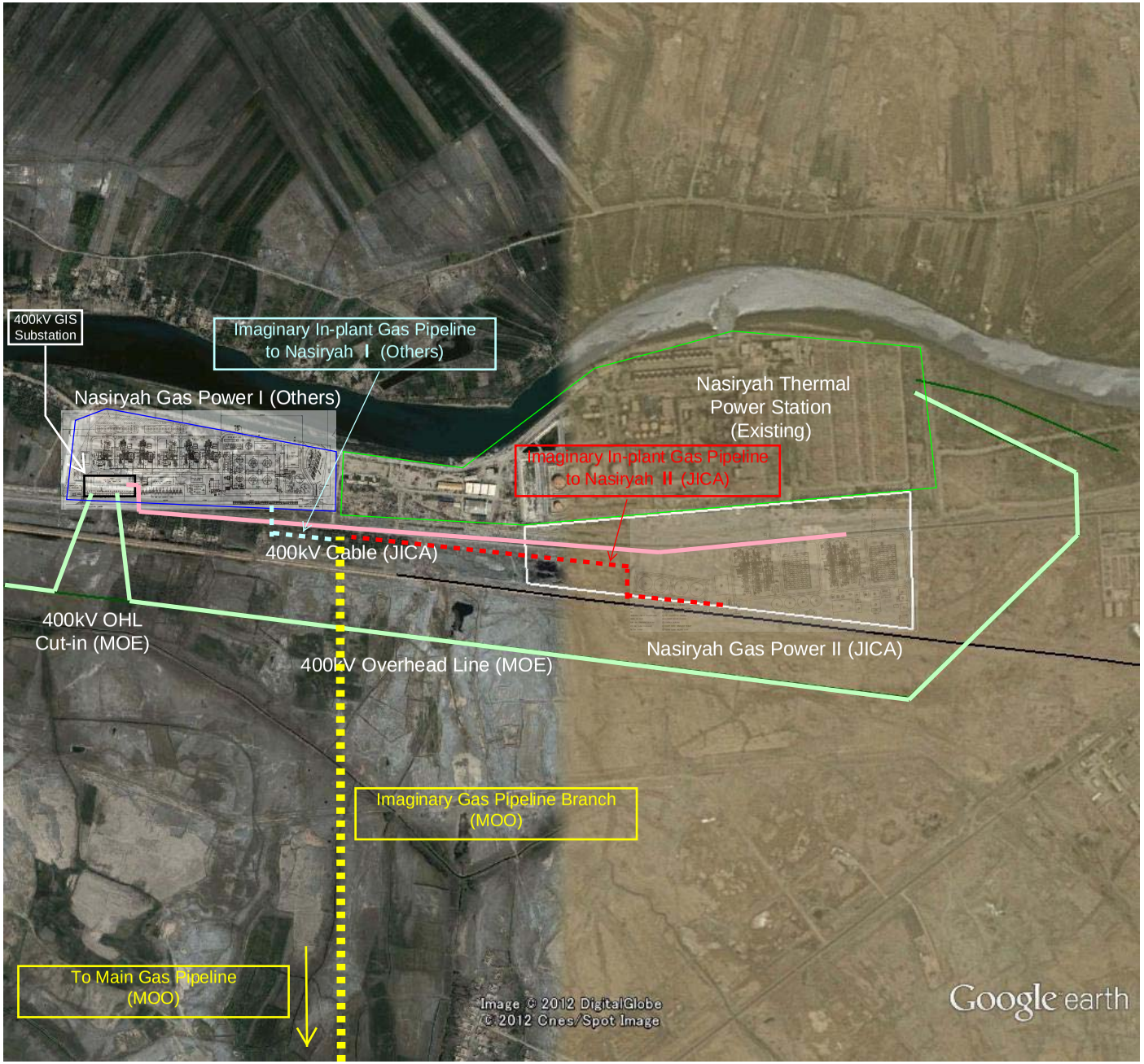
Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		environment, are adequate measures considered to reduce the impacts?		people may cause unnecessary social conflict, and the EPC contractor will formulate “Recruitment plan” to provide appropriate guidance to the local people.
	(2) Accident Prevention Measures	(a) In the case of coal-fired power plants, are adequate measures planned to prevent spontaneous combustion at the coal piles (e.g., sprinkler systems)?	(a) Not applicable	(a) The fuel is natural gas and the item is not applicable for the Project.
	(3) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) refer to the right column (c) Y (d) Y	(a) MOE will implement the monitoring on air, water, noise and vibration. (b) MOE will implement the monitoring according to the program described in “Chapter 8: Environmental management plan” of the EIA report. (c) MOE will have the “Safety and Environment” team under the General Manager. The team has about 10 staff including technician who is in charge of a laboratory. The budget is described in “Chapter 6: Formulation of Implementation of Program” of this report. (d) Reporting of results of monitoring to MOEN is currently not decided in details by the Law on Environmental Protection and Improvement. Nasiryah TPP has been compiling its monitoring results and reports to MOE HQ, and its “Safety and Environment” team has regular contact with the Provincial

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				Office of MOEN.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of electric transmission lines and/or electric distribution facilities). (b) Where necessary, pertinent items described in the Ports and Harbors checklist should also be checked (e.g., projects including construction of port and harbor facilities).	(a) Not applicable (b) Not applicable	(a) Power transmission lines and gas supply line are prepared for the other thermal power plant to be constructed next to Nasiryah TPP. Nasiryah II will use those facilities and the construction works for the transmission lines and gas pipelines to Nasiryah II are within the plant boundary.. Refer to the attached illustration which indicates assumed power transmission lines and gas pipeline connected to Nasiryah I and then to Nasiryah II. (b) There is not a plan to construct any port or harbor facilities for the construction of Nasiryah II.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, and global warming).	(a) Y	(a) Although CO_2 emission increases by the Project, the alternatives are examined to reduce its volume by utilizing Combined Cycle turbine and natural gas as its fuel while meeting the electricity demands of Iraq.

1) Regarding the term “Country’s Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are requested to be made.

In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.



Google earth

miles 1

km 2

Attachment - 17 Monitoring form (draft)

Monitoring form (draft)
During the construction stage
For Nasiryah II

1. Ambient air quality

Parameter	Monitoring points				Standards (Iraq)
	No.1	No.2	No.3	No.4	
PM_{10}					350μg/m^3/24hr
SO_2					0.1 ppm/hr
NO_2					0.04 ppm/hr
CO					35 ppm/hr

2. Water quality

(1) Effluent water quality

Item	Monitoring point No. 1	Standards*	
		Iraq	IFC
Water temperature		< 35	-
pH		6.5 – 9.5	6 – 9
Dissolved Oxygen (DO)		-	-
BOD5		< 40	-
COD		< 100	-
Suspended Solid (SS)		50	50
Oil and grease		-	10
Total residual chlorine		-	0.2
Chromium (Cr)		0.1	0.5
Copper (Cu)		0.2	0.5
Iron (Fe)		-	1.0
Zinc (Zn)		2.0	1.0
Lead (Pb)		0.1	0.5
Cadmium (Cd)		0.01	0.1
Mercury (Hg)		0.05	0.005
Arsenic (As)		0.05	0.5

* unit: mg/l except for temperature and pH

(2) Water quality of Euphrates River

Parameter	Unit	Monitoring points		Standards
		No.1	No.2	(Iraq)
Temperature	℃			-
SS	mg/l			-
pH	-			6.6 – 8.5
DO	mg/l			> 5
BOD	mg/l			< 3
COD	mg/l			-
Total Dissolved Solid (TDS)	mg/l			-
Cyanide CN^-	mg/l			0.02
Fluoride F^-	mg/l			0.2
Free Chlorine	mg/l			Trace
Chloride Cl^-	mg/l			200
Phenol	mg/l			0.005
Sulphate SO_4^{2-}	mg/l			200
Nitrate NO_3	mg/l			15
Phosphate PO_4	mg/l			0.4
Ammonium NH_4^+	mg/l			1
DDT	mg/l			nil
Lead (Pb)	mg/l			0.05
Arsenic (As)	mg/l			0.05
Copper (Cu)	mg/l			0.05
Nickel (Ni)	mg/l			0.1
Selenium (Se)	mg/l			0.01
Mercury (Hg)	mg/l			0.001
Cadmium (Cd)	mg/l			0.005
Zinc (Zn)	mg/l			0.5
Chromium (Cr)	mg/l			0.05
Aluminum (Al)	mg/l			0.1
Barium (Ba)	mg/l			1.0
Boron (B)	mg/l			1.0
Cobalt (Co)	mg/l			0.05

Monitoring form (draft)
During the construction stage
For Nasiryah II

Parameter	Unit	Monitoring points		Standards (Iraq)
		No.1	No.2	
Iron (Fe)	mg/l			0.3
Manganese (Mn)	mg/l			0.1
Silver (Ag)	mg/l			0.01
Oil and grease	mg/l			-

3. Noise

Item	Monitoring points			Standards (dBA)
	No.1	No.2	No.3	
Daytime (07:00 – 22:00)				70
Nighttime (22:00 – 07:00)				70

The standard is from "IFC: Environmental, Health, and Safety General Guidelines (2007)"

4. Vibration

Item	Monitoring points			Standards (ppv)
	No.1	No.2	No.3	
Daytime (07:00 – 22:00)				15
Nighttime (22:00 – 07:00)				15

The standard is from "British standard, BS 5228: part 4 (1992)". The standard can be equivalent to the unit of dB.

Monitoring form (draft)
During the operation stage
For Nasiryah II

1. Air quality

(1) Air emission

Parameter	Stacks		Standards (mg/Nm^3)	
	No.1	No.2	Iraq maximum limit	IFC
O_2			-	-
NOx			70 - 500	152 (or 72 ppm)
SO_2			500	-
CO			500	-
PM			250	NDA: 50 DA: 30

The monitoring will be conducted by Continuous Emission Monitoring System.

IFC: Environmental, Health, and Safety Guidelines THERMAL POWER PLANT (2007), and the standards are under "dry gas, excess O_2 content 15%". NDA: Non-degraded airshed, DA: degraded airshed.

(2) Ambient air quality

Parameter	Monitoring points							Standards (Iraq)
	No.1	No.2	No.3	No.4	No.5	No.6	No.7	
PM_{10}								$350\mu g/m^3/24hr$
SO_2								0.1 ppm/hr
NO_2								0.04 ppm/hr
CO								35 ppm/hr

2. Water quality

(1) Effluent water quality

Item	Monitoring point No. 1	Standards*	
		Iraq	IFC
Water temperature		< 35	-
pH		6.5 – 9.5	6 – 9

Dissolved Oxygen (DO)		-	-
BOD5		< 40	-
COD		< 100	-
Suspended Solid (SS)		50	50
Oil and grease		-	10
Total residual chlorine		-	0.2
Chromium (Cr)		0.1	0.5
Copper (Cu)		0.2	0.5
Iron (Fe)		-	1.0
Zinc (Zn)		2.0	1.0
Lead (Pb)		0.1	0.5
Cadmium (Cd)		0.01	0.1
Mercury (Hg)		0.05	0.005
Arsenic (As)		0.05	0.5

* unit: mg/l except for temperature and pH

(2) Water quality of Euphrates River

Parameter	Unit	Monitoring points		Standards
		No.1	No.2	(Iraq)
Temperature	°C			-
SS	mg/l			-
pH	-			6.6 – 8.5
DO	mg/l			> 5
BOD	mg/l			< 3
COD	mg/l			-
TDS	mg/l			-
Cyanide CN^-	mg/l			0.02
Fluoride F^-	mg/l			0.2
Free Chlorine	mg/l			Trace
Chloride Cl^-	mg/l			200
Phenol	mg/l			0.005
Sulphate SO_4^{2-}	mg/l			200
Nitrate NO_3	mg/l			15
Phosphate PO_4	mg/l			0.4

Monitoring form (draft)
During the operation stage
For Nasiryah II

Parameter	Unit	Monitoring points		Standards
		No.1	No.2	(Iraq)
Ammonium NH_4^+	mg/l			1
DDT	mg/l			nil
Lead (Pb)	mg/l			0.05
Arsenic (As)	mg/l			0.05
Copper (Cu)	mg/l			0.05
Nickel (Ni)	mg/l			0.1
Selenium (Se)	mg/l			0.01
Mercury (Hg)	mg/l			0.001
Cadmium (Cd)	mg/l			0.005
Zinc (Zn)	mg/l			0.5
Chromium (Cr)	mg/l			0.05
Aluminum (Al)	mg/l			0.1
Barium (Ba)	mg/l			1.0
Boron (B)	mg/l			1.0
Cobalt (Co)	mg/l			0.05
Iron (Fe)	mg/l			0.3
Manganese (Mn)	mg/l			0.1
Silver (Ag)	mg/l			0.01
Oil and grease	mg/l			-

(3) Water quality of the underground water near the landfilling site

Parameter	Unit	Monitoring points	Standards
		No.1	(Iraq)
Temperature	°C		-
SS	mg/l		-
pH	-		-
DO	mg/l		-
BOD	mg/l		-
COD	mg/l		-
Cyanide CN^-	mg/l		0.02
Fluoride F^-	mg/l		0.2
Free Chlorine	mg/l		Trace

Monitoring form (draft)
During the operation stage
For Nasiryah II

Parameter	Unit	Monitoring points No.1	Standards (Iraq)
Chloride Cl^-	mg/l		200
Phenol	mg/l		0.005
Sulphate SO_4^{2-}	mg/l		200
Nitrate NO_3	mg/l		15
Phosphate PO_4	mg/l		0.4
Ammonium NH_4^+	mg/l		1
DDT	mg/l		nil
Lead (Pb)	mg/l		0.05
Arsenic (As)	mg/l		0.05
Copper (Cu)	mg/l		0.05
Nickel (Ni)	mg/l		0.1
Selenium (Se)	mg/l		0.01
Mercury (Hg)	mg/l		0.001
Cadmium (Cd)	mg/l		0.005
Zinc (Zn)	mg/l		0.5
Chromium (Cr)	mg/l		0.05
Aluminum (Al)	mg/l		-
Barium (Ba)	mg/l		1.0
Boron (B)	mg/l		1.0
Cobalt (Co)	mg/l		0.05
Iron (Fe)	mg/l		-
Manganese (Mn)	mg/l		0.1
Silver (Ag)	mg/l		0.01
Oil and grease	mg/l		-

NOTE: The parameters are tentative. They need to be selected based on the types, quantities, and concentrations of constituents in wastes managed in the landfill; the mobility, stability, and persistence of waste constituents their reaction products in the unsaturated; the detectability of indicator parameters, waste constituents, and reaction products in ground water; the constituent concentrations in the groundwater background[2].

[2] IFC: Environmental, Health, and Safety Guidelines for Waste Management Facilities (2007)

Monitoring form (draft)
During the operation stage
For Nasiryah II

3. Noise

Item	Monitoring points			Standard (dBA)
	No.1	No.2	No.3	
Daytime (07:00 – 22:00)				70
Nighttime (22:00 – 07:00)				70

The standard is from "IFC: Environmental, Health, and Safety General Guidelines (2007)"

4. Vibration

Item	Monitoring points			Standard (ppv)
	No.1	No.2	No.3	
Daytime (07:00 – 22:00)				15
Nighttime (22:00 – 07:00)				15

The standard is from "British standard, BS 5228: part 4 (1992)". The standard can be equivalent to the unit of dB.

Terms of Reference (draft)
Nasiryah II

This Terms of Reference must be referred to as part of overall specification for the Consultant.

1. General

The Environmental Impact Assessment for Nasiryah II was conducted in 2011 – 2012. The EIA was prepared by assessing the environmental and social impacts induced by the Nasiryah II project.

The Consultant is required to review the specification and comply with the requirements contained therein.

2. Environment, health and safety (EHS) in general

The Consultant shall guarantee that the expected impacts described in the EIA report should be mitigated particularly on the social related issues: employees' recruitment, EHS in the construction site, EHS at camp and traffic safety during the construction stage.

3. Ambient air quality

The Consultant shall guarantee that the ambient air quality level to be observed under the Iraqi standards at the project boundary and the vicinity of the road used for the construction activities (especially junction points of other roads where traffic congestions are expected) during the construction stage.

The Consultant shall guarantee that the ambient air quality level to be observed under the Iraqi standards at the plant boundary and the vicinity of the plant especially junction points of other roads where traffic congestions are expected during the operation stage.

4. Effluent air quality

Nasiryah II shall be designed firing Natural Gas only. The Consultant shall guarantee that the effluent air quality level to be observed at the Iraqi and the international (IFC[3]) standards during the construction and operation stages.

5. Effluent water quality

The Consultant shall guarantee that the effluent water from the construction site shall meet the

[3] International Finance corporation (IFC): Environmental, Health, and Safety Guidelines THERMAL POWER PLANT (2007)

requirements of the Iraqi and the international[4] standards during the construction stage.

The Consultant shall guarantee that the effluent water from the plant shall meet the requirements of the Iraqi and the international[5] standards during the operation stage.

6. Noise

The Consultant shall guarantee that the noise level shall not exceed 70 dBA[6] at the construction boundary all the time during the construction and operation stages.

7. Vibration

The Consultant shall guarantee that the vibration level shall not exceed 15 ppv[7] (peak particle velocity in mm/s, or equivalent in the unit of dB) at the construction boundary during the construction and the operation stages.

8. Waste management

The Consultant shall guarantee that all the construction wastes including domestic waste at the construction camp are properly segregated and managed under Waste management plan[9].

9. Monitoring

The Consultants shall monitor ambient air quality, effluent air quality, effluent water quality, river water quality, noise and vibration complying with the contents of the EIA report.

[4] IFC: Environmental, Health, and Safety Guidelines THERMAL POWER PLANT (2007)
[5] IFC: Environmental, Health, and Safety Guidelines THERMAL POWER PLANT (2007)
[6] IFC: Environmental, Health, and Safety General Guidelines (2007)
[7] British standard, BS 5228: part 4 (1992)
[9] It should be managed under "IFC: Environmental, Health, and Safety Guidelines for Waste Management Facilities (2007)".

Attachment - 18　TOR for surveys on air emission and noise (draft)

Terms of Reference (draft)
Surveys on Air emission and Noise
Nasiryah II

This Terms of Reference must be referred to as part of overall specification for the Consultant.

General

The Environmental Impact Assessment for Nasiryah II was conducted in 2011 – 2012. The EIA was prepared by assessing the environmental and social impacts induced by the Nasiryah II project.

The Consultant is required to review the specification and comply with the requirements contained therein.

AIR EMISSION

1. Background

Regarding cumulative impacts induced by the three TPPs (existing Nasiryah TPP, Nasiryah I and II), an assessment is not conducted in the EIA Study because of the following reasons.

The baseline data (Table 5-10 and 5-11 in the EIA report) were collected at two (2) sampling points and for one (1) day, which are not sufficient to know the current status of the ambient air quality around the existing TPP. The exiting TPP sometimes stops or reduces its operation because of its aging equipment and other factors such as cleaning steam turbine condensers, which makes it difficult to understand how the air effluents actually emit from the plant. Since detailed information of Nasiryah I is not available, it is not practical to conduct a simulation. Regarding Nasiryah II, as described in the previous lines, a simple simulation is conducted as a preliminary one to identify whether any significant impacts are expected.

2. Collection of data on the weather conditions

The Consultant shall collect data on the weather conditions, namely the existing Nasiryah TPP, Nasiryah I and II. The weather conditions include air temperature, relative humidity, rainfall, wind velocity and direction for one year. This exercise is for conducting a simulation of air effluents from the three thermal power plants (TPPs)

3. Baseline data and operational status of the existing Nasiryah TPP

The Consultant shall collect baseline data on the ambient air quality around the existing Nasiryah TPP. The Consultant shall obtain the information on the accurate operational status

of the existing Nasiryah TPP to validate the relationship between the above-mentioned data on the ambient air quality and the operational status.

4. Nasiryah I

The Consultant shall collect information on the specification of Nasiryah I in order to conduct simulation of air effluents from Nasiryah I.

5. Cumulative impacts

The Consultant shall conduct a simulation on air effluents from the three TPPs and assess the induced impacts on the environments. The Consultant shall propose mitigation measures if the impacts are significant.

NOISE

1. Background

Regarding an impact to the residential area located at one (1) km from Nasiryah II (Thermal power plant 1 residential area: Figure 5-15 in the EIA report) and cumulative impacts induced by the three TPPs, assessments are not conducted because of the following reasons.

The baseline data (Table 5-13 in the EIA report) were collected at two (2) sampling points and for one (1) day, which are not sufficient to know the current status of the noise level around the existing TPP. The exiting TPP sometimes stops or reduces its operation, which makes it difficult to understand how the noise comes from the plant. Although it is expected that noise from Nasiryah I does not affect the residential area (Nasiryah II is located between the two locations), detailed information on noise sources of Nasiryah I is not available. Regarding Nasiryah II, although the main source of the noise is expected to be the Hybrid air cooled condenser (ACC), magnitude of its noise level is not known at the present moment, the details of which needs to be obtained from producers.

2. Baseline data and operational status of the existing Nasiryah TPP

The Consultant shall collect baseline data on the noise level around the existing Nasiryah TPP. Since weather conditions may affect noise diffusion, the weather conditions (i.e. air temperature, relative humidity, rainfall, wind velocity and direction) are simultaneously collected. The Consultant shall obtain the information on the accurate operational status of the existing Nasiryah TPP to validate the relationship between the above-mentioned data on the noise level and the operational status.

3. Nasiryah I

The Consultant shall collect information on the specification of Nasiryah I especially on noise sources in order to assess impacts induced by Nasiryah I.

4. Specification of Hybrid ACC

The Consultant shall collect information on the specification Hybrid ACC from producers to assess impacts the Hybrid ACC of Nasiryah II.

5. Cumulative impacts

The Consultant shall conduct a simulation on noise diffusion from the three TPPs and assess the induced impacts on the environments especially on Thermal power plant 1 residential area. It is important the noise level at the residential area should be 55 dBA (07:00 – 22:00) and 45 dBA (22:00 – 07:00)[1]. The Consultant shall propose mitigation measures if the above-mentioned standard can not be observed.

[1] International Finance Corporation: Environmental, Health, and Safety General Guidelines (2007)